

Appendix A



Matt Tillett

Brown-headed nuthatch

Resources of Concern

Introduction

Congress has entrusted the Service to conserve and protect migratory birds and fish, federally listed threatened and endangered species, interjurisdictional fishes, wetlands, and certain marine mammals. These are known as “trust resources.”

In addition to this Service mandate, each refuge has one or more purposes for which it was established that guide its management goals and objectives. Further, refuges support other elements of biological diversity including invertebrates, rare plants, unique natural communities, and ecological processes that contribute to biological diversity, integrity, and environmental health at the refuge, ecosystem, and broader scales (USFWS 1999, USFWS 2003).

Given the multitude of purposes, mandates, policies, regional, and national plans that can apply to a refuge, there is a need to identify the potential resources of concern and then prioritize those resources that the refuge is best suited to focus on in its management strategies. We followed the process detailed in the *Identifying Refuge Resources of Concern and Management Priorities: A Handbook* (Paveglio and Taylor 2010). The following narrative details the process we used to identify priority resources of concern and develop habitat goals, objectives, and strategies to benefit these resources associated with James River NWR.

I. What is a Resource of Concern?

The Habitat Management Plan policy (620 FW) defines “resources of concern” as

*All plant and/or animal **species, species groups, or communities** specifically identified in Refuge purpose(s), System mission, or international, national, regional, State, or ecosystem conservation plans or acts. For example, waterfowl and shorebirds are a resource of concern on a refuge whose purpose is to protect ‘migrating waterfowl and shorebirds.’ Federal or State threatened and endangered species on that same refuge are also a resource of concern under terms of the respective endangered species acts.*

II. Identifying Potential Resources of Concern for the James River NWR

In collaboration with refuge planning staff and technical experts (see chapter 5), we developed a matrix of potential resources of concern for the refuge. To determine the potential resources of concern that would guide the management priorities at James River NWR, we examined a multitude of guiding documents and other information sources. These documents, plans, or policies typically identify resources of concern, species groups, or habitats. These sources fall into four categories:

- Legal Mandates.
- USFWS Trust Resources.
- Biological Integrity, Diversity, and Environmental Health Policy.
- Regional Conservation Plans.

a. Legal Mandates

i. Statutory Authority

National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd–668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act) (Public Law 105-57; 111 Stat. 1253) provides

guidelines and directives for administration and management of all areas in the system, including "wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, or waterfowl production areas."

The Refuge Improvement Act states that each refuge shall be managed to fulfill the mission of the Refuge System: "*To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.*" (Public Law 105-57)

ii. Enabling Legislation

The enabling legislation is the legal authority used to establish a new refuge and acquire lands for that refuge.

The purpose of the Endangered Species Act of 1973, as amended (ESA; 7 U.S.C. § 136; 16 U.S.C. 1531 et seq.), is to protect and recover imperiled species and the ecosystems upon which they depend. The ESA provides authority to acquire habitat specifically for endangered species, in addition to acquisition authorities previously vested in the Secretary of the Interior.

The ESA authority was used to establish and acquire land for the creation of the James River NWR. The Chesapeake Bay Bald Eagle Recovery Team recommended the establishment of this refuge to protect vital bald eagle roosting and nesting habitat. At the time of refuge establishment, bald eagles were federally listed endangered and the James River NWR was the fourth refuge established specifically for the protection of bald eagles.

iii. Refuge Purpose

Purposes of a refuge are those specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge sub-unit.

The purpose of James River NWR is derived from the ESA, and is specifically "*...to conserve (A) fish or wildlife which are listed as endangered species or threatened species...or (B) plants.*"

b. USFWS Trust Resources

Although the refuge purposes are the first obligation, managing for trust resources (defined above) is also a priority for the refuge. Trust resources are further defined as follows:

i. Migratory Birds

A list of all species of migratory birds protected by the Migratory Bird Treaty Act (16 U.S.C. 703–711) and subject to the regulations on migratory birds are contained in subchapter B of 50 CFR § 10.13. The Migratory Birds Program also maintains subsets of this list that provide priorities at the national, regional, and ecoregional (bird conservation region) scales.

The primary sources of information that the refuge used to identify potential migratory birds species of concern included:

- ❖ The South Atlantic migratory bird initiative plan (Bird Conservation Region 27).
 - ❖ The Mid-Atlantic/Southern New England draft implementation plan (Bird Conservation Region 30).
 - ❖ Partners in Flight (PIF) Mid-Atlantic Coastal Plain Priority Species List (PIF 44).
 - ❖ USFWS's 2008 birds of conservation concern list.
 - ❖ The North American Waterbird conservation plan.
 - ❖ The Atlantic Coastal Joint Venture Waterfowl implementation plan.
- ii. Interjurisdictional Fish
This group includes those fish populations “...that two or more States, nations, or Native American tribal governments manage because of their geographic distribution or migratory patterns” (710 FW 1.5H). Examples include anadromous species of salmon and free-roaming species endemic to large river systems, such as paddlefish and sturgeon (FWS Director’s Order No. 132, Section 6[c]).
- The primary sources of information that the refuge used to identify potential fish species of concern included the Atlantic States Marine Fisheries Commission list of interjurisdictional fish.
- iii. Marine Mammals
The Marine Mammal Protection Act of 1972 (16 U.S.C. 1361-1407) prohibits, with certain exceptions, the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importing of marine mammals and marine mammal products into the U.S. No marine mammals were found to utilize James River NWR.
- iv. Wetlands
The Emergency Wetlands Resources Act of 1986 (Public Law 99-645; 100 Stat. 3582) authorizes the purchase of wetlands from Land and Water Conservation Fund monies, removing a prior prohibition on such acquisitions. It requires the Secretary to establish a National Wetlands Priority Conservation Plan, requires the States to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund amounts equal to the import duties on arms and ammunition.
- James River NWR wetlands are included in the list of wetlands that warrant protection (USFWS Regional Wetlands Concept Plan, Emergency Wetlands Resources Act, October 1990).
- v. Threatened and Endangered Species
The Endangered Species Act of 1973 states that “*The Secretary of the Interior ... is designated as the Management Authority and the Scientific Authority for purposes of the Convention and the respective functions of each such Authority shall be carried out through the United States Fish and Wildlife Service.*” The ESA also requires all Federal departments and agencies shall seek to conserve

endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act.

To identify Federal threatened or endangered species of relevance to James River NWR we reviewed:

- ❖ Federal Threatened and Endangered Species
 - FWS Environmental Online Conservation System (ECOS) database
 - National Marine Fisheries list
- ❖ Recovery Plans for federally listed species in our region

c. Biological Integrity, Diversity, and Environmental Health (BIDEH)

The 1997 National Wildlife Refuge System Improvement Act states that in administering the System the Service shall “... *ensure that the biological integrity, diversity, and environmental health of the System are maintained...*” (601 FW 3; also known as the “Integrity Policy”). The USFWS (2003) defines these terms as:

- **Biological Diversity**—the variety of life and its processes, including the variety of living organisms, the genetic differences between them, and the communities and ecosystems in which they occur.
- **Biological Integrity**—biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities.
- **Environmental Health**—composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment.

Where possible management on the refuge restores or mimics natural ecosystem processes or functions and thereby maintains biological diversity, integrity, and environmental health. Given the continually changing environmental conditions and landscape patterns of the past and present (e.g., rapid development, climate change, sea level rise), relying on natural processes is not always feasible nor always the best management strategy for conserving wildlife resources. Uncertainty about the future requires that the refuge manage within a natural range of variability rather than emulating an arbitrary point in time. This maintains mechanisms that allow species, genetic strains, and natural communities to evolve with changing conditions, rather than necessarily trying to maintain stability.

As stated by Meretsky et al. (2006), the Integrity Policy directs refuges to assess their importance across landscape scales and to “*forge solutions to problems arising outside refuge boundaries.*” Some of these regional land use problems include habitat fragmentation/lack of connectivity, high levels of contaminants, and incompatible development or recreational activities.

To assess the historical condition, site capability, current regional landscape conditions, and biological diversity and environmental health data pertinent to James River NWR, we used the following resources:

- Current maps of the refuge with existing vegetative communities.

- Descriptions from the Northeast Terrestrial Wildlife Habitat Classification (Gawler 2008).

Table A.1 describes the BIDEH elements for existing habitats on the refuge.

Table A.1 Summary of Biological Integrity, Diversity, and Environmental Health (BIDEH) Elements of James River NWR

Broad Habitat Type	Population/Habitat Attributes	Natural Processes Responsible for these Conditions	Limiting Factors
Pine-dominated Forest	<p>Abandoned loblolly pine plantations or early-successional loblolly pine forests established after agriculture ended. Soil and topography result in more moist conditions than upland pine stands in sandy conditions. Canopy dominated by loblolly pine with varying amounts of white, red, black, and post oaks in both upper and mid-canopy. Sweetgum may be present but not generally dominant. Shrub layer is of variable closure and often characterized by American holly, wax myrtle, or swamp bay. Vines such as common greenbrier, muscadine, and poison ivy can contribute considerable midstory cover. Herbaceous layer is sparse to non-existent, or made of exotic species such as Japanese stiltgrass.</p> <p><i>Potential Conservation Species: brown-headed nuthatch, chuck-will's-widow, eastern hognose snake, eastern slender glass lizard, northern scarletsnake, oak toad, pine warbler, red-headed woodpecker, silver-haired bat, southeastern fox squirrel, southern chorus frog, yellow-billed cuckoo</i></p>	<p>Historical agricultural use removed original forest cover and kept areas clear of woody vegetation until farming stopped. Most recently loblolly pines were densely planted for silviculture. Periodic natural-process fire reduces understory vegetation.</p>	<p>Disease occurs in high density stands. Invasive species spread in the understory. Large storm events with strong wind components. Legacy of historic plantings driving current community composition and structure. Suppression of fire.</p>
Moist Hardwood Forest	<p>Moist upland forested areas typically found on lower slopes, bluffs along streams and rivers in dissected terrain, mesic flats between drier pine-dominated uplands and floodplains, and local raised areas within bottomland terraces or wet flats. Forest stands are naturally sheltered from frequent fire. Soils are variable in both texture and pH. Vegetation consists of tree-dominated forest and includes a significant component of mesophytic deciduous hardwood species, such as beech or southern sugar maple. Upland and bottomland oaks at the mid range of moisture tolerance are also usually present, particularly white oak, but sometimes also southern red oak, Virginia pine, and loblolly pine are present but not dominant. Shrub and herb layers may be sparse or moderately dense.</p>	<p>Located on active floodplains or river terraces and subject to temporary or seasonal flooding. Also occurs along or on steep slopes or ravines. Dominant hardwood species composition and moist soils reduces fire's effect on this habitat.</p>	<p>Altered hydrology due to mechanical treatments or draining of moist areas. Invasive species can spread and change the composition of understory vegetation.</p>

Broad Habitat Type	Population/Habitat Attributes	Natural Processes Responsible for these Conditions	Limiting Factors
Moist Hardwood Forest (cont.)	<p><i>Potential Conservation Species: Apameini spp., barking treefrog, black-and-white warbler, cerulean warbler, chimney swift, eastern box turtle, eastern mud salamander, eastern spadefoot, eastern wood-pewee, ovenbird, red-shouldered hawk, small whorled pogonia, whip-poor-will, wood thrush, worm-eating warbler</i></p>		
Floodplain Forest	<p>Includes forest that occurs on floodplains of smaller streams, where fine-textured silt and clay sediment predominates. Depositional landforms, such as a natural levee, are often distinctly present but fairly small. They help create variation in the duration of flooding and nutrient input. Soils are generally fertile and not strongly acidic. Flooding is generally seasonal but may range to nearly semi-permanent. Bald cypress and tupelo dominate in wetter sites. Forested stands with oaks and other bottomland hardwoods are present in more mesic areas. Understory, shrub, and herb layers are generally well-developed.</p> <p><i>Potential Conservation Species: acadian flycatcher, bald eagle, confused cloudywing butterfly, cotton mouse, dwarf waterdog, eastern lesser siren, eastern mudsnake, hoary bat, hooded warbler, Kentucky warbler, little brown bat, Louisiana waterthrush, many-lined salamander, marbled salamander, prothonotary warbler, Rafinesque's big-eared bat, spotted salamander, wood duck, yellow-throated vireo, yellow-throated warbler</i></p>	<p>Relies on seasonal flooding or perched water tables. Soils typically contain a shallow organic layer over mineral soils. Dominant species composition and flooded soils reduces the effect of fire.</p>	<p>Altered hydrology due to a change in the duration or frequency of seasonal flooding. Invasive species spread and change the composition of the understory.</p>
Freshwater Marsh and Shrub Swamp	<p>Tidal freshwater marshes characterized by fresh to oligohaline waters driven by irregular tides. Predominantly found in the drowned creeks and inland estuary shores of the embayed region. Marshes typically occur as complexes dominated by large graminoids such as salt hay, bulrushes, cattails, and rushes, sometimes with species-rich associations of shorter graminoids, forbs, and floating or submerged aquatics.</p> <p><i>Potential Conservation Species: American black duck, common ribbon snake, eastern painted turtle, king rail, least bittern, marsh rabbit, marsh senna, marsh wren, northern river otter, rainbow snake, rare skipper, river bulrush, sensitive joint-vetch, sora, spotted turtle</i></p>	<p>Irregular flooding and fire are both important forces in this system.</p>	<p>Sea level rise as a result of climate change altering water levels that could affect species composition. Dredging of James River and the placement of dredged soils around this habitat. Spread of monospecific colonies of common reed and/or other invasive species.</p>

Broad Habitat Type	Population/Habitat Attributes	Natural Processes Responsible for these Conditions	Limiting Factors
Aquatic Habitats	<p>Open water on the refuge, primarily present as waters of James River and Powell Creek, but also includes to lesser degree streams that flow into Flowerdew Hundred Creek and three small seasonal inland ponds. Also includes submerged aquatic vegetation, characterized by presence of horned, sago, and claspingleaf pondweed. A host of macroalgae is also an important system component.</p> <p><i>Potential Conservation Species: alewife, alewife floater, American eel, American shad, Atlantic sturgeon, blueback herring, devil crayfish, hickory shad, river shrimp, striped bass, tidewater mucket</i></p>	Continuously flooded and occurs in deepwater pools and tidal creeks.	Sea level rise as a result of climate change altering water depth and clarity that can effect light penetration. Vulnerable to pollution run-off.
Erosional Bluff	<p>Steep, linear cliffs where erosion in alluvial deposits has left tall (great than 3 meters), nearly vertical banks of sand, silt, clay, or a mixture. Typically develop in landscapes that are otherwise of rather low relief. Substrate is unconsolidated and provides habitat for animals that burrow into steep banks, such as bank swallows and certain invertebrates. Vegetation is sparse, mostly herbaceous, and variable in composition.</p> <p><i>Potential Conservation Species: bank swallow</i></p>	Formed through erosion of soft bank soils by river flow.	Storms and major weather events cause increased slope sloughing and removal of vegetation.

d. Regional Conservation Plans

James River NWR exists within a larger conservation landscape. To evaluate the role that the refuge can play in supporting the priorities of other agencies, groups, and entities, other conservation plans were reviewed. The first priority for the refuge is to meet the obligations of its purpose and other legal mandates. Supporting other conservation priorities can be considered when they align within the framework of the refuge purpose and legal mandates.

The primary sources of information that the refuge used to identify other conservation priorities included:

- North Atlantic Landscape Conservation Cooperative's representative species list for the mid-Atlantic sub-region.
- North Atlantic Landscape Conservation Cooperative's list of priority fish species within the Lower Chesapeake watershed.
- State of Virginia Wildlife Action Plan.
- The Nature Conservancy Chesapeake Bay Lowlands Ecoregional Plan.

e. Summary Table

Table A.2 is a comprehensive list of species potentially occurring or known to occur in the refuge vicinity that are considered to be conservation priorities by the Service, as well as other agencies, groups, or entities.

Guide to Table A-2

¹ Refuge Purpose

X = Species specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge sub-unit.

² Potential Priority Refuge Resources of Concern

X = All species considered either priority refuge resources of concern or other benefitting species.

³ Refuge Occurrence

X = Species occurrence on the refuge provided by several physical surveys, observations, and species inventories compiled by USFWS.

⁴ Federal T&E

Federal Endangered Species List. E - Endangered; T - Threatened; C - Candidate.

⁵ VA T&E

Virginia Endangered Species List. E - Endangered; T - Threatened.

⁶ VA NHP

Virginia Natural Heritage Program. S1 - Extremely Rare; S2 - Very Rare; S3 - Rare; S4 - Common; SH - Potentially Rediscoverable Species; SX - Extirpated; SU - Uncertain; S_S_ - Range of Rank; S_B - Breeding Status; S_B/S_N - Breeding and Nonbreeding Status.

⁷ BCR 27

Bird Conservation Region 27. HH - Highest Priority; H - High Priority; M - Moderate Priority.

⁸ BCR 30

Bird Conservation Region 30. HH - Highest Priority; H - High Priority; M - Moderate Priority.

⁹ PIF 44

Partners in Flight Mid-Atlantic Coastal Plain Priority Species Table. 1A - High Continental Priority, High Regional Responsibility; 1B - High Continental Priority, Low Regional Responsibility; 2A - High Regional Concern; 2B - High Regional Responsibility; 2C - High Regional Threats; 3 - National Priority (No Regional Priority).

¹⁰ VA Wildlife Action Plan

1 - Critical Conservation Need (Tier 1); 2 - Very High Conservation Need (Tier 2); 3 - High Conservation Need (Tier 3); 4 - Moderate Conservation Need (Tier 4).

¹¹ USFWS Birds of Conservation Concern

X = Species considered to be of conservation concern for the U.S. Fish and Wildlife Service.

¹²North American Waterbird Plan

HH: Highest - Population declines and low population numbers; H: High - Population declines; M: Moderate - Population declines or stable population with potential threats but restricted distributions or small population and restricted distribution; L: Low - Populations stable with threats or populations increasing with threats and restricted distributions or large populations with threats and restricted distributions.

¹³ACJV Waterfowl Conservation Need

HH: Highest; H: High; MH: Moderately High; M: Moderate; ML: Moderately Low; L: Low. When both breeding and non-breeding populations occur, the highest ranking is used.

¹⁴TNC Chesapeake Bay Lowlands Ecoregional Plan

1 - Primary Priority; 2 - Secondary Priority.

¹⁵North Atlantic LCC

X = Representative species in Mid-Atlantic sub-region of the North Atlantic Landscape Conservation Cooperative (LCC); Numerical values denote General Habitat Type in the plan that corresponds to habitat mapped on the refuge; AQ = Representative species for aquatic systems in the North Atlantic LCC.

Table A.2 Comprehensive List of Conservation Priority Species Potentially Occurring or Known to Occur at James River NWR

Common Name	Refuge Purpose ¹	Potential Priority Refuge Resources of Concern ²	Refuge Occurrence ³	Federal T&E ⁴	VA T&E ⁵	VA NHP ⁶	BCR 27 ⁷	BCR 30 ⁸	PIF 44 ⁹	VA Wildlife Action Plan ¹⁰	USFWS Birds of Conservation Concern ¹¹	North American Waterbird Plan ¹²	ACJV Waterfowl Conservation Need ¹³	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁴	North Atlantic LCC ¹⁵
LANDBIRDS															
Acadian flycatcher		X	X				M		2B						
Bald eagle	X	X	X			S2S3B/ S3N		M		II	X				
Baltimore oriole								H							
Bank swallow		X				S3B									27
Barn owl						S3B/ S3N				III					
Black-and-white warbler		X	X					H		IV					3
Blackburnian warbler						S2B		M							
Blackpoll warbler							M								
Black-throated green warbler							HH			I					
Blue-winged warbler						S3B		HH	1B	IV	X				29
Bobolink			X			S1B	M								
Broad-winged hawk								H							
Brown creeper			X			S3B/ S5N				IV				2	
Brown thrasher			X				H	H	2A	IV					29
Brown-headed nuthatch		X	X			S3S4	H	M	1B	IV	X			2	13
Canada warbler						S3S4B		M		IV					

Common Name	Refuge Purpose ¹	Potential Priority Refuge Resources of Concern ²	Refuge Occurrence ³	Federal T&E ⁴	VA T&E ⁵	VA NHP ⁶	BCR 27 ⁷	BCR 30 ⁸	PIF 44 ⁹	VA Wildlife Action Plan ¹⁰	USFWS Birds of Conservation Concern ¹¹	North American Waterbird Plan ¹²	AC-JV Waterfowl Conservation Need ¹³	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁴	North Atlantic LCC ¹⁵
Carolina chickadee			X						2A						
Cerulean warbler		X				S3S4B	HH	M	1B	II	X				
Chimney swift		X	X				H	H	2A	IV					
Chuck-will's-widow		X	X				H		3B	IV					
Cliff swallow						S3S4B									
Common nighthawk															21
Cooper's hawk			X			S3B/ S3N									
Dickcissel						S2S3B									
Eastern kingbird							H	H	2A	IV					
Eastern meadowlark							H			IV					28
Eastern towhee			X				H	H	2A	IV					22
Eastern wood-pewee		X	X				H		2A	IV					4
Field sparrow							H	H	1A	IV					
Golden-crowned kinglet			X			S2B/ S5N									
Grasshopper sparrow							H	M	2C	IV					28
Gray catbird			X					M	2A	IV					
Great crested flycatcher			X					H							
Hermit thrush			X			S1B/ S5N									

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Hooded warbler		X	X				M		1A					2	
Indigo bunting			X				M								
Kentucky warbler		X	X				H	H	1A	IV	X			2	23
Loggerhead shrike					T	S2B/ S3N		M		I	X				
Louisiana waterthrush		X	X				M	H		IV					23
Magnolia warbler						S2B									
Marsh wren		X					M	H	2A	IV					10
Nashville warbler						S1B									
Northern bobwhite							H	H	2A	IV					
Northern flicker			X				H	H							
Northern harrier						S1S2B/ S3N				III				2	
Northern parula			X				M			IV					
Northern rough-winged swallow										IV					
Northern saw-whet owl						S1B/ S2N				II					
Northern waterthrush						S1B									
Orchard oriole							M								
Ovenbird		X	X							IV					4
Peregrine falcon					T	S1B/ S2N				I	X				

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Pine warbler		X	X				M		2B						
Prairie warbler			X				H	HH	1A	IV	X				13
Prothonotary warbler		X	X				H	H	1A	IV				2	23
Purple finch			X			S1B/ S5N									
Red-bellied woodpecker			X				M								
Red-breasted nuthatch			X			S2B/ S4N									
Red-headed woodpecker		X	X				H	M	3B		X				
Red-shouldered hawk		X	X												3
Rose-breasted grosbeak										IV					
Rusty blackbird			X				H	H		IV	X				
Savannah sparrow						S3S4B/ S4N									
Scarlet tanager			X					H	1A	IV					
Sedge wren						S1B/ S1S2N	M	M	2C	III	X				
Short-eared owl						S1B/ S2N			2C		X				
Summer tanager			X				M								
Swainson's thrush						S1B									
Swainson's warbler			X			S2B	H	M	1B	II				2	
Swamp sparrow			X			S1B/ S4S5N									

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Vesper sparrow							H								
Whip-poor-will		X						H	1A	IV	X				3
White-eyed vireo			X				M								
White-throated sparrow			X				H								
Willow flycatcher								H		IV					
Winter wren						S2B/ S4N				II					
Wood thrush		X	X				H	HH	1A	IV	X				3
Worm-eating warbler		X	X				H	H	1A	IV	X			2	3
Yellow warbler										IV					
Yellow-bellied flycatcher			X			S1B									
Yellow-bellied sapsucker			X			S1B/ S4N				I					
Yellow-billed cuckoo		X	X				H		2A	IV					
Yellow-breasted chat			X							IV					
Yellow-throated vireo		X	X				M	H		IV					
Yellow-throated warbler		X	X				M		1A						
WATERBIRDS															
American coot						S1B/ S2N	HH					L			
Black-crowned night-heron						S3B/ S4N	H	M		III		M			

Common Name	Refuge Purpose¹	Potential Priority Refuge Resources of Concern²	Refuge Occurrence³	Federal T&E⁴	VA T&E⁵	VA NHP⁶	BCR 27⁷	BCR 30⁸	PIF 44⁹	VA Wildlife Action Plan¹⁰	USFWS Birds of Conservation Concern¹¹	North American Waterbird Plan¹²	AC-JV Waterfowl Conservation Need¹³	TNC Chesapeake Bay Lowlands Ecoregional Plan¹⁴	North Atlantic LCC¹⁵
Bonaparte's gull			X				M					M			
Caspian tern			X			S1B/ S2N						L			
Common moorhen						S1B/ S1N	H					M			
Common tern						S3B	HH	M		III		L			20
Double-crested cormorant			X			S2B/ S4S5N									
Forster's tern			X			S3B/ S3N	M	H	2B	IV		M			
Glossy ibis						S2B/ S1N	H	H		III		L			
Great blue heron			X			S3B/ S5N									
Great egret						S2S3B/ S3N	M								
Green heron										IV		L			
Herring gull			X									L			
King rail		X				S2B/ S3N		M		II		H			10
Least bittern		X				S3B/ S3N	H	M		III	X	H			10
Little blue heron			X			S2B/ S3N	H	M		II		H			
Pied-billed grebe						S1S2B/ S3N	H				X	H			
Sora		X				S1B/ S2N		M				H			
Tricolored heron						S2B/ S3N	H	M		III		H			
Yellow-crowned night-heron						S2S3B/ S3N	H	M		III		M			

Common Name	Refuge Purpose ¹	Potential Priority Refuge Resources of Concern ²	Refuge Occurrence ³	Federal T&E ⁴	VA T&E ⁵	VA NHP ⁶	BCR 27 ⁷	BCR 30 ⁸	PIF 44 ⁹	VA Wildlife Action Plan ¹⁰	USFWS Birds of Conservation Concern ¹¹	North American Waterbird Plan ¹²	ACJV Waterfowl Conservation Need ¹³	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁴	North Atlantic LCC ¹⁵
SHOREBIRDS															
American woodcock							HH	HH	1A	IV					
Common snipe								M							
Dunlin							H	H		IV					
Killdeer			X					M							
Least sandpiper							H	M							
Red knot	X			C		S2N	HH	HH		IV	X				20
Red-necked phalarope								M							
Short-billed dowitcher							H	H		IV	X				
Spotted sandpiper						S2B	M	M							
Upland sandpiper					T	S1B	H	M	2C	I	X				
Willet							H	H	3B						14
Wilson's snipe							H								
WATERFOWL															
American black duck		X	X				HH	HH	1A	II			H	2	23
American wigeon			X				H	M					ML		
Blue-winged teal						S1B/ S2N	H						M H		
Brant							HH	HH		III			H		
Bufflehead			X					H					M H		26

Common Name	Refuge Purpose ¹	Potential Priority Refuge Resources of Concern ²	Refuge Occurrence ³	Federal T&E ⁴	VA T&E ⁵	VA NHP ⁶	BCR 27 ⁷	BCR 30 ⁸	PIF 44 ⁹	VA Wildlife Action Plan ¹⁰	USFWS Birds of Conservation Concern ¹¹	North American Waterbird Plan ¹²	ACJV Waterfowl Conservation Need ¹³	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁴	North Atlantic LCC ¹⁵
Canada goose			X				HH	HH					HH		
Canvasback							HH	H					M H		26
Common goldeneye							H	M					ML		
Common merganser			X			S1B/ S4N							L		25
Gadwall			X			S2B/ S4N		M					ML		
Greater scaup								H		IV			H		
Green-winged teal			X					M					ML		
Hooded merganser			X					M					H		
Lesser scaup							HH	H					H		
Long-tailed duck								H					ML		
Mallard			X					H					H		
Northern pintail			X				HH	M					M		10
Northern shoveler			X										ML		
Red-breasted merganser								M					H		
Redhead							HH			III			ML		
Ring-necked duck			X										ML		25
Ruddy duck			X					M					M H		
Snow goose							HH								

Common Name	Refuge Purpose ¹	Potential Priority Refuge Resources of Concern ²	Refuge Occurrence ³	Federal T&E ⁴	VA T&E ⁵	VA NHP ⁶	BCR 27 ⁷	BCR 30 ⁸	PIF 44 ⁹	VA Wildlife Action Plan ¹⁰	USFWS Birds of Conservation Concern ¹¹	North American Waterbird Plan ¹²	ACJV Waterfowl Conservation Need ¹³	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁴	North Atlantic LCC ¹⁵
Tundra swan			X					H					H		
Wood duck		X	X					M					H		23
MAMMALS															
Cotton mouse		X				S3				IV					
Eastern red bat															23
Hoary bat		X				SUB/ S3N									
Little brown bat		X													
Marsh rabbit		X				S3				IV					
Northern river otter		X	X			S4									
Rafinesque's big-eared bat		X			E					I				1	
Silver-haired bat		X				SUB/ S4N									
Southeastern fox squirrel		X				S3				III					
REPTILES															
Black kingsnake						S2				III					
Common ribbon snake		X								IV					
Eastern box turtle		X								III					3
Eastern hognose snake		X								IV					13
Eastern mudsnake		X								IV					
Eastern painted turtle		X													25

Common Name	Refuge Purpose ¹	Potential Priority Refuge Resources of Concern ²	Refuge Occurrence ³	Federal T&E ⁴	VA T&E ⁵	VA NHP ⁶	BCR 27 ⁷	BCR 30 ⁸	PIF 44 ⁹	VA Wildlife Action Plan ¹⁰	USFWS Birds of Conservation Concern ¹¹	North American Waterbird Plan ¹²	ACJV Waterfowl Conservation Need ¹³	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁴	North Atlantic LCC ¹⁵
Eastern slender glass lizard		X								IV					
Glossy crayfish snake						S1				III					
Northern diamond-backed terrapin						S4				II					X
Northern scarlet snake		X								IV					
Queen snake										IV					
Rainbow snake		X				S3				IV					
Scarlet kingsnake						S2S4									
Spotted turtle		X								III					
Yellow-bellied slider										IV					
AMPHIBIANS															
Barking treefrog		X			T	S1				II				2	
Dwarf waterdog		X				S2S3				III					
Eastern lesser siren		X				S2S3				III					
Eastern mud salamander		X								IV					
Eastern spadefoot toad		X								IV					
Greater siren						S3				IV					
Many-lined salamander		X				S3				IV					
Marbled salamander		X													23

Common Name	Refuge Purpose ¹	Potential Priority Refuge Resources of Concern ²	Refuge Occurrence ³	Federal T&E ⁴	VA T&E ⁵	VA NHP ⁶	BCR 27 ⁷	BCR 30 ⁸	PIF 44 ⁹	VA Wildlife Action Plan ¹⁰	USFWS Birds of Conservation Concern ¹¹	North American Waterbird Plan ¹²	ACJV Waterfowl Conservation Need ¹³	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁴	North Atlantic LCC ¹⁵
Oak toad		X				S2				II					
Southern chorus frog		X				S3				IV					
Spotted salamander		X	X												24
Wood frog															24
FISH															
Alewife	X		X	C						IV					AQ
American brook lamprey			X			S3				IV					
American eel			X							IV					AQ
American shad			X							IV					AQ
Atlantic sturgeon	X		X	E	E	S2				II				1	
Banded sunfish						S3				IV					
Blackbanded sunfish					E	S1				I					
Blueback herring	X		X	C											
Bridle shiner						S2				I					
Ironcolor shiner						S3				IV					
Lake chubsucker						S2				IV					
Least brook lamprey						S3				IV					
Mud sunfish										IV					

Common Name	Refuge Purpose ¹	Potential Priority Refuge Resources of Concern ²	Refuge Occurrence ³	Federal T&E ⁴	VA T&E ⁵	VA NHP ⁶	BCR 27 ⁷	BCR 30 ⁸	PIF 44 ⁹	VA Wildlife Action Plan ¹⁰	USFWS Birds of Conservation Concern ¹¹	North American Waterbird Plan ¹²	ACJV Waterfowl Conservation Need ¹³	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁴	North Atlantic LCC ¹⁵
Roanoke bass						S3				II					
INVERTEBRATES															
Alewife floater						S3				IV					
Apameini spp.		X													
Confused cloudywing butterfly		X				S2S4									
Crayfish						S3									
Devil crayfish						S3									
Diana fritillary						S3				IV					
Rare skipper		X				S1S2				II				1	
River shrimp						S1				IV					
Southern pearly-eye butterfly						S3S4									
Spring azure butterfly						S2S4									
Tidewater interstitial amphipod						S3				III				1	
Tidewater mucket										IV					
Yellow lampmussel						S2				III					
HERBACEOUS VEGETATION															
Blue-hearts						S1S2									
Cuthbert turtlehead						S2								1	
Little-leaf sensitive-briars		X				S2									

Common Name	Refuge Purpose ¹	Potential Priority Refuge Resources of Concern ²	Refuge Occurrence ³	Federal T&E ⁴	VA T&E ⁵	VA NHP ⁶	BCR 27 ⁷	BCR 30 ⁸	PIF 44 ⁹	VA Wildlife Action Plan ¹⁰	USFWS Birds of Conservation Concern ¹¹	North American Waterbird Plan ¹²	ACJV Waterfowl Conservation Need ¹³	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁴	North Atlantic LCC ¹⁵
Marsh senna		X	X												
New Jersey rush						S2								1	
Parker's pipewort						S2								2	
Red milkweed						S2									
River bulrush		X				S2									
Sensitive joint-vetch	X	X		T	T	S2								1	
Small whorled pogonia	X	X		T	E	S2								1	
Sun-facing coneflower						S1									
Swamp pink	X			T	E	S2								1	
Virginia least trillium						S2								1	
TREES															
Blackjack oak						S2									
Longleaf pine						S1									
Turkey oak						S3									

III. Prioritizing Resources of Concern

The comprehensive list of conservation priority species table (A.2) contains a large number of species with a broad array of habitat needs. The refuge prioritized these species and their associated habitats as refuge resources of concern, while concurrently developing a reasonable range of habitat management alternatives to support these species.

To guide us in prioritizing this list, we considered the following concepts:

- Achieving refuge purposes and managing for trust resources, as well as biological diversity, integrity, and environmental health, can be addressed through the habitat requirements of resources of concern, or species that may represent guilds that are highly associated with important attributes or conditions within habitat types. The use of resources of concern is particularly valuable when addressing USFWS trust resources such as migratory birds.
- The surrogate species approach is a conservation management method to reduce the burden of addressing the requirements of many species individually. Surrogate species are defined by Caro (2010) as “*species that are used to represent other species or aspects of the environment*”. The method provides direction for setting biological objectives and discusses the importance of establishing new and refining existing collaborations within the conservation community to help us collectively meet the conservation needs of the nation’s fish, wildlife and plants. Used consistently, this will improve our efficiencies and impacts through identifying where on the landscape to target efforts and will result in more cost-effective management decisions and investments in conservation. Technical guidance on selecting species for design of landscape-scale conservation is available at: <http://www.fws.gov/landscape-conservation/pdf/DraftTechnicalGuidanceJuly2012.pdf>.
- The Bird Conservation Region (BCR) plans are increasing their effectiveness at ranking and prioritizing those migratory birds most in need of management of conservation focus. Although all species that make it to a ranked BCR priority list are in need of conservation attention, we considered resources of concern that were ranked High or Moderate in Continental concern with a High to Moderate BCR Responsibility. The BCR rules used to rank birds are available at: <http://www.abcbirds.org/nabci>.
- Priority species selected that were not birds were identified as resources of concern due to range-wide concern over their population status or because they are currently under review for inclusion on the federal Endangered or Threatened Species list. Fish species were reviewed using information available from the limited number plans for fish species and consulting local State and Federal fisheries experts on the capacity of the refuge to support or contribute to particular fish species.
- Habitat conditions on or surrounding the refuge may limit the refuge’s capability to support or manage for a potential species of concern. The following site-specific factors were evaluated:
 - ❖ Patch size requirements.
 - ❖ Habitat connectivity.
 - ❖ Incompatibility surrounding land uses.
 - ❖ Environmental conditions: soils, hydrology, disturbance patterns, contaminants, predation, invasive species.
 - ❖ Specific life history needs.
- The likelihood that a potential species of concern would have a positive reaction to management strategies.

- The ability to rely on natural processes to maintain habitat conditions within a natural range of variability suitable to the resources of concern.
- The ability to use adaptive management (flexibility and responsiveness of the refuge and the habitats) in the face of changing environmental conditions (e.g., climate change).
- Consultation with State and Federal taxonomic and natural resource experts.

To select the final priority resources for the preferred habitat management alternative (alternative B), we used a decision support matrix process, with scores associated with each of the criteria described above and developed from information in Paveglio and Taylor (2010). Each category had a possible range of scores (10, 7, 5, 3, or 1, with 10 being the best), and each species was given a score under each criteria. The separate scores were then added to obtain a total score for each species, so that each potential priority resource of concern had a score that could be compared against other potential resources. The exercise of scoring each potential resource against set criteria allowed us to systematically evaluate each resource and provide a relatively quantitative and transparent analysis to support the final selection of priority resources.

Refuge management is most often focused on restoring, managing, or maintaining habitats or certain habitat conditions to benefit a suite of priority species or a suite of plants and animals associated with a particular habitat. James River NWR identified priority habitats on the refuge based on information compiled in Section I (e.g., site capability, historic condition, current vegetation, conservation needs of wildlife associates). The designation of Priority I and Priority II habitats was used instead of an alternative classification such as high, moderate, or low priorities because all habitats are important to the refuge. The designation of a habitat into the Priority I category helps refuge management focus efforts when funding and resources are limited. As part of this process, we identified any limiting factors that affect the refuge's ability to maintain these habitats (see table A.3).

Table A.3. Priority I and II Habitats on James River NWR under Alternative B

Habitat Type	Reason for Ranking	Limiting Factors/Threats
Priority I		
Pine-dominated Forest	Largest habitat acreage on the refuge. Mature, pine-dominated forest is lacking on the landscape due to intensive forest management practices since European development. High intensity of management needed to restore this habitat to high quality. <i>Priority Refuge Resources of Concern: brown-headed nuthatch, chuck-will's-widow.</i>	Disease occurs in high density stands. Invasive species spread in the understory. Large storm events with strong wind components. Legacy of historic plantings driving current community composition and structure. Suppression of fire.
Moist Hardwood Forest	Provides habitat for wood thrush, considered to be an indicator of a gradient of forest conditions and representative of conditions required by many other species (Watts 1999). <i>Priority Refuge Resources of Concern: eastern box turtle, red-shouldered hawk, wood thrush.</i>	Altered hydrology. Invasive species can spread and change the composition of understory vegetation.
Floodplain Forest	Provides nesting and foraging habitat for breeding and overwintering bald eagles, the primary refuge establishing purpose species. <i>Priority Refuge Resources of Concern: bald eagle, prothonotary warbler, spotted salamander.</i>	Altered hydrology due to a change in the duration or frequency of seasonal flooding. Invasive species spread and change the composition of the understory.
Freshwater Marsh and Shrub Swamp	Provides habitat migratory waterfowl and waterbird species. Vulnerable to sea level rise that can dramatically change the characteristics of the habitat. <i>Priority Refuge Resources of Concern: least bittern, marsh wren.</i>	Sea level rise as a result of climate change altering water levels that could affect species composition. Dredging of James River and the placement of dredged soils around this habitat. Spread of monospecific colonies of common reed and/or other invasive species.
Priority II		
Erosional Bluff	Too limited in extent to make a meaningful difference. <i>Priority Refuge Resources of Concern: bank swallow</i>	Storms and major weather events cause increased slope sloughing and removal of vegetation.
Aquatic Habitats	Outside the management authority or jurisdiction of the refuge. Too limited in extent to make a meaningful difference. <i>Priority Refuge Resources of Concern: none</i>	Sea level rise as a result of climate change altering water depth and clarity that can effect light penetration. Vulnerable to pollution run-off.

- a. **Priority Refuge Resources of Concern**
 Based on the habitat types identified on the refuge as described in table A.3, we then developed a table of the priority resources of concern with their associated habitat types (table A.4) for the preferred habitat management alternative, alternative B. This table also described the habitat structured required by each priority species and identifies other species that would benefit from the same or similar habitat conditions.

Table A.4. Priority Refuge Resources of Concern for James River NWR under Alternative B

Priority Refuge Resources of Concern	Habitat Type	Habitat Structure	Life History Requirement	Other Benefiting Species
Brown-headed nuthatch	Pine-dominated Forest	Uses mature, open pine stands where natural fire patterns are present. Nesting and roosting occurs in snags while foraging occurs on live trees (Withgott and Smith 1998).	Breeding, foraging	eastern hognose snake, eastern slender glass lizard, northern scarlet snake, oak toad, pine warbler, red-headed woodpecker, silver-haired bat, southeastern fox squirrel, southern chorus frog, yellow-billed cuckoo
Chuck-will's-widow		Occurs in deciduous, pine, and mixed forest stands with open understories for nesting (Watts 1999, Straight and Cooper 2012). Forest openings are important for foraging (Watts 1999).	Breeding, foraging	
Eastern box turtle	Moist Hardwood Forest	Inhabits a variety of forest and field habitats. Prefers open canopied woodlands with significant understory (Mitchell 1994; Hammerson 2010).	Year-round	<i>Apameini</i> sp., barking treefrog, black-and-white warbler, cerulean warbler, chimney swift, eastern mud salamander, eastern spadefoot, eastern wood-pewee, ovenbird, small whorled pogonia, whip-poor-will, worm-eating warbler
Red-shouldered hawk		Uses a variety of extensive forest stands with mature or old-growth canopy trees and varying understory (Dykstra et al. 2008). Nests below the canopy, typically between 12 and 19 meters above the ground (Crocoll and Parker 1989).	Breeding	
Wood thrush		Uses mixed and deciduous forest edges and interiors with trees greater than 16 meters high, moderate subcanopy and shrub density, shade, fairly open forest floor, moist soil, and decaying leaf litter (Evans et al. 2011).	Breeding, foraging	
Bald eagle	Floodplain Forest	Nests typically in forested areas less than 2 kilometers from large bodies of water. Forested tracts with nests have relatively open canopies, some form of habitat discontinuity or edge, or high levels of foliage-height	Breeding, migration	Acadian flycatcher, confused cloudywing butterfly, cotton mouse, dwarf waterdog, eastern lesser siren, eastern mudsnake, hoary bat, hooded warbler, Kentucky warbler, little brown bat,

Priority Refuge Resources of Concern	Habitat Type	Habitat Structure	Life History Requirement	Other Benefitting Species
Bald eagle (cont.)	Floodplain Forest	diversity that provides access to nest trees (Buehler 2000).		Louisiana waterthrush, many-lined salamander, marbled salamander, Rafinesque's big-eared bat, wood duck, yellow-throated vireo, yellow-throated warbler
Prothonotary warbler		Requires the presence of water near wooded areas with suitable cavity nest sites. Nest sites are typically over water or within 5 meters of water's edge and found on low, flat terrain with shaded forest greater than 100 hectares and sparse understory (Petit 1999). Canopy height of forest cover is 12 to 40 meters with 50 to 75 percent canopy and sparse ground vegetation less than 0.5 meters high (Kahl et al. 1985).	Breeding, foraging	
Spotted salamander		Inhabits deciduous forest stands with semi-permanent pools less than one meter deep (Bishop 1943, VDGIF 2013).	Year-round	
Least bittern	Freshwater Marsh and Shrub Swamp	Uses wetlands with tall, dense growths of bulrush and cattail and low-lying, "wetter" sites with a maximum water depth of 70 centimeters (Poole et al. 2009).	Breeding, foraging	American black duck, common ribbon snake, eastern painted turtle, king rail, marsh rabbit, marsh senna, northern river otter, rainbow snake, rare skipper, river bulrush, sensitive joint-vetch, sora, spotted turtle
Marsh wren		Uses dense stands of cattails and bulrushes in deeper water for nesting (Kroodsma and Verner 1997).	Breeding, foraging	
Bank swallow	Erosional Bluff	Nests in colonies along streams and rivers with vertical eroding banks comprised of alluvial, friable soils (Garrison 1999).	Breeding	NONE

IV. Adaptive Management

The priority resources of concern and their respective habitat attributes were used to develop specific habitat objectives for the preferred alternative. Refuge habitat management objectives must be achievable. Many factors, such as lack of resources, existing habitat conditions, species response to habitat manipulations, climatic changes, contaminants or invasive species, may reduce or eliminate the ability of the refuge to achieve objectives.

Although these limiting factors were considered during the development of refuge objectives, conditions may and are likely to change over the next 15 years and beyond.

The refuge will use adaptive management to respond to changing conditions that impair our ability to measure and achieve the habitat objectives. This requires that we establish and maintain a monitoring program to ensure that we can detect and respond to changing conditions.

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