Prepared by

U.S. Fish & Wildlife Service
Northeast Region (R5)
Division of Planning
300 Westgate Center Drive
Hadley, Massachusetts 01035

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I. PURPOSE OF AND NEED FOR ACTION

A. Purpose of Action

The proposed action is to establish a national wildlife refuge on the Peninsula locally known as Crow's Nest, located between Accokeek and Potomac Creeks in Stafford County, Virginia. This proposed refuge would be named Accokeek Creek National Wildlife Refuge.

The purpose of this action is to provide long term protection to the ecologically unique habitats of Crow's Nest that support numerous species of neotropical migratory birds, waterfowl, sport and commercial fish, as well as numerous rare and threatened plant species. This final Environmental Assessment (EA) describes possible alternatives and discloses the environmental impacts of each alternative.

B. Background

The Crow's Nest Peninsula is bounded on three sides by Accokeek and Potomac Creeks, and is deeply dissected by ravines on both sides. The entire Peninsula is forested with a diverse mix of hardwood community types, including two that are ranked Globally Imperiled (G2[1]) by The Nature Conservancy and the network of State Natural Heritage programs. Surrounding the Peninsula are approximately 700 acres of tidal emergent marsh that accounts for 60 percent of all marshes in Stafford County. The Peninsula's highly diverse forest and freshwater tidal marsh communities provide breeding, migrating and wintering habitat for many species of neotropical landbirds and waterfowl, and hosts numerous Federally, regionally and state rare plant species. Crow's Nest is home to two nesting pairs of the Federally listed bald eagle (threatened), and hosts one of the largest heron rookeries in the Chesapeake Bay watershed, with more than 600 nesting pairs. The area also supports economically important fur-bearing mammals and sport and commercial fish and mollusk species.

Disturbance of Crow's Nest has been relatively limited due largely to the steep topography that restricted access to the Peninsula. The only major development on the Peninsula occurred in the nineteenth century when the southeastern portion was cleared for a large plantation. The plantation was destroyed during the Civil War (Eby 1997). Since then, selective timbering reportedly took place on the ridge tops and gentler

[1]The Nature Conservancy and the network of State Natural Heritage program ranks species and communities on a global scale of 1 to 5, with G1 defined as Critically Imperiled and G5 defined as Secure (abundant and widespread). Communities classified as Globally Imperiled typically have 6 to 20 occurrences world wide. Each State program also ranks the species on a State scale of 1 to 5.

slopes until the early 1950's (Ralph Law, pers. comm.). The majority of the Peninsula is currently owned by Stafford Lakes Limited Partnership, a development corporation located in McLean, Virginia.

The study area has been identified for protection by the U.S. Fish & Wildlife Service's Regional Wetlands Concept Plan, Chesapeake Bay/Susquehanna River Ecosystem Team's "Potential Land Protection Sites List", the Virginia State's Chesapeake Bay Preservation Act of 1988. It was also recognized as an area of international importance under the Ramsar Convention. A small portion of the Peninsula, a 70-acre heron rookery, is already protected by the Northern Virginia Conservation Trust. In addition to its vast biological value, Crow's Nest has unique geological features and cultural values that include Native American, early Colonial, and Civil War history.

C. Need for Action

The proposed action is needed to protect the diverse wildlife habitats of Crow's Nest from timbering, recreational, and development threats. The Crow's Nest property is located less than a mile from the Richmond, Fredericksburg, and Potomac Railroad's station in the Village of Brooke. A portion of the Peninsula, approximately 960 acres, has been plotted for several hundred residential lots. Another 3,000 acres of the Peninsula is owned by a development corporation located in McLean, Virginia. Although the development of property is somewhat constrained by steep slopes and wetland zoning, its proximity to the railroad station, the existing network of dirt roads, and its viewshed of the two creeks make the Peninsula a likely candidate for residential development.

More immediate than the threat of residential development is the potential for major timber harvesting and recreational water activities. The large size of the trees and well-maintained network of logging roads make this property very favorable to timber harvesting. In February of 1999, thousands of mature trees were marked for harvesting. Requests from conservation organizations delayed the harvest while opportunities to protect the area were explored.

Large, unfragmented mature hardwood forests as found at Crow's Nest are rare in the Virginia Coastal Plain, and are rapidly disappearing. Experts estimate that within 50-100 years, the forest at Crow's Nest will constitute a substantial occurrence of old-growth stands (Fleming 1998). Such old growth forests are very limited across Virginia and within the Atlantic Coastal Plain and occur only in small patches (Dean Cumbia, Virginia Department of Forestry, pers. comm.). While Virginia has over 60 percent of its landscape in forest habitats (Johnson 1992), only three percent of Virginia's forests are protected from harvesting (John Pemberton, Virginia Department of Forestry, pers. comm). The remaining forests are either managed as timberland or are threatened by harvesting and development. The growing trend by the timber industry to convert hardwood forests to shorter rotation pine plantations further threatens the remaining unfragmented hardwood forests (Gary Fleming, pers. comm.).

The 700-acre freshwater tidal marsh that surrounds the Peninsula is being increasingly threatened by recreational activities. The rapidly growing population of Stafford and King George Counties have generated tremendous demand for water-related recreation. All along the tributaries of the Potomac River, bank stabilization, construction of private and commercial docks, and increased boat traffic have altered the water quality and vegetation of freshwater marsh habitats. Potomac and Accokeek Creeks are

experiencing the start of these developments. If left unprotected, the wildlife habitat, water quality, and scenic quality of the two creeks are likely to be degraded as other creeks along the Potomac River.

D. Location and Size of Study Area

The study area for the proposed Accokeek Creek National Wildlife Refuge is located in Stafford County, Virginia, approximately 40 miles south of Washington, D.C. and five miles northeast of the City of Fredericksburg. The Crow's Nest Peninsula is approximately 5 miles long and 2 miles wide and consists of approximately 5,000 acres of unfragmented forest and is surrounded by 700 acres of freshwater tidal marsh.

In order to assemble an ecologically intact, biologically viable refuge, the planning team considered a large land protection study area which expanded slightly beyond the Peninsula to include land north of Accokeek Creek and south of Potomac Creek. Rough boundaries of this study area include the Richmond, Fredericksburg and Potomac Railroad to the west, the ridge line of Marlborough Peninsula to the north, Bell Plains Road to the south, and the intersection of Accokeek and Potomac Creeks to the east. The size and location of the proposed refuge is outlined in the **ALTERNATIVES** section and in Map 1 and Map 2.

E. Overview of the National Wildlife Refuge System

If established, the Accokeek Creek National Wildlife Refuge would be managed as part of the National Wildlife Refuge System. The National Wildlife Refuge System is a national network of lands and waters managed by the U.S. Fish & Wildlife Service for the conservation, management, and restoration of fish, wildlife, and plant resources, and their habitats for the continuing benefit of present and future generations of Americans. There are approximately 520 national wildlife refuges in the fifty states and U.S. territories that comprise over 93 million acres. In 1997, Congress passed the National Wildlife Refuge System Improvement Act to guide the management and strategic growth of the Refuge System. The Act: *(1)* Established that national wildlife refuges are managed for wildlife first and foremost; *(2)* recognized hunting, fishing, environmental education, interpretation, wildlife observation, and photography as legitimate, appropriate, and priority uses on a national wildlife refuge; and *(3)* directed all refuges to develop a Comprehensive Conservation Plan (CCP) to guide its management for 10-15 year periods. The attached Conceptual Management Plan (CMP) gives an overview of additional laws and mandates directing the management of national wildlife refuges.

F. Scope of this EA and Decision to be Made

The draft EA was released for public review and comment for 37 days from August 25 to October 1, 2000. Comments received during this comment period were used to prepare the final EA. The Regional Director for the Northeast Region will use the final EA to choose an alternative for implementation. She will further determine, as required by the National Environmental Policy Act (NEPA) of 1969, whether the

selected alternative will have a significant impact on the quality of the human environment.

The Planning Team is recommending Alternative C as the Preferred Alternative. If either Alternative B or C is selected by the Regional Director, and land is purchased by the Service, the attached Conceptual Management Plan (CMP) will guide the operation and management of the Refuge until further planning is conducted. As more information is gathered about biological resources and public uses, future planning projects will expand upon or replace the CMP. Comprehensive Conservation Planning (CCP) is scheduled to begin in 2008 for the Potomac River National Wildlife Refuge Complex. For the interim period between the establishment of the Refuge and the completion of the CCP, any major management actions will need additional planning to comply with NEPA.

G. Issues Considered

The overall comments received during public scoping meetings and the comment period were in favor of the establishment of the Refuge and the proposed management activities. Two main issues were raised concerning Federal acquisition and public use at the proposed Refuge. The impact of the proposed Refuge as it applies to these two issues are discussed in the Environmental Consequences of this document.

1. Federal Acquisition

Although the majority of the public that we heard from (93 percent) supported land acquisition by the Service as a means of protecting the habitats at Crow's Nest, a few landowners did express concern over Federal land acquisition. Some of these concerns were that: (1) the Service would condemn private lands proposed for acquisition; (2) the Service would not pay fair price for lands to be acquired; and (3) the establishment of a refuge would add additional restriction or regulations on lands in or near the Refuge boundary. These concerns are addressed in the Environmental Consequences, Socioeconomics section of this document and the Land Protection Plan (Appendix D).

2. Public Use

Since initiating this project the Service has received a wide array of opinions regarding public use of the property if it is acquired by the Service. Opinions ranged from closing the Refuge to all public use to opening it to a wide variety of recreational uses. The strongest comments were often issued in favor of or against hunting. This EA addresses only the six priority wildlife dependent uses as emphasized by the National Wildlife Refuge System Improvement Act of 1997: hunting, fishing, environmental education, interpretation, wildlife observation and photography. The Compatibility Determinations for these uses are attached as Appendix C. The CMP (Appendix B) describes public uses allowed on the Refuge during the interim period between the establishment of the Refuge and completion of the CCP.

II. ALTERNATIVES

The Service proposes two action alternatives to protect the long term biological integrity of Crow's Nest Peninsula. These two action alternatives and the "No Action" alternative (required under NEPA) are described in this section. These alternatives primarily address land protection strategies. The proposal for management of the Refuge and public uses are briefly mentioned in this EA, but are described in detail in the CMP (Appendix B). All alternatives were developed with consideration of input received from the public during the public scoping period.

A. No Action Alternative

Under the "No Action" alternative, the Service would not establish a national wildlife refuge at the Crow's Nest Peninsula. The wildlife and their habitats would be subject to residential development, timbering and recreational threats. The natural communities would be negatively impacted by timbering and light development, but may recover over time. With dense development, however, the communities at Crow's Nest would be irreversibly lost. Under the No Action Alternative, there would be no Service-sponsored public use opportunities at Crow's Nest. Depending on future ownership and landuse patterns, there may or may not be any public use on the Peninsula. The small group of individuals that currently use the property for hunting and fishing would continue their use at the landowner's discretion. The heron rookery would continue to be protected and managed by the Northern Virginia Conservation Trust. However, foraging habitat for the herons would not be protected. Some of the wildlife and wetlands could be protected by Federal, state, and local land use regulations. The Service would provide technical assistance on Federally regulated species, particularly through Section 7 consultation provided by the Endangered Species Act.

B. Minimum Acquisition Alternative

With full implementation of Alternative B, the Service would protect through acquisition the eastern-most 2,900-acre portion of the Peninsula owned by Stafford Lakes Limited Partnership. Map 1 graphically depicts the proposed acquisition boundary. This proposal could protect more than half the mature forest of the Peninsula, but does not extend protection to the nearly 2,000 acres of additional forest in the Crow's Nest Harbour subdivision and west of Raven Road, or the 700 acres of freshwater marsh surrounding the Peninsula. The full implementation of this alternative would protect nesting and migration habitat for neotropical landbirds and the diverse plant communities at Crow's Nest. However, the Service would not be able to directly manage the activities in the two creeks and other upland activities that affect water quality of the creeks. Over the long term, degradation of the creeks could negatively impact waterfowl, fish, mollusk, amphibians, and reptiles populations. Implementation of Alternative B would provide new wildlife dependent opportunities, including deer hunting, fishing, wildlife observation and photography, where the activities are determined to be compatible with the purposes for which the Refuge was established and the mission of the Refuge System. Environmental education and interpretation could be developed given sufficient staff and funding. These provisions for new public use opportunities could have minor impacts on

vegetation and wildlife associated with road expansion and disturbance to wildlife and vegetation. In the long term, implementation of Alternative B would positively impact the biological resources of the Crow's Nest Peninsula through protection of habitat and cultivation of community support for wildlife conservation.

C. Preferred Action Alternative

Alternative C is the Planning Team's recommendation to the Regional Director for implementation. With the full implementation of Alternative C, the Service would have the opportunity to protect and manage the entire peninsula east of Brooke Road, and additional tracts north of Accokeek Creek and south of Potomac Creek. The total area to be protected, including approximately 400 acres of open water, is approximately 7,480 acres. Map 2 graphically depicts the proposed acquisition boundary. This alternative could protect approximately 5,800 acres of mature forest communities as well as the tidal marsh habitats, bottomland wetland forests, and floodplain forests associated with Accokeek and Potomac Creeks. Implementation of Alternative C would allow the Refuge to meet its goal of maintaining the ecological integrity of these habitats. Endangered species, neotropical migratory birds, waterfowl, fish, amphibians, reptiles, and plant communities would benefit from these management and protection efforts. The water quality of the two creeks would also be protected for the benefit of both wildlife and people. Of the three alternatives, this alternative represents the highest degree of ecosystem protection and management. The public use opportunities would be the same as proposed in Alternative B.

III. AFFECTED ENVIRONMENT

The purpose of this section is to describe the existing conditions of the study area. This section includes highlights of the physical, biological, and social resources that could be affected by or could affect the proposed alternatives. The information presented below will be the baseline condition to which all alternatives will be compared in Section IV, Environmental Consequences.

A. Physical Environment

1. Climate

Stafford County has a humid and temperate climate typical of most coastal areas of the mid-Atlantic states. It is classified by warm summers and relatively mild winters, and has a long growing season that lasts about 200 - 250 days. The county is in the pathway of warm, moist air currents from the south and southwest and cold dry air currents north from Canada. Mean annual temperature vary slightly from year to year but average about 57 °F. Temperatures above 100 °F or below 0 °F are rare. Mean annual precipitation averages 40 inches, but can vary from 35 to 51 inches. The majority of rain falls during the summer months in the form of thundershowers. The heaviest rains are associated with infrequent summer hurricanes that sometimes can cause flooding. Prevailing winds are from the northwest, with southerly winds more frequent during the summer months (Natural Resource Conservation Service 1974, Linzey 1979).

2. Geology and Physiography

Crow's Nest Peninsula lies within Virginia's Coastal Plain province. The landscape of this province was formed over the last hundred million years through the rise and fall of sea level. Beginning in the late Triassic period (approximately 230 million years ago), rifting of the large land mass known as Pangea opened up the present day Atlantic Ocean. At the break point, the crusts thinned out, lowering it to below sea level and subjecting it to flooding (William and Mary Department of Geology 2000).

During the Tertiary period, the sea level rose and fell numerous times, depositing and eroding substrates. The Crow's Nest Peninsula was formed through deposition of substrates associated with the rising of the sea during the Eocene period (54-38 million years ago). Named the Aquia Formation, the substrates that made up the Formation included mainly Glauconitic quartz sand, and is in part shelly (Frye 1986). Later sea rises deposited layers of silt, clay, sand and calcareous or shelly marine substrates. These periods of depositions are interspersed with periods of erosion which gouged out the steep ravines. During the Quarternary period (1.6 mya to present day), accretions of sand, mud and muck formed the extensive marshes surrounding the Peninsula (Mixon *et al.*, in press).

3. Topography and Soils

The topography of the Crow's Nest is highly varied. The high, narrow Peninsula rises 160 feet above the tidally influenced Potomac and Accokeek Creeks, and is deeply dissected on both its northern and southern sides by series of trellis-form ravines cutting steeply down to the bordering creeks. The Natural Resource Conservation Service (NRCS) classified the soils at Crow's Nest in the Sassafras and Caroline series. Both of these soil types are described as strongly acidic sandy, loamy or clay sediments that are low in organic matter (NRCS 1974). However, soil samples taken by Gary Fleming (1999), Ecologist, Virginia Department of Conservation and Recreation, Division of Natural Heritage (DCR-DNH) found calcareous soils high in organic matter. Two samples taken from a sandy ridge crest and a ravine slope found the soil to be slightly to moderately acidic (pH=6.4 and 5.7) and have calcium concentrations of 1,727 parts per million (ppm) and 2,620 ppm, compared to <200 ppm typical of the Coastal Plain. The Cation Exchange Capacity (CEC) of the soil samples were calculated to be 19.36 and 17.3, well above what is typical for the Coastal Plain. CEC is an often-used measure of the soil's potential to nourish plants. The larger the CEC, the more capacity the soil has to hold nutrients (Lippert 2000). A cation is any positively charged element, such as hydrogen, potassium, calcium, and magnesium. CEC represents the amount of these four cations found in 100 grams of soil.

The recent soil samples and the rich diversity of vegetative communities at Crow's Nest suggest that NRCS's assessment of the Peninsula's soils are not entirely accurate. More extensive testing are necessary to accurately document the soil characteristics of the Peninsula.

4. Hydrology and Water Quality

Potomac and Accokeek Creeks are located approximately 65 miles upstream of Chesapeake Bay and are influenced by its daily tidal cycle. Water from the Peninsula drains into the Potomac and Accokeek Creek which flows southeast into the Potomac River. The Potomac is one of five rivers that provides 90 percent of freshwater to the Chesapeake Bay. Both Potomac and Accokeek Creeks are tidally influenced freshwater streams.

As directed by the Clean Water Act of 1972, the Virginia Department of Environmental Quality (DEQ) routinely monitors the water quality of surface water to assess environmental health. Three permanent monitoring stations are set up in the vicinity of the study area: Two on Potomac Creek and one on Accokeek Creek. A wide range of physical, chemical and biological data, including temperature, dissolved oxygen, pH (acidity), phosphorus, nitrate, lead, and fecal coliform are collected routinely. Assessment of monitoring data for these three sites in 1999 found that the water quality of the two creeks fully support (meet or exceed) the State standards for aquatic life and human safety (Kultar Singh, VA DEQ pers. comm.).

5. Air Quality

As directed by the 1990 Clean Air Act, the Environmental Protection Agency (EPA) sets National Ambient Air Quality Standards for common, non-point source pollutants. The corresponding agencies within each state are responsible for monitoring the pollutants on a yearly basis. In 1998, the Virginia DEQ determined that ambient concentrations of lead, carbon monoxide, nitrogen dioxide, sulfur dioxide, and particular matter up to 10 microns in diameter (PM_{10}) in the state of Virginia are well within the EPA's national standards. Several municipalities however, including Stafford County, did not meet the 1-hour ozone national standard of 0.12 parts per million (William Motley, VA DEQ, pers. comm.). Within these non-attainment areas, DEQ is recommending precautionary measures to reduce ground-level ozone and requiring new power plants or major modifications to meet the Lowest Achievable Emission Rate.

B. Biological Resources

1. Vegetation and Habitat

The Crow's Nest Peninsula rises 160 feet above Accokeek and Potomac Creeks, and is highly dissected on both its north and south sides by steep ravines flowing to the two tidal creeks. Virtually the entire Crows Nest Peninsula is forested with a mature stand of mixed hardwoods that is considered one of the finest, if not the finest, example remaining in the Virginia Coastal Plain (Fleming 1999).

The forest on the Peninsula can be divided into several distinct community types, each associated with its unique topography and soil type. Three communities that occur throughout Crow's Nest include Dry-Mesic Oak-Hickory Forest, Mesic Mixed Hardwood Forest, and Coastal Plain Bottomland Hardwood. Dry-Mesic-Oak-Hickory Forests are found on dry ridge crests and are associated with acidic, nutrient-poor soil environments. This community comprises mixed stands of chestnut oak (*Quercus montana*), black oak (*Q. velutina*), southern red oak (*Q. falcata*) , white oak (*Q. alba*), mockernut hickory (*Carya alba*), and American beech (*Fagus grandifolia*), with an understory layer dominated by heath-family plants like mountain-laurel (*Kalmia latifolia*), hillside blueberry (*Vaccinium pallidum*), and black huckleberry (*Gaylussacia baccata*). Mesic Mixed Hardwood Forests are found on steep ravine slopes and are associated with subacidic to acidic soil environments. This community comprises stands of tulip-poplar (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), oaks (*Quercus spp.*), and hickories (*Carya spp.*), with American holly (*Ilex opaca*) dominating the understory. Coastal Plain Bottomland Hardwoods are found on non-tidally influenced floodplains along Accokeek and Potomac Creeks and large ravine bottoms, and are associated with alluvial soil environment. This community comprises green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), sycamore (*Platanus occidentalis*), tulip-poplar, and hydrophilic oaks. Understory vegetation varies depending on site condition.

The Peninsula also supports several isolated communities that are rare to the Coastal Plain Ecosystem. Two

nutrient-rich communities associated with lime sands and localized shell concretions that can be broadly classified as Basic Mesic Forests (G2, globally imperiled) are found on several slopes and ridge crests. One community is dominated by tulip-poplar with dense understory of silvery glade fern (*Athyrium thelypterioides*). The other has a more mixed community with a canopy layer of chinkapin oak (*Quercus muehlenbergii*), black walnut (*Juglans nigra*), slippery elm (*Ulmus rubra*), and redbud (*Cercis canadensis*), with an understory made up of Paw-paw (*Asimina triloba*), small-flowered baby blue-eyes (*Nemophila aphylla*), Dutchman's breeches (*Dicentra cucullaria*), toothworts (*Dentaria spp*.), maidenhair fern (*Adiantum pedatum*), lowland fragile fern (*Cystopteris protrusa*), glade fern (*Athyrium pycnocarpon*), pubescent sedge (*Carex hirtifolia*), and zig-zag goldenrod (*Solidago flexicaulis*).

A third rare community that is typically associated with shell-marl environments, the Basic Oak-Hickory Forest (G2, globally imperiled), is found on two very steep slopes facing Potomac Creek. Dominant canopy species include chestnut oak, chinkapin oak, northern red oak (*Quercus rubra*), and white ash (*Fraxinus americana*). Redbud and dogwood (*Cornus florida*) dominate the small tree/shrub layer. Herbaceous understory comprise both forb and grass-like species, and include the elm-leaved goldenrod (*Solidago ulmifolia*), blue-stemmed goldenrod (*Solidago caesi*), Bosc's panic-grass (*Dichanthelium boscii*), eastern brome-grass (*Bromus pubescens*), smooth rock-cress (*Arabis laevigata*), gray beardtongue (*Penstemon canescens*), starry campion (*Silene stellata*), plantain-leaved pussy-toe (*Antennaria plantaginifolia*), and blunt-lobed woodsia (*Woodsia obtusa*). We also expect that there are more understory communities exist that have yet to be surveyed.

Surrounding the Peninsula is approximately 700 acres of tidal marshes that account for 60% of all marshes in Stafford County. The marshes are in pristine conditions and represent some of the best examples found in the State (Gary Fleming, pers. comm.). The majority of the marshes are freshwater and comprise highly productive, mixed-species communities that can be divided into three vegetational zones according to elevation relative to mean low water. Areas below mean low water are mainly vegetated with stands of yellow pond lily (*Nuphar luteum*), with concentrated clustered of American lotus (*Nelumbo lutea*) scattered throughout the two creeks. At slightly higher elevations, mixed stands of pickerelweed (*Pontederia cordata*), arrow arum (*Peltandra virginica*), spatterdock (*Nuphar advena*), and wild rice (*Zizania aquatica*) dominate the vegetation. At highest elevations, the community comprises marsh hibiscus (*Hibiscus moscheutos*), smartweed (*Polygonum spp*.), cardinal flower (*Lobelia cardinalis*), big cordgrass (*Spartina cynosuroides*), jewelweed (*Impatiens capensis*), and beggar-ticks (*Bidens spp*).

Preliminary assessment found slightly brackish marshes to the eastern portion of Accokeek Creek are dominated by big cordgrass (*Spartina cynosuroides*), Olney-three square (*Shoenoplectus americanus*), saltmarsh fleabane (*Pluchea odorata*), and bull-tongue arrowhead (*Sagittaria lancifolia media*).

2. Threatened and Endangered Species

The American bald eagle is the only Federally listed species known to occur at Crow's Nest. Currently, there are three documented nests on the property, two of which are active. An additional five pairs that are documented nesting near the study area forage in the two creeks. The property also potentially hosts two

Federally listed plant species that were documented at nearby sites with similar habitat ((DCR-DNH unpublished data). Sensitive joint-vetch (*Aeschynomene virginica*, threatened) occurs in fresh tidal marshes at several Coastal Plain rivers in Virginia, including a tidal marsh in Stafford County along the Potomac River (Strong and Kelloff 1994). Small whorled pogonia (*Isotria medeoloides*, endangered) occurs in subacidic mixed hardwood forests at several nearby sites in Stafford and King George Counties.

Ginseng (*Panax quinquefolius*), a State-listed species was found in several ravines on the Peninsula. The State-listed river bulrush (*Scirpus fluviatilis*) was found in fresh tidal marsh along Potomac Creek. Potential habitat also exists for several other State-listed species monitored by the Virginia Department of Conservation and Recreation, Division of Natural Heritage (DCR-DNH).

3. Rare Plants

The DCR-DNH conducted preliminary field work during the 1999 growing season. They found two State-listed species, and potential habitat for two Federally listed species and several State-listed species (see Threatened and Endangered Species above). Other rare plants found during these cursory surveys include showy orchid (*Orchis spectabilis*), adam and eve (*Aplectrum hyemale)*, black snake root (*Cimicifuga racemosa*), cut-leaved toothwort (*Dentaria lacinata)*, common alum-root (*Heuchera americana*), pubescent sedge (*Carex hirtifolia*), and silvery glade fern (*Athyrium thelypterioides*). Table 1 lists noteworthy plants found on the Peninsula to date.

Table 1. Noteworthy plants of Crow's Nest, Stafford County, VA. These are plants that are regionally or globally rare or plants that have not been previously recorded in Stafford County.

Species	Common Name	County Record	Disjunct Population
Scirpus fluviatilis	river bulrush	x	
Carex oxylepis	sharp-scaled sedge	x	x
Carex squarrosa	squarrose sedge	x	
Carex virescens	ribbed sedge	x	x
Cystopteris protrusa	lowland brittle fern	x	x
Cardamine angustata	slender toothwort		x
Deschampsia flexuosa	wavy hairgrass	x	x
Athyrium pycnocarpon	glade fern	x	x
Fraxinus profunda	pumpkin ash	x	
Luzula acuminata	southern hairy woodrush	x	
Mentha arvensis	American wild mint	x	
Nemophylla aphylla	small flwd. baby blue eyes		x
Orobanche uniflora	one flwd. cancer-root	x	
Panax quinquefolius	American ginseng	x	x
Pilea fontana	black-fruited clearweed	x	
Potamogeton pulcher	spotted pondweed	x	
Quercus muehlenbergii	chinkapin oak		x
Ranunculus micranthus	rock buttercup	x	x
Solidago flexicaulis	zig-zag goldenrod	x	x
Solidago ulmifolia	elm-leaved goldenrod	x	x
Viola pubescens	yellow frost violet	x	
Zizaniopsis miliacea	southern wild rice	x	

4. Birds

Located on a 70-acre parcel adjacent to Crow's Nest is one of the largest heron rookeries in the Chesapeake Bay watershed, containing more than 600 nests. Although the rookery is already protected by Northern Virginia Conservation Trust, the protection of additional habitat is critical in sustaining the colony as the birds feed exclusively in the marsh habitat and need areas to expand as they typically decimate the trees on which they roost over time.

The extensive stands of marshes bordering the Peninsula provide nesting, migrating and wintering habitat for a variety of waterfowl. No waterfowl surveys were conducted for the area, but a 30-year Christmas Bird Count survey conducted for the Peninsula counted 26 species of waterfowl using the property, including 10 of 13 NAWCA Priority Waterfowl species[2] (Table 3). The breeding status of these waterfowl are not

[2]A list of waterfowl species identified as important for conservation and protection by the North American

known, but the existing habitats would, at a minimum, support breeding populations of Canada geese, mallards, black ducks, blue-winged teal and wood duck.

Table 3. Waterfowl documented in the study area. – indicated NAWCA Priority Waterfowl Species.

American black duck –
American wigeon –
bufflehead
blue-winged teal
Canada goose
canvasback –
common goldeneye
common merganser
gadwall
green-winged teal
hooded merganser
lesser scaup –
greater scaup –
mallard –
mute swan
northern pintail –
northern shoveler
red-breasted merganser
ruddy duck
redhead –
ring-necked duck –
snow goose
tundra swan
white-winged scoter
wood duck –

The diverse and pristine forest types of the Crow's Nest Peninsula provide valuable nesting and migration habitat for neotropical migrants whose populations have largely been on the decline. Between 1978 and 1987, 71 percent of neotropical migratory species in the eastern states displayed negative population trends, with forest-nesting species showing the most significant declines (Roberts and Norment 1999). Factors attributing to this decline include loss of wintering habitat in Central and South America, natural fluctuation in population, and fragmentation and loss of suitable migration and breeding habitat in North America (Roberts and Norment 1999). On breeding grounds, the major causes of population decline associated with forest fragmentation are believed to be nest predation and brood-parasitism by browned headed cowbirds (Robinson and Wilcove 1994).

The brown-headed cowbird is historically a prairie species. As forest on the east coast was converted to farms and lawns, the cowbird has invaded the fragmented forest habitats. Cowbirds lay their eggs in other species' nests. Because the forest-nesting species did not co-evolve with cowbirds, they have no defense mechanisms against this parasite and usually raise cowbird chicks instead of or along with their own. The cowbird chicks typically hatch first and would out-compete or kill the host's young; thus dramatically reducing the host's reproductive success.

Biannually, neotropical migrants must travel several thousand kilometers between their wintering grounds in Latin or South American and their breeding grounds in North America (Delach and Barber-Delach 1999a).

Wetlands Conservation Council, a partnership of State and Federal agencies.

Migration exerts extreme energy demand on the small landbirds, and most species cannot store enough fat reserves to complete the journey without stopping (Moore *et al*. 1995). Thus, the availability of suitable stopover habitats where the birds can replenish depleted fat stores and water becomes critical to the survival of the individual, and over the long term, the species. Since Crow's Nest has not been extensively surveyed, we do not know the extent of species diversity. However, the full range of habitats associated with variations in physiological, vegetative, and structural features, potentially support a highly diverse community of neotropical migrants (Robinson and Wilcove 1994, Aimee Delach pers. comm.). Additionally, Moore *et al*. (1995) have found mixed forest habitats to support the greatest species richness when compared to all other habitat types.

A Breeding Bird Survey conducted in the Spring of 1999 found 57 species of neotropical migratory landbirds. Table 2 lists all species recorded during the survey. Ten of these species were identified as high global priority species by Partners in Flight. Another eleven species have been experiencing significant population declines. In fact, species with declining populations accounted for 60 percent of individual birds counted. In a geographic analysis of important habitats for neotropical migrants, Rosenberg and Wells (1995) identified Virginia to be the most important state in the Northeast for the conservation of worm-eating warblers and Louisiana waterthrush, two species whose distribution is relatively limited. They also recommended long term planning and conservation for forest dependent species, with emphasis on wood thrush, Louisiana waterthrush, scarlet tanager, and yellow-throated vireo.

Table 2. Breeding neotropical migratory landbirds encountered at Crow's nest during a point count conducted in the Spring of 1999. Hours of observation (# hour/ observer X # observers) totaled 58 hours. _ indicates high global priority species as identified by Partners in Flight; * indicates species that have exhibited significant (p=0.05) declining populations from 1978-1987 (Saber and Drag 1992).

turkey vulture
osprey
sharp-shinned hawk
cooper's hawk
broad-winged hawk
yellow-billed cuckoo*
belted kingfisher
yellow-bellied sapsucker
eastern wood-pewee _*
Acadian flycatcher _
eastern phoebe
great-crested flycatcher
purple martin
tree swallow
northern rough-winged swallow
barn swallow*
ruby-crowned kinglet
blue-gray Gnatcatcher
veery*
Swainson's thrush
hermit thrush
wood thrush _*
American robin
gray catbird
white-eyed vireo _*
solitary vireo
yellow-throated vireo _
red-eyed vireo
northern parula*
yellow warbler
chestnut-sided warbler*
magnolia warbler
black-throated blue warbler
black-throated green warbler*
yellow-throated warbler

pine warbler
prairie warbler –
palm warbler
bay-breasted warbler*
blackpoll warbler
black-and-white warbler
American redstart
worm-eating warbler –*
Swainson's warbler –
ovenbird*
northern Waterthrush
Louisiana Waterthrush –
Kentucky warbler –
common yellowthroat*
hooded warbler
Canada warbler
scarlet tanager
rose-breasted grosbeak*
indigo bunting*
chipping sparrow
red-winged blackbird
brown-headed cowbird

5. Mammals

No population surveys have been conducted for mammals on Crows' Nest. However, past hunting and trapping activities at the Peninsula have harvested white-tailed deer (*Odocoileus virginianus*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethinus*), Ermine (*Mustela erminea*), mink (*Mustela vison*), river otter (*Lutra canadensis*), black bear (*Ursus americanum*) and red fox (*vulpes*). Other species commonly found in Stafford County and likely to occur on the property include gray fox (*Urocyon cinereoargenteus*), long-tailed weasel (*Mustela frenata*), deer mouse (*Peromyscus maniculatus*), white-footed mouse (*Peromyscus leucopus*), eastern harvest mouse (*Reithrodontomys humilis*), house mouse (*Mus musculus*), southeastern shrew (*Sorex longirostris*), short-tail shrews (*Blarina brevicauda*), least shrew (*Cryptotis parva*), pygmy shrew (*Sorex hoyi*), star-nosed mole (*Condylura cristata*), meadow vole (*Microtus pennsylvanicus*), pine vole (*Microtus pinetorum*), eastern chipmunk (*Tamias striatus*), gray squirrel (*Sciurus carolinensis*), red squirrel (*Tamiasciurus hudsonicus*), southern flying squirrel (*Glaucomys volans*), woodchuck (*Marmota monax*), eastern cottontail (*Sylvilagus floridanus*), racoon (*Procyon lotor*), and opossum (*Didelphis virginiana*). Two solitary roosting bat species relatively common to the State, the red bat (*Lasiurus borealis*) and the hoary bat (*Lasiurus cinereus*) are likely to roost (during the day) in the study area. Other species that may roost or feed in the study area include the big brown bat (*Eptesicus fuscus*), little brown bat (*Myotis lucifugus*) and the evening bat (*Nycticeius humeralis*).

6. Amphibians and Reptiles

There have been no surveys conducted for amphibians and reptiles (collectively known as herps) on the Peninsula. Even surveys in the County have largely been lacking (Mitchell and Reay 1999). With its

diverse habitats and location at the junction of southern and northern geographic distributions for many of these species, Virginia is home to 74 species of amphibians and 61 species of reptiles. With the range of habitats and the natural condition of wetlands at Crow's Nest, we can expect a diverse community of amphibians and reptiles. In our best professional judgement, we have identified 38 species (Table 4) that have a high possibility of being present in the study area, some of which have been confirmed.

7. Aquatic Resources

The freshwater marshes are highly valuable spawning and nursery habitats for many species of economically important sport and commercial fish, including striped bass, alewife, blueback herring, white perch, hickory shad, and yellow perch. There have not been extensive surveys for aquatic species in the two creeks, but an electrofishing survey conducted in 1995, creel data, and other cursory surveys have documented occurrences of the following fish and mollusk species (Table 5).

Table 4. Amphibian and Reptile species observed or potentially* occurring within the study area. Source: VDGIF's Fish and Wildlife Information Service, Atlas of Amphibians and Reptiles in Virginia, and observation by USFWS biologists.

Common Name	Scientific Name	Status
eastern cricket frog	*Acris crepitans crepitans*	confirmed
eastern American toad	*Bufo americanus americanus*	confirmed
Fowler's toad	*Bufo fowleri*	confirmed
green tree frog	*Hyla cinerea*	possible
northern spring peeper	*Pseudaccris crucifer crucifer*	probable
American bullfrog	*Rana catesbeiana*	probable
southern green frog	*Rana clamitans melanota*	probable
pickerel frog	*Rana palustris*	probable
southern leopard frog	*Rana sphenocephala*	probable
wood frog	*Rana sylvatica*	possible
eastern spadefoot	*Scaphiopus holbrooki*	possible
southeastern chorus frog	*Pseudacris feriarum feriarum*	possible
Cope's gray treefrog	*Hyla chrysoscelis*	possible
spotted salamander	*Ambystoma maculatum*	probable
marbled salamander	*Ambystoma opacum*	possible
northern dusky salamander	*Desmognathus fuscus*	confirmed
northern two-lined salamander	*Eurycea bislineata*	probable
southern two-lined salamander	*Eurycea cirrigera*	probable
three lined salamander	*Eurycea guttolineata*	possible
four-toed salamander	*Hemidactylium scutatum*	possible
red spotted newt	*Notophthalmus viridescens*	probable
red backed salamander	*Plethodon cinereus*	confirmed
white spotted slimy salamander	*Plethodon cylindraceus*	possible
mud salamander	*Pseudotriton montanus*	possible
red salamander	*Pseudotriton ruber*	probable
eastern snapping turtle	*Chelydra serpentina serpentina*	confirmed
eastern painted turtle	*Chrysemys picta picta*	confirmed
spotted turtle	*Clemmys guttata*	probable
eastern mud turtle	*Kinosternon subrubrum subrubrum*	confirmed
river cooter	*Pseudemys concinna*	confirmed
northern red-bellied cooter	*Pseudemys rubriventris*	possible
eastern musk turtle	*Sternotherus odoratus*	possible
eastern box turtle	*Terrapene carolina*	confirmed
red eared slider	*Trachemys scripta elegans*	confirmed
eastern worm snake	*Carphophis amoenus amoenus*	probable
black rat snake	*Elaphe obsoleta obsoleta*	probable
northern copperhead snake	*Agkistrodon contortrix*	confirmed
northern water snake	*Nerodia sipedon sipedon*	probable
eastern garter snake	*Thamnophis sirtalis sirtalis*	probable
rough green snake	*Opheodrys aestivus*	probable
smooth earth snake	*Virginia valeriae*	possible

- these are common or abundant species that have been documented in similar habitat in Stafford County

or in adjacent counties. Probable indicates high potential for occurrence.

Table 5. Aquatic resources observed in Accokeek and Potomac Creeks. Note: This is not a comprehensive list of species. Data is compiled from observation and cursory surveys. Source: Virginia Department of Game and Inland Fisheries's Wildlife Information Online.

Common Name	**Scientific Name**
alewife floater mussel	*Anodonta implicata*
eastern elliptio mussel	*Elliptio complanata*
eastern floater mussel	*Pyganodon cataracta*
squawfoot mussel	*Strophitus undulatus*
triangle floater mussel	*Alasmidonta undulata*
alewife	*Alosa psuedoharengus*
striped bass	*Morone saxatilis*
American eel	*Anguilla rostrata*
largemouth bass	*Micropterus salmoides*
bluegill	*Lepomis macrochirus*
brown bullhead	*Ameiurus nebulosus*
common carp	*Cyprinus carpio*
creek chub	*Semotilus atromaculatus*
creek chubsucker	*Erimyzon oblongus*
blacknose dace	*Rhinichythus atratulus*
rose dace	*Clinostomus funduloides*
tessellated darter	*Etheostoma olmstedi*
fallfish	*Semotilus corporalis*
longnose gar	*Lepisosteus osseus*
banded killfish	*Fundulus diaphanus*
cutlip minnow	*Exoglossum maxillingua*
eastern silvery minnow	*Hybognathus regius*
eastern mosquitofish	*Gambusia holbrooki*
mummichog	*Fundulus heteroclitus*
white perch	*Morone americana*
yellow perch	*Perca flavescens*
chain pickerel	*Esox niger*
redfin pickerel	*Esox americanus americanus*
pumpkinseed	*Lepomis gibbosus*
gizzard shad	*Dorosoma cepedianum*
American shad	*Alosa sapidssima*
satinfin shiner	*Cyprinella analostamas*
golden shiner	*Notemigonus crysoleucas*
common shiner	*Luxilus cornutus*
spottail shiner	*Notropis hudsonius*
swallowtail shiner	*Notropis proene*
northern hog sucker	*Hypentelium nigricans*
white sucker	*Catostomus commersonii*
redbreast sunfish	*Lepomis auritus*

warmouth *Lepomis gulosus*

C. Human Environment

1. Land Use and Infrastructure

Because of its steep topography, the Crow's Nest Peninsula has largely been excluded from the logging, farming and developmental pressures that have altered the surrounding areas. In the almost four hundred years since European settlement, the Peninsula has had only a handful of owners. The earliest recorded owner of the property was Colonel Gerared Fowke. In 1662, the property was deeded to Rawleigh Travers, whose daughter married Peter Daniel (1706-1777). The Travers-Daniel family owned the property for 200 years and established a large plantation on the eastern portion of the property, fully complimented with livestock, game fowl, tannery, blacksmith, shoe, and textile shops, and a trading vessel named the "Crow" after which the property was named. During the Civil War, the Union troops saw the Peninsula as the perfect observation point for watching over activities on Potomac Creek and confiscated the property in 1862. The manor house and all its buildings were reportedly burned. The Union Army used Potomac Creek as a staging and supply area, and built a bridge from Belle Plains to Crow's Nest to transport supplies (Eby 1997). It is unclear what portion of the Peninsula was deforested and farmed while owned by the Daniel-Travers family. Records and pictures from the Civil War period documented the clearing of hills facing Potomac Creek for fuel and firewood and to facilitate transport of materials.

Ownership of the property after the Civil War is not well documented. There are some indications that Gustevus Wallace and his family lived on the property until 1905. From 1905 to 1989, County records show the property to have changed hands fourteen times, with each owner holding the property for a relatively short period of time (Barbara Kirby, Stafford County Planning Department, pers. comm.). For the most part, these landowners did not actively use the land. Exceptions included the Montross Lumber Company (1948 - 1953) who selectively logged the Peninsula, Representative Frank William Boykin (1953 - 1961) who held hunting parties on the property, and Crow's Nest Harbour Ltd. (1971-1981), who plotted and sold off lots in the subdivision. The current owners, Stafford Lakes Limited Partnership purchased the property in 1989.

The property currently has minimum facilities and infrastructure. There is a network of logging roads running through the property. An informal hunting club maintains an open area on the northwest portion of the property where they keep a trailer. Other structures on the property are registered with the Virginia Department of Historic Resources, and include the Daniel family cemetery, the foundation of a barn, and a stone wall.

2. Socioeconomics

The study area is located approximately 40 miles southeast of the Washington-Baltimore metropolitan area with an estimated population of 7.3 million (U.S. Census Bureau 1998). Stafford is one of the fastest growing counties in Virginia in both population and development (Stafford County 1999). From 1980 to 1998, the population grew 130 percent from 40,470 to 93,160. Almost two-thirds of Stafford's working residents commute outside the County to work, mostly to the Washington D.C. area. The service and retail industries dominate the job market in the County with Geico Insurance as the largest employer, followed by the school system.

Tourism is becoming an increasingly important industry in Stafford County. Most people visit Stafford County for its historical features. Highlights include George Washington's boyhood home and famous Civil War battlefields such as the Fredericksburg, the Chancellorville, The Wilderness, and the Spotsylvania Courthouse. The historical City of Fredericksburg also draws many antique collectors.

Bounded to the east by the Potomac River and the south by the Rappahannock River, Stafford County also offers a wide variety of recreational opportunities, particularly water sports. Both Stafford County and the State are planning both water and land trails to increase tourism in the County and along the Potomac River. Currently, individuals with boat access, particularly landowners across the creek, use the two creeks to fish or enjoy the scenery and wildlife. The two creeks also support local commercial fishermen that still fish in the area.

Recognizing the residents' desire for open space and the need to protect important wildlife habitats, Stafford County has specifically identified Crow's Nest as an area to be protected for wildlife habitat and open space in their Draft Wildlife Habitat Protection Plan (2000).

3. Cultural and Archaeological Resources

Located only one mile from the Potomac River, the Crow's Nest Peninsula has played an important role in Native American, Colonial, and Civil War histories. Below are some major highlights of the Peninsula's vast cultural values.

Native American Settlement

Across from the Crow's Nest Peninsula at Indian Point is the historic site of the Patawomeke (Potomac) village (Virginia Department of Historical Resources unpublished data), believed to be initially settled in the 1300's. The Patawomeke Indians belonged to the Powhatan Confederacy that stretched from Washington, D.C. to North Carolina. The Chief of the confederacy was Wahunsonacock, better known as Powhatan. Wahunsonacock's famous daughter, Pocahontas, was believed to have been abducted by Samuel Argall in 1613 when she was visiting the Patawomeke village at Indian Point. The village itself was burned down in 1622 when a group of Colonists living in the village, led by Captain Madyson attacked and killed 30-40 Patawomeke Indians (Blanton *et al.* 1999, John Hennessy, pers. comm.). Several Patawomeke Indians stayed in the area after the attack, but gradually abandoned their ancestral site.

The Crow's Nest Peninsula itself was probably too steep for the Patawomeke Indians to have established residence or crop farms. A large cache of unfinished projectile points found at one site on the Peninsula

suggested that the Patawomeke Indians used the property as a lithic reduction workshop, and probably hunted and even camped on the Peninsula. Both creeks that surround the Peninsula still bear Native American names. Potomac is derived from the name of the Village. Accokeek is derived from an Algonquian word meaning at the edge of the hill or rising ground (Kenny 1961). The Patawomeke Indians probably so named the creek to describe the steeply rising peninsula.

English Settlement of Virginia

On December 20, 1606, three English ships, the Susan Constant, the Godspeed, and the Discovery, set sail from London with a total of 144 men and boys to establish the settlement in Virginia. In May 1607, the ship landed at Jamestown, located approximately 90 miles south of the study area. Notes by the early settlers indicated that the Jamestown Settlement had good relations with and traded with the Patawomeke Indians regularly. Several colonists even lived among the Indians. These accounts were supported by European artifacts found in an old burial site at Indian Point.

Colonial Period

In 1662, Rawleigh Travers received a patent for the 3,650-acre peninsula between Potomac and Accokeek Creeks. He started a tobacco plantation that was expanded by his descendants. The current-day name for the Peninsula, Crow's Nest, came from a black sailing vessel called "The Crow" that transported the family's tobacco and manufactured goods to and from Europe. The plantation was most developed under the ownership of Travers Daniel (1741-1824), Rawleigh Traver's grandson. Daniel and his wife Frances Moncure built a magnificent brick manor house on a high ridge near Crow's Nest point. For the most part, Crow's Nest was a self-sufficient village, and included cabins for servants and several shops such as blacksmith, tannery, shoe, spinning, and weaving shops, to produce necessities for people who worked and lived at Crow's Nest. The family also grew grains, vegetables, and fruit, and raised livestock and game fowls.

Today, nothing remains of the manor house or its many buildings, except for a brick pile marking its location (VDHR, unpublished data). VDHR records do show a cemetery belonging to the Travers-Daniels family. Records indicate that the cemetery, at the time of the Civil War, was quite large, covering nearly an acre of land. Before the Civil War, Supreme Court Justice Peter Daniel (1794-1860) replaced the original wooden grave marker with sandstone, marble and granite gravestones and tombs. The cemetery fell into disrepair after Gus Wallace sold the property. Over the past century, many of the gravestones were destroyed, and some were removed from the property. In the 1980's, Daniel's descendants constructed a curved wall near the cemetery to hang the four remaining gravestones.

Civil War Period

Several major battles were fought near the study area, including the Fredericksburg, the Chancellorsville, The Wilderness, and the Spotsylvania Courthouse. The Union army chose Potomac Creek as a staging and supply area because of its strategic location along the Potomac River and of the nearby railroad spur. The Travers-Daniel plantation was confiscated by the Union army in 1862 to serve as a lookout for activities on Potomac and Accokeek Creeks and on the Potomac River. The manor house and its associated buildings were reportedly burned. The Union troops built a bridge across Potomac Creek where loaded trains transported materials. In 1864, Belle Plains, located across Potomac Creek, became a holding area for thousands of Confederate prisoners captured at the Battles of The Wilderness and Spotsylvania Courthouse.

4. Recreational Resources

Except for two years during the Civil War, the Crow's Nest property has been in private ownership since the English settlement, and thus never offered recreational opportunities to the general public. Throughout the years, however, the landowners and their guests did enjoy various recreational activities on the property, including hunting and fishing. The Daniel-Travers family raised game fowl and presumably also hunted deer and small mammals. There are reports of weekend hunting parties when Representative Boykin owned the property. Starting in the 1950's, Ralph Law was appointed the caretaker of the property when the series of timber and development companies owned the land. Mr. Law erected a gate at the entrance to the property, and allowed a very small group of people to access the property for hunting, fishing, and other recreational activities.

Parts of Accokeek and Potomac Creeks are navigable waters, and are under the jurisdiction of the State. Local residents have used the creeks for boating, waterfowl hunting, wildlife viewing, and fishing. The Department of Recreation and Conservation is developing the Potomac River Water Trail which will direct users to important natural and scenic resources of the River. The proposed Crow's Nest site has been considered one of the stops.

IV. ENVIRONMENTAL CONSEQUENCES

This section discusses the effects of the proposed action alternatives on the physical, biological, and socioeconomic environments as compared to the No Action Alternative. The impacts of the No Action Alternative are based on the assumption that in the absence of Service acquisition, the property would be developed similar to that of surrounding lands, in accordance with existing Federal, State and local regulations. The consequences described in the action alternatives are written with the assumption that all the actions proposed in these alternatives would be fully implemented.

A. Physical Environment

1. Climate, Geology, Topography and Soils

None of the proposed alternatives would impact climate or geology in the study area and surrounding lands. Under the No Action Alternative, potential logging operations and residential development would likely alter the topography and soils of the Peninsula. Because of the steep topography of the Peninsula, any timbering or development would likely grade the topography to facilitate development or logging operations. These land clearing practices would cause some erosion of the top soil and change the topography of the land. Full implementation of Alternative B or Alternative C would protect the topography and soil of the Peninsula against such threats. Under these action alternatives, the proposed widening of the spine road and the construction of small parking areas would cause some disturbance to the soil, but would not result in a significant impact. In all proposed constructions, the Refuge will comply with both Federal and state environmental regulations and will work closely with the responsible state agency to minimize impact to the environment.

2. Hydrology and Water Quality

Under the No Action Alternative, residential development and recreational water sports in Potomac and Accokeek Creeks would likely increase. Certain recreational water sports and associated activities, such as unregulated boating, jet-skiing, construction of piers, and stream stabilization would disturb wildlife, damage aquatic vegetation, and decrease water quality. Wave action from the wake of the water crafts would damage the marsh community and contribute to the erosion of the stream banks. Pier construction and stream stabilization would alter the hydrology, causing erosion and siltation. The clearing of land associated with logging and residential development would dramatically increase sedimentation and surface runoff. With increased residential development, discharge from septic systems and use of fertilizers and pesticides would degrade water quality, increase nutrient loading and increase water temperature in the two creeks.

At a minimum, implementation of Alternative B or Alternative C would maintain the existing water quality by

precluding logging and development. Under these alternatives, the Service would work with DCR and local landowners to reduce sedimentation, erosion, and non-point source pollution of the two creeks. Alternative B only protects the Peninsula and doesn't guarantee the long term protection of the creeks. Full implementation of Alternative C would have the greatest positive impact on water quality as the refuge would protect through acquisition all upland areas adjacent to the creeks and work with private landowners within the watershed to maintain or improve the water quality of the creeks.

3. Air Quality

Under the No Action Alternative, logging and residential development would have some short term and long term impact on the air quality of Stafford County. The logging operation would directly impact air quality by releasing pollutants into the air. The removal of 2,900 acres of trees would eliminate the filtering system inherent in a forest ecosystem and degrade the air quality. An increase in fugitive dust may also be expected from land clearing practices. If allowed to reforest, this degradation would recover in 10-15 years when a substantial stand of tree saplings is established. However, if the Peninsula is developed for residential homes, the degradation of air quality would be more permanent from the loss of trees and increased air emissions associated with fuel consumption for home heating and automobile exhaust. The magnitude of these impacts would vary with the degree and intensity of development.

Full implementation of Alternative B would protect the approximately 2,900-acre, eastern-most portion of the Peninsula from logging and development. Full implementation of Alternative C would protect approximately 6,000 acres of forested habitats. Implementation of either alternative would reduce the threats described above. Implementation of Alternative C would have the greatest positive impact on air quality as it would protect the most habitat and preclude the highest amount of development. Under Service ownership, the Refuge staff will work closely with Virginia Department of Environmental Quality to reduce air pollution during road and facility construction. Negative impacts from Refuge operations would be minimal and are mainly related to automobile exhaust from visitor vehicles and regular maintenance of Refuge facilities with gas-powered tools and vehicles.

B. Biological Resources

1. Vegetation and Habitat

Even though certain portions of the Peninsula are restricted from development by County zoning, endangered species and wetlands regulations, the majority of the Peninsula can be logged. The topography of the Peninsula has historically limited forestry practices to selective logging. Advances in technology in the past fifty years, however, would enable clearcutting of the property today if the landowners choose to do so.

Under the No Action Alternative, either selective logging or clearcutting would have a significant negative impact on the vegetation and habitat at Crow's Nest. The forests at Crow's Nest represent one of the

finest upland hardwoods in the Virginia Coastal Plain, with substantial occurrences of large tree specimens over four feet in diameter, and an impressive diversity of vegetation, community composition, and wildlife habitats. The Peninsula also supports several regionally and globally rare plants and plant communities, including two communities (3 occurrences) designated globally imperiled by The Nature Conservancy (TNC) and DCR-DNH. Additionally, in another 50 - 100 years, the forests at Crow's Nest would constitute significant old growth stands (Fleming 1999). Selective logging would temporarily destroy plant communities and vegetation associations, and would open up gaps in the canopy. If allowed to reforest, the communities may recover to its current state in 100 to 150 years. However, exotic, invasive plant species may invade the disturbed habitat before the native plants can reestablish themselves. Exotic, invasive plant species have life history characteristics similar to weeds, and would often out compete and replace native species. If unmanaged, invasive species could dominate habitats, and would decrease diversity in plant communities. Clearcutting would have an even greater impact on vegetation as this logging practice would change topography and soil in addition to the forest structure and vegetation, and may render the Peninsula unsuitable for reestablishment by its current assemblages of plant communities. Clearcutting would also expose the newly disturbed soil to nearby seed sources and invasion by exotic species. Other possible land uses, including pine monoculture and residential development would have similar, but more permanent impacts on vegetation and habitat.

Under the No Action Alternative, the marsh vegetation would be negatively impacted by upland land uses and unregulated recreational water activities. The decrease in water quality associated with increased sedimentation and nutrient loading from logging and residential development would change vegetation structure and species composition to favor species more tolerant of pollution, siltation, and elevated water temperatures. The disturbance associated with these shoreline projects may also help exotic, invasive plant species to establish, threatening the native communities. Additionally, unregulated boating and jet-skiing would directly damage submerged and emergent aquatic vegetation.

Implementation of Alternative B or Alternative C would ensure the long term protection of the existing habitats by precluding these threats. Some limited disturbance to vegetation would occur, associated with trail improvements. The proposed widening of the spine road and construction of several small parking areas would result in the loss of some trees and understory vegetation, and grading of soil in some instances. This loss would not significantly impact vegetation on the Peninsula as the construction would occur along existing trails where the vegetation is already disturbed. Under both action alternatives, refuge staff would coordinate with State and local landowners to cooperatively protect the water quality of the two creeks and the ecological integrity of the marsh habitats. Implementation of Alternative C would provide the greatest protection to vegetation as it would protect 700 acres of marsh habitat as well as the forests on the Peninsula.

2. Threatened and Endangered Species

Under the No Action Alternative, the immediate areas around the bald eagle nesting sites would be protected from development and logging by the Endangered Species Act. However, the surrounding forest and the creeks may be altered such that the creeks would no longer support the foraging needs of nesting

eagles and chicks. Implementation of Alternative C would protect the nesting and feeding habitats for the eagles nesting on or adjacent to the Crow's Nest property. On a regional scale, the loss of these two nesting eagle pairs would not significantly impact the eagle's overall population. Over their range, the bald eagle has recovered from a population of 417 nesting pairs in 1963 to almost 6,000 nesting pairs today. The Service is planning to delist the bird completely this year (USFWS 1999). The eagles would still be protected under the Bald Eagle Protection Act of 1940.

The study area supports the State listed American ginseng and river bulrush, and potential habitats for the Federally listed small whorled pogonia (endangered) and sensitive joint-vetch (threatened), and several additional State listed plant species. Under the No Action Alternative, no surveys would be conducted for any of these T & E species known or potentially occur on the property. Future logging and residential development could inadvertently destroy populations of these T & E species. With the implementation of either Alternative B or Alternative C, the Service would develop an Inventory and Monitoring Plan to survey and monitor these species. Research would also be conducted to determine if the Federally listed species can be feasibly reintroduced onto refuge lands. Implementation of Alternative B would protect the mesic hardwood forests that support the American ginseng and small whorled pogonia. Implementation of Alternative C would protect habitats for all known and potential T & E plant species within the Study Area.

3. Rare Plants

The Peninsula hosts many rare, disjunct or outlier plant communities, some of which may be the only existing occurrence in the Coastal Plain. In addition to the T & E species mentioned above, the Peninsula also supports several globally and regionally rare species, and 19 county records (species that have not been previously recorded in Stafford County). Under the No Action Alternative, these rare plant communities would be threatened by logging and residential development. The destruction of these communities could have a significant negative impact on populations in Stafford County, and potentially the Virginia Coastal Plain. Implementation of Alternative B or Alternative C would permanently protect the unique plant communities at Crow's Nest. Additionally, the Service would inventory and monitor these rare plant communities to preclude threats from invasive species, herbivory, and Refuge users. Implementation of Alternative C would provide the greatest amount of protection to rare plants as the Service could acquire and protect a larger area that includes the marsh habitats as well as the upland forests.

4. Birds

Colonial nesting birds

Under Alternative A, the 70 acres supporting the 600-nest heron rookery would be protected by the Northern Virginia Conservation Trust. However, degradation of water quality and submerged aquatic vegetation, as described under Vegetation and Habitat would decrease fish and shellfish populations upon which the heron prey. The development of habitats adjacent to the rookery for recreational purposes would expose the rookery to disturbance and negatively impact the colony. Alternative B would protect the upland habitats, but would not preclude recreational development or logging of the wetland forest

immediately adjacent to the rookery.

Full implementation of Alternative C would preclude residential development around the heron rookery; thus reducing disturbance and protection additional habitats for the expansion or geographic shifting of the rookery over the long term. Typically within a heron rookery, dropping from the herons and the weight of the nest will decimate the trees on which they roost, and eventually the herons would move to new trees. Over time, the colony shifts in location. Implementation of Alternative C would ensure that the rookery can expand and shift as it needs to. Under both Alternatives B and C, the Service would work with the State and adjacent landowner to maintain or improve the water quality and environmental health of creeks and marsh habitats.

Waterfowl

Since there is little information on waterfowl use in the study area, we do not yet know how important the study area is to the overall populations of specific species. However, we can reasonably conclude that waterfowl populations in the study area would be negatively impacted under the No Action Alternative. If no action is taken to protect the Peninsula, logging is a real possibility in the near future. The loss of forested habitats would negatively impact breeding populations of wood duck, American black duck, and mallards. The siltation from logging would also negatively impact submerged aquatic vegetation (SAV) and invertebrate abundance and composition, thus reducing the availability of food for migrating and wintering waterfowl. These combined impacts would reduce the capacity of the creeks to support waterfowl populations over the short term, but could be restored if the forest is allowed to recover.

However, if housing development follows logging, the impacts would be far more permanent. Increased recreational boating, bank stabilization, and pier construction associated with residential development would permanently alter the hydrology and SAV community in the two creeks. Unregulated and high traffic boating activities would damage SAV and directly disturb the waterfowl. Pier construction and bank stabilization would interrupt the hydrology of the two creeks and cause future erosion and siltation. The disturbance associated with these shoreline projects may also help exotic, invasive plant species to establish. For many waterfowl species, these impacts translates into less habitat and forage availability, and ultimately decreased productivity.

Implementation of Alternative B or Alternative C would preclude the impacts described above by preventing logging and development of the upland areas. Under these Alternatives, there would still be some impact from recreational boating activities. Waterfowl is most sensitive to disturbance during their migratory and wintering periods, where they concentrate in large numbers to feed or rest. Since most boating occurs during the summer months, however, these disturbances would be minimal. Additionally, the Refuge staff would partner with the State and adjacent landowner to minimize wildlife disturbance and habitat damage in the two creeks.

Waterfowl hunting from floating blinds would occur in the two creeks according to State regulations under all alternatives. Although the Service does not have full authority to regulate activities on the water, some waterfowl hunters have approached the Service and have indicated that they would work closely with Refuge staff to minimize disturbance to wildlife and other public uses. The general waterfowl hunting season

is usually from November to January, but can start as early as October. Waterfowl hunting would result in the loss of those individuals taken by waterfowl hunters. Along the Atlantic Flyway (from Maine to Florida), however, populations are not likely to be significantly impacted as the duration of the hunting season and bag limited are set each year by U.S. Fish & Wildlife Service, the Flyway Commission, and each State based on regional population trends.

Neotropical migratory birds

As one of the largest contiguous tracts of mature forest in the Virginia Coastal Plain, Crow's Nest plays a very important role as a safe stopover for neotropical landbirds that migrate along the eastern coast and nesting habitat for species that require larger landscapes.

Under the No Action Alternative, the forest habitat may be fragmented by limited logging and residential development, or completely destroyed by clearcutting and intense development. In the latter case, the Peninsula would no longer support many species of migratory or resident forest dependent birds. In the former case, the removal of older mature trees and the clearing of land for housing development would fragment the mixed hardwood forest. This fragmentation would negatively impact nesting birds as it would increase brood parasitism by cowbirds and nest predation (Robinson and Wilcove 1994) and decrease pairing success and fledgling rate (Proneluzi and Faaborg 1999), all of which would lead to lowered reproductive success (Robinson and Wilcove 1994), and even displacement of species that require larger tracts of contiguous forest.

The fragmentation of the Crow's Nest peninsula would significantly diminish the value of the forests as a stopover habitat. Moore *et al*. (1995) found that "mixed" forest habitats supported the greatest species richness (diversity and volume). With the fragmentation of the forest or conversion of the mixed hardwood forest to pine plantations, neotropical landbirds that arrive in the area may search for another "rest area" entirely, or feed in a less suitable habitat within increased competition and threat of predation. For long distance migrants, the single most important constraint during migration is probably to obtain enough food to meet energetic requirements. These stresses would detract from the migrants' ability to replenish their fat reserve and may negatively impact their migration success.

Implementation of Alternative B or Alternative C would permanently protect 2,900 acres and 6,000 acres of mature forest, respectively, to benefit neotropical migrants. Under Service ownership, we would maintain the diverse habitat types to benefit both migrating and nesting landbirds. The network of dirt roads originally cleared as subdivision streets would be allowed to revert back to forest. This action would decrease the amount of edge habitats, and thus reducing brood parasitism by cowbirds and predation. Cowbirds and nest predators (racoon, skunks) often use open trails for travel (Robinson and Wilcove 1994). In summary, Implementation of either Alternative B or Alternative C would sustain or increase reproductive and migratory success of forest nesting neotropical migratory species.

It is difficult to determine if reduced reproductive success at one site would significantly impact the overall neotropical migrant population on the east coast. Given that 71 percent of neotropical migratory species have experienced population declines throughout their range (Roberts and Norment 1999), we can reasonably conclude that the loss of the 5,000 acres of mature forest at Crow's Nest and an additional 1,000 acres north of Route 608 would contribute to the continued decline of forest nesting species.

Combined with other regional factors, this loss may have a significant negative impact on the overall breeding populations.

5. Mammals

Under the No Action Alternative, a small group of individuals hunt for deer on the Peninsula during the State open season, and take approximately 30-50 deer per year. Since the population of deer in Stafford County is estimated to be twice that of its historic population, this hunting is desirable to reduce deer populations to its natural level. Under the No Action Alternative, potential timbering and residential development would temporarily displace individual mammals from some parts of the Peninsula. None of the mammals inhabiting, or expected to inhabit the Peninsula are considered rare or declining; therefore, the removal or displacement of individuals would not have a significant impact on overall mammal populations in the County and State. Over the long term, some species, including white-tailed deer, raccoons, skunks, fox, and squirrels may even be positively impacted by the increased edge habitats associated with residential development and selective logging.

With the implementation of Alternative B or C, baseline research would determine the mammalian population using the Peninsula and the surrounding marshes. During the interim period between acquisition of the peninsula and the completion of a CCP, Alternatives B and C propose a public deer hunt in the third week of November with the objective of taking 30-50 deer per year. The impacts of the deer hunt would be similar to those described under the No Action Alternative. Under these action alternatives, the refuge would monitor the deer population and vegetation and adjust the hunting regulations accordingly each year. In summary, none of the alternatives would have a significant impact on mammals.

6. Amphibians and Reptiles

Amphibian and reptile (collectively known as herps) use in the study area has not been surveyed. Given that both the marshes and the forest habitats have been largely undisturbed and comprise diverse community types, we expect a diverse community of herp populations and several occurrences of rare or threatened species. Under the No Action Alternative, water pollution, habitat degradation, and habitat loss would negatively impact amphibian and reptile populations on the Peninsula. Since Crow's Nest contains habitats rare throughout the County, the State and the Virginia Coastal Plain, loss and degradation of these habitats may have a significant negative impact on the overall amphibian and reptile population in Stafford County and in Virginia.

Implementation of Alternative B or Alternative C would protect the integrity of these unique habitats at Crow's Nest, and thus positively impact amphibian and reptile populations in the proposed acquisition area and in the Coastal Plain. Implementation of Alternative C would have the greatest positive impact on herps as it protects 700 acres of diverse freshwater marsh habitat and an additional 700 acres of adjacent upland habitat to ensure the long term integrity of the two creeks. Under both action alternatives, the Service would develop an Inventory and Monitoring Plan to survey herp populations, and if necessary, manage for

any rare or threatened species.

7. Aquatic Resources

No extensive surveys were conducted for fish species in the study area. However, an electrofishing survey, personal observations and reports from commercial and recreational anglers indicate both creeks to support a high diversity and density of both freshwater and marine fish and mollusk species.

Under the No Action Alternative, recreational water activities, logging and residential development along the shorelines would have a significant impact on fish populations in the two creeks. Upland logging activities and development would increase siltation, nutrient loading, and alter the hydrology of the streams. The degradation of water quality would result in a direct negative impact on native mussel population in the two creeks. It also would have indirect negative impact on fish populations by changing the aquatic vegetation and invertebrate species composition and abundance. Unregulated recreational water activities could directly disturb feeding fish, and cause damage to the aquatic vegetation. Studies of other creeks along the coast have found that coastal development over time decreases abundance, productivity, species richness and potentially cause the loss of species (Weaver and Garman 1994). On a community level, upland disturbances and pollution tend to change the species composition in favor of habitat generalists and omnivores (Weaver and Garman 1994) and non-native species at the expense of native species that require natural habitats and specific prey items (i.e. piscivores or insectivores).

Implementation of Alternatives B and C would protect the ecological integrity of the marshes to benefit aquatic populations. Under both alternatives, the Refuge would work with the State, landowners and other partners to minimize impacts of recreational water activities and upland land use practices to benefit the marsh communities and the water quality of the two creeks.

C. Human Environment

1. Infrastructure and Facilities

Under the No-Action Alternative, the existing logging roads would continue to deteriorate through the actions of nature. Erosion is already evident in several sites along the existing trails. Depending on the future ownership and land use of the property, neither access nor trails may be maintained under private ownership. Both Alternatives B and C propose trail maintenance and restoration to improve access to the property. These proposals would improve the main "spine road" to accommodate two-way vehicular traffic (CMP, Map 2). Nine of the side trails would be maintained as walking-only trails, and some of the remaining trails would be allowed to revert back to forests. Several small parking areas, accommodating 5-10 cars each, would be constructed to facilitate the proposed public uses. Depending on future funding, the refuge may temporarily set up a trailer for headquarter facilities or store equipment and vehicles in the cleared area where the hunt club currently keeps its trailer. In the long term, permanent staffing of the area and associated permanent facilities can be expected.

2. Socioeconomics

Effect on local landowners

None of the alternatives would have a significant impact on the local landowners. Under the No Action Alternative, the Crow's Nest Peninsula may be subdivided for residential houses. Under Alternatives B and C, the Service would negotiate with landowners within the acquisition boundary to acquire land. The Service can acquire land in several ways, including purchasing fee acquisition (all rights to a property), purchasing conservation easement (certain rights), accepting donations, or exchanging lands. The acquisition boundary under Alternative C was delineated to protect the long term integrity of the peninsula, and incorporates some developed lands. However, none of the landowners within the acquisition boundaries would be forced to sell their land. It is the policy of the Service to acquire land only from willing sellers. Although the Service does have the power of eminent domain, we have not condemned any land in the past ten years[3]. In all acquisitions, the Service is required by law to offer fair market value as determined by an approved appraisal that meets professional standards and Federal requirements. Landowners within the Crow's Nest Harbor subdivision may be positively impacted as the lack of roads and utilities have inhibited the development of residential homes and sales of property in the past. With the implementation of Alternative C, the Service would become a willing buyer for these lands.

Lands within or adjacent to a Refuge acquisition boundary would not be subject to any additional regulation above and beyond the existing laws. The establishment of an acquisition boundary allows the Service to protect important wildlife habitats without conducting further NEPA and administrative planning should the landowner wish to sell. Though difficult to qualify, establishment of the Refuge would likely increase the property value of lands adjacent to the refuge.

With the implementation of the action alternatives, road traffic on Raven Road would increase due to refuge visitation. However, this increase would not exceed the projected traffic increase if Crow's Nest were to be developed for residential purposes.

Effects on the local economy

None of the proposed alternatives would have a significant impact on the local economy of Stafford County. Under the No Action Alternative, the County would continue to receive tax revenues for the lands identified in the respectively Refuge boundaries. If the study area was developed for residential homes, the County would receive more revenue from taxes, but would also have to spend more to provide community services, such as education, emergency services, fire prevention, law enforcement, road and utilities maintenance. While the ratio of tax revenue and cost of community services vary from municipality to municipality, studies

[3]Excludes friendly condemnations where the Service starts the condemnation process at the request of the landowner in order to clear title or reconcile disagreement over land value.

conducted by the American Farmland Trust across the nation have consistently found that for residential neighborhoods, municipalities spend more money for community service than they receive in tax revenue (American Farmland Trust 2000).

Under Alternatives B and C, acquisition of land for Refuge purposes would permanently remove the availability of the land for development purposes, and from the County's tax rolls. However, the County would be compensated with Refuge Revenue Sharing payments, calculated at ¾ of 1 percent of fair market value, as stipulated by the Refuge Revenue Sharing Act of 1964. The funding for this payment comes from refuge revenues and congressional appropriations. The actual amount distributed each year varies depending on how much Congress appropriates in a given fiscal year. In recent years, it has been about 60 to 66 percent of the full amount, and is decreasing each year as more land is added to the Refuge System without a corresponding increase in appropriations.

The County currently receives approximately $7, 200 per year in taxes for the 3,500-acre property known as Crow's Nest (Elizabeth Daley, Stafford County Treasurer, pers. comm.). Based on a conservative estimate of the property value, the County can receive up to 10 times as much in Refuge Revenue Sharing payments from the U.S. Fish & Wildlife Service. For lands in the Crow's Nest Harbour subdivision, the Refuge Revenue Sharing payments are expected to be similar to the current tax revenues. For lands along Belle Plains and Marlborough Point, Refuge Revenue Sharing payments are estimated to be less than the current tax revenues. With the full implementation of Alternative B, the Refuge Revenue Sharing payments would exceed what the County currently receives in tax revenues. With the full implementation of Alternative C, the Refuge Revenue Sharing payments would be similar to what the County currently received in tax revenues. Depending on funding availability for Revenue Sharing payments, the County may even have a net gain in revenue.

Additionally, the County would benefit economically from Service ownership of the Crow's Nest property by the reduction of the cost of community services. Under Service ownership, the County would not have to provide educational or law enforcement services to potential communities at Crow's Nest. The refuge would have fire prevention plans in place, and would receive aid from regional firefighters, the National Park Service, and the State. In case of a wild fire, the County would not be the primary entity responsible for its control. The refuge would also maintain most roads within the Peninsula. Refuge visitors would increase traffic on Raven Road, which can contribute to road degradation, but it would be less than if the property was developed for residential or commercial purposes.

The refuge would also contribute to the local economy by attracting out-of-town visitors and increasing sales revenue to local merchants. Although difficult to quantify, a study conducted by National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (USFWS 1997) estimated that refuge visitors typically spend $20/day per person in the local community. The establishment of the refuge, particularly under Alternative C would also benefit the commercial fishermen that fish Potomac and Accokeek Creeks by protecting water quality and ecological integrity of the two creeks.

Effects on the social environment

It is our belief that the refuge's greatest contribution to Stafford County is the preservation of wildlife habitats. Implementations of either Alternative B or C would ensure that the Crow's Nest Peninsula with its

wealth of biological diversity, cultural history, and scenic beauty would be preserved in perpetuity for the enjoyment of current and future generations of Americans. During the scoping period, we heard repeatedly from the public of their appreciation for the "wilderness characteristics" of Crow's Nest and the associated recreational opportunities available on the property. With the implementation of Alternative B or Alternative C, the public would benefit from increased wildlife-dependent public uses, and the preservation of a natural ecosystem that will offer inspirational vistas to the current and future generations of Americans.

3. Cultural and Archaeological Resources

The Crow's Nest Peninsula and its surrounding areas have a wealth of archeological and historical resources. The Virginia Department of Historic Resources has registered four sites at Crow's Nest, most of which were recently discovered during biological surveys of the property. There are no laws regulating State and private landowners' actions that may affect Federally and state registered Historical Landmarks (Lee Tippett, Virginia Department of Historical Resources, pers. comm.). Under the No Action Alternative, the responsibility of protecting these registered historical sites would fall on the landowner. Other potential sites not yet identified may be inadvertently disturbed from logging and development activities.

With the implementation of Alternatives B and C, the refuge would protect known cultural resources from vandalism and promote understanding and appreciation of the Native American, Colonial, and Civil War histories associated with these sites. Under Service management, archeological surveys would be conducted prior to any ground disturbing activities to avoid accidental destruction of historical sites. Research with partners provided under the Archeological Resource Protect Act may discover additional archeological sites and help to piece together the overall historical picture at Crow's Nest. In summary, implementation of Alternatives B and C would significantly benefit cultural resources in the vicinity of and at Crow's Nest.

4. Recreational Resources

Under the No-Action Alternative, only the few individuals granted access to the property would be able to enjoy recreational activities on the property. These privileges may be revoked at any time at the owner's discretion.

With the implementation of Alternative B or Alternative C, there would be new opportunities for compatible, wildlife-dependent public uses on the property. The group of individuals currently using the property for recreational purposes would no longer have exclusive access to the property. Under Service management, non-wildlife dependent uses would no longer be allowed. Wildlife-dependent activities that will be allowed on an interim basis include limited hunting, fishing, wildlife observation, and wildlife photography as detailed in the Conceptual Management Plan (Appendix B). During the interim period, environmental education and interpretation would be accommodated on a case by case basis. The proposed public use program would provide the visiting public unparalleled vistas of mature coastal forest and pristine marshes and an opportunity to learn about the unique biological, geological and cultural values

of Crow's Nest. The proposed public uses would cause some short term disturbances to wildlife. In the long term, however, wildlife and habitat would benefit from the public use program through increased public understanding and support for wildlife conservation, the National Wildlife Refuge System, and the Service's mission.

D. Cumulative Impacts

1. Potential Cumulative Impacts

Cumulative impacts are those impacts on the physical, biological, and human environment resulting from the incremental impact of the proposed actions when added to other past, present, and reasonably foreseeable future actions on a landscape scale. Cumulative impacts can result from individually minor but collectively significant actions taking place on a larger scale or over a long period of time.

Under the No Action Alternative, without protection and management, the unique plant communities, neotropical migrants, waterfowl, fish, amphibian, and reptile populations at the Crow's Nest Peninsula would be negatively impacted by timbering practices, recreational activities, and residential development. Combined with the loss of wintering habitats in South America and breeding habitat throughout the east coast, the loss of the mature forest community at Crow's Nest would have a cumulative negative impact on neotropical migratory bird populations throughout their range. The decline of water quality in Potomac and Accokeek Creeks would negatively impact fish populations, which can have a cumulative negative impact on local commercial fishermen that have lost fishing opportunities in adjacent creeks due to pollution.

With the implementation of either Alternative B or Alternative C, the diverse habitat types in the respective areas to be acquired would be permanently protected against development and logging threats. There are currently no plans to protect other large areas in Stafford County for wildlife purposes. As lands surrounding the Peninsula are developed for residential or commercial purposes, Crow's Nest will become increasingly important as a showcase for diverse hardwood forest and freshwater tidal marsh communities. As the remaining large tracts of lands are subdivided for residential homes, outdoor recreational opportunities in Stafford County would also diminish. Implementation of either Alternative B or Alternative C would ensure the protection of a natural area where the public could engage in wildlife-dependent activities.

2. Relationship between Short-Term Uses and Long-Term Productivity

This section evaluates the relationship between short-term uses of property and long-term productivity of the environment. Management of the refuge would be aimed at enhancing the long-term productivity and sustaining the ecological integrity of the ecosystem over the long term. The wildlife-dependent public uses proposed for the refuge and associated facility improvements would have short-term negative impacts on the biological environment. However, over the long term, the public use program would benefit wildlife and their habitats by fostering an educated public that advocates wildlife conservation and the mission of the National Wildlife Refuge System.

3. Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those which cannot be reversed, except perhaps in the extreme long term. An example of an irreversible commitment is an action which contributes to the extinction of a species. Once gone, the species can never be recovered.

Under the No Action Alternative, the development of the Peninsula for residential homes would result in an irreversible commitment of biological resources. Once a residential community is established, it is very unlikely that it would revert ever revert back to natural conditions prior to development.

With the implementation of Alternative B or C, refuge land acquisition would result in an irreversible commitment of resources. Once the Service acquires land, it is exceptionally rare that Refuge lands would revert back to any other ownership. Acquisition of land for refuge purposes would permanently make the land unavailable for residential and recreational development.

In comparison, irretrievable commitments of resources are those which can be reversed given sufficient time and resources. An example of an irretrievable commitment is the timbering of a mature forest.

Under the No Action Alternative, timbering of the property would result in an irretrievable loss of biological resources. Timbering would result in the temporary loss of wildlife habitat and vegetative communities, but the vegetation and habitat could be recovered. No irretrievable commitment of resources would result from implementation of the action alternatives.

4. Unavoidable Adverse Effects

Unavoidable adverse effects are those impacts that are anticipated but cannot be avoided. An example of an unavoidable adverse effect is the loss of wetland for the expansion of a highway. None of the alternatives would result in unavoidable adverse effects on the natural or human environment.

V. PREPARERS AND REVIEWERS

A. Core Planning Team

Nancy Pau, Land Acquisition Planning Biologist, U.S. Fish & Wildlife Service, Division of Planning, Northeast Region, Hadley, Massachusetts

Greg Weiler, Refuge Manager, U.S. Fish & Wildlife Service, Potomac River National Wildlife Refuge Complex, Woodbridge, Virginia

Walt Quist, Team Leader, Land Planning Reviewer, U.S. Fish & Wildlife Service, Division of Realty, Northeast Region, Hadley, Massachusetts

B. Contributors

The following individuals provided substantial support throughout the planning process by conducting biological investigations, providing information, or assisting with the planning project.

Hal Wiggins, Environmental Scientist, Army Corps of Engineers, Fredericksburg Field Office, Fredericksburg, Virginia

Gary Fleming, Ecologist, Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia

Aimee Delach, Executive Assistant, Defenders of Wildlife, Washington, D.C.

Robert Barber-Delach, U.S. Geological Survey, Reston, Virginia.

Ralph Law, Care Taker, Crow's Nest Peninsula, Stafford County, Virginia.

Kathy Quindlen, Online Service Coordinator, Virginia Department of Game and Inland Fisheries, Richmond, Virginia

VI. CONSULTATION AND COORDINATION

The planning effort associated with this EA was coordinated with Federal and State agencies, local governments, private organizations and the general public. In February of 2000, two public open houses were held to discuss issues concerning the establishment and management of the proposed refuge. These meetings were advertised in local papers, and notices were sent out to elected officials, County and State governments, local organizations, and landowners. At the open houses, over 200 workbooks were handed out to the public to gather comments and concerns. Over 120 people responded to the workbooks. On August 25, 2000, over 300 copies of the draft Environmental Assessment were sent out to federal, state, and local government, landowners within the proposed acquisition boundary, and those individuals that requested the draft EA. Press releases were sent to local newspapers, television, and radio media. The draft EA was also made available to the public at the Stafford County Courthouse, Potomac River Refuge Complex, and via the internet. The comments received in response to the draft EA and during the public meeting are summarized below. This final EA is being forwarded to the following groups.

A. Distribution List

1. Federal Agencies

U.S. Department of Agriculture

Natural Resource Conservation Service, Virginia State Office, Richmond, Virginia

U.S. Department of Defense

Army Corps of Engineers, Fredericksburg Field Office, Fredericksburg, Virginia

U.S. Department of Interior

Fish & Wildlife Service

Director, Washington, D.C.
Division of Realty, Washington Office, Arlington, Virginia
Division of Refuges, Washington Office, Arlington, Virginia
Division of Ecological Services, Virginia Field Office, Gloucester, Virginia
Division of Ecological Services, Chesapeake Bay Field Office, Annapolis, Virginia
Division of Fisheries, Chesapeake Bay Field Office, Annapolis, Virginia
Division of Fisheries, Susquehanna River Coordinator, Harrisburg, Pennsylvania
Refuge Manager, Potomac River National Wildlife Refuge Complex, Woodbridge, Virginia

2. State Agencies

Virginia Department of Conservation and Recreation (DCR)

Director, Richmond, Virginia
Division of Natural Heritage, Richmond, Virginia
Virginia Department of Historical Resources, Division of Project Review, Richmond, Virginia

Virginia Department of Game and Inland Fisheries, Richmond, Virginia

Virginia Department of Environmental Quality, Office of Environmental Impact Review, Richmond, Virginia

Virginia Department of Forestry, Central Office, Charlottesville, Virginia

3. Federal and State Legislators

Federal legislators

Senator John W. Warner
Senator Charles S. Robb

State legislators

Governor Jim Gilmore
Senator John H. Chichester (District 28)
Delegate Bill James Howell (District 28)

4. Local Government

Stafford County

Board of Supervisors
Department of Planning and Community
Department of Forest and Parks
King George County

Board of Supervisors

5. Private Organizations

Trust for Public Land, Chesapeake Bay Office
Chesapeake Bay Foundation
Virginia Native Plant Society, Piedmont Chapter
The Nature Conservancy of Virginia
Stafford Lakes Limited Partnership
Friends of Rappahannock
National Fish & Wildlife Foundation

Battlefields Sierra Group
Maryland Native Plant Society
Izaak Walton League of America, Virginia Division, Alexandria Chapter
Northern Virginia Conservation Trust

6. Private Landowners

This EA was sent to over 300 private individuals, including all the landowners in the proposed acquisition boundary and adjacent landowners. Copies of this EA were also provided to the public at Stafford County Courthouse, the Potomac River Refuge Complex and via the internet.

B. Public Review and Comments

The public overwhelmingly supported the establishment of Accokeek Creek National Wildlife Refuge. We received over 20 letters, 12 emails, and numerous phone calls regarding the establishment of the Refuge. The following section represents some of the comments and concerns received from the open houses and the public comment period, followed by the Service's response. Many of the responses below are taken from actual correspondence letters prepared by the Service and sent in reply to the inquiring agency, organization, or individual. The final Environmental Assessment was revised to address the comments received.

1. General Comments concerning establishment of refuge

- "I support Alternative C. I have photographed and painted various areas in and around Crow's Nest and would be deeply disturbed by the destruction of this unique and beautiful land."
- "Nowhere have I seen the vast variety of birds, mammals, plants and trees that exists here. To lose even one acre of this wildlife wonderland would be most unfortunate. The entire 6,700 acres must be protected."
- "I propose to add an alternative D: Close shop and get a meaningful job. Not all cuckoos live in the forest."
- "We want to do whatever we can to preserve this pristine area and save it for many people to enjoy in generations to come. We feel the best way to do this is indeed under the protection of the U.S. government."
- "It seems that the local population could relate more to the naming of the site "Crow's Nest National Wildlife Refuge." This name reflects the cultural history of the site and has been the name used among county residents for over a century. The name "Accokeek Creek National Wildlife Refuge" does not set this property aside from any other refuge and seems more like the name of an Indian reservation rather than property known for its biological, cultural and historical qualities."

The name Accokeek is derived from an Algonquian word meaning at the edge of the hill or rising ground, and was given to the Creek by the Patawomeke Indians. Given the fact that the Patawomeke Indians' ancestral village was located at Indian Point, we felt it was appropriate to recognize and promote their historical ties to the area. The word also characterizes the topography and geological history of the Peninsula that so strongly influences its biological diversity. The name "Crow's Nest" reflects only a short period in geological and human history, and refers to an ownership rather than an ecological or biological unit. The Crow's Nest name will be the theme of one of the cultural interpretations at the Refuge and will continue to live on in the County's historical records, and the resident's memories.

- "My wife and I wholeheartedly agree with your recommendation that Alternative C be adopted, thus preserving a small piece of our history indefinitely."
- "I am writing to express the strongest possible support for the proposed Accokeek Creek National Wildlife Refuge in Stafford County, Virginia."
- "My wife and I are strongly in favor of Alternative C, the more extensive of the two plans for creating a Refuge. We would very much like to see this area preserved for the future, and to have the wildlife habitat protected in perpetuity."

2. Questions and comments concerning Service acquisition policy or proposed boundary

Throughout the scoping period and during the public comment period, we received questions regarding the Service's acquisition policy and the impact of the refuge on landowners. During the public comment period, we also received comments to change the proposed refuge boundary. Many of these inquiries were addressed formally through letters, or informally through e-mail and phone conversations. Below is a summary of these inquiries and the Service's responses.

- "What, if any rights would I, [as a landowner], have to develop my property after the Refuge is established?"

  The establishment of the refuge does not affect the landowner's rights to develop his or her land. The establishment of the refuge boundary is an administrative procedure on the part of the Service to comply with National Environmental Policy Act. The Service would not obtain any rights to lands within an acquisition boundary until we purchase full or partial interest in it.

- "How would FWS determine fair market value for the lands within the acquisition boundary?"

  When a landowner within the acquisition boundary wishes to sell his or her land to the Service, we initiate an appraisal for the value of the land. The appraisal is conducted according to federal and professional standards, and is reviewed by a Review Appraiser. For lands larger than 750,000 acres, two appraisals are done. The Service is required by law to offer the full value of the appraisal.

- "What is the projected date for the Director's decision on selecting an alternative? If Alternative B or C is selected, what is the projected date for the Refuge to be established?"

  The refuge will officially be established when the first piece of land is the purchased. The completion of the final Environmental Assessment and Finding of No Significant Impact (FONSI) by the Director gives the Service authority to begin negotiations with landowners with the established boundary. Since our priority parcel is K&M properties where negotiations may be complicated and the price is expected to be high, the actual establishment may take as long as a couple of years.

- "What will happen to those of us who own property in the former Crow's Nest Harbor development. I bought a lot before the development went bankrupt. In particular, will access be available to those few private lots within the project or will the refuge project or trust purchase the land?"

  The inclusion of a property with a refuge acquisition boundary does not add any additional zoning or development restrictions on the property. The landowners within the Crow's Nest Harbor subdivision would retain the access they acquired when they first purchased their lots. For those landowners that do wish to sell, the Service will become a willing buyer if Alternative C is selected and a finding of no significant impact is determined.

- "Geographically, all northern borders, as set forth in Map #3 (Alternative C), should be moved further north of State Rt. 608 to the ridge line in order to include and protect the watershed of the Accokeek Creek."

  The final Environmental Assessment expanded the refuge boundary as proposed in Alternative C to include the Polar Hill subdivision, and several other tracts that will protect the water quality of Accokeek Creek.

- "You might want to say something about the community of people who currently live along Raven Road. I can't find anything in the document that references them, and how a new refuge surrounding their community would affect them."

  There are a number of residential dwellings within the proposed refuge boundary under Alternative C, including houses along Raven Road, Brooke Road, and Marlborough Point Road. This alternative was developed regardless of ownership and development status with the goal of protecting the ecological integrity of the refuge. The Service only negotiates with willing sellers and will not force these people from their homes. The establishment of the refuge will generally have a positive impact on these landowners, as the refuge will permanently protect scenic and wildlife habitats around them. The Land Protection Plan, Appendix D, further explain the Service's land acquisition policies and priorities.

3. Questions or Comments concerning proposed public uses

Hunting

- "The draft EA implies that the FWS will work with the current private blind owners so that they will still have the opportunity to waterfowl hunt from their blinds. As a federal agency, I do not understand how the FWS could unilaterally extend the privilege to hunt off their riparian shoreline to a select group of individuals."

  Waterfowl hunting in the two creeks is permitted and regulated by the State, since hunting occurs on open water where the State has jurisdiction. Virginia State waterfowl hunting blind laws give landowners exclusive privileges to hunt in the riparian zones. If the landowner forfeits this right, other individuals may apply for stationary blind license. Holders of the license have the privilege each year to renew the license within the required time frame. Since the license holders on Accokeek and Potomac Creeks usually renew their license, the individuals that hunt these two creeks do not generally change, and over the years, an informal group was formed to better coordinate the hunt and settle disputes. The Service recognizes the State's jurisdiction and proposes working with the waterfowl hunters to to make sure that the waterfowl hunting and refuge activities do not conflict. The waterfowl hunting section of the final Conceptual Management Plan was expanded to explain the Virginia blind laws in detail.

- "I support your plan to allow limited hunting. I feel this will be the only economically feasible method to control deer populations."
- "I think all the uses [as proposed in the draft EA] are compatible and appropriate. With regard to deer hunting, I agree with the ban on using dogs. I also enjoy duck hunting and would like to see that continue."
- "I am a lifelong hunter, but in the case of the refuge, I say leave this place as a sanctuary for the birds and mammals. There are plenty of other places for hunters to go that are already trashed."
- "Hunting is an exceedingly poor use of a "refuge." Hunting in a refuge is today, and will always be, an egregious violation of the principle of sanctuary. A refuge is altered irrevocably by hunting, and certainly not for the better. I sincerely hope that you will not promote this anachronistic and shameful practice in a beautiful place that should be a peaceful retreat for all creatures."

  Hunting is one of the six priority uses on a refuge as identified by the National Wildlife Refuge System Improvement Act of 1997. The Service is directed by the law to provide opportunities for the big six where it is determined compatible. The Refuge Manager has determined that hunting is compatible with the purpose of Accokeek Creek Refuge. The Planning Team also feels that a limited hunt during the interim period will control deer populations which may have a negative impact on the diverse understory vegetation at Crow's Nest.

- "Please consider allowing limited entry spring and fall turkey hunting on a first come, first serve basis. It could be limited to walk-in entry only. The same suggestion could apply to small game hunting as well. Allowing these activities would further the FWS commitment to the recently passed Refuge Improvement Act which highlights hunting as one of the priority uses of the refuge system."

  Due to the lack of a Refuge staff in Stafford County for the first few years, we are proposing

limited public use activities for the interim period, especially for activities that require a lot of personnel monitoring, such as hunting. Turkey and small-game hunting may be discussed in the Comprehensive Conservation Plan, scheduled for 2008.

Other public uses

- "There is more than one entrance now and all entrances must be controlled in some manner."
- "Whatever recreational activities are allowed, they must not have an adverse effect upon the ecologically unique habitats of Crow's Nest."
- "I would support only "low impact" use of the Refuge by the general public. By this I mean hiking on pre-cut trails, boating with non-motorized boats such as canoes or kayaks."

Other than the expansion of the existing spine road and construction of small parking areas to meet federal two-way vehicular traffic standards, all public use will be conducted on existing trails during the interim period. Some unnecessary and degraded trails will be restored to forests. All public will access the Refuge via the gate off Raven Road from sunrise to sunset.

- I don't recall any mention in the report about trapping. Will there be any actions taken to keep the beavers under control and will adjacent property owners still be allowed to trap?

The Refuge will not propose trapping for recreational purposes. At this time, we do not believe that the beaver population in the two creeks is high enough to cause ecological or property damage concerns. If in the future, the Refuge feels the beaver population does pose a threat, they will initiate population control measures, which may include trapping. Service ownership will have no effect on adjacent landowner's opportunity to trap on their lands.

4. Other comments or questions

- "There should be no timber cutting on the property. The timber is essential to sustain the rare and endangered species of plant life and to prevent serious erosion."
- "The unfragmented mature/old growth forests of Crow's Nest peninsula are absolutely unique. I strongly believe that these "relic forests" would not return with the same biodiversity indices, therefore the forest structure would be changed forever."
- "The Patawomeck Indians reserve all ancient Tribal Rights or Claims to said area that may exist, including but not limited to hunting and fishing. As Crow's Nest has always been a place of spiritual solace, and used to educate our children in the ways of nature, and to pay homage to our ancestors, we would like the right to enter freely. "

The Service has the deepest appreciation for a Native American's right to practice their way of life, and welcome them as partners in cultural resource education. While we will try to accommodate the Patawomeck Indian's ancestral use of the Refuge, we cannot extend them all

rights to use the property freely. After the establishment of the Refuge, if the Tribal Council feels that the existing public uses do not adequately allow tribal members to carry out their spiritual practices, they may submit specific requests to the Refuge Manager.

- "The commercial watermen's fishing devices including, but not limited to, their nets, pound nests and poles [should] be protected in the existing uses."

  The Refuge will generally not interfere with the watermen's use of the open waters, where the State has primary jurisdiction. The Refuge Manager has also agreed to let the watermen to continue their practice of caching poles on the property under a special use permit, provided it does not negatively impact vegetation.

- "I appreciate the fact that the Refuge is proposed primarily to protect fish and wildlife and their habitats, as well as important tree and plant species. Crow's Nest is however also of importance from the historical point of view, and I hope that this fact will be considered when the decision is made whether to establish the Refuge."

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