Chapter 4

Cyrus Brame/USFWS

Bald eagle nest tree

Management Direction and Implementation

4.1 Introduction

4.2 Overview of Refuge Management Direction

4.3 General Refuge Management

4.4 Goals, Objectives, and Strategies

4.1 Introduction

This chapter begins with a description of refuge goals, objectives, and strategies, and provides an overview of management direction. We present those actions that are required by law or regulation, have been previously approved, or that help to achieve multiple refuge goals. We also identify decisions we are not making at this time and that will require additional NEPA analysis before a final decision can be made. We conclude with details on our goals, objectives, and strategies for managing the refuge. The array of management actions described are those that, in our professional judgment, will best achieve the refuge's purposes, vision, goals, and best respond to public issues.

4.1.1 Relating Goals, Objectives, and Strategies

Goals

Refuge goals are intentionally broad, descriptive statements of the desired future condition of refuge resources. They articulate the principal elements of the refuge purposes and our vision statement, and provide a foundation for developing specific management objectives and strategies. By design, they are less quantitative, and more prescriptive, in defining the target of our management. As noted in chapter 1, developing a strategic plan to achieve refuge goals is the purpose for developing the CCP.

Objectives

The objectives we developed are incremental steps toward achieving a goal. Objectives further define management targets in measurable terms. They provide the basis for determining more detailed strategies, monitoring refuge accomplishments, and evaluating successes. We followed guidance in "Writing Refuge Management Goals and Objectives: A Handbook" (USFWS 2004b) for writing "SMART" objectives that possess five characteristics:

- Specific.
- Measurable.
- Achievable.
- Results-oriented.
- Time-fixed.

A rationale accompanies each objective to explain its context and why we think it is important. We will use the objectives to develop or revise refuge step-down plans, described later in this chapter. We will measure our successes by how well we achieve the objectives. Unless otherwise noted, the objectives and strategies will be implemented by refuge staff.

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

Inventory and Monitoring Activities
For most objectives, we also identify inventory and monitoring activities that will help us measure our success toward meeting refuge goals and objectives. The activities listed may be further refined in the refuge's inventory and monitoring plan.

4.2 Overview of Refuge Management Direction

It is important here to re-emphasize that CCPs provide long-term guidance for management decisions through goals, objectives, and strategies. They represent our best estimate of future needs. This CCP details program levels and activities that are above current budget allocations and, as such, should be viewed as strategic in nature. Congress determines our budgets annually, which are then distributed through our Washington and regional offices before arriving at field stations. Final CCPs do not constitute a Service commitment for staffing increases or funding for operations, maintenance, or future land acquisition. Implementation must be adjusted annually given the reality of budgets, staffing, and unforeseen critical priorities.

Over the life of this plan, we will manage the existing pine-dominated forest in a manner to allow it to transition to a mature pine savanna habitat with an open midstory and understory. We will reduce the density of trees in the pine-dominated forest by mechanical thinning and prescribed burning, which will promote the growth of larger and healthier pine trees, and help establish and maintain this habitat at a high quality for the benefit of priority refuge species, such as the brown-headed nuthatch and Chuck-will's-widow. We will experimentally plant longleaf pine seedlings and saplings and monitor their progress.

We will continue to protect the biological integrity, diversity, and environmental health of the existing moist hardwood forest, floodplain forest, freshwater marsh and shrub swamp, and aquatic habitats at their current acreages. Their locations will remain the same, and we will not undertake any new management activities in these habitats. However, we will increase monitoring and control of invasive species in these areas. We will conduct baseline inventories and long-term monitoring of priority refuge species and invasive species. We will

investigate the hydrologic flow between the wetlands in the southwestern portion of the refuge and Powell Creek.

To help stabilize the 3 miles of erosional bluff, we will consider employing erosion control techniques, such as planting bald cypress to break up wave action, and formally monitor erosion rates and bank loss, to help stabilize bluffs, reduce erosion, and benefit priority refuge species, such as the bank swallow. Because this habitat is also important to protecting bald eagles, we will use the spring and summer bald eagle surveys as an additional time to evaluate the condition of the shoreline.

We will continue to mow the existing 13 acres of non-forested upland for administrative purposes. We will convert 2 acres of pine-dominated forest around the weather station to non-forested upland to prevent interference of the signal transmission in the future.

We will conduct expanded cultural resources activities. We will conduct fieldwork to better understand the location of archaeological sites, to help prevent against adverse impacts from activities related to the pine-dominated forest transition, as well as to protect those resources located in the other refuge habitat areas. We will implement recommendations in the Archaeological Overview (Goode et al. 2009).

We will gradually expand the number and diversity of public use opportunities on the refuge available for a broad range of audiences. Although some improvements to existing visitor support facilities can be accomplished within 5 years of CCP approval, the majority of the following proposed expansions of existing public uses and opening the refuge to new uses require completion of additional planning documents and NEPA review. We will accommodate public deer hunting on the refuge for 1,460 hunter use days annually, allowing for an increased hunt participation overall. In addition, we will open the refuge to turkey hunting, offering up to 1,200 hunter use days annually, most of which will be in conjunction with the deer hunt. We will also promote youth involvement in hunting by providing youth hunt opportunities for deer, turkey, and waterfowl. We will open the refuge to fishing at two designated locations. We will designate one area to support regular use by refuge visitors interested self-guided and organized wildlife observation, photography, environmental education, and interpretation opportunities between sunrise and sunset throughout the year; no permit will be required for visitors participating in these wildlife-dependent uses in the designated public use areas after approval of a VSP and completion of infrastructure improvements.

Because James River NWR is considered by the Service to be an urban refuge, we anticipate that interest in the refuge and annual visitation will increase in the future. To support this, we will enhance

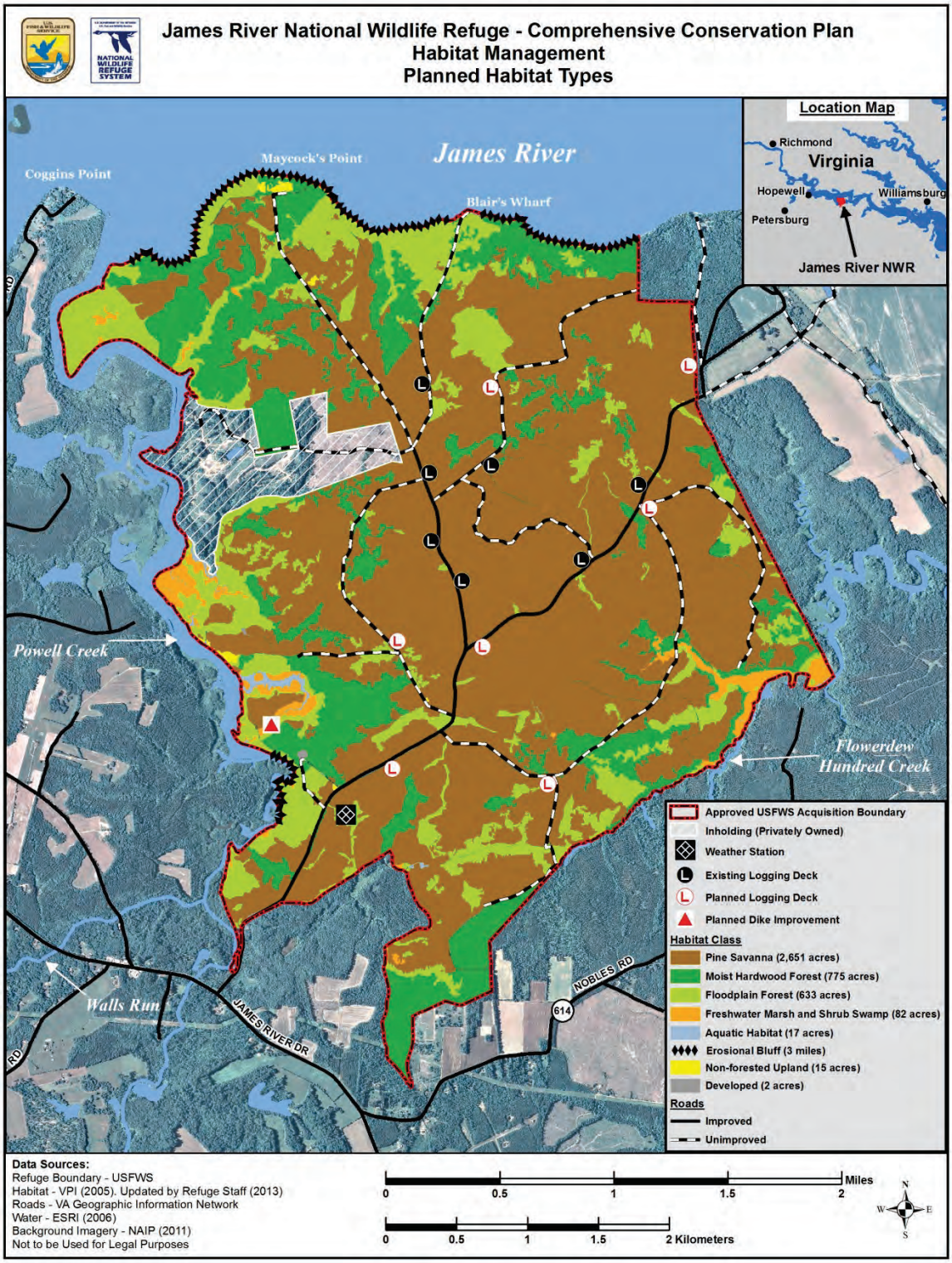
on-refuge infrastructure to support those increases, including an expanded and improved trail system, improved roads, and designated public use parking areas. We will further support increased visitors through our partnerships with a variety of entities outside of the Service, which we will develop further to support the refuge's purpose, provide research support, and meet the refuge's goals and objectives for resource management.

Planned habitat conditions and public use focus areas are depicted in maps 4.1 through 4.3.

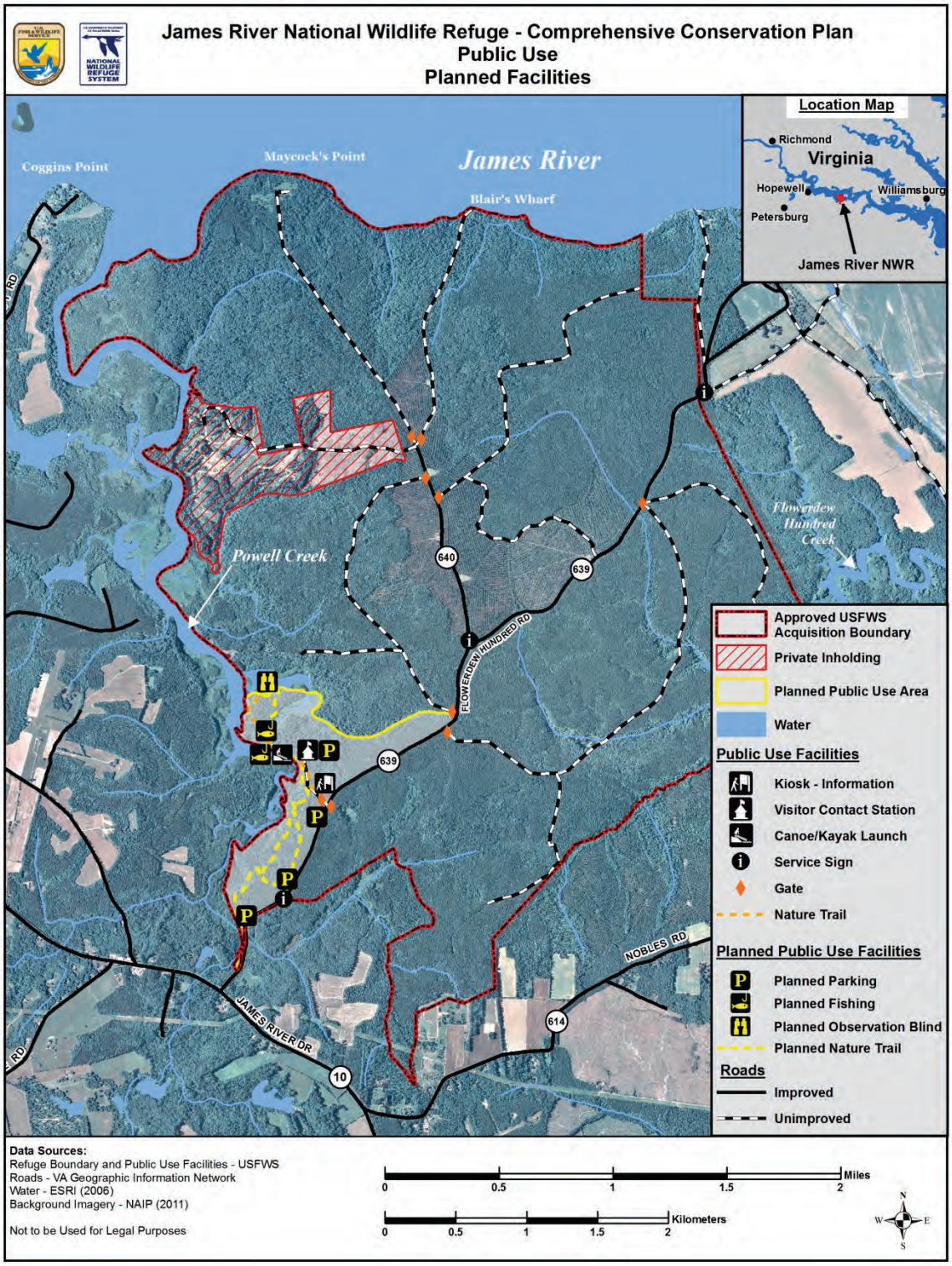
Rebekah Wilson/VDCR

Fire crew partnership: The Nature Conservancy, Burrowsville Volunteer Fire Department, Virginia Department of Conservation and Recreation, National Park Service, and U.S. Fish and Wildlife Service

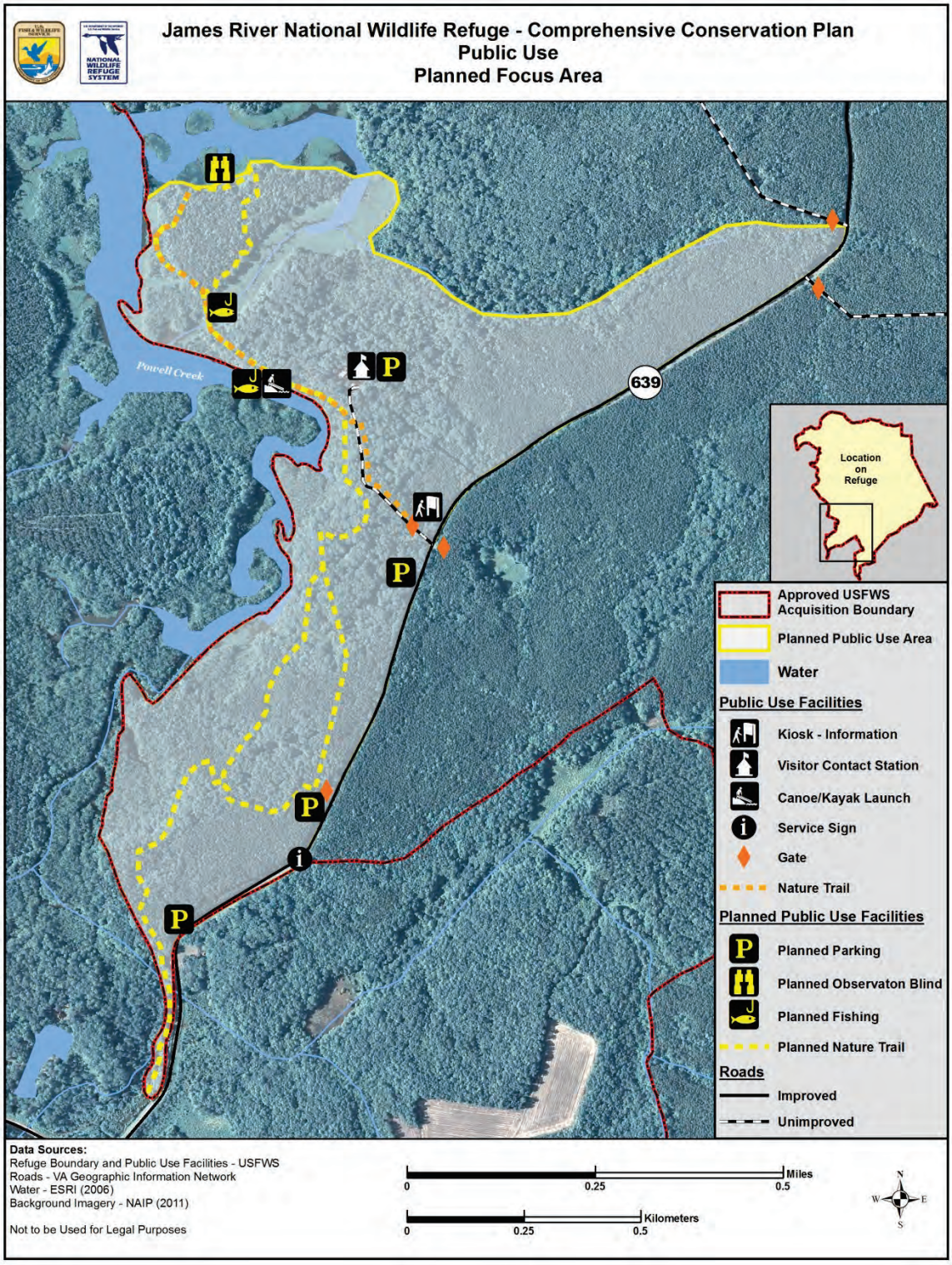
Map 4.1 Planned Habitat Management at James River NWR



Map 4.2 Planned Public Use Facilities at James River NWR



Map 4.3 Planned Public Use Focus Area at James River NWR



4.3 General Refuge Management

Some action we propose to take in managing James River NWR over the next 15 years are required by law or policy, or represent actions that have undergone previous NEPA analysis, public review, agency review, and approval. Others may be administrative actions that do not require public review, but are those that we want to highlight in this public document.

Certain current practices and policies will continue, as discussed in more detail below, related to the following topics:

- Refuge staffing and administration.
- Species and habitat conservation.
- Cultural resources management.
- Visitor services management.
- Findings of appropriateness and compatibility determinations.
- Refuge revenue sharing payments.
- Special designation areas.
- Additional NEPA analysis.

4.3.1 Refuge Staffing and Administration

Refuge Staff

Continue to share staff across the Eastern Virginia Rivers NWR Complex, including the three new positions: visitor services specialist, refuge biological science technician, and maintenance worker (appendix C, USFWS 2007c, USFWS 2012c).

Discussion and Rationale

In 2000, a decision was made by the Service to administratively group James River NWR with Rappahannock River Valley and Presquile NWRs to form the Eastern Virginia Rivers NWR Complex. In 2003, Plum Tree Island NWR joined the refuge complex. The intent of administratively grouping these refuges was to create management efficiencies, to the maximum extent possible, due to declining budgets. The refuge manager for the refuge complex is responsible for setting staff priorities and resource distribution across the four refuges.

In 2007, our Regional Directorate completed 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. The goal of the plan is a maximum of 75 percent of a refuge station budget to cover salaries and fixed costs, while the remaining 25 percent or more would be operating and maintenance funds. An analysis of refuge

staffing using the National Staffing Model resulted in a proposed increase of three staff, with shared responsibilities among the four refuges in the refuge complex (USFWS 2007c). Increasing refuge complex staff by three would help support management on James River NWR, including increased visitor services opportunities and management of the natural and built resources on the refuge. The three new positions would be allocated across each of the four refuges as needed to ensure efficient operation and management throughout the refuge complex.

Our strategy is to improve the capability of each refuge manager to do the highest priority work, and not to have most of a refuge budget tied up in inflexible fixed costs. This strategy was successful for a few fiscal years; however, we now anticipate a level or declining budget environment, which will affect our flexibility in managing financial resources and may have implications for the level of permanent staffing. A new round of workforce planning began in 2013 in response to the Federal Government's sequestration directive and anticipated future budget reductions.

Requiring a Permit for Refuge Access
Continue to require a permit for refuge access not associated with refuge-sponsored programs or planned activities.

Discussion and Rationale
Since refuge establishment, the refuge has been closed to general public access. Only those visitors who participate in the refuge's deer hunts or made advanced reservations to participate in a refuge program, partner-sponsored event, or conduct a visit are allowed access to the refuge. People interested in visiting the refuge outside of refuge-or partner-sponsored programs are required to request permission to access the refuge at least three business days in advance of their visit. If the request is determined to be compatible and is granted, refuge staff issue a SUP that visitors are required to carry a copy of while on the refuge. Requiring permission to visit the refuge has worked well because it:

- Proactively prevents incompatible or unauthorized uses from occurring on the refuge.
- Minimizes wildlife disturbance on the refuge by stipulating in the permit that access is in designated areas only.
- Minimizes cultural resource disturbances by requiring people to stay in designated areas.
- Enhances safety for the children that are participating in the environmental education programs offered year-round.
- Allows for stricter monitoring of who is on the refuge and why.

- Minimizes conflicts between user groups (e.g., bird watchers and deer hunters) for safety purposes and supports high quality experiences.
- Protects the visitor experience of being immersed in nature in a secluded and remote area.
- Provides a mechanism for law enforcement to prevent people from beaching their boat on the fragile shoreline and engaging in other unauthorized uses.

This practice will continue until a VSP is approved and signage and visitor support facility improvements are completed. Improvements of the existing 0.5-mile trail, parking, restroom, and development of the refuge's VSP are needed prior to relaxing the refuge's permit requirement for wildlife observation, photography, environmental education, interpretation, and fishing in the designated public use area. As discussed in the "Refuge Step-down Plans" section below, we will complete the signage installation, facility improvements, and VSP within 5 years of CCP approval. If the VSP includes proposals for modifying existing visitor service facilities and/or additional visitor service improvements, additional NEPA and approvals may be necessary prior to implementing those actions. We anticipate that NEPA analysis and implementation of facility improvements or other improvements needed to support appropriate and compatible uses on the refuge will be completed 5 to 10 years after CCP approval.

Permit availability (i.e., the number of permits issued) is not a concern and is not predicted to become a major concern over the next 5 years. Very few permit requests are denied annually and are denied in accordance with Service policy (603 FW 2).

Additional details about this permit requirement are provided in the compatibility determination for "Wildlife Observation, Photography, Environmental Education, and Interpretation" in appendix B.

Refuge Step-down Plans

Continue to complete refuge step-down plans according to the identified schedule. The habitat management plan, inventory and monitoring plan, and visitor services plan are priorities for completion.

Discussion and Rationale

The Service uses CCPs to detail the "what, why, and how" of refuge management priorities that would be explored further in step-down plans, which detail the "how, where, and when" we would accomplish the refuge's goals and objectives. Step-down plans will be prepared in accordance with Service guidance, handbooks, and this CCP. As discussed in chapter 1, we have completed some step-down plans for the refuge. We would develop new plans and revise existing plans once the final CCP is approved. The following three step-down plans are a

priority for completion on James River NWR. Under each description, we identify a timeline for their completion.

Habitat Management Plan: A HMP for the refuge is the requisite first step to achieving the objectives of the biological goals, goals 1 and 2 (USFWS 2013c). We will complete a HMP within 5 years of CCP approval. The HMP will provide more details on the habitat management strategies we will use to accomplish CCP goals and objectives over the next 15 years. In particular, the HMP will detail the specific areas and habitat types we will manage for, as well as the tools and techniques we will use and the timing of our management actions. Additional analysis of the impacts of specific methods may be necessary to fulfill our responsibilities under NEPA. The HMP will also incorporate the results of appendix A, which identifies how we derived priority refuge species and habitats for the refuge. We will not prepare a separate Forest Management Plan because the HMP will serve the same purpose for this refuge.

The goals, objectives, and strategies in this CCP identify how we intend to manage habitats on the refuge. Both the CCP and HMP are based on current resource information, published research, and our own field experiences. Our methods, timing, and techniques will be updated as new, credible information becomes available. To facilitate our management, we will regularly maintain our databases, including Geographic Information Systems data, documenting any major vegetation changes on at least a 5-year basis.

Inventory and Monitoring Plan: The IMP will outline and prioritize inventorying and monitoring activities for the refuge based on the priorities identified in this CCP and detailed in the HMP. The IMP will be completed within 5 years of completing the HMP. We will use our inventory and monitoring program to assess whether our original assumptions and proposed management actions are supporting the refuge's habitat and species objectives, as well as Service priorities at the regional, flyway, and landscape scales. 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. The IMP will incorporate recommendations from the "Strategic Plan for Inventories and Monitoring on National Wildlife Refuges: Adapting to Environmental Change" (USFWS 2010a) to ensure a coordinated approach to inventory and monitoring across refuges.

Visitor Services Plan: A VSP is required by Service policy (605 FW 1, Section 1.8.A) and, along with the HMP, is among the highest priority step-down plans for all refuges (USFWS 2013c). Exhibit 1 of that policy includes an outline for the plan. The VSP will further detail strategies to help meet the visitor services goals and objectives contained in this CCP over the next 15 years, including finding ways to

increase the understanding and appreciation for fish and wildlife conservation by urban audiences (*http://americaswildlife.org/wp-content/uploads/2012/04/Recommendation-131.pdf*; accessed September 2013). We will complete a VSP within 5 years of CCP approval. If the VSP includes proposals for modifying existing visitor service facilities and/or additional visitor service improvements, additional NEPA and approvals may be necessary prior to implementing those actions. We anticipate that NEPA analysis and implementation of facility improvements or other improvements needed to support appropriate and compatible uses on the refuge would be completed 5 to 10 years after CCP approval.

Known and Potentially Hazardous Materials
Conduct an ecological risk assessment at former skeet range.

Discussion and Rationale
As discussed in section 3.10.4, a 25-acre skeet range exists on present-day refuge land and refuge staff are working with our Ecological Services Virginia Field Office to assess the extent and nature of the contamination associated with the former skeet range. The site characterization will consist of conducting a field reconnaissance, designing a sampling plan (i.e., surficial soil samples collected either through a sampling grid or transect design), implementing this plan, and comparing analytical results to ecological soil screening levels for contaminants to evaluate potential risk to ecological receptors. If ecological risk is confirmed, remedies to mitigate this risk will be evaluated.

The primary constituent of concern associated with the former skeet range is from the lead shot. Firing of lead shot can create lead dust, which can be carried off site by either wind or water erosion. The heat of firing projectiles can also atomize lead into vapor, which can precipitate or condense on soil particles at the firing line. The normal operation of a range can produce lead concentrations of several percent (1 percent = 10,000 ppm) in soils located behind and adjacent to targets and impact areas within the range.

Lead is a particularly hazardous element for fish and wildlife resources. The ecological and toxicological aspects of lead in the environment have been extensively studied and reported in the scientific literature (Eisler 1988). Lead concentrates in organic-rich soils and may be mobilized through exposure to acidic rainwater and groundwater (USEPA 2001). Lead is neither essential nor beneficial to living organisms, and measured effects to biota are adverse (Eisler 1988). It is toxic in most of its chemical forms. In plants, excessive lead levels can cause growth inhibition, as well as reduced photosynthesis, mitosis, and water absorption (Demayo et al. 1982). In animals, lead is a nonspecific toxicant at the molecular level and inhibits the activities of many enzymes necessary for normal biological functions (Pattee

and Pain 2003). Mortality, neurological dysfunctions, immune suppression, and reproductive impairment are documented effects of lead exposure in birds (Kendall et al. 1996). Lead can be incorporated into the body by inhalation, ingestion, dermal absorption, and placental transfer to the fetus. An accumulative metabolic poison, lead affects behavior as well as the vascular, nervous, renal, and reproductive systems. Lead is known to be fetotoxic and teratogenic. Ingestion of lead-contaminated soil and prey are principal pathways for wildlife exposure (Kendall et al. 1996, Pattee and Pain 2003). Lethal or sublethal effects depend on lead absorption and distribution within the body and other factors including age, sex, environment, and diet (Pattee and Pain 2003).

Facilities Maintenance

Continue to address the refuge's maintenance backlog of high priority maintenance and construction projects.

Discussion and Rationale

Periodic maintenance and renovation of existing facilities will continue to ensure safety and accessibility for staff and visitors. The refuge's existing facilities are described in chapter 3. Construction and maintenance projects currently listed in the RONS and SAMMS databases would be undertaken in accordance with the regional and refuge rankings for each project (see appendix D).

As we undertake these projects, the refuge will consult with other Federal, State, and local government agencies with jurisdiction and authority to ensure that activities are consistent, to the maximum extent practicable. We will conduct further consultations, as warranted, to ensure compliance with Federal laws such as the NHPA and the ESA. We will also work to ensure consistency, to the maximum extent practicable, with the enforceable policies of the Virginia Coastal Management Program in compliance with the Coastal Zone Management Act of 1972 (see appendix F); to acquire required permits prior to commencing with projects; and to ensure that the Service and its agents use appropriate and required mitigation measures if required during project implementation.

The Council on Environmental Quality guidelines for implementing NEPA also require examining energy requirements and conservation potential in environmental documents. We will meet these guidelines by incorporating principles of sustainability in the design, construction, and operation of existing and new facilities constructed on the refuge.

Rights-of-way Easements

Continue to coordinate with right-of-way easement holders regarding maintenance activities.

Discussion and Rationale
While purchasing land to complete the refuge boundary, the Service has acquired land with reserved rights, rights-of-way, leases, and other agreements. Currently there are three easements for electricity and power service on lands now included within the refuge. The refuge will follow policy guidance when any of these reserved rights are exercised. Specifically we follow 50 CFR 29.21-9, as well as ensure compliance under the refuge compatibility policy (603 FW 2) and biological integrity, diversity and environmental health policy (601 FW 3). Depending on the location and the extent of disturbance required to exercise reserved rights on refuge lands, other laws may apply. In general, the refuge will coordinate with all private parties exercising their rights to ensure the protection of refuge resources. The refuge will issue SUPs as necessary to manage these uses and to ensure that impacts to refuge resources are as minimal as possible.

4.3.2 Species and Habitat Conservation

Protecting Federally Listed and Recently De-listed Species
Continue to protect and enhance bald eagle nesting and roosting habitat throughout the refuge forests by protecting active bald eagle nests (independent of habitat type), as well as providing and maintaining communal nocturnal roost and feeding habitat in a condition capable of supporting a minimum of 150 bald eagles.

Protect and enhance existing habitat throughout the refuge for federally listed species found to exist on the refuge.

Discussion and Rationale
The bald eagle was removed from the Federal list of threatened and endangered species in 2007 and removed from the State list in 2013. However, the bald eagle continues to be protected federally under BGEPA and the MBTA. We will continue to protect nesting bald eagles and their habitat on the refuge because their protection was the primary purpose for establishing the refuge. There are currently five nesting bald eagle pairs on the refuge, and we will continue to monitor the nests and breeding activities and prohibit the public from disturbing them.

We will continue to protect federally listed and recently de-listed species as follows:

- Bald eagles:
  - Protecting and enhancing the active nests on the refuge, while improving the habitat to a condition that will support additional nesting pairs.
  - Protecting and enhancing the existing nocturnal roost and feeding roost habitat on the refuge, while improving the habitat to a condition that will support additional roost areas.

- ❖ Continually identifying, protecting, and enhancing potential nest and roost trees to ensure that high quality habitat will continue to exist within the refuge.

- Sensitive joint-vetch and small whorled pogonia:
  - ❖ In cooperation with the VDCR Natural Heritage Program, continue to survey for these species. If located, we will work with the respective species' recovery lead and other experts to develop plans to protect them.

Adaptive Management
Continue to employ an adaptive management approach for improving our resource decisions and management.

Discussion and Rationale
We will employ an adaptive management approach for improving resource management by better understanding ecological systems through iterative learning.

The Department of the Interior's technical guidebook to assist managers and practitioners in adaptive management provides the following definition for adaptive management (U.S. Department of the Interior 2009):

> *Adaptive management is a decision process that promotes flexible decisionmaking 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, increases 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 continuous learning. This approach recognized that we can never achieve perfect understanding of the natural world and that we must implement management in the face of uncertainty. At the refuge level, adaptive management is an integral part of management planning, research design, and monitoring. Uncertainties about ecological systems are addressed through targeted monitoring of resource response to management

actions and predictive models that mimic the function of the natural world.

Adaptive management gives the refuge manager flexibility to adjust management action or strategies if they do not meet goals or objectives. Significant changes from what we present in this CCP may warrant additional NEPA analysis and public comment. Minor changes from what we present in this CCP may not warrant additional NEPA analysis and public comment, but we would document them in our project evaluation, annual reports, or 5-year reviews, as appropriate. Implementing an adaptive management approach supports all refuge goals. Furthermore, adaptive management is all the more compelling in light of climate change concerns.

Climate Change
Continue to address climate change by maintaining and restoring healthy, connected, and genetically diverse wildlife populations and ecological communities, monitoring conditions over the long-term; promoting energy efficient practices; and promoting other carbon reduction activities.

Discussion and Rationale
Climate Change: There is consensus among the scientific community that global climate change, occurring in part as a result of emissions of carbon dioxide and other greenhouse gases from human activities, will lead to significant impacts across the U.S. and the world (Joint Science Academies 2005). The effect of climate change on wildlife and habitats is expected to be variable and species-specific, with a predicted general trend of species ranges and vegetation communities shifting northward and higher in elevation.

Uncertainty about the future effects of climate change requires refuge managers to use adaptive management to maintain healthy ecosystems in light of unpredictability (Inkley et al. 2004). This involves improving or adjusting policies and practices based on the outcomes of monitoring or management activities and may result in changes to regulations, shifts in active habitat management, or changes in management objectives. A few recommendations include:

- Prepare for diverse and extreme weather conditions (e.g., drought and flood).
- Maintain or restore healthy, connected, and genetically diverse wildlife populations to increase resiliency in wildlife and habitats.
- Employ monitoring and adaptive management. (see Inkley et al. 2004 for more recommendations).

James River NWR may play an important role in monitoring and predicting the effects of global climate change. At the refuge level, it

will be increasingly important to understand how the refuge and its habitats and communities respond to potential changes such as habitat shifts, changes in temperature, changes in waterway salinity, and storm intensification.

In forests, climate change will likely result in shifts in forest composition and structure (Iverson and Prasad 1998) that will greatly change the availability of habitat for many species. Shifts in the dominant vegetation type or even small changes in the understory composition may result in significant changes in animal communities. The goal of adaptation is to reduce the vulnerability of ecosystems to climate change and increase their resilience to climate-induced changes in ecological conditions.

Forest management strategies include those listed above, as well as the following:

- Reduce the impacts of stresses that can exacerbate the effects of climate change, particularly from wildland fire, insects, and diseases.
- Step-up measures to prevent and control the spread of invasive species.
- Prevent or reduce barriers to species migration, such as forest fragmentation.
- Improve forest health monitoring for early detection of climate change impacts.
- Help forests regenerate after disturbances (e.g., through reforestation).
- Support research to better understand forest vulnerability to multiple stressors and to find ways to enhance forest resilience.
- Consider establishing a continuous forest inventory monitoring system.

Energy Efficient Practices: We will continue to make incremental progress in maintaining and constructing facilities in a manner consistent, to the maximum extent practicable, with the most current guidance. We will continue to identify and remove those structures that have no useful purpose or that pose safety hazards. We must also take care to maintain both new and rehabilitated facilities to Service standards to keep them safe, functional, and attractive.

We will continue to service, repair, and maintain existing renewable energy infrastructure as needed. The Refuge Manager will fully evaluate the alternative energy structures on the refuge and, if

necessary, remove them, modify their design, move them to more effective locations or add additional infrastructure. The Service remains committed to use of renewable energy sources to the fullest extent feasible on refuge lands.

Carbon Reduction Practices: Carbon sequestration is one mitigation strategy used to offset effects of climate change. The USFS provides widely accepted calculations of carbon stored in various forest types (Smith et al. 2004). Opinions in the literature regarding the effect of active forest management on carbon sequestration capability of forests are not consistent among scientists (Nunery and Keeton 2010, Hennigar et al. 2008). Management of refuge forests will be focused on providing wildlife habitat, promoting healthy native forests, and support the ability of refuge forests to sequester carbon effectively. These strategies also support the carbon sequestration activities within the Service's proposed climate change objectives, as outlined in the draft strategic plan for responding to accelerating climate change (USFWS 2009b).

Invasive Plant Species Control

Continue to control invasive species on refuge lands as funding, staffing, and equipment logistics allow, with particular attention to controlling Japanese privet and stiltgrass in moist hardwood forest, as well as tree-of-heaven and princess tree along roadsides and within non-forested upland.

Discussion and Rationale

EO 13112 defines an invasive species as "*…an alien (or non-native) species whose introduction does, or is likely to cause economic or environmental harm or harm to human health.*" The unchecked spread of invasive plants threatens the biological diversity, integrity, and environmental health of all refuge habitats. In many cases, invasive species out-compete native species and become the dominant cover. This situation reduces the availability of native plants as food and cover for native wildlife. Over the past several decades, government agencies, conservation organizations, and the public have become more aware of the negative effects of invasive species. One report estimated the economic cost of invasive species in the U.S. at $137 billion every year (Pimentel et al. 2000). Up to 46 percent of the plants and animals federally listed as threatened and endangered have been negatively impacted by invasive species (Wilcove et al. 1998, National Invasive Species Council 2001).

The Service's Northeast Region initiated an effort to systematically identify, locate, and map invasive plant species occurring on refuge lands, leading to an effective integrated management plan. James River NWR staff has begun identifying and mapping locations of invasive species on the refuge as time and resources allow. Japanese privet, Japanese stiltgrass, and tree-of-heaven are the biggest

concerns on the refuge currently. We will use this information to guide the development of monitoring, control, and eradication projects. When control is deemed necessary, the refuge will use the most effective combinations of mechanical, biological, and chemical controls to achieve long-term control or eradication. Only herbicides approved by the national contaminants coordinator will be used, and only in accordance with the approved rate and timing of application. Currently, the refuge uses triclopyr and glyphosate to treat invasive species, when resources allow.

We will continue to implement the following strategies related to invasive species control:

- Follow the national guidance on invasive species provided in the Service Manual (620 FW 1.7G).
- Complete the inventory and mapping of invasive plant species and prioritize invasive species to be controlled or eradicated.
- Implement integrated pest management using biological, ecological, mechanical, prescribed fire, or chemical techniques, as needed.
- When using heavy equipment on refuge property, we would ensure all equipment brought on to and taken off the refuge for this work is clean and free from reproductive plant parts, to minimize opportunities for invasive species transport.

Pest Management
Continue to participate with State and Federal partners to monitor and manage nuisance issues from wildlife, such as pine beetle, feral hogs, and nutria.

Discussion and Rationale
In controlling pests, whether invasive or native species, we will continue to 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 of pest management problems and solutions follow.

- *Existing problem*: The southern pine beetle outbreaks in dense pine stands, over mature trees, and generally unhealthy stands

poses a significant threat to the health of the refuge's pine-dominated forest.

Existing solution: Proper silviculture management techniques of thinning and promoting a stand of large, healthy trees should reduce susceptibility to infestations.

Potential solution: If infestation is severe, chemical treatments may be needed.

- *Potential problem*: If documented on the refuge in the future, small populations of feral hogs can grow exponentially and decimate habitat and food resources that are important for native wildlife species.

  Potential solutions: If documented on the refuge in the future, use control methods to eliminate population on refuge property. Methods may be conducted by USFWS staff, partners, or through SUPs.

- *Potential problem*: If documented on the refuge in the future, nutria eating of roots and stems of wetland plants can convert marshes and swamps into unvegetated mudflats.

  Potential solutions: If documented on the refuge in the future, use control methods to eliminate population on refuge property. Methods may be conducted by USFWS staff, partners, or through SUPs.

- *Potential problem*: If documented on the refuge in the future, mute swans can have a direct adverse impact on plant diversity, fish assemblages, water quality/erosion control, and vegetation available to native waterfowl.

  Potential solution: If documented on the refuge in the future, we will work with other Federal and State partners to capture and remove mute swans from the refuge. The Service goal is zero productivity for mute swans in the Northeast Region, due to the swan's negative impact on native waterfowl and their habitats.

We do not intend to initiate a public or recreational trapping program at this time. Trapping is considered a commercial activity and must meet a higher standard of compatibility than priority wildlife-dependent public recreational uses or other non-commercial uses. We will reconsider our position if future situations arise in which predation, habitat loss, or disease is severe, and we determine public trapping to be an effective, essential element in managing them. Until that is necessary, we will use trapping only on a case-by-case basis to help alleviate a particular problem. In this context, trapping will be

considered a management or administrative activity and not subject to compatibility review.

4.3.3 Cultural Resources Management

Protection and Maintenance Recommendations

Continue to comply with Section 106 of the NHPA through consultation with the RHPO and SHPO when new ground-altering activities are proposed, evaluate existing facilities for National Register eligibility before altering, and require compliance with standard terms and conditions agreed to by refuge staff for forest management.

Discussion and Rationale

As a Federal land management agency, we are entrusted with the responsibility to locate and protect cultural resources, including archaeological sites and historic structures that are eligible for the National Register. As described in chapter 3, there are 7 known archaeological sites, 53 potential historic locations, and a large area of prehistoric high probability. Considering the refuge's location on the lower James River, it is likely that additional sites of various periods would be identified in the future.

The Service Manual, 614 FW 1, outlines the process of refuge managers and regional office archaeologists for analyzing the potential for our projects to affect archeological and historical resources, and consulting with the SHPO and Tribes as appropriate in order to comply with the NHPA. Projects involving soil moving or building alteration are most likely to damage archaeological sites and historic buildings. Identifying sites and buildings through archaeological or architectural survey early in the project planning process may enable the Service to avoid the cultural resources. Preserving important sites and structures is always the preferred outcome. If we cannot avoid an important site, we design mitigation for the impact in consultation with the SHPO, federally recognized Tribes, and other constituencies. NHPA requires that we consider the important sites and historic structures in planning the activity and get the advice of the SHPO during planning.

We also plan to work with the NPS, Tribal representatives, the SHPO, the Archaeological Society of Virginia, and local historical societies to interpret the Pre-Contact Period and history on the refuge and to explain the importance of protection and preservation of cultural resources.

Outreach and Communications

Continue to actively communicate with federally recognized Tribes, unrecognized Virginia Tribal organizations, and descendant communities to discuss proposed refuge activities and share periodic progress reports on refuge activities.

Discussion and Rationale
James River NWR provides an ideal place to demonstrate to the public how an appreciation of indigenous values regarding stewardship of land and wildlife can enhance public and personal attachment to the James River watershed. The refuge consults with eight federally recognized Indian Tribes when NEPA and NHPA are relevant. In addition, there are 11 unrecognized Indian Tribes represented in Virginia: Cheroenhaka (Nottoway), Chickahominy, Eastern Chickahominy, Mattaponi, Monocan Nation, Nansemond, Nottoway of Virginia, Pamunkey, Pattawomeck, Rappahannock, and Upper Mattaponi (*http://www.ncsl.org/issues-research/tribal/list-of-federal-and-state-recognized-tribes.aspx#s-va*; accessed August 2013). All of these Tribes are State recognized, and some are actively seeking Federal recognition. Federal recognition of the Pamunkey Indian Tribe has preliminary approval from the Department of the Interior for Federal recognition, and a decision is pending (*https://federalregister.gov/a/2014-01349*, accessed June 2014; http://bit.ly/1DpUCtc, accessed February 2015).

Through early 20th century residents, the refuge's history is linked to the nearby Eastern Chickahominy Tribe's history. We will continue to actively communicate with all recognized and unrecognized Virginia Tribal organizations with regard to identification, education, and interpretation efforts on the refuge to ensure information is shared about how the refuge was part of the history of Virginia's Native Americans.

4.3.4 Visitor Services Management

Outreach and Communications
Continue to work with partners to promote the protection and preservation of the refuge for the benefit of wildlife through environmental education and interpretation about the natural environment and wildlife of the James River.

Discussion and Rationale
Developing and maintaining partnerships is key to fulfilling the Service's mission. Refuge staff has established working relationships with a variety of partners to promote wildlife and habitat conservation through environmental education and interpretation. We will continue to participate in these partnerships and develop a better understanding of the refuge's and the Service's role in surrounding communities.

EO 13508, "Protection and Restoration of the Chesapeake Bay" (signed May 2009), outlines actions for the Federal government to take to make progress toward restoring the health of the Chesapeake Bay. The Federal Leadership Committee was created for the Chesapeake Bay, which in September 2010 issued the EO Strategy, outlining specific efforts to undertake. As part of the James River

watershed, actions at James River NWR are related to the overall health of the Chesapeake Bay. Of the nine goals in the EO Strategy, the refuge is most directly connected to the goals of conserving land, increasing public access, and expanding citizen stewardship.

We will continue to participate in the *Envision the James* initiative, a watershed-wide community outreach and engagement initiative to promote natural resource conservation stewardship and to develop recreational opportunities within the James River watershed (*http://www.EnvisionTheJames.org*; accessed November 2013). By participating in this effort, we will develop a better understanding of the refuge's role in the promoting an understanding and appreciation of natural and cultural resources in communities along the James River.

At both James River NWR and Presquile NWR, we will continue working with the JRA and NPS to promote the Captain John Smith Chesapeake NHT and Chesapeake Bay Gateways and Watertrails Network by enhancing place-based interpretation, providing public access, and fostering conservation and restoration of natural and cultural resources related to the Chesapeake Bay through programming, outreach, and citizen involvement. We will work with the NPS to ensure that Captain John Smith Chesapeake NHT-related activities proposed to occur at the refuge will be conducted in a manner compatible with the purpose and intent of the refuge.

Additionally, our partnership with the JRA for the Ecology School emphasizes our shared interest in encouraging the public to develop an appreciation for, and stewardship ethic toward, the protection and conservation of natural and cultural resources at James River and Presquile NWRs. Although the current focus of our partnership is to offer environmental education programs on Presquile NWR through the Ecology School, we will continue to work with the JRA to explore opportunities to host environmental education programs and projects at James River NWR that engage communities throughout the greater Richmond metropolitan area.

4.3.5 Findings of Appropriateness and Compatibility Determinations

Chapter 1 describes the requirements for findings of appropriateness and compatibility determinations. Uses are evaluated based on whether or not they contribute to meeting refuge purposes, goals, and objectives. Appendix B includes all approved findings of appropriateness and compatibility determinations for James River NWR.

Activities Allowed

In accordance with approved compatibility determinations, we will:

- Support a quality, public deer hunt on the refuge.

- Support wildlife observation, photography, environmental education, and interpretation opportunities on the refuge by maintaining quality facilities, offering quality programs, and supporting existing partnerships.
- Support compatible research and investigations on the refuge by non-Service personnel that help further our knowledge of refuge resources, or that address regional or national conservation concerns of the Service.

Activities Not Allowed
Continue to prohibit certain activities on the refuge that were determined by the refuge manager to be not appropriate.

Discussion and Rationale
We occasionally receive requests for activities that are prohibited on refuges (50 CFR 25-26). Other activities are not allowed because the refuge manager has determined that the activities are not appropriate on the refuge or are sufficiently provided elsewhere nearby on other ownerships. Appendix B documents the refuge manager's justification for why they are deemed not appropriate.

These activities will continue to be prohibited on this refuge:

- Camping.
- Collecting natural products.
- Firing range.
- Horseback riding.
- Pets on refuge.
- Public motorized boat ramp.
- Swimming and sunbathing.
- Use of pursuit dogs for hunting.

Any exceptions will be at the discretion of the refuge manager, under specific, special circumstances (e.g., to accommodate visitors with disabilities). All other uses not explicitly allowed or not allowed that require a SUP will be evaluated on a case-by-case basis by the refuge manager for appropriateness and compatibility (50 CFR 26, 603 FW 2).

4.3.6 Refuge Revenue Sharing Payments

Continue to issue annual refuge revenue sharing payments to counties in accordance with law and annual congressional appropriations.

Discussion and Rationale
NWRs contribute to local economies through shared revenue payments. Federally owned lands are not taxable; however, under the provisions of the Refuge Revenue Sharing Act (16 U.S.C. 715s), the municipality or other local unit of government receives an annual refuge revenue sharing payment to offset the loss of property taxes that would have been collected if the land had remained in private ownership. In addition, federally owned land requires few services from municipalities, yet it provides valuable recreational opportunities for local residents. As we describe in chapter 3, we pay annual refuge revenue sharing payments based on the acreage and the appraised value of refuge lands. The annual payments are calculated by formula determined by, and with funds appropriated by, Congress. We 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.

4.3.7 Special Designation Areas

Continue to protect key characteristics of the refuge habitats and resources that supported their special area designations.

Discussion and Rationale
In chapter 3, we describe the various special area designations that include the refuge. Most relate to significant natural and cultural resources in the region, and the unique opportunities the area affords to protect and interpret these resources. Our existing and proposed activities on the refuge will be consistent with, or not detract from, those special area designations.

We will continue to protect the refuge habitats and resources that supported their designation. For example, we will:

- continue to support and promote bald eagle nesting and roosting within the summer and winter bald eagle concentration area on the Lower James River;
- continue to support and promote other bird species of concern associated with the Lower James River IBA; and
- continue to promote anadromous fish use waterways within and adjacent to the refuge.

We will continue to conduct reviews every 15 years as required by Service policies by following the planning process outlined in 602 FW 1 and 3 to determine if the refuge meets criteria for Wilderness Areas, National Wild and Scenic Rivers, or other Federal special status designations.

4.3.8 Additional NEPA Analysis

The draft CCP and EA was developed with sufficient detail to account for the greatest potential impacts that could result from future step-down planning efforts. However, if we determine that our analysis of potential impacts on the human and natural environments is inadequate during subsequent planning (e.g., refuge step-down plans), additional NEPA review and NHPA compliance may be required prior to implementing those plans, actions, or activities (40 CFR 1508.28).

Examples of proposed actions that may require further analysis include:

- Developing a LPP with appropriate NEPA documentation to meet habitat needs for Service Trust species and to contribute to the network of conservation lands and wildlife resources in the regional landscape by expanding the refuge's acquisition boundary.
- Improving or removing existing facilities and construction of new facilities.
- Expanding the existing hunt program and adding new hunting opportunities for adults and youth.
- Removing nuisance wildlife using lethal and non-lethal methods, if deemed necessary.

4.4 Goals, Objectives, and Strategies

GOAL 1 **FOREST HABITAT**

Protect, enhance, and restore the ecological integrity of inner coastal plain forest ecosystems of the lower James River to support native wildlife and plant communities, including species of conservation concern, and to ensure those ecosystems are resilient in anticipation of climate change.

Objective 1.1 **Pine-dominated Forest**

Over the life of the plan, promote transformation of up to 2,651 acres of pine-dominated forest towards a mature pine savanna with 80 to 100 trees per acre containing mature trees with a minimum average diameter at breast height (DBH) of 10 inches, an open midstory, and an understory with an average diversity of 23 plant species per square meter to increase resident brown-headed nuthatch populations and breeding populations of Chuck-will's-widow.

Discussion and Rationale

While there are small pockets of pine savanna in Virginia, this habitat is missing from the larger landscape context surrounding the refuge and is disappearing in the southeast region of the U.S. Today, pine savanna only covers 3.6 percent of its original range (Kelly and Bechtold 1990). Pine savannas are open, fire-dependent plant communities dominated by well-developed ground cover and some low-growing shrubs with only scattered trees. The open herbaceous understory of the dry pine ecosystem provides more diversity than almost any other upland habitat type in North America, an average diversity of 23 plants per square meter (Walker and Peet 1983), and the structure suitable for many ground nesting and foraging species including Chuck-will's-widow, bobwhite quail, and wild turkey (Straight and Cooper 2012, Stoddard 1931, Markley 1967). Decline of this habitat has been attributed to landscape fragmentation, logging operations, and fire suppression (Platt et al. 2006).

Regionally and locally important species are dependent on this habitat type. For example, the nesting brown-headed nuthatch populations would benefit from increased stand age and fire management practices because of the increase in dead standing trees for cavity nests (Wilson and Watts 1999, Wilson and Watts 2000). Brown-headed nuthatches almost exclusively forage on mature pine trees, focusing on insects in the spring/summer months and pine seeds during winter (Slater et al. 2013). Chuck-will's-widow nesting populations would benefit from a more open forest for nesting habitat. Though limited data on nesting Chuck-will's-widow exists, local birders have noticed increase in occurrence of individuals on the refuge in areas where thinning and prescribed burning operations are being conducted (Straight and Cooper 2012; Bose 2013 personal communication).

Robert B. Clontz/The Nature Conservancy

Pine savanna at The Nature Conservancy's Piney Grove Preserve in Sussex County, Virginia

The previous forest management techniques of thinning the dense pine plantations were employed to increase forest health, reduce disease risk, and improve wildlife habitat. Under this CCP, we will undertake more intense active management through thinning and prescribed fire to work toward pine savanna as the desired future condition that would be achieved over the next 30 or more years. Within 10 years after approval of this plan, we will actively thin pines and use prescribed fire to reduce tree density to 200 trees per acre, control hardwood regeneration, and allow release of pines to increase DBH of mature trees to a minimum average DBH of 10 inches (25.6 cm), as preferred by brown-headed nuthatch (O'Halloran and Conner 1987). Over the next 30 or more years, the density of pine trees will be reduced to between 80 and 100 trees per acre. Active pine thinning and prescribed burning will also encourage herbaceous plant growth in the understory to develop the savanna habitat. Pine thinning and prescribed burning will enable ample sunlight to reach the forest floor; most herbaceous plants require ample sunlight (Kelly and Bechtold 1990).

We will experimentally plant longleaf pine using the existing thinned areas within the forest as our experimental planting sites. Though loblolly pine is the dominant pine species and most of our habitat objectives can be reached in a loblolly pine ecosystem, the refuge lies along the northern edge of the historic range of longleaf pine (Bhuta et al. 2008). Longleaf pine is better adapted than loblolly to the dry, sandy soils often found in southeastern Virginia. Compared to loblolly,

longleaf pine is a more long-lived species and is resistant to invasive pine beetles (Kelly and Bechtold 1990). The older, more closely spaced, and slower growing the pines, the more likely they are to be infested and killed by bark beetles. Furthermore, during southern pine beetle outbreaks, infestation can spread much more rapidly when trees are closer together (VDOF 2007). For these reasons, as well as for restoring some of the original biodiversity and aesthetic appeal that was lost with the disappearance of this habitat, there is great interest throughout the South in restoring longleaf in selected areas (VDOF 2007). We will widen the thinned corridors to allow more light to the planting area and promote longleaf pine growth (Kelly and Bechtold 1990). This method is preferred over a complete clear cut of the whole unit because of reduced cost and habitat that would still be available for wildlife.

Strategies

Continue to:

- Protect potential nest and roost trees to ensure ideal bald eagle habitat would continue to exist on the refuge.

Throughout the life of the plan:

- Protect 75 percent of trees with 24-inch DBH or greater.
- Protect snags that do not pose a threat to safety of refuge operations. Create dead trees in the interior of management units to replace snags that are removed.
- Actively work to remove the midstory through mechanical and fire treatments to promote development of pine savanna habitat.
- Promote an open understory of savanna habitat by mimicking natural fire regimes.
- Seed 1- to 1.5-acre decks used in logging operations with native grasses (e.g., broomsedge) to limit woody regrowth between thinning operations.

Within 5 to 10 years of CCP approval:

- Investigate longleaf pine restoration options by planting longleaf pine seedlings and/or saplings in widened thinning corridors as part of the existing forest management actions.

Within 10 years of CCP approval:

- Perform active thinning and fire management projects to reduce tree density to 200 trees per acre and allow release of pines to increase DBH of mature trees to a minimum average DBH of 10 inches (25.6 cm).

Inventory and Monitoring Activities

Continue to:

- Conduct annual forest breeding bird point count survey.

Throughout the life of the plan:

- Coordinate with regional forester to conduct regular timber assessments.

Within 5 years of CCP approval:

- Conduct baseline inventory and identify long-term monitoring protocols for brown-headed nuthatch and breeding Chuck-will's-widow populations.

Within 10 to 15 years of CCP approval:

- Assess survivorship and cost-effectiveness of planting longleaf pine seedlings and/or saplings.

Objective 1.2

Moist Hardwood Forest

Over the life of the plan, maintain 775 acres of moist hardwood forest with 75 percent ground cover in leaf litter, 50 percent midstory cover from more than 10 native species, and 30 percent mature trees with a minimum DBH of 20 inches to protect year-round habitat for eastern box turtle and nesting habitat for breeding red-shouldered hawks and wood thrushes.

Discussion and Rationale

The refuge contains 775 acres of hardwood forest, which is approximately 18 percent of the total refuge area.

Since refuge establishment, the emphasis for moist hardwood forest management has been to protect native tree species, especially those large trees with the potential to be used by nesting eagles, and limit public activities that would disturb eagles. The moist hardwood forest also provides important feeding and roost sites for wild turkey, stopover site habitat for neotropical migratory birds, feeding and bedding habitat for white-tailed deer, as well as feeding and nesting sites for cavity-nesting birds, hawks, gray squirrels and other native mammalian species (USFWS 1996, 2003, 2013).

Our forest management activities will continue to benefit bald eagles, as well as wild turkey, cavity-nesting avian species, various hawk species, and native mammalian species (USFWS 1996). Activities in the moist hardwood forest will contribute toward satisfying the following conditions applicable to all refuge forests:

- Produce up to 20 potential bald eagle nesting trees per acre over the next 60 to 80 years, with the potential addition of one to two additional active nest sites on the refuge within 60 years, and to result in no net loss of nest trees over the next 60 to 80 years.

- Provide and maintain nocturnal roost and feeding roost habitat in a condition capable of supporting a minimum of 150 bald eagles by identifying and protecting the existing and potential roost trees to assure ideal bald eagle habitat will continue to exist within the refuge.

- Provide for nesting and feeding habitats for cavity-nesting birds including wood ducks, woodpeckers, and songbirds. Retain all snags that do not pose a hazard during refuge operation.

- Develop a forest with three stages of foliage heights including mature, pole size, and seedling/brush cover types.

We will focus on using three species as indicators of habitat quality and to trigger habitat management actions: eastern box turtle, wood thrush, and red-shouldered hawk. These species were chosen because their habitat requirements focus on different aspects of this habitat type. Although eastern box turtles are considered habitat generalists, they have more specific requirements when it comes to overwintering. The refuge's moist hardwood forest floor provides ideal habitat for burrowing in soil or leaf litter to protect themselves from weather extremes (Erb 2011). The breeding wood thrush uses the midcanopy portion of the forest and is found in areas with a variety of mature deciduous tree species, moderate structure in the subcanopy and shrub layer, and a fairly open forest floor (Evans et al. 2011). The red-shouldered hawk nesting habitat is characterized by bottomland hardwoods with larger trees and reduced canopy cover (Moorman and Chapman 1996).

To satisfy all three of these species' needs, the moist hardwood forest will need to be intact at the forest floor, midstory, and canopy levels. We will continue to protect these mature forests that are important for this each of these species. We will work to improve our understanding of these species on refuge property and monitor their populations during seasons of use. Monitoring changes in resident and breeding populations of the eastern box turtle, wood thrush, and red-shouldered hawk will give staff indication of the success of management strategies to protect this habitat.

Strategies

Throughout the life of the plan:

- Limit activities (e.g., human and mechanical) that will disturb bald eagles and other forest dwelling species during the nesting season.

- Limit disturbance of forest floor to protect wildlife species dependent on this microhabitat.

Inventory and Monitoring Activities

Continue to:

- Conduct annual forest breeding bird point count survey.

Within 5 to 10 years of CCP approval:

- Conduct baseline inventory and identify long-term monitoring protocols for eastern box turtle, wood thrush, and red-shouldered hawk.
- Conduct periodic habitat/vegetation assessment surveys.

Objective 1.3

Floodplain Forest

Over the life of the plan, maintain 633 acres of floodplain forest containing 30 percent mature trees with a minimum DBH of 20 inches, 20 percent trees with DBH between 15 and 20 inches, and 3,530 to 10,600 cubic feet per hectare of coarse woody debris to promote forest health and to protect nesting and roosting bald eagles, breeding prothonotary warblers, and resident spotted salamander populations.

Discussion and Rationale

The refuge's existing 633 acres of floodplain forest will be maintained to provide nesting habitat for the benefit of bald eagles, the refuge purpose. We will focus on nest and roost habitat for bald eagles. Mature trees adjacent to bodies of water are the most important for use as roost and foraging sites year round for both juvenile and adult bald eagles (USFWS 1996). As protection of this habitat from development or disturbance is limited outside of the refuge boundaries, these 633 acres provide an important sanctuary for both migratory and resident bald eagles.

We will expand our focus to include prothonotary warblers and spotted salamander populations. Prothonotary warblers, a species in decline due to habitat loss on breeding and wintering grounds, are cavity nesters that select nesting sites in flooded, well-shaded bottomland hardwood forests with sparse understory (Petit 1999). With only 10 percent of the U.S. original bottomland forest remaining (Dickson et al. 1995), protecting forested tracts that are more than 247 acres (100 hectares) (Robbins et al. 1989) and riparian woodlands that are less than 98 feet wide (30 meters wide) (Kahl et al. 1985) is important for providing prothonotary warbler breeding grounds.

Most of the amphibian populations in the U.S. are declining nationally, with amphibian occupancy declining by 3.7 percent from 2002 to 2011. Those species that are red-lined by the IUCN declined an average of 11.6 percent annually (Adams et al. 2013). The spotted salamander is listed as an overall stable population (Hammerson 2004), but threats to local populations include intensive timber harvesting practices that reduce canopy closure, understory vegetation, uncompacted forest litter, or coarse woody debris (moderately to well-decayed) in areas surrounding breeding sites (deMaynadier and Hunter 1999). Resident spotted salamander populations require maintained forest habitat greater than 328 feet (100 meters) around breeding pools for dispersal during winter months. Maintaining connectivity of large forest blocks

is a priority for this species and other amphibians as they avoid open areas and edges (Regosin et al. 2005). Butts and McComb (2000) recommend that 3,530 to 10,600 cubic feet per hectare (100 to 300 cubic meters per hectare) of coarse woody debris be retained for terrestrial salamanders.

There is little information on amphibian populations for either species on refuge property, but understanding their use of the refuge and monitoring their populations will be the inventory and monitoring focus in this habitat. We will use this information to inform management decisions and future plans to benefit wildlife species that depend on this habitat.

Strategies

Continue to:

- Protect native trees.
- Not thin any floodplain forest areas.
- Limit activities that will disturb bald eagles, especially during nesting season.

Inventory and Monitoring Activities

Continue to:

- Conduct spring and summer shoreline bald eagle surveys.
- Conduct annual forest breeding bird point count survey.

Within 5 to 10 years of CCP approval:

- Conduct baseline inventory and identify long-term monitoring protocols for prothonotary warblers and spotted salamanders.
- Conduct periodic habitat/vegetation assessment surveys.

GOAL 2

NON-FOREST HABITAT

Protect, enhance, and restore the ecological integrity of non-forest ecosystems to support native wildlife and plant communities, including species of conservation concern, and to ensure those ecosystems are resilient in anticipation of climate change.

Objective 2.1

Freshwater Marsh and Shrub Swamp

Over the life of the plan, maintain and promote natural hydrology and native plant species in 82 acres of freshwater marsh and shrub swamp for resident marsh wren populations and breeding least bitterns.

Discussion and Rationale

Approximately 80 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). More than 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 nutrient and toxic material filtering. Wetlands are significant for global cycles of nitrogen, sulfur, methane, and carbon dioxide (Mitsch and Gosselink 1993). Freshwater marshes and shrub swamps are types of freshwater wetland ecosystems.

The refuge contains 82 acres of freshwater marsh and shrub swamp, which is approximately 2 percent of the total refuge area. Freshwater marshes and shrub swamps are located primarily along Powell Creek and Flowerdew Hundred Creek adjacent to the floodplain forests. As discussed in chapter 3, these marshes typically occur as complexes dominated by large grasses, such as salt hay, bulrushes, cattails, and rushes.

Currently, much of the freshwater marsh and shrub swamp habitat is ecologically intact, with minimal presence of invasive species. Controlling and preventing the spread of invasive plants and animals, particularly common reed, nutria, and feral hogs, is an essential component of wetland protection and management. Most of the system is hydrologically intact; however, the culvert in the dike located in the southwestern portion of the refuge has filled in, reducing water from flowing between the wetlands on either side of the dike. The reduced water flow has resulted in an increase in sediment being deposited on the eastern side of the dike. We will investigate the hydrologic flow between the wetlands in the southwestern portion of the refuge and Powell Creek.

Freshwater marsh and shrub swamp habitats provide breeding, migratory, and overwintering habitat for a variety of waterfowl and waterbirds. The American black duck, which is a priority species in BCR 27, BCR 30, and the Virginia WAP, has been observed on the

Mark Vance

Least bittern

refuge during spring and fall migration and during the overwintering period. Tidal habitats in the mid-Atlantic are essential overwintering habitat for this species (Longcore et al. 2000).

The freshwater marshes on the James 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 in large freshwater or brackish marshes that have tall vegetation such as cattails, bulrushes, reeds, cordgrass, or needlerush (Gutzwiller and Anderson 1987). Least bitterns, a priority species in BCR 27, BCR 30, and the Virginia WAP, also occupy freshwater or brackish marshes with tall, dense emergent vegetation and clumps of woody plants over deep water (Poole et al. 2009), like those at the refuge. Because least bitterns are so secretive, population trend data is lacking and contradictory. The least bittern is sensitive to structurally different vegetation types (Winstead and King 2006); therefore, the invasion of common reed into refuge marshes may alter the wetland habitat and eliminate least bitterns from infested wetlands.

We will conduct an inventory and monitoring program of existing and future conditions to identify potential changes and trends in freshwater marsh and shrub swamp habitat conditions or marsh wren and least bittern populations. Creating an inventory and monitoring program will also allow us to detect and respond to the presence of invasive species rapidly. We plan to use the inventory and monitoring program to inform us on potential changes, as well as to inform us on the outcomes of our management decisions. Ultimately, the inventory and monitoring program will direct our future management actions. For example, the inventory and monitoring program will enable us to understand the hydrologic conditions at the dike in the southwestern portion of the refuge.

Strategies

Continue to:

- Protect all native vegetation by limiting disturbance from refuge operations and public use in freshwater marsh and shrub swamp areas.

Inventory and Monitoring Activities

Within 3 years of CCP approval:

- Investigate the hydrologic flow between the wetlands in southwestern portion of the refuge and Powell Creek.

Within 5 to 10 years of CCP approval:

- Conduct baseline inventory and identify long-term monitoring protocols for marsh wren and least bittern populations.

Objective 2.2

Aquatic Habitats

Over the life of the plan, support efforts of partners to maintain or increase submerged aquatic vegetation in 17 acres of aquatic habitat for the benefit of native species (e.g., Atlantic sturgeon, alewife, blueback herring) and protect this habitat from being degraded.

Discussion and Rationale

The James River and its associated backwater habitats, including tidal creeks, are important spawning habitats for resident and migratory fish, such as alewife, American shad, freshwater mussels, and as foraging and resting habitat for migratory and overwintering waterfowl, water birds, and bald eagles. In 2012, the Atlantic sturgeon was federally listed as endangered. With the recent listing, we anticipate our role in supporting the recovery of this species will increase as we work with our partners.

Similar to Atlantic sturgeon, American shad spend a significant portion of their life in marine waters and migrate to freshwater to spawn. The Virginia Marine Resources Commission (VMRC) issued a moratorium on American shad harvest in the Chesapeake Bay and its tributaries due to concerns with overfishing, habitat degradation such as pollution, dams, and land use changes. Information about the specific spawning and nursery habitat characteristics required for American shad in Virginia's rivers is incomplete (Bilkovic et al. 2002). Within James River NWR, Powell Creek is relatively intact and may provide habitat for freshwater mussels and other non-migratory fish species, such as bridle shiner, alewife, and blueback herring (collectively referred to as river herring), and gizzard shad. The adjacent marsh provides potential nursery habitat for fish that can use the larger James River and Chesapeake Bay system.

The James River adjacent to the refuge is listed as a category 5 impaired waterway for aquatic life and fish consumption uses, due to inadequate benthic community shores and elevated levels of PCB in fish tissues (VDEQ 2012). This news is countered by evidence that SAV has been increasing annually since 2006 along Powell Creek, the refuge's western border. In 2011, SAV was observed to cover the headwaters between 70 and 100 percent in fragmented patches throughout the majority of Powell Creek extending to its mouth at the James River (VIMS 2013). Continued efforts to improve water quality in refuge and adjacent waters are necessary.

Management of the James River and associated backwaters habitats will be fairly minimal. The aquatic habitat acreage within the refuge boundary is only 17 acres of non-contiguous waters. While it is a small component when considered in the context of the entire 10,432-square mile watershed, under this plan, we will engage activities that will maximize our beneficial contribution to the James River watershed's health.

The ability for Service to manage this habitat type is limited jurisdictionally. A variety of Federal and State agencies (including, but not limited to, U.S. Army Corps of Engineers, VDEQ, VMRC, and VDGIF) oversee activities tied to waterway bottoms, water quality management and navigation. Coordination with the appropriate agencies will be required for any action tied to this habitat type.

The 4,324-acre refuge will employ best management practices on refuge lands to minimize sedimentation to the James River. Additionally, existing wetlands and riparian buffer protection will continue within the refuge throughout the life of the plan.

We will investigate the hydrologic flow between the wetlands in the southwestern portion of the refuge and Powell Creek. The existing earthen dike restricts natural flow patterns of waters. This 300-foot-long by 20-foot-wide earthen dike was originally constructed to provide access to a 30-acre island for logging operations. The presence of the dike affects marsh hydrology. The existing culvert that is buried within the dike is no longer functional. The dike functions as a barrier to tidal flooding in the channel immediately south of the island. The impacts are most pronounced in the emergent marsh immediately east of the dike and south of the island. By restricting the connection with Powell Creek, the dike lengthens the flow path for tidal water. Instead of water flowing approximately 0.10 miles from Powell Creek, water must now pass about 0.60 miles through the tidal channel that wraps around the north and east side of the island. In the emergent marsh east of the dike, there is less tidal fluctuation than there was prior to dike construction (Wurster 2013 personal communication).

Water quality monitoring and data collection projects initiated by local universities or watershed organization will be encouraged. Monitoring of tidal creeks and aquatic habitats may provide critical reference information, because other aquatic resources outside of the refuge are affected by global climate change and land use changes.

Strategies

Continue to:

- Implement best management practices for construction and land management activities to minimize potential release of sediment load and deposition in the James River.
- Maintain vegetated riparian areas and natural habitats.
- Collaborate with State and Federal partners to maintain fish populations suitable for wildlife consumption (i.e., bald eagles) and public recreation opportunity.
- Support partner efforts to restore federally listed Atlantic sturgeon habitat.

- Assist partners in promoting James River watershed protection and health, and contribute to the recovery of species of conservation concern (e.g., Atlantic sturgeon, alewife, blueback herring).

Within 10 to 15 years of CCP approval:
- Plant native species along disturbed or denuded riparian areas.

Inventory and Monitoring Activities
Continue to:
- Work with partners to monitor water quality stations in refuge vicinity.
- Support partner efforts to monitor federally listed Atlantic sturgeon habitat.
- Work with partners to monitor SAV.

Throughout the life of the plan:
- Make use of the Virginia Institute of Marine Science monitoring of SAV to evaluate success.

Within 3 years of CCP approval:
- Investigate the hydrologic flow between the wetlands in the southwestern portion of the refuge and Powell Creek.

Objective 2.3

Erosional Bluff
Over the life of the plan, maintain and promote native vegetation on 3 shoreline miles to help stabilize bluffs, reduce erosion, and provide nesting substrate for breeding bank swallows.

Discussion and Rationale
Three shoreline miles of erosional bluff occur along the refuge's border with the James River. While the unconsolidated soils along the bluffs provide habitat for burrowing wildlife, the soils are easily eroded and transported into adjacent waterways. Since refuge establishment, our habitat management activities have emphasized using best management practices to localize and minimize soil disturbance, as well as alteration of existing topography and limiting disturbance to roosting bald eagles, throughout the refuge (USFWS 1989, USFWS 1996, USFWS 2003).

We will continue to maintain the existing erosional bluff habitat by limiting activities that will disturb existing topography and standing vegetation, whether live or dead. We will increase our shoreline monitoring efforts to determine if any erosion is occurring at a rate that is adversely impacting the refuge and assess the sediment load transported into the James River. We will also monitor this habitat for any potential impacts that could be attributed to climate change, such as sea level rise or salinity change effects on vegetation. By formally

monitoring our shoreline conditions, we will be better able to determine how best to balance our responsibilities to provide nesting habitat for species that are dependent on this erosional bluff habitat (such as bank swallow) while also limiting the transport of sediment in to the James River.

According to the national breeding bird survey data for 1966 through 2007, bank swallow populations nationwide are experiencing a significant decline of approximately 2 percent per year (NatureServe 2009). Habitat alteration by humans has been identified as the only major known threat to this species. The growing emphasis on implementing flood and erosion control projects and streamflow regulation projects has eliminated much of the nesting habitat for bank swallows in California (Garrison 1998). Conversely, sand and gravel mining activities can create new nesting habitats.

Strategies

Continue to:

- Protect all standing, live or dead, native trees in erosional bluff areas by not removing vegetation and limiting mechanical equipment use in areas around waterways and steep slopes.

Within 10 to 15 years of CCP approval:

- Investigate and employ shoreline erosion control techniques to promote bank stabilization and protect bank swallow habitat, if appropriate.

- Strategically plant key plant species (e.g., bald cypress) to break up wave energy, if appropriate.

Inventory and Monitoring Activities

Within 5 years of CCP approval:

- Conduct shoreline erosion surveys and document bank loss.

Within 5 to 10 years of CCP approval:

- Conduct baseline inventory and identify long-term monitoring protocols for breeding bank swallow populations.

Cyrus Brame/USFWS

Erosional bluff habitat along the James River

Objective 2.4

Non-forested Upland

Over the life of the plan, maintain 15 acres of non-forested upland for administrative purposes (e.g., weather station operation).

Discussion and Rationale

The refuge currently mows 13 acres as non-forested upland, which is less than 1 percent of the total refuge area. We regard these areas as incidental habitat of low value to wildlife, especially grassland birds, because of their small size and low-quality vegetation.

To prolong the onset of succession to transitional and eventually mature forest, and to support administrative uses of these areas, non-forested upland will continue to be mown at least once a year and cedars will be thinned or removed (USFWS 1996). Maintaining a mature forest with small pockets of non-forested upland is in keeping with the historic natural landscape of the area (Watts 1999).

We will selectively cut up to 2 acres of pine-dominated forest adjacent to the existing weather station as preventative maintenance to promote functioning of the station. Tall trees in the vicinity of the weather station can adversely affect signal transmission from the weather station to the satellites (National Wildfire Coordinating Group 2012; Craig 2013 personal communication). A total of 15 acres will be maintained as non-forested upland for administrative purposes.

We will continue to monitor infestations of invasive species and increase control of specific highly invasive species as resources allow. The VDCR published an advisory list of invasive alien plant species of Virginia to inform land managers of potential risks associated with certain plant species known to exhibit invasive behavior in some situations (*http://www.dcr.virginia.gov/natural_heritage/invsppdflist.shtml*; accessed August 2013). This list details light and moisture requirements, habitat regions, and degree of invasiveness for Virginia's most troublesome invaders. The species are ranked as highly invasive, moderately invasive, or occasionally invasive. Tree-of-heaven and Japanese stiltgrass are among the highly invasive species known to occur within or along the edges of the refuge's non-forested upland (Brame 2013 personal communication).

Strategies

Continue to:

- Mow at least once a year.

Within 3 years of CCP approval:

- Selectively cut up to 2 acres of pine-dominated forest around the weather station and manage it as non-forested upland to maintain equipment functions.

Inventory and Monitoring Activities
None.

GOAL 3 **CULTURAL RESOURCES**
Protect and conserve the refuge's cultural resources and landscape, and seek opportunities to increase knowledge and appreciation of the refuge's history as part of the lower James River.

Objective 3.1 **Cultural Resource Protection**
Within 5 years, use more precise information about archaeological sites to protect known archaeological sites and better inform refuge management decisions.

Discussion and Rationale
James River NWR contains significant archeological sites that have the potential to advance our understanding of Virginia prehistory and history. The sites surviving at the refuge chronicle Native American culture, initial settlement of the James River by Europeans, Native American resistance against European settlement, Plantation society, military history, post-Civil War rural agriculture, and 20th century African and Native American adaptation to the lack of economic opportunity. The sites are potentially significant regionally and perhaps nationally.

The management and protection of cultural resources is an integral element in fulfilling refuge goals. Service-initiated actions likely to affect archaeological and historic sites are routinely reviewed and assessed under the provisions of Section 106 of the NHPA. We will continue to consult the RHPO and SHPO early in project planning for activities that may involve ground disturbance. To date, projects requiring such review on the refuge have been limited. In preparation for this CCP, an archaeological overview of the refuge was prepared (Goode et al. 2007). That study located 47 new archaeological sites based on historic background research. A model of prehistoric archaeological site location and areas of high sensitivity were developed and can now be used to inform future refuge management actions.

The existing fire management plan (USFWS 2006) calls for protecting known archaeological sites and sensitive areas by delineated an area where forest management activities are not conducted. Conducting archaeological surveys before ground disturbing activities occur helps to ensure that vulnerable archaeological sites are identified and appropriate management actions are developed for the sites. In addition, by more precisely locating the sites, less acreage will need to be excluded from logging. Such surveys are conducted under Section 106 of the NHPA in advance of the proposed logging or could be conducted as part of a more comprehensive inventory of sensitive areas designed to improve management information for the refuge in

Cyrus Brame/USFWS

Skids used by forest management equipment

the future to satisfy Section 110 of the NHPA.

We will continue to conduct forest management activities at James River in accordance with SHPO-reviewed standard operating procedures and VDOF Best Management Practices (USFWS 2006), to allow logging to occur without further SHPO review. If necessary, we will work cooperatively to update the standard operating procedures to ensure protection of the refuge's cultural resources.

The current standard operating procedures include:

- Outfitting any equipment with high flotation tires.
- Marking known archaeological sites in the field and excluding these areas from any forest management activities.
- Using grapple skidders instead of cable skidders.
- Creating any new log landings without lowering the grade.
- Using skid trails only on level stands where no water diversion will be needed.
- Using only low pressure equipment for pre-mechanical thinning of small diameter trees.
- Identifying areas excluded from being logged.

We suspect archaeological sites along the refuge's shoreline and steep slopes may have been damaged by erosion. Three known archaeological sites will be evaluated and will possibly need stabilization (Small 2013 personal communication). Shoreline protection efforts we plan under objective 2.2 will also serve cultural resource protection; however, development and implementation of restoration plans will likely take more than 5 years to adequately prevent further shoreline erosion. At the same time, some of the shoreline protection efforts, such as tree planting and promoting forest succession on the refuge, could negatively impact archaeological sites. For example, the growing roots of trees could damage intact cultural levels and features (Kirchen 2013 personal communication). The development of a proactive NHPA Section 110 initiative prior to the implementation of these management activities will help ensure that vulnerable archaeological sites are identified and appropriate management actions are developed for the sites.

Strategies

Continue to:

- Consult with the RHPO and SHPO regarding refuge activities that have the potential to disturb the ground.
- Ensure that refuge activities are conducted in accordance with the approved standard operating procedures for mechanical pine thinning and fire management.

Throughout the life of the plan:

- Stabilize sites vulnerable to erosion.
- Conduct targeted archaeological Phase I surveys on strategically determined sensitive locations related to habitat management and survey structures on the refuge to determine eligibility for the National Register.
- Protect indigenous cultural landscapes of the moist hardwood forest, floodplain forest, freshwater marsh and shrub swamp, aquatic habitats, and erosional bluff.
- Promote professionally qualified and permitted archaeological research and study to expand professional knowledge and understanding of the objects, their context, and relevance.
- Assemble artifacts and field records of previous archaeological excavations on the refuge in a repository that meets Department of the Interior standards to make them available for research and interpretation.

Within 5 years of CCP approval:

- In advance of conducting forest management activities, refuge staff will prepare a list of the pine-dominated stands to be logged

and Service archaeologists will map and flag archaeological sites and sensitive areas with a buffer zone of 200 feet.

Inventory and Monitoring Activities
Within 5 years of CCP approval:

- Establish an archaeological site monitoring program, including both a baseline assessment of the two major excavated archaeological sites, site visits, and mapping to record location information and monitor site condition.

GOAL 4

WILDLIFE-DEPENDENT RECREATION

Provide wildlife dependent recreational opportunities for visitors to connect with nature and foster enhanced stewardship of the lower James River, Chesapeake Bay estuary, and the Refuge System.

Objective 4.1

Hunting

Over the next 3 to 5 years, provide high quality recreational hunting opportunities and complete all the administrative requirements to expand the existing deer hunt, add new hunts, and promote youth hunt involvement.

Discussion and Rationale
Hunting is one of the six priority public uses as outlined in the Refuge Improvement Act. We recognize deer hunting as a long-established, traditional outdoor pastime in this area of Virginia. When managed responsibly, it can instill a unique appreciation of wildlife, their behavior, and their habitat needs. Service policy also states that, where practicable, we should make our hunt regulations consistent with State regulations.

We will continue to administer the refuge's existing deer hunt while completing administrative requirements to expand the refuge's existing deer hunt and open the refuge to wild turkey and waterfowl hunting within 5 years of CCP approval. Promoting youth involvement in the refuge's existing deer hunt does not require us to complete any additional administrative documentation.

We will provide visitors with information related to the hunting opportunities at the refuge and to refuge-specific and State hunting regulations through various media, including the refuge website, signage, and brochures. For example, all materials related to the hunting program will promote the use of lead-free shot by hunters. Ingestion of lead-contaminated soil and prey are principal pathways for wildlife exposure (Kendall et al. 1996, Pattee and Pain 2003). Sensitivity to lead toxicity varies among bird species, but in most instances a single lead shot can kill a bird (Eisler 1988, Sanderson and Bellrose 1986). Lead shot has been found to have harmful effects on birds, particularly waterbirds, because of their feeding habits (Michael 2006). Laboratory studies show that an amount of lead as small as 82.5

milligrams can be lethal for a bald eagle (Pattee et al. 1981, Hoffman et al. 1981); this lethal amount represents less than one percent of a single 12-gauge slug, a single 20-gauge slug, or a single muzzleloader bullet. Promotional materials regarding lead-free shot will provide hunters with information on the impacts of lead shot on wildlife; encouragement to use cost-effective, lead-free ammunition when hunting deer and turkey on the refuge, as well as at non-refuge locations; and actions that can be taken to protect wildlife from contamination when lead shot is used.

Lead-free shot is required by Federal and State regulation for hunting all waterfowl, mergansers, coots, moorhens, gallinules, snipe, and rails (51 FR 23443, codified at 50 CFR 20.21; *http://www.dgif.virginia.gov/hunting/regulations/2013-2014-waterfowl-booklet.pdf,* accessed July 2014), but lead-free shot is not currently required by State law or refuge-specific regulation for deer or turkey hunting. While completing the administrative requirements for the proposed expanded hunt program, we will investigate the required use of lead-free ammunition for deer and turkey hunting. This will include identifying the impacts of lead exposure from hunting activities on wildlife as well as the impacts of lead ammunition restrictions on hunters.

Expanded Deer Hunt

Deer are common in the upland hardwood and mixed forested areas of the refuge. Woody herbaceous and fruit-producing plants are important to deer populations throughout the southeast (including Virginia). Acorns are a major component of whitetails' fall diet (Dickson 2001), and oak trees are common in the moist hardwood forests on the refuge. A substantial amount of escape cover, used for fleeing predators and bedding, is available in the refuge's pine forest. The refuge has a harvestable population, habitat that deer prefer, and the means to administer public hunting opportunities. The hunt is provided as a recreational opportunity and contributes to maintaining county herd populations.

Since the 1940s, VDGIF has based deer populations on harvest totals. The estimated deer population has been steadily increasing throughout the State, from low of 4,019 in 1947 to a high of 259,147 in 2008. The 5-year average for Prince George County is 2,254 deer, and this number is both holding relatively stable and similar to Statewide trends (*http://www.dgif.virginia.gov/wildlife/deer/harvest/index.asp*; accessed August 2013).

As detailed in chapter 3, the refuge offers public deer hunting opportunities to maintain the population of white-tailed deer at a level commensurate with the biological carrying capacity of the available refuge habitat and to provide high quality wildlife-oriented recreation. We offer hunting opportunities for public deer hunting on specific

days during the State's archery, muzzleloader, and shotgun seasons. The refuge harvest totals support that objective of having a stable deer population, with a female harvest rate of approximately 40 percent of the total deer kill (VDGIF 2012a). Based on the past 5 years of refuge participation data and harvest success ratios, deer hunters participating in the refuge muzzleloader and shotgun seasons have a harvest success ratio that is slightly better than the 2014-2015 State average (Brame 2015 personal communication).

We will continue to offer public deer hunting opportunities to maintain the population as determined by the State, and to continue providing this type of high quality wildlife-oriented recreation. We will offer a mix of archery, shotgun, and muzzleloader hunting opportunities on 1,460 hunter use days. We will increase the total number of hunter use days on the refuge by increasing the number of muzzleloader hunt days and participating in the State's Youth Deer Hunt Day.

We will increase the number hunt days in the muzzleloader hunting season, as opposed to increasing the archery or shotgun season, for two reasons. First, hunters wishing to participate in muzzleloader hunting opportunities are also interested in participating in shotgun hunting opportunities. We have heard from hunters that increasing the number of muzzleloader hunt days on the refuge will be of interest because they have less opportunity on non-refuge lands to hunt, largely due to private hunt club restrictions, during muzzleloader season (Brame 2013 personal communication). Second, we have documented that hunters participating in our muzzleloader season have a higher rate of success than hunters participating in the refuge's archery or shotgun hunt seasons (Brame 2013 personal communication). Increasing our muzzleloader hunt days will help to satisfy the public request for more deer hunting opportunities on the refuge and meet our need to provide a quality hunt.

We will make administrative changes to our hunt program and enhance our promotional efforts to increase hunter participation in each of the hunts offered. We will enhance our promotional efforts through various media, including our refuge website and VDGIF, to reach a larger audience. By having a large pool of hunters that are familiar with the refuge opportunity, we will fill available hunting spaces and issue more permits on the day of the hunt on a first-come, first-served basis. We aim to increase hunter participation to 35 percent annually, across the three hunt seasons. This will include the 19-day archery season, during which participants are authorized to hunt every day available to them, but rarely do. A 35 percent hunter participation means that hunting will occur on at least 511 of the total 1,460 hunter use days offered annually.

New Hunts

Turkey Hunting: VDGIF and the public requested we consider providing opportunities for turkey hunting at James River NWR. Turkey hunting is an extremely popular form of hunting in Virginia. During the 2011-2012 hunt season, turkey hunters accounted for 38 percent of all hunters in Virginia (VDGIF 2013b). In 2011 to 2012, Virginia hunters were asked how important different forms of hunting were to them; spring turkey season ranked 2nd and fall turkey season ranked 3rd most important (VDGIF 2013b). In addition, a Service-led visitor services review (USFWS 2010b) recommended that James River NWR explore possibility of fall turkey hunting opportunities that could couple with or complement the deer hunt without additional staff involvement. VDGIF established a youth spring gobbler hunt day in 2004 and a youth fall turkey hunt day in 2008. In 2013, nearly 3 percent of the spring gobbler harvest (522 birds) occurred during the Special Youth Season (*http://www.dgif.virginia.gov/wildlife/turkey/springharvestsummary.asp*; accessed June 2014).

Wild turkeys are common in the hardwood and mixed forested areas of the refuge (USFWS 1992). Oak mast is the most important spring and winter food for wild turkeys (Hurst 1992) and greatly influences wild turkey population dynamics (Steffen et al. 2002). Oak trees are common in the moist hardwood forests on the refuge. While no reliable, economically feasible method exists for accurately estimating turkey populations in Virginia, research shows that the best indices of turkey population trends and abundance are spring gobbler harvests and success by hunters (VDGIF 2013b). Relative densities of wild turkey populations in the immediate vicinity of the refuge in 2012 were found to be high with populations stable or increasing across the region from 2003 to 2012 (VDGIF 2013b).

We will open the refuge to accommodate up to 1,260 turkey hunter use days annually. We will offer wild turkey hunting during the State's fall season in conjunction with the refuge's fall archery and muzzleloader deer hunt seasons and 3 days of wild turkey hunting during the State's spring season. A hunter participating in a refuge hunt during a fall designated deer and turkey hunt day will be allowed to take either species or both.

Developing a wild turkey hunting program will give us the opportunity to provide additional hunting opportunities to the surrounding community, potentially attracting a new hunter user group of hunters interested in taking only turkey during a combined deer and turkey hunt. Offering a spring turkey season will also enable us to offer a different hunt opportunity that will attract a new and different hunter user group. Gobbler-only hunting in the spring is a different hunting approach that taking turkey while hunting for other species.

We will be able to open the refuge to limited spring turkey hunt opportunities when we complete the administrative requirements for opening the refuge to this new hunting opportunity, establish the necessary thinning and burning regime for the pine-dominated forest to transition toward a pine savanna, and complete public use infrastructure improvements to support this new hunting opportunity. We will coordinate closely with VDGIF to keep informed about State hunting regulations, trends in turkey populations, and disease outbreaks to most effectively manage the wild turkey hunting program at the refuge.

Waterfowl Hunting: The public requested we consider providing opportunities for waterfowl hunting at James River NWR. A 2010 survey of Virginia waterfowl hunters showed that what made for an enjoyable waterfowl hunting experience included being in the field and enjoying the outdoors (89 percent); seeing waterfowl (87 percent); and being able to hunt with friends or family (85 percent). Only 9 percent of Virginia waterfowl hunters accompanied a youth on the designated youth waterfowl hunting day during the 2009 to 2010 season (Jagnow et al. 2010).

In the late 1990s, the Service began promoting youth waterfowl hunting. To promote youth involvement in waterfowl hunting at James River NWR, we will open the refuge to accommodate up to four hunters (at least one youth hunter per licensed adult companion on each of 10 days; 40 waterfowl hunter use days) during the State's season. Waterfowl hunting will be allowed on the refuge from one stationary blind that will accommodate up to four people, which will also serve as a wildlife observation and photography blind on non-hunt days. We will construct the blind at the northern most tip of the Powell Creek trail. On waterfowl hunt days, we will close a portion of the wildlife observation trail to minimize the potential for user conflicts and safety concerns.

Susan Heisey/USFWS

Youth hunting

Promote Youth Hunt Involvement
The VDGIF and public requested that we consider promoting youth hunt involvement. State fish and wildlife agencies across the Nation have reported significant declines in the number of youth hunters (Engelmeyer 2013 personal communication). Virginia has observed a 30-year decline in hunting license sales and, in response, has implemented a youth hunting program (*http://www.dgif.virginia.gov/about/board/issues/hunter-recruitment-retention/hunter-recruitment-retention-presentation.pdf;* accessed August 2013). The State has designated specific youth hunt days outside of regular hunt seasons to provide youth with the opportunity to learn how to hunt from experienced, licensed hunters.

We will offer youth hunting at the refuge on the State youth deer, turkey, and waterfowl hunt days that are designated in the annual issue of *Hunting and Trapping in Virginia* Regulations Digest. By providing separate youth hunt days on the refuge, we will contribute to the State and Service's goals of developing a new generation of hunters and fostering a sense of stewardship for the environment.

Although no new specialized infrastructure will be required to solely support youth hunting opportunities, we will renovate the interior and exterior of the hunter check station to become a visitor contact station. The visitor contact station will have the look and feel of an old-time hunting and fishing lodge. We will include features such as archival hunting and fishing photos and wildlife mounts to complement a comfortable, down-home setting. We will highlight how hunters and anglers contributed to the early conservation movement, as well as the rich history of the Service. Sustainable materials and green technologies will be featured throughout the visitor contact station. The footprint of the visitor contact station will not change unless required to meet ADA requirements. If any required changes result in an increase in footprint, we aim to avoid or minimize the potential for ground disturbance. The visitor contact station will continue to be a staging and registration area for all hunt programs.

Strategies
Continue to:

- Administer public deer hunt in accordance with the approved hunt management plan (1993) and subsequent amendments to accommodate up to:
    - Fifty hunters to hunt on any or all days within one 19-day archery season (950 hunter use days annually).
    - Seventy hunters per day on each of 2 muzzleloader hunting days (140 hunter use days annually).
    - Seventy hunters per day on each of 4 shotgun hunting days

(280 hunter use days annually).

Throughout the life of the plan:

- Allow adaptive management of hunt days offered based on State monitoring program (DMAP) recommendations for herd management.

Within 3 years of CCP approval:

- Improve hunt administration processes to increase hunter participation.
- Enhance promotion of the hunt to a larger audience, including youth.
- Construct a four-person stationary blind along the northern peninsula of the Powell Creek trail.

Within 5 years of CCP approval:

- Complete all administrative requirements for the proposed expanded hunt program once the CCP is approved and resources are available, including developing a separate NEPA document, compatibility determination, hunt plan, and further public involvement, to accommodate up to:
  - Deer:
    - Fifty hunters on any or all days within one 19-day fall archery season (950 hunter use days annually).
    - Seventy hunters per day on each of 3 fall muzzleloader hunting days (210 hunter use days annually).
    - Seventy hunters per day on each of 4 fall shotgun hunting days (280 hunter use days annually).
    - Twenty youth hunters to participate in the 1 fall State Youth Deer Hunt Day (20 hunter use days annually).
  - Turkey:
    - Fifty hunters per day on any or all 19 days, in conjunction with the 19-day fall archery deer hunt season (950 hunter use days annually).
    - Seventy hunters per day on each of 3 hunt days, in conjunction with fall muzzleloader deer hunt season (210 hunter use days annually).
    - Twenty hunters per day on 3 days during the State's spring season (60 hunter use days annually)

- Twenty youth hunters on 1 spring day and 1 fall day, in conjunction with the State's Youth Turkey Hunt Day (40 hunter use days annually).

- Waterfowl:

  - Open one location on Powell Creek for four hunters (at least one youth per licensed adult) on each of 10 hunt days (40 hunter use days annually).

- Provide visitors with general information on the expanded hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote use of lead-free ammunition.

- Investigate the required use of lead-free ammunition for deer and turkey hunting, including identifying the impacts of lead exposure from hunting activities on wildlife and the impacts of lead ammunition restrictions on hunters.

Within 5 to 15 years of CCP approval:

- Renovate the hunter check station with features that are similar to an old-time hunting and fishing lodge (archival hunt/fishing photos, mounts, and comfortable/downhome setting). The facility will highlight the rich history of the Service and the conservation movement and serve as a staging/registration area for all hunt programs.

Inventory and Monitoring Activities

Continue to:

- Monitor harvest success ratios, harvested game species health, and public safety.

- As needed throughout the year, coordinate with DGIF District Biologist to evaluate game species population size, disease issues, and current regulations.

- Participate in the VDGIF DMAP.

Within 5 years of CCP approval:

- Request that each waterfowl hunt participant complete the Migratory Bird Hunt Report (FWS form 3-2361).

Objective 4.2

Wildlife Observation, Photography, Environmental Education, and Interpretation

Over the next 10 years, provide infrastructure within a designated area to support opportunities for visitors to participate in wildlife observation, photography, environmental education, and interpretation to improve the quality of visitor experiences.

Discussion and Rationale

Wildlife observation, photography, environmental education, and interpretation are four of the six priority public uses as outlined in the Refuge Improvement Act. When managed responsibly, these uses can instill refuge visitors with a deeper appreciation for wildlife, their behavior, and their habitat needs.

As part of the data gathering process for developing the Virginia Outdoor Plan (VOP), VDCR sponsored an outdoor demand survey in 2011. The Statewide survey asked respondents to select up to three recreation opportunities that are most needed in Virginia from a list of possibilities. The most frequently selected choices were trails for hiking and walking (68 percent); public access to State waters for fishing, swimming, and beach use (60 percent); and access to natural areas (55 percent) (Ellis et al. 2012).

A Service-led visitor services review (USFWS 2010b) recommended that the refuge:

- Provide unreserved access to Powell Creek Trail.
- Consider extending the Powell Creek Trail to provide a richer experience.
- Ensure part of this trail is ADA-compliant.
- Consider converting the existing hunter check station into a visitor contact station.

Within 5 years of CCP approval, we will complete a VSP to designate a 240-acre area adjacent to Powell Creek in which we will develop public use infrastructure (maps 4.2 and 4.3) to support wildlife observation, photography, environmental education, and interpretation. We believe that designating a total of 240 acres to support these public uses will dovetail well with our habitat management actions.

Within the public use area, we will improve public parking by providing an area to support up to 20 vehicles and a bus (approximately 14,000 square feet). The new parking area will include a trailhead that will provide access to the existing 0.5-mile trail. Following the development of the parking area and trailhead, we will open the existing 0.5-mile trail to wildlife observation, photography, environmental education, and interpretation from sunrise to sunset. The public use area will be open throughout the year, including on refuge hunt days. However, we will administer the hunt programs in a manner that ensures public safety. Wildlife observation, photography, environmental education, and interpretation will be conducted on designated refuge roads and trails in all Service-owned areas open to the public.

We will improve the refuge's restroom facilities and renovate the hunter check station to become the refuge's visitor contact station as discussed under objective 4.1. We will upgrade the existing equipment shed to serve as an outdoor meeting space for partners promoting Service mission-related topics. The location for new facilities will be selected based on ease of access, high value for watchable wildlife opportunities, clearly defined man-made features and natural barriers (e.g., archaeological resources, roads, and waterways), and placement away from conflicting upland habitat management and consumptive recreational activities (e.g., prescribed burns, mechanical thinning, and hunting). Completion of these facility improvements and other improvements that may be proposed in the VSP will allow us to accommodate an increase in refuge visitation and lift our refuge permit requirement to visit, while ensuring compatibility with the Refuge System mission and refuge's purpose.

We will also provide local, regional, and national visitors an opportunity to connect with nature and learn about our diverse ecosystem. Within Prince George County, green spaces designated for wildlife observation opportunities and preserved native habitats are lacking. We will work more actively with Prince George County Parks and Recreation Department to provide environmental education and interpretation programs. James River NWR is located within a 25-mile radius of Richmond, which makes it a candidate for an urban refuge. To reach out to this key audience, we will develop an urban partnership to coordinate with local schools to establish regular visitation and introduce community youth to the natural resources within their county. Biology classes could use the trails and facilities as an outdoor classroom, as a location for stewardship project, or as a place to encourage connections with nature.

Within 5 to 10 years of CCP approval, we will continue to improve visitor support facilities in designated areas. For example, we will extend the existing 0.5-mile trail to 3 miles, including a portion that will be ADA-compliant; improve vehicular ingress and egress route(s) on the refuge and establish two additional parking areas, each of which will accommodate up to five vehicles for trail users; and improve the existing canoe/kayak launch to provide access to Powell Creek for canoes, kayaks, and non-trailered, hand-launched boats with small electric motors. Completion of these and other facility improvements will support an increase in refuge visitation in the long term.

Within the life of the plan, we will relocate the maintenance complex from the public use area to a less public location that will also improve our refuge operational efficiency.

We will monitor existing and newly constructed infrastructure used by visitors to determine use patterns and capacity limits, as well as monitor impacts on vegetation and wildlife within public use area and

track trends.

Strategies

Continue to:

- Require participants to request a refuge-issued permit three business days in advance of proposed visit until signage and visitor support facility improvements are completed.

Within 5 years of CCP approval:

- Designate a 240-acre area adjacent to Powell Creek in which we will develop public use infrastructure.
- Improve public parking (approximately 14,000 square feet, sufficient for 20 vehicles and a bus) and establish a trailhead that will provide access to the existing 0.5-mile trail.
- Open public access from sunrise to sunset.
- Improve restroom facilities and renovate hunter check station to become a visitor contact station.
- Upgrade equipment shed to serve as an outdoor meeting space for partners promoting Service mission-related topics.
- Partner with Prince George County Parks and Recreation Department to administer environmental education and interpretation programs.

Within 5 to 10 years of CCP approval:

- Improve visitor use facilities in designated areas, in particular:
  - Extend the existing 0.5-mile trail to become a 3-mile wildlife observation trail system with:
    - A pedestrian walkway as part of the trail, which doubles as an observation platform along steep valleys.
    - An improved canoe/kayak launch.
    - An improved vehicular ingress and egress route(s) and establish two additional parking areas (combined total of approximately 7,000 square feet, sufficient for five vehicles each).
    - An improved access at Powell Creek to accommodate nature trail users' access to island.
    - Develop interpretive signs and brochures to address topics of interest including, but not limited to, bald eagle life history and recovery success, forest management, and indigenous cultural landscapes.

- Construct a four-person wildlife observation/photography blind along Powell Creek.

- Provide refuge or partnered-sponsored programs throughout the year, using a reservation system only when space or equipment is limited (such as boat trips or canoe sojourns).

- Offer two boat tours annually, specifically to observe bald eagles.

- Develop an urban partnership to coordinate with local schools to establish regular visitation and introduce community youth to the natural resources within their county.

Within the life of the plan:

- Relocate the maintenance complex from the area of high visitor use to a more centralized, non-public location.

Inventory and Monitoring Activities

Continue to:

- Monitor conditions of existing facilities and infrastructure used by visitors (e.g., trail, restrooms, kiosk).

Throughout the life of the plan:

- Monitor existing and newly constructed infrastructure used by visitors to determine use patterns and capacity limits.

- Monitor impacts on vegetation and wildlife within public use area and track trends, adjust public access as necessary.

Objective 4.3

Fishing

Over the next 5 years, open the refuge to year-round fishing at up to two designated locations to accommodate up to 1,460 anglers annually.

Discussion and Rationale

The Refuge Improvement Act identifies fishing as a priority wildlife-dependent recreation activity. 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 and an important cultural activity in this area of Virginia. Fishing promotes public understanding and appreciation of natural resources and their management on lands and waters in the Refuge System.

We received public comments requesting that the refuge be opened to recreational fishing and that we provide public access to waterways for fishing. Additionally, according to the 2007 VOP (VDCR 2007), fishing ranked as the seventh most popular outdoor recreational activity; improved access to Virginia's rivers and streams is necessary to meet water-related recreational demands.

The refuge will remain closed to fishing until we completed the administrative requirements to open the refuge to fishing. We will complete these administrative requirements within 5 years of CCP approval.

After completion of the administrative requirements and within 5 years of CCP approval, we will open the refuge to fishing at up to two designated locations. Both locations will provide access to fishing in Powell Creek. At the first location, we will improve the infrastructure at the canoe launch site to establish it as a fishing location. Improvements at this site will also facilitate non-trailered, hand-launching of canoes, kayaks, and boats with small electric motors for fishing access to Powell Creek. At a second location along Powell Creek (yet to be determined), we will create infrastructure to establish a fishing location. The second fishing location will be sited to ensure that a quality fishing opportunity will be offered and easily accessible.

Fishermen will park at designated parking areas for public access to the 3-mile trail network (e.g., gravel corridors, unimproved dirt trails, and boardwalk) on foot and travel to the two designated fishing locations (maps 4.2 and 4.3). To facilitate access to the fishing locations, we will improve and maintain roads and parking areas. Designating these two sites for fishing access will enable us to open the refuge to a traditional, priority wildlife-dependent recreation activity while continuing to protect the shoreline, particularly in areas of eagle nests or high concentration roosting activity. We anticipate that up to 1,460 fishermen will be accommodated annually, assuming two anglers per day will use each of the two sites daily. Fishing of some sort can be accommodated throughout the year, as determined by VDGIF.

We will provide visitors with information related to the fishing opportunities at the refuge and to refuge-specific and State fishing regulations through various media, including the refuge website, signage, and brochures. For example, we will advise fishermen that the refuge will remain closed to herring dipping in accordance with State regulations (4 VAC 20-1260-10 et seq.). All materials related to the fishing program will promote the use of lead-free tackle by anglers. Lead tackle has been found to have harmful effects on birds, particularly waterbirds, because of their feeding habits (Michael 2006). Sensitivity to lead toxicity varies among bird species, but in most instances a single fishing weight can kill a bird (Eisler 1988, Sanderson and Bellrose 1986). Promotional materials regarding lead-free tackle will inform anglers about the impacts of lead tackle and encourage them to utilize cost-effective, lead-free tackle alternatives when fishing on the refuge as well as at non-refuge locations.

We will monitor the refuge support facilities at both designated fishing locations for fishing-related impacts. We will coordinate closely with

VDGIF to keep informed about State fishing regulations, trends in fish populations, and disease outbreaks in fish to most effectively manage the fishing program at the refuge.

Strategies

Within 5 years of CCP approval:

- Complete all administrative requirements for the proposed opening of the refuge to fishing once the CCP is approved and resources are available, including developing a separate NEPA document, compatibility determination, sport fishing plan, and further public involvement.

Within 5 to 10 years of CCP approval:

- Allow fishing (rod and hook) at up to two designated sites on Powell Creek.
- Improve and maintain access roads and parking areas for accessing both fishing locations.
- Work with partners and volunteers to improve the infrastructure at the canoe/kayak launch site to establish it as a fishing location and to facilitate non-trailered, hand-launched boat access to Powell Creek.
- Provide visitors with general information on the fishing program and refuge-specific and State regulations through the refuge website, information signs, and a fishing brochure. In all materials related to the fishing program, promote use of lead-free tackle.

Inventory and Monitoring Activities

Throughout the life of the plan:

- Monitor the refuge support facilities associated with fishing.
- Coordinate with VDGIF regarding angler regulations, fish populations, and disease notifications.
- Monitor impacts on vegetation and wildlife within public use area and track trends, adjust public access as necessary.

GOAL 5

PARTNERSHIPS

Develop new partnerships and strengthen existing partnerships to promote natural and cultural resource conservation and the mission of the Refuge System.

Objective 5.1

Partnerships

Over the life of the plan, enhance existing partnerships and develop new partnerships with Federal, State, and local government agencies, non-government organizations, academic institutions, conservation organizations, and volunteers to fulfill mutual natural resource conservation mandates and help meet wildlife, habitat, and visitor

services objectives.

Discussion and Rationale

Developing and maintaining partnerships is key to fulfilling the Service's mission. At the heart of the Service's mission are the conservation and management of the Federal Trust Species: migratory birds, threatened and endangered species, interjurisdictional fish, certain marine mammals, and species of international concern. It is estimated that 73 percent of our Nation's land is privately owned and that the majority of our fish and wildlife resources occur on those lands. Consequently, we recognize that other government agencies, organizations, conservation groups, and individuals share our interest in providing for fish and wildlife needs.

We will expand our wildlife, habitat, and public use management programs while also anticipating that a level or declining budget environment will affect our flexibility in managing financial resources and may have implications for the level of permanent staffing. Maintaining and expanding our existing partnerships, as well as developing new partnerships, will promote the refuge in its effort to fulfill its wildlife, habitat, and public use management programs despite budgetary and staffing uncertainties. The potential for developing existing and new partnerships with other government agencies and organizations was highlighted in the 2007 VOP as a way to allow additional recreational access and involve volunteers in assisting refuge staff in managing and monitoring of the refuge. (*http://www.dcr.virginia.gov/recreational_planning/documents/voppd19.pdf;* accessed April 2014)

Our existing partnerships with VDGIF, VDOF, TNC, and VDCR Natural Heritage Program provide needed assistance for managing habitat resources on the refuge and increase our success in effectively managing habitats for species of concern. Habitat management activities will increase with the transformation of the pine-dominated forest towards a mature pine savanna forest. This increase in activity will require an expansion of existing partnerships as well as the creation of new partnerships to help inform management decisions, to conduct management activities, and to fully understand the impacts of management activities on habitats and species. Increased habitat management activity will also require an increase in volunteers to assist in performing these activities, such as monitoring the effects of a thinning operation or prescribed fire.

Research is essential to successful habitat and species management; however, refuge staff is extremely limited in our ability to design and conduct research projects. The research conducted by our Ecological Services Virginia Field Office, VCU, CCB, and Richmond Audubon provides important data and information that helps guide refuge management decisions and activities. The Service will undertake a

number of new activities and develop a suite of new questions regarding the effectiveness of management techniques, the impacts of climate change on habitats and species, the benefits of management to habitats and species, and the effects of increase visitor use opportunities on the refuge and the public. Expanding existing partnerships and developing new partnerships offers the opportunity to conduct research to answer these and other questions. The refuge will continue to collaborate with existing partners, as well as develop new partnerships, to enhance the existing research program.

Public outreach improves recognition of the refuge, the Refuge System, and the Service among neighbors, local leaders, conservation organizations, and elected officials. By participating in community events, refuge staff is better able to engage with the public in direct communication and raising awareness about the refuge. Although we are constrained by limited available resources and staffing, we are able to effectively reach the public through partnerships. Our partnerships with the NPS for the Captain John Smith Chesapeake NHT, Richmond Audubon, CBF, and JRA enable us to conduct more effective outreach and provide more wildlife-dependent recreational opportunities on the refuge than we could do alone. Our collective public outreach efforts garner support for conservation in the region. Implementing this CCP will result in increased visitor use and public outreach opportunities that will be supported by building and maintaining a variety of new visitor use support facilities, such as an expanded trail, fishing platforms, and canoe/kayak launch. The refuge will expand existing partnerships and develop new partnerships to conduct outreach on and off-refuge, and providing wildlife-dependent recreational opportunities on the refuge, as well as involve volunteers in the construction and maintenance of new visitor use support facilities. Past refuge volunteers have provided a great service to us and enjoyed themselves. We will offer increased opportunities for volunteers to engage with our staff, each other, and the public.

Since refuge establishment, we have developed and maintained partnerships with a variety of groups to fulfill the refuge's purpose and meet management goals and objectives. Some of our partnerships have been formally documented, while others remain informal agreements. For example, the Service entered into a cooperative agreement with NPS, USFS, and Commonwealth of Virginia for wildland fire management and Stafford Act response. In contrast, there is no formal agreement or documentation between the Service or refuge with the Appalachian Trail Club for habitat management assistance and infrastructure maintenance at James River NWR. We will significantly increase our work with partners and volunteers on the refuge in a strategic way that will help achieve our expanded wildlife, habitat, and public use objectives.

Strategies

Continue to:

- Maintain existing partnerships to manage forests and respond to wildfires; conduct formal and informal biological inventory, monitoring, and research; conduct cultural resource surveys; offer environmental education and wildlife interpretation programs; and maintain refuge infrastructure.

Within 5 years of CCP approval:

- Expand partnership with NPS to accomplish Captain John Smith Chesapeake NHT interpretive and resource protection goals associated with Powell Creek and indigenous cultural landscapes, as well as partnership for improving the existing canoe/kayak launch on Powell Creek.

Within 5 to 10 years of CCP approval:

- Expand existing partnerships individually, and in small groups, with JRA, CBF, and Virginia Master Naturalists Chapters.
- Develop new and expand on existing partnerships with universities for research and environmental education programs.
- Create a Friends group or develop new partnerships with other organizations in support of off-refuge environmental education.
- Encourage long-term volunteers and seasonal volunteers by constructing a building or recreational vehicle hookups near where water and electricity are available.

Inventory and Monitoring Activities

Within 5 years of CCP approval:

- Assess effectiveness of expanded public use opportunities including youth engagement and outreach efforts, promotion of conservation messages, and visitor satisfaction.