

## Chapter 2. The Planning Process



USFWS

*We manage wetlands and impoundments to provide a food source for migratory waterfowl*



## The Comprehensive Conservation Planning Process

Our planning process includes

- A draft vision statement and goals
- The continued collection of information on important fish and wildlife populations and habitats
- The involvement of the public in identifying the issues and opportunities that the plan must address
- The analysis of a reasonable range of management alternatives based on those issues and refuge resources
- A draft EA for public review and comment
- A CCP that reflects public comment and the alternative chosen by our Regional Director.

In compliance with NEPA and our CCP process, we began the planning process in April 1998. The public identified issues of concern in workbooks, at public meetings and in discussions with State and conservation organizations. We held 17 public scoping meetings to identify relevant issues, concerns, and opportunities in Dorchester, Talbot, Caroline, Wicomico, and Somerset Counties. At those meetings, we distributed our Issues Workbooks, which described the refuges and requested public comment. We also mailed those workbooks to more than 3,000 individuals, agencies, and organizations, and made presentations to local organizations, conservation organizations, and State representatives.

The draft CCP/EA and Draft Land Protection Plan were distributed for public review in June 2005. We have incorporated the public comments we received on the draft CCP into this final plan, where appropriate. Appendix A presents substantive public comments and our responses. We will review the CCP periodically throughout its 15-year life span, and amend it as necessary. Any major changes would require renewed public notification and involvement.

The CCP is only one of several plans crucial for refuge management. It provides guidance in its goals, objectives, and strategies, but may lack some of the specifics needed for implementation. We will develop step-down management plans, as necessary, to provide more detailed direction for day-to-day management. We have listed those step-down plans in Chapter 5.

### Public Involvement and Issues

The four major issues that follow identify public concerns about the potential effects that may arise from implementing the alternative our Regional Director has selected from the draft CCP/EA. We considered these issues most carefully in developing our alternatives and evaluating their environmental impacts. During the scoping process, the public identified these four major issues:

1. Potential effects of an expanding human population and changing demographics on Service trust resources;
2. Potential effects of land acquisition and refuge expansion;
3. Potential effects of habitat changes; and
4. Potential effects on floral and faunal populations.

## ***Issue 1. Potential effects of expanding human population and changing demographics***

### ***Urban or Residential Sprawl (including some discussion of external land use changes)***

About 60 percent of the Nation's population lives within a day's drive of the Refuge Complex. Because most Americans want to live, work, and play near scenic coastal areas, human populations within the analysis area and the Chesapeake Bay watershed are rapidly increasing. By 2020, the population within the watershed is expected to increase almost 33 percent (Maryland Office of Planning 2000).

The influx of humans causes substantial changes in land use. In 25 years, more than 3,500 square miles of forest, wetlands, and farms—an area 50 times greater than Washington, D.C.—will have been converted to suburban or urban uses (Chesapeake Bay Foundation 2000). The available open space is declining (e.g., farms, fields, forests, wetlands and other wildlife habitats), and the areas that remain are becoming more and more fragmented.

At the same time, land use ownership patterns are changing, as a generational shift occurs. Economic and cultural stresses are acting to replace a landscape dominated by communities of watermen, farmers, and forest owners grounded in a rural economy, with a landscape of vacation homes, retirement communities, and waterfront estates grounded in a suburban economy. Lands within the Nanticoke protection area particularly are under intense development pressure, since easily developable waterfront property is the rarest commodity in the present-day Eastern Shore real estate market.

Population growth, fragmentation, and other land use changes must serve as an important backdrop for the Refuge Complex CCP, since these forces ultimately result in elemental changes to fish, wildlife, and plant populations and to ecosystem processes. They affect land acquisition efforts, create logistical problems in land management, maintenance, and law enforcement, and produce significant recreational demands and pressures on the Refuge Complex. The salient issues in this context are

- What role should the Refuge Complex (and each refuge) play as part of the emerging larger system of interconnected protected lands within the watershed?
- What techniques can the Service employ to manage wildlife populations at viable levels in a predominantly human-altered landscape?
- What management programs can the Refuge Complex put in place that will keep the “wildlife first” mission intact and promote ecosystem integrity, while simultaneously responding to demands for public recreation and wildlife-dependent use?

### ***Vessel Traffic***

Specific concerns that surfaced under this overriding issue were the concern about increasing recreational and commercial vessel traffic within the Nanticoke protection area, the increasing demands for water-dependent recreation at Blackwater NWR, and the increasing commercial crabbing and netting in and around Martin NWR. The recent (1999) attempts at Blackwater NWR to regulate boat traffic into areas along the Blackwater River (once marsh but now open water) to minimize trespass and address human disturbances to wildlife is but one example illustrating the complex relationship between changing population demographics and increasing human use of areas previously unused.

Similarly, a recent boating study indicated that the boating public's knowledge of the special resources of the Nanticoke River is increasing. Indeed, the high quality boating environment of the river is attracting more and more boaters (Nanticoke Watershed Alliance 1996). As the demands for access points (e.g., boat ramps and marinas) increase, so will resource management challenges. Martin NWR has its own suite of unique management problems, including weekend camping on colonial water bird nesting areas, the placing of crab pots and nets so as to interfere with refuge management operations, and the increasing public demand for ecotourism businesses that want access to closed areas.

### ***Changing Public Use Attitudes, Needs, and Demands***

During our several open houses, the public expressed a desire to see additional facilities and more opportunities for public use. They wanted to see a new observation tower constructed to replace the unsafe one. They wanted to see video and observation sites, boardwalks over the marsh, canoe and kayak trails, and photo blinds.

The public indicated its desire for increased environmental education programs and teacher workshops on protecting wildlife, wildlife habitat, and our environment, especially for the children, our future. The only existing education programs for the public are three special events that have been very well attended. With funding and assistance from the Friends of Blackwater, an environmental education manual is being developed to meet the needs of the school systems. The schools have shown great enthusiasm in helping to develop the manual. However, funding is still needed to staff and carry out the program once the manual has been completed.

Each year, the Service pays the taxing authorities where it owns land a revenue sharing payment, calculated as three-quarters of 1 percent of the appraised value of that land, 25 percent of the gross receipts received from the sale of refuge products, or 75¢ per acre of land held in fee title, whichever yields the greatest amount. Each year, Congress allocates, or funds, a high percentage of that amount. Land that has been removed from local tax rolls by being incorporated into a national wildlife refuge generates this payment for the taxing authority in perpetuity, yet never costs that locality anything for school or other municipal services, as would residential land development.

#### **Refuge revenue sharing**

With only one full-time public use refuge employee on the entire Refuge Complex for the last 9 years, it often has been difficult to provide staff for interpretive and educational programs. A staff of 100 volunteers enables the Visitor Center at Blackwater to remain open, but refuge staff must fill in when volunteers are unable to work. There is an overwhelming program backlog, and requests are increasing. The Visitor Center and exhibits are outdated and need refurbishing. The public expressed a desire for more guided tours, interpretive events, interpretive programs (especially children's programs), interpretive signs and identification plaques, trail markers, maps, information leaflets, interpretive exhibits, and a new Visitor Center.

### ***Issue 2. Potential effects of refuge expansion and land acquisition***

The importance of the analysis areas' unique natural resources has been recognized internationally, nationally, regionally, and locally. Many studies have recommended protecting and managing the areas' important wetland and wildlife habitats, which support large concentrations of Federal- and State-listed rare, threatened, and endangered plant and animal species; unique ecological communities; significant concentrations of waterfowl, wading birds, shorebirds, and other migratory birds; shellfish and finfish; and resident wildlife.

Many Federal and state plans have specifically identified the analysis areas' extensive wetland habitats; they are listed as priorities for protection by the Emergency Wetlands Resources Act of 1986, the North American Waterfowl Management Plan, the Conference on Wetlands of International Importance, and several Endangered Species Recovery Plans. Our Land Acquisition Priority System, a nationwide evaluation procedure based on biological values, ranked the importance of these habitats for protecting Service trust resources as 10<sup>th</sup> in the Nation. Some of the public surveyed particularly pointed out that additional information on floral and faunal distribution, species conservation status, and land cover would help focus our acquisition priorities, and ensure that the parcels most important to Federal trust resources and the goals and objectives of the Refuge Complex were protected.

Conservation partners and members of the public who attended our scoping meetings or responded to our questionnaires also expressed their desire that the Service view land protection in a regional or landscape context. The land protection issues that surfaced focused on the need to identify (1) what should be protected, (2) the threats to trust resources, (3) landowner preferences, and (4) the most appropriate protection methods (e.g., fee-title purchase, exchanges, conservation easements or partial rights to specific properties, leases, donations, life estates, memorandums of understanding, cooperative agreements, land regulations that prohibit or encourage certain uses, etc.).

During the scoping meetings, conservation partners voiced strong support for Service involvement in cooperatively identifying land protection priorities, and favored Service protection of lands and easements, where appropriate. Protecting additional lands and conservation easements in the vicinity of existing refuge properties and along the Nanticoke River was considered to be extremely important in fulfilling the Refuge Complex goals for endangered species, waterfowl and other migratory birds, fisheries, providing compatible recreational and educational opportunities, and ensuring public access for the future.

Many local citizens also supported additional land protection and refuge expansion. They envisioned improvements in the local economy through increased ecotourism, better protection and management of the natural resources that support their livelihoods, like commercial hunting and fishing on surrounding lands and waters, improved recreational opportunities, and improved land values. A few expressed the positive benefits of land protection and refuge expansion for achieving delisting or down-listing of endangered species, and the benefit of not having to be concerned about developing habitat conservation plans to avoid being cited for “take.”

Others, however, voiced their concerns about the potential for negative economic impacts, such as the loss of revenues that would result from the removal of land from the tax base and from forestry and agricultural production; additional regulations and restrictions being imposed on them because of refuge expansion; the potential for the expansion of endangered species’ ranges and landowner responsibilities for complying with the Endangered Species Act.

People who expressed a concern that Federal land acquisition would effectively reduce local property tax revenues believed this would place an additional financial burden on county residents who own land and pay property taxes. They were also concerned that some of our partners who don’t pay taxes, such as the State and some land trusts, might acquire additional lands as part of our comprehensive and collaborative protection of land. Others pointed out that, while the Service doesn’t pay property taxes, it does pay taxing authorities a revenue sharing payment, which, in many cases, is more per acre than the private property tax assessment.

Under its long-standing policy, the Service buys land only from willing sellers. Each year, a long list of landowners wishes to sell more land to the Service than we have money to buy. In a few situations, and only at the request of a landowner, the Service may use eminent domain in “friendly” condemnations, when an owner wants to sell but cannot establish a price, or when multiple owners require a settlement, or to clear title. In all cases, the price the Service pays is based on the land’s approved appraised fair market value.

**Willing seller policy**

Several people commented about our Environmental Impact Statement (1983) to establish a specific refuge boundary for Blackwater NWR, and voiced opposition for a similar process that would identify specific parcels for fee-title acquisition. The public heatedly opposed the establishment of a formal refuge boundary in 1983, because they felt it foreshadowed their having to sell their property to the Service, thus adversely affecting land values and private sales to individuals or other entities. Because of those concerns, the Service discontinued development of its 1983 draft EIS, and reinforced its long-standing history of dealing only with willing sellers as they approached the refuge, collectively or individually. However, most people who were familiar with the 1983 draft commented that they were pleased with the focus area concept we presented during our scoping meetings.

Like all Federal agencies, the Service has the power of eminent domain, which allows condemnation as a means to acquire lands for the public good. A few landowners, particularly those from adjoining counties who had no experience with our land acquisition program, feared that the Service might condemn and take their lands without their consent. They also feared that if this happened, they would not be adequately compensated for the real value of their land. See appendix B, “Land Protection Plan,” for a detailed discussion of Service land acquisition.

### ***Issue 3. Potential effects of habitat changes***

#### ***Wetland Loss***

Since its establishment in 1933, Blackwater NWR has lost nearly 7,000 acres of wetlands. That loss has occurred primarily in the brackish tidal three-square bulrush marsh at the heart of the refuge, near the confluence of the Little Blackwater and Blackwater Rivers, but now it is also progressing downstream. Since the 1970s, several scientific studies have focused on this unusually high rate of wetland loss, which may be the result of several confounding factors, including sea-level rise, land subsidence, saltwater intrusion, severely modified hydrology, and excessive herbivory.

The Refuge Complex is located on the Eastern Shore of the Chesapeake Bay, on a low-lying terrace of the Delmarva mainland in an area of extremely low elevation and relief. The ongoing rate of sea-level rise in this area has been 3.0 mm/year, approximately twice the average worldwide rate (1.5–1.8 mm/year). Departures of this magnitude from the norm are common along much of the mid-Atlantic coast, and apparently can be attributed to crustal subsidence related to isostatic adjustment. Less conservative estimates of the rates of sea-level rise in this area, after adjusting for the relatively high rates of land subsidence in southern Dorchester County, have been as high as 65 cm over the next 100 years.

Rising water levels and storm-induced high tides in recent years have interacted to increase localized saltwater intrusion. This phenomenon has been most dramatized by patches of Loblolly pine forest dying off along the marsh–upland ecotone after saltwater intrusion. An enlarging breach in the Parson’s Creek canal, which connects to the relatively high-saline Slaughter Creek and Little Choptank River, also has caused saltwater intrusion into the formerly freshwater upper reaches of the Blackwater River. On the other end of the Blackwater River, Maple Dam Road may also be affecting tidal sheet flow severely to and from the high-saline Fishing Bay. Since the turn of the 20<sup>th</sup> century, the log pilings that serve as the foundation for that road in effect have also served as a levee that has forced tidal flow under the bridge at Shorter’s Wharf.

As well as those large-scale and local changes in hydrology and geomorphology, Blackwater NWR has had a continuing problem with excessive grazing by native and introduced herbivores. Indigenous muskrats were considered problematic to marsh health early in the refuge’s history. Increasing populations of migratory Canada geese have caused localized marsh eat-outs in more recent decades. Most recently, increasing populations of resident Canada geese and introduced nutria have severely damaged vegetation in both moist soil impoundments and the tidal marsh on Blackwater NWR. The negative impact of nutria on marsh health is even more dramatic, because of their tendency to dig into the marshes’ organic mat, effectively lowering marsh elevation to below the water line, thus precluding the germination of some floral species.

Clearly, marsh loss of this magnitude is a concern for Blackwater NWR, not only because of the substantial loss of wetland acres, but also because it compromises the ability of the refuge to fulfill its mandate to provide habitats for waterfowl and threatened or endangered species. Although the issue is very real, the solutions are not as apparent, because we lack full understanding of how these factors, many of which are external to the refuge, interact. Finding a set of long-term solutions to this problem also demands a response to the overriding concern of how saline we should permit the estuarine system to become.

Blackwater NWR could choose to curb or even reverse marsh loss by implementing or continuing to implement practices such as nutria control, prescribed burns, erosion control, the use of dredge spoil to raise marsh elevation, shoreline protection, and other marsh restoration techniques. On the other hand, given that sea water may have inundated most existing refuge lands by the start of the next century, another approach to solving this problem may be to work with, rather than against, those geomorphological processes. That approach may call for protecting the shoreline of uplands, improving the drainage of marshlands to flush flocculent material, and enhancing deep water habitats by stabilizing their bottoms and promoting the establishment of submerged aquatic vegetation beds (SAV).

### ***Island Loss***

Past studies have shown that the Chesapeake Bay shoreline is severely eroding in many areas (USACOE 1986, VIMS 1977, Singewald 1946). Particularly hard hit are the islands off the Eastern Shore. Since colonial times, at least 4,375 hectares have been lost in only the middle eastern portion of the Bay. The shoreline recession rates of many islands exceed 3 meters per year, with an associated load of approximately 2,541,717 kg (2,500 tons) of sediment per mile annually entering the Bay (Offshore and Coastal Technologies 1991). Water clarity and SAV health are being impacted, and some of the most important colonial water bird nesting areas and waterfowl wintering habitats in the region are being lost.

Sea-level rise and wave-generated erosion are of particular concern to the Refuge Complex, because its Chesapeake Island Refuges are significantly affected. Most of the offshore islands in the Tangier Sound and Dorchester County region, encompassing thousands of acres of tidal wetlands, shrub hammocks, forests, and beaches, are part of the Island Refuges.

Islands are a unique ecosystem component in the Chesapeake Bay watershed. Their isolation, lack of human disturbance, and few predators make them productive nesting sites for colonial water birds, waterfowl, the Federal-listed (threatened) bald eagle, and the Federal-listed (endangered) tiger beetle. In Maryland, with the exception of great blue heron and least tern, all heron and lard colonies occur on island sites, including terns, pelicans, and skimmers (Brinker pers. com.).

During spring and fall migrations, thousands of songbirds and butterflies rely on these important resting habitats. The shallow waters on their leeward side support the most expansive and productive aquatic vegetation beds in the tidal portion of the watershed. Trust resources that rely on that aquatic habitat type include migratory birds and anadromous fish. Without the wave-dampening effect of the islands, these SAV beds will be lost, as will the commercial crab fishery and local economy that depend upon them.

The issue of island loss raises the question of combating those erosion processes, or planning for their predictable environmental consequences. Unlike coastal barrier island geomorphology (sand islands that migrate and reposition), Chesapeake Island's parent material is a hard, laminar mud clay that erodes into the water column. This eroded material generally does not accrete along other shorelines, but is deposited subaqueously in deeper Bay waters. Bay islands form over hundreds of years, as Eastern Shore peninsulas are breached and the remaining disconnected lands erode toward their center.

Due to human settlement and armoring of mainland shorelines to prevent erosion, with few exceptions new islands are not being formed. At present erosion rates, most Chesapeake Bay islands will disappear within the next 100 years. So, too, will the last remaining island community in Maryland, Smith Island, the location of Martin NWR.

### ***Water Quality Degradation***

Animal feed operations (AFOs), particularly poultry farms, and the application of their wastes as fertilizer are known to contribute nutrients, trace metals, and estrogenic compounds to surface and ground waters of both the Blackwater and Nanticoke watersheds. The Delmarva peninsula is one of the largest commercial poultry areas in the United States, annually producing 600 million chickens valued at more than \$2 billion. Hog and pig farms and, to a lesser extent, dairy farms also are present in this heavily agricultural area. The amount of manure produced is staggering; e.g., 1000 chickens produce 1 ton of manure. Excessive nutrient loading from leachate and runoff from fields on which the manure is applied can contribute significantly to algal blooms, decreased water clarity, anoxia, and reduced SAV beds.

According to data from the Maryland DNR, nitrogen levels in the Nanticoke River are among the worst of all tidal tributary areas in Maryland. Similarly, the State of Delaware attributed water quality problems in the Nanticoke River to eutrophication and bacterial contamination. Eight hundred and thirty livestock farms in the watershed produce 28.8 million pounds of nitrogen annually. Poultry alone represents 99 percent of the total nitrogen entering the watershed from animal waste each year. Eutrophication from AFOs also has been linked to outbreaks of *Pfiesteria piscicida*, a dinoflagellate that has caused fish kills on the nearby Chicomicomico River. The almost 80,000

people who live in the Nanticoke watershed, 70 percent of whom use septic systems, produce an additional 0.3 million pounds of nitrogen annually.

On Blackwater NWR, the problems associated with AFOs are far fewer. Fewer than a dozen commercial poultry operations and one large hog farm exist within the Little Blackwater River, Buttons Creek, and Transquaking River watersheds. The CBFO is conducting a study to investigate the contribution of AFOs to water quality degradation within the Blackwater watershed. Regardless of the outcome of this one study, it is apparent that monitoring at some level (and perhaps mitigation) will be required as the AFO industry expands on Delmarva.

### ***Forest Health, Composition, Fragmentation, and Management***

The forest that covered the Eastern Shore before European habitation was predominantly hardwood, although increasingly mixed with pine to the southward. Large patches of pine-dominated woods exist today, but, at least in Maryland, they are largely second-growth woods, the result of extensive clearing in historic times. In aboriginal times, the woods of the Eastern Shore were likely oak-hickory, oak-gum, or oak-pine types, all of which still exist in second-growth form. Roundtree and Davidson use the Choptank River as the dividing line, with oak-hickory forests growing on the higher grounds north of the Choptank and oak-pine on the lower ground south of the river (Carter 2000).

At the time of European settlement, Maryland's forests are believed to have covered most of the State. It is also believed that 95 percent of the Chesapeake Bay watershed was forested at that time. Forest composition was not one expansive carpet of old growth giants; instead, it was a mosaic of forest types and successional stages. Much of the forested land acquired by the refuge is in less than desirable condition, as a result of poor forest management practices and the lack of planning for future habitat conditions. A large percentage of the forested land acquired earlier (1933–1969) was either recently cleared or in an early stage of succession (<30 years). Many people expressed concern that refuge forests were not being managed properly to maintain historical forest composition and forest health for wildlife.

Maryland's forests, which now cover 42 percent of the State, are more abundant than they were 70 years ago. Not only do we have more forest land than at the turn of the century, we also have more trees. Statewide, the average amount of wood removed is less than the amount of growth that accumulates (Miller 1998). Forests are still the dominant land cover, making up 59 percent of the land base, or 24 million of the 41 million acres in the basin.

However, the public expressed concern that, despite the sound forest management practices of most forest landowners and the forest products industry, we are currently losing forest at a rate of 100 acres per day, primarily to development. In the last 15 years alone, the Bay's forest has declined by more than 471,000 acres, equivalent to about half of the State of Delaware (Society of American Foresters 1998). Others claim that Maryland's forest land base is decreasing by an estimated 10,000 acres per year, also primarily to development. Much of the current forest loss is occurring where the forests are most needed, in urbanized areas.

Many people pointed out that the most dramatic impact to wildlife populations and their habitat is the fragmentation of the habitat that remains. Fragmentation occurs when larger, contiguous forest landscapes are broken up into smaller, more isolated tracts, typically as a result of human development in once rural areas (Bates). For years, scientists have considered forest fragmentation to be one of the greatest threats to wildlife survival worldwide (Rochelle 1998). Many birds and other wildlife species require large blocks of forest for successful breeding, or some life stage of particular species requires the specialized type of habitat more likely to be found in large natural areas than in a small patch.

Protecting large patches of natural landscape and connecting them with green corridors can help maintain the viability of populations otherwise rendered vulnerable because of small numbers or isolation. This is the basis for the Department of Natural Resources' Green Infrastructure initiative, and is the concept behind the original efforts to protect greenways (MDNR 2000). Wildlife habitat and migration corridors are being lost, and normal ecosystem functions, such as the absorption of nutrients, recharging of water supplies, and replenishment of soils are being disturbed or destroyed. Water quality has been degraded in numerous streams and rivers.

Many of Maryland's remaining wetlands have been altered by filling, draining, constructing impoundments, grazing livestock, logging, diverting freshwater, discharging industrial waste and municipal sewage, and discharging non-point pollutants such as urban and agricultural runoff. The scattered pattern of modern development not only consumes an excessive amount of land, it fragments the landscape. As roads and development divide and isolate forested areas, interior habitat decreases, human disturbance increases, opportunistic edge species replace interior species, and populations of many animals become too small to persist (Weber and Wolf).

An important additional component of this major issue was the public concern about economic loss associated with forest conversion to development and fragmentation. The viability of both agriculture and forestry depends on the availability of not just suitable land, but also of large uninterrupted tracts. Furthermore, the public expressed concern that the failure to protect substantial amounts of land from intensive development also increases the potential threat to maintaining biological diversity and the resource base needed to support natural-resource-based recreation (MDNR 2000).

Fragmentation also changes the distribution of market and non-market benefits and costs from the landscape. As fragmentation occurs, the forest base diminishes. Expansive fragmentation can eventually lead to a loss in aesthetic values, recreation, forest base employment, and harvested wood products, and to increased pressure on infrastructure (e.g., roads and utilities) (SAF 1998).

Much of the forested land now owned by the refuge was previously managed for the production of forest products, supplying forest products to families, and many small locally owned mills as well as large regional corporations. Some refuge land was owned or managed by large-scale forest product corporations like Chesapeake Forest Products, and may have supplied forest products throughout the Nation. It was noted during the scoping meetings that, once lands had been acquired by the Service they were taken out of timber production, and no longer provided forest products, which may have helped to keep small local mills in business.

The impact of man has caused dramatic shifts in species composition and cover type. The most significant of these impacts is the unregulated draining and ditching of forested wetlands for either agriculture or the management of forest monotypes. Much of the historic forested wetlands have been cleared at least once, and most likely drained to facilitate the harvest of the most recent crop of trees or to regenerate a new stand of a more preferred species that requires drier soil and better drainage. As a result, most of the hardwood-dominated swamps have been replaced with a mix of pine and hardwoods typical of drier soils.

Another prime example is the loss or conversion of the formerly vast Atlantic white cedar swamps, once a dominant forest type along the Nanticoke River. Atlantic white cedar swamps have been identified as a globally rare and declining ecotype. The ditching and draining of these swamps for agriculture, forestry, and development has resulted in a conversion to pine-hardwood mix forest type. The public thus identified opportunities for restoring the hydrology of those areas once inhabited by Atlantic white cedar, and felt that restoration should be the highest resource management concern, from a national, state, and local perspective.

Throughout the history of Blackwater NWR, and more significantly in recent years, the lack of forest management, coupled with other endemic processes, have had significant impacts on forest health. The public was quick to point out that increased stress and decreased vigor make our forests highly susceptible to disease and insect infestations. Insects and diseases often are referred to as "the silent killers" of our forests. More trees are lost to insects and diseases each year than are harvested for wood products. In the last century, a number of epidemics of forest insects and diseases have had devastating effects on tree populations. The more familiar cases include the chestnut blight, the Dutch elm disease, the southern pine beetle, the forest tent caterpillar, and most recently, the gypsy moth.

### ***Riparian Buffers and Corridors***

Forests along streams can serve as both riparian buffers and corridors. As semi-aquatic buffers between aquatic and terrestrial systems, they take up nutrients in ground and surface flow, stabilize stream banks, shade the water and maintain its temperature, and provide food and cover for aquatic and terrestrial animals alike. Riparian forests are also natural corridors for wildlife movement and dispersal, and sustain floral and fauna assemblages that may be unique in the surrounding landscape. The absence of a forested riparian area is an indicator of aquatic and terrestrial system stress within a watershed.

In the Refuge Complex, degradation and loss of riparian buffers and corridors is an issue that pertains primarily to the Nanticoke protection area. Although large contiguous blocks of forest still exist on lands proposed for the refuge, only 40 percent of the watershed remains forested. Approximately a third of riparian forest buffers along streams in the Nanticoke River watershed are less than 100' on both sides. Riparian buffers of this width are inadequate, given the high levels of nitrogen runoff from adjacent agricultural fields.

#### ***Issue 4. Potential effects on floral and faunal populations***

##### ***Injurious, Invasive, or Exotic Species***

The Refuge Complex is experiencing problems with certain species of exotic, invasive, and injurious plants and animals that conflict with its management objectives. The public generally expressed the opinion that exotic species should be controlled for the benefit of native species.

Nutria, exotic rodents introduced from South America into Dorchester County in the 1940s, exacerbate the rates of marsh loss. Blackwater NWR has conducted a trapper rebate program since 1989. Control by trapping occurs for about 3 months during the State trapping season. Incidental to their other duties, refuge staff kill nutria year-round. The public expressed concern that trapping was not sufficient to control nutria, that their populations and range expansion were unchecked, that nutria will negatively impact refuge management programs, and that a proposed eradication plan has not been funded. [Please note, funding for a 3-year pilot program to evaluate eradication has since been approved.] Public hunting for nutria on the refuge was suggested as a control measure.

Mute swans, exotic birds from Eurasia that escaped into the Bay from Talbot County in 1962, have increased rapidly in numbers, to about 4,000 in 2000. Federal law does not protect them, but they are protected by State law. These birds are preventing native water birds from nesting, and are destroying SAV beds used by native waterfowl, fish, and shellfish species. In 1995, Maryland DNR asked refuge staff to assist with mute swan control, and has asked the refuge manager to serve on a citizen task force to develop management measures for mute swan and other injurious species. During scoping, the public suggested mute swan hunting on the refuge as a control measure.

The gypsy moth is an exotic insect that preys on deciduous woody species, particularly oaks, and poses a threat to hardwood species through annual defoliations. The USDA Forest Service has been cooperating with the refuge in providing gypsy moth control through aerial spraying with *B.T.*, which is specific for lepidopteran larva, or with Gypcheck, which is specific for gypsy moth larva. The public has expressed concern about the impact of gypsy moths on forest health and endangered species habitat, but also expressed concern about the impacts of the spraying on other species and their habitats.

Southern pine beetles (SPB) and their effects on loblolly pine forest habitat and associated wildlife were another concern, particularly the lack of timber management and how that could set the stage for devastating outbreaks of SPB. Through the Forest Service cooperative program, the refuge is monitored for SPB outbreaks. Although isolated cases have occurred, no control has been warranted.

The public was concerned about the interference of house sparrows, grackles, and starlings with the refuge nest box programs (particularly bluebird and wood duck boxes). Refuge staff maintain and monitor bluebird and wood duck boxes on a seasonal basis, primarily with volunteer assistance. House sparrow control is conducted in blue bird boxes; no control is conducted at wood duck boxes.

The public cited white-tailed deer as interfering with the refuge cropland program, which provides food for migratory and wintering waterfowl, and they wanted deer populations reduced through hunting. Since 1985, the refuge has conducted deer hunts to reduce crop damage on the refuge and adjoining private lands, maintain herd health, prevent habitat damage, and provide wildlife-dependent recreation.

The public is worried that resident Canada geese negatively impact refuge cropland and reduce winter food supplies for migratory waterfowl. The expanding number of resident Canada geese on the refuge, now about 4,000–5,000, has become a problem. Population control measures suggested by the public to reduce damage by resident geese

included hunting. Some Dorchester County residents in the vicinity of release areas also have complained that translocated geese damage lawns by eating the grass, and foul lawns, cars, and sidewalks with droppings.

Common reed (*Phragmites australis*) is a native invasive plant species that out-competes desirable plants in the forest and marsh areas, and invades refuge moist-soil impoundments. The refuge conducts limited aerial and hand spraying with glyphosate along the edges of impoundments and forest or transition zones, but funds have not been adequate to properly manage the problem of wildlife habitat degradation. The public, while concerned about *Phragmites* invasions, also voiced concern about the potential negative biological effects of chemical spray, and about the impact on bald eagle hatchlings of burning *Phragmites* to remove dead growth.

Purple loosestrife, an exotic plant first observed on the refuge in 1996, is a wetland invader that competes with native beneficial plants. Control on the refuge has involved digging up and burning the plants, but the area of infestation continues to expand. The public wondered what efforts would be necessary to control loosestrife invasions, and what effect chemical control might have on refuge habitat and wildlife.

Johnson grass, thistle, and saltmarsh fleabane are invasive plants the public cited as cause for concern because of their competition with desirable plants. The refuge now performs spot treatments by hand spraying with Roundup® around and in agriculture and moist-soil units. The public commented that the refuge should expand its role in protecting indigenous flora, and that it would be an ideal analysis area for long-term, large-scale investigations of methods for non-indigenous plant control and propagation of affected native plants.

At issue is how far the Refuge Complex should go in eradicating or controlling problematic species. Some species, such as Japanese honeysuckle, are exotic and may be somewhat invasive, but may not directly impact refuge management objectives. However, if certain faunal communities are identified as rare, should the refuge eradicate non-indigenous species that infringe on those communities?

### ***Lack of Scientific Data***

For decades, conservation managers and researchers have lamented the lack of scientific data about wildlife populations, their habitats, and the effect of management actions. This is particularly true today, when they are tasked with developing adaptive management programs, when habitat-specific rather than species-specific management is being emphasized, when promoting biodiversity has become an almost universal management goal, when long-term ecological monitoring is considered a critical component by the scientific community, and when the occurrence of rare species is of both public and regulatory interest. Public comment encouraged the refuge to protect land to conserve and restore unique plant communities, and to work with State agencies and NGOs to protect important habitat.

The public recommended that the Refuge Complex fill four specific information gaps by implementing:

1. A baseline inventory to determine the occurrence and spatial distribution of flora and selected fauna;
2. A long-term monitoring program to determine temporal trends in selected flora and fauna;
3. An adaptive management program to guide significant habitat and population management actions; and
4. Detailed research into habitat-species relationships. Some of the more obvious relationships for investigation are waterfowl use of refuge habitats and habitat requirements for threatened or endangered species.

### ***Rare, Threatened, or Endangered Species***

The Endangered Species Act clearly mandates that we manage for Federal-listed species. The Refuge Complex has contributed significantly to the protection and recovery of the bald eagle, Delmarva fox squirrel, and peregrine falcon. The peregrine falcon was delisted in 1999. Blackwater NWR continues to be a focal point for research and management of the Delmarva fox squirrel.

New recovery initiatives will be identified as land for the proposed Nanticoke protection area is protected, as new species are listed, and as detailed inventories of the Refuge Complex are completed. The Federal-listed (threatened) swamp pink (*Helonias bullata*) occurs in Dorchester County, and likely occurs on Blackwater NWR, as well. The Maryland and Delaware Natural Heritage Programs have documented 200 species of rare, threatened, or endangered plants (G1–G5, S1–S3), and almost 70 species of rare, threatened, or endangered animals within the Blackwater and Nanticoke watersheds. Globally rare species (G3, G4, or higher) include more than 20 plants and five animal species. Three natural communities that occur in the watershed (coastal plain ponds, xeric dunes, and Atlantic white cedar swamps) are likely to be ranked as globally rare once the classification has been completed.

The initial inventory by the Natural Heritage Programs makes it clear that a complete floral and faunal inventory is certainly the first step in a more comprehensive management program for rare and listed species. With this many candidate and listed species, the likelihood of management programs' conflicting is high. For example, prescribed woodland fire may be used to enhance DFS habitat by opening the understory; however, this habitat change could also have a negative effect on the use of understory by Neotropical migrant songbirds. Conversely, protecting entire floral communities may hamper silviculture intended to enhance DFS habitat. Also, the labor and time costs of intensive recovery programs may preclude other management activities due simply to fiscal or staffing constraints.

Lastly, during the scoping process, the public expressed concern that their rights as landowners would be abrogated by legal constraints associated with threatened or endangered species. Local landowners were concerned specifically that the expansion of DFS and bald eagles from refuge to private lands would hamper timber harvesting and home building, and result in economic loss.

### ***Waterfowl***

Several issues about waterfowl management were identified. Although the clear mandate for establishing Blackwater NWR to manage for waterfowl has persisted into contemporary times, the waterfowl species of concern and their associated management practices have changed. At the time the refuge was established, waterfowl production was emphasized. Testifying before the Migratory Bird Conservation Commission in 1931 on the establishment of the refuge, Dr. Oliver L. Austin, Jr. of the U.S. Biological Survey stated “[American] black duck and blue-winged teal breed here in more concentrated numbers than any other place I have encountered them on the Eastern Shore. I consider the area the most important waterfowl breeding area on the Atlantic coast south of Labrador.”

Seventy years later, both dabbling species continue to breed on the refuge. However, due to changes in agricultural practices, reforestation of cropland, and continued loss of emergent wetland, Blackwater NWR cannot be considered a major breeding area for waterfowl. This is particularly true for blue-winged teal. Aerial surveys indicate that blue-winged teal and American black duck populations have not exceeded 800 and 2500, respectively, since 1990. Blackwater NWR is now considered more a migration stopover site for the former and a wintering ground for the latter.

Although wood ducks are still considered a National Species of Special Emphasis, Blackwater NWR has curtailed its nest box program. At one time, the refuge maintained and monitored more than 200 boxes. However, this program is being reduced to one that is more for educational outreach purposes than for actual brood production since the refuge maintains excellent and sufficient palustrine forested wetlands as natural breeding and nesting habitat.

Similarly, the role of Blackwater NWR in contributing to Atlantic Flyway populations of Canada geese, both resident and migrant, has changed as the former have increased and the latter have decreased. Ironically, migrant populations of Canada geese were considered rare during the first 5 years following the establishment of the refuge,

and did not appear in any substantive numbers until 1939. By the 1960s, however, more than 100,000 geese were using the refuge. Its use by migrant Canada geese has declined since then, as Atlantic Flyway populations have waned; aerial surveys since 1990 have consistently documented fewer than 26,000 geese on the refuge. Still, the refuge supports 15 percent of Maryland's midwinter Canada goose population.

In 1979, the first Canada goose broods were documented on the refuge, heralding the incipient resident goose problem. In 1989, we estimated the resident population at 350; by 1998, it had ballooned to 5000. The completion in 2000 of the "Environmental Assessment for the Management of Conflicts Associated with Non-migratory (Resident) Canada Geese" clearly indicates a new management direction. The recent and rapid increase in the mute swan population on the Chesapeake Bay, specifically, within the Chesapeake Island Refuges, also may require similar changes in management direction.

New attention to the lesser snow goose population that winters on Blackwater NWR may be warranted. The lesser snow goose is primarily a migrant in the mid-continental and Pacific flyways. However, a relatively small proportion of the continental population migrates south in the fall to the Chesapeake Bay, Currituck Sound, and adjacent waters of the Atlantic Coast. A high proportion of this regional population is the blue phase, and many of those have routinely wintered on the refuge since 1934–35. Since 1990, more recent aerial surveys indicate that 2500–3500 lesser snow geese winter on the refuge, with counts as high as 6500 during peak migration. All the other refuges on the mid-Atlantic coastal plain support greater snow geese (*Anser c. atlantica*). Apparently, the population at the refuge is unique, from both a continental and regional perspective, and may contribute uniquely to the genetic diversity of continental lesser snow goose populations.

Waterfowl management on the Refuge Complex has been an evolving process, and will continue to be so. As tidal wetlands continue to be lost at Blackwater NWR, it may become necessary to reevaluate our current focus on dabbling duck populations, and consider creating and enhancing habitats for diving ducks. Similarly, we may need to reassess our current cropland and moist soil management program at the refuge, as its functional role in maintaining the unique lesser snow goose population becomes clearer.