

**FINAL DETERMINATION ON REMAND
OF THE
U.S. ENVIRONMENTAL PROTECTION AGENCY'S
ASSISTANT ADMINISTRATOR FOR WATER
PURSUANT TO SECTION 404(c) OF THE CLEAN WATER ACT
CONCERNING THE PROPOSED WARE CREEK
WATER SUPPLY IMPOUNDMENT
JAMES CITY COUNTY, VIRGINIA
MARCH 27, 1992**

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I. INTRODUCTION

A. STATUTORY AND REGULATORY BACKGROUND

Section 404(c) of the Clean Water Act (33 U.S.C. Section 1251 *et seq.*) provides that, if the Administrator of the U.S. Environmental Protection Agency (EPA) determines, after notice and opportunity for public comment, that unacceptable adverse effects on municipal water supplies, shellfish beds, fishery areas (including spawning and breeding areas), wildlife, or recreational areas would result from the discharge of dredged or fill material, he may exercise his authority to withdraw or prohibit the specification, or deny, restrict or withdraw the use for specification, of any defined area as a disposal site for dredged or fill material.

The procedures for implementation of Section 404(c) are set forth in the Code of Federal Regulations, 40 CFR Part 231. The major milestones in these procedures are: 1) the Regional Administrator's proposed decision to withdraw, deny, restrict or prohibit the use of a site (Proposed Determination); 2) the Regional Administrator's recommendation to the Administrator to withdraw, deny, restrict or prohibit the use of a site (Recommended Determination); and 3) the Administrator's final decision to affirm, modify, or rescind the Regional recommendation (Final Determination). The Administrator has delegated the authority to make final decisions under Section 404(c) to the Assistant Administrator for Water, who is EPA's national Clean Water Act Section 404 program manager.

This document concerns the proposed placement of dredged or fill material for the purpose of creating a local water supply impoundment on Ware Creek in the County of James City, Virginia. The impoundment would supply water to James City County residents. As described below, EPA's original Final Determination for this project was issued on July 10, 1989, and remanded by the Fourth Circuit Court of Appeals on January 29, 1992. This decision reaffirms EPA's 1989 determination that the proposed James City County impoundment project would have unacceptable adverse effects on wildlife¹. This determination concludes that considerations of environmental effects alone justify a Section 404(c) action to "veto" the proposed James City County water supply dam and reservoir. This determination thus withdraws the specification of the subject waters of the United States as described in the Department of the Army Section 404 permit number 84-0614-06 dated March 1, 1991, and restricts the disposal of dredged or fill material in the subject waters of the United States for the purpose of constructing the local water supply impoundment proposed by James City County.

¹ For the purposes of this Section 404(c) Determination, "effects on wildlife" include impacts to ecosystem integrity, nutrient pathways, and all other life requisites of animal, including fish, species.

B. PRIOR REGULATORY PROCEEDINGS

An impoundment on Ware Creek has been under consideration for some time. On May 12, 1981, in a letter to the Norfolk District of the Corps of Engineers (Corps), EPA Region III stated, "Destructive impacts to such a large area of the local wetland resource would be unacceptable. EPA would therefore strongly object to any water supply structure placed in this waterway." In 1984, James City County, Virginia, filed an application with the Norfolk District of the Corps for a Clean Water Act Section 404 permit to place dredged or fill material in Ware Creek for the construction of a local water supply impoundment. On September 30, 1985, EPA Region III formally commented on the Corps Draft Environmental Impact Statement (EIS), detailing EPA concerns regarding adverse impacts of the proposal. EPA maintained its concerns regarding the proposed project in comments on the Final EIS, stating that construction of the proposed James City County impoundment was environmentally unsatisfactory. In the formal comment letter on the Final EIS, EPA Region III stated that options to address Agency concerns, including actions under Clean Water Act Section 404(c), were being considered by EPA. On July 11, 1988, the Corps of Engineers issued a Notice of Intent to issue the Section 404 permit to the County. In its Clean Water Act Section 404(b)(1) analysis, the Corps found that, although the adverse environmental impacts from the project would be substantial, those impacts would be mitigated to a level to prevent significant degradation, and the lack of less damaging alternative water supplies justified the project.

On November 18, 1988, EPA Region III solicited comment on a Proposed Determination to prohibit, or deny the specification, or the use for specification of an area as a disposal site; Ware Creek, James City County, Virginia. In a letter dated January 30, 1989, the U.S. Fish and Wildlife Service responded to that proposal by stating, "During the course of our involvement, the Service and other agencies have documented that the Ware Creek watershed provides diverse and high quality habitat for fish and wildlife.... We consider this loss of wildlife habitat to be unacceptable because of its severity and the lack of adequate mitigation." There are no subsequent documents from the U.S. Fish and Wildlife Service in the administrative record.

On February 17, 1989, EPA Region III's Regional Administrator recommended that EPA prohibit the use of Ware Creek as a disposal site for dredged or fill material in connection with the construction of any water supply impoundment. The Regional Administrator based his recommendation upon his finding that the discharge of dredged or fill materials in connection with this project would have unacceptable adverse impacts on wildlife, fishing areas and recreational areas.

Upon review of the administrative record for the Recommended Determination and the Corps' permit record, and after consultation with the County, EPA's Acting Assistant Administrator for Water issued a Final Determination on July 10, 1989. In that determination, EPA found that the proposed project would result in the loss of a

diverse wetland and open water aquatic habitat providing critical ecological support to wildlife in Ware Creek, associated ecosystems and downstream aquatic systems, including Chesapeake Bay. EPA also found that the County had practicable, less environmentally damaging alternatives for meeting its water supply needs. Based on both of these findings, EPA restricted the designation of the proposed site for the purpose of constructing James City County's local water supply impoundment.

As directed by a District Court ruling described below, the Corps of Engineers, Norfolk District, on March 1, 1991, issued a Section 404 permit to James City County for construction of the water supply reservoir on Ware Creek and other such work as described in the September 1987 Final Environmental Impact Statement for this project. However, in the interim between the issuance of the permit and this determination, no discharge of dredged or fill material associated with construction of the proposed James City County impoundment has occurred.

C. JUDICIAL PROCEEDINGS

In September 1989, James City County filed a complaint in U.S. District Court for the Eastern District of Virginia asking that EPA's Final Determination be vacated and that the Corps be directed to issue the permit. The District Court granted the relief requested by the County on November 6, 1990, based on its finding that the County had, in fact, no practicable water supply alternatives. *James City County, Virginia v. U.S. EPA*, Civil Action No. 89-156-NN (E.D. Va. November 6, 1990). The Court's ruling was based solely on the issue of the availability of alternative water supplies for the County and did not discuss EPA's finding of substantial adverse environmental impacts. In granting the relief sought by the County, the District Court did not remand the Final Determination to EPA for a decision on whether the adverse environmental impacts alone would justify the restriction of the site.

EPA appealed the relief granted by the District Court to the Fourth Circuit Court of Appeals. On January 29, 1992, the Court of Appeals reversed the District Court on the issue of relief and remanded the case for further remand to EPA. The Court stated that on remand EPA must determine whether the adverse environmental effects of the project would justify a restriction of the site for this project even if no practicable water supply were available to the County. Both the District Court and Court of Appeals held that the record before the Agency in 1989 demonstrated that practicable water supply alternatives were not available to the County, and the Court of Appeals stated that EPA could not revisit this issue on remand. Finally, based on EPA's representation that a remand to review the Final Determination on the issue of impacts could be completed within about 60 days, the Court of Appeals stated that it would "view seriously" any failure by EPA to renew or withdraw its Final Determination for the project within that time period.

D. PROTOCOL FOR REVIEW

The Section 404(c) procedural regulations do not specify any process for reconsideration of Final Determinations. In addition, given the time constraints for EPA's reconsideration of the Final Determination and the limited scope of the reconsideration, EPA determined that conducting, once again, a full Section 404(c) process would be neither possible nor necessary.

As a result of this determination, EPA's reconsideration of this case involved the following procedural steps. First, EPA undertook a reexamination of the administrative record upon which the July 10, 1989, Final Determination was based. To determine whether the adverse environmental effects of the proposed Ware Creek project would justify a restriction of the site even if no practicable water supply were available to the County, EPA reviewed only those documents or portions of documents which described either relevant environmental background conditions or the potential impacts of the dam and reservoir proposal, including the proposed mitigation offered by James City County during the 1989 Section 404(c) consultation. EPA then reviewed the 1989 Final Determination itself to determine whether the project description and discussion of project impacts were substantiated by the administrative record.

Second, on February 4, 1992, EPA Region III Regional Administrator Edwin Erickson wrote to Assistant Administrator for Water LaJuana Wilcher, renewing the Region's recommendation that the site be restricted based on the project's serious adverse environmental impacts.

Third, by letter dated February 25, 1991, the Agency offered James City County an opportunity to contribute any additional information to, or corrections of, the administrative record. By letter dated March 4, 1992, James City County declined EPA's invitation. EPA received a request to meet with the other litigants, the *amici*. On March 3, 1992, Assistant Administrator for Water LaJuana Wilcher and other EPA personnel met with representatives from the Chesapeake Bay Foundation and National Wildlife Federation to listen to their concerns regarding the remand decision. The Chesapeake Bay Foundation and National Wildlife Federation requested that the EPA reissue its veto of the proposed Ware Creek impoundment based on environmental impacts alone. A report of that meeting is contained in the administrative record for this decision. A meeting with EPA was requested by the County and Congressional representatives, but was then canceled at the request of James City County.

Finally, on March 16, 1992, Assistant Administrator LaJuana Wilcher and other EPA personnel toured the wetland and open water areas that would be directly affected by the Ware Creek impoundment project. Counsel for James City County and a representative of the landowner, the Chesapeake Corporation, as well as a representative of the U.S. Fish and Wildlife Service, accompanied EPA personnel on the tour. At the conclusion of the tour, EPA again requested that James City County provide any

additional information or corrections to the administrative record for EPA's deliberations on the remand determination. The administrative record for this decision contains a report of this field visit. EPA did not receive information or corrections to the administrative record from James City County.

II. REVIEW OF THE ADMINISTRATIVE RECORD FOR THE 1989 FINAL DETERMINATION

A. ADDITIONAL INFORMATION

The primary discussion of relevant environmental background conditions and potential adverse impacts of the dam and reservoir proposal on aquatic and wetland ecosystems is presented in subsection B. of this Section. In addition, EPA's reevaluation of the administrative record revealed certain information that warranted additional discussion because it is of particular importance to EPA's decision on remand. This information is summarized below.

The primary adverse impact to wetlands and aquatic resources from the proposed dam and reservoir project would occur as a consequence of the loss of palustrine and estuarine wetlands in the Ware Creek/York River system and their replacement with lacustrine open water. The open water reservoir system would provide little, if any, usable habitat for a majority of the wildlife species that depend upon the present and vastly different Ware Creek aquatic ecosystem. The structural diversity and mosaic of wetland types interspersed with flowing stream channels provides significantly distinct and superior wildlife habitat than that provided by a reservoir system. Additionally, as a result of this proposal, additional wetlands and aquatic systems downstream would be impacted by reduced discharges of freshwater, sediment, nutrients and detrital material.

1. Values and Functions of Existing Ware Creek Wetlands and Aquatic Ecosystems

The administrative record confirms that the existing Ware Creek aquatic system provides valuable wildlife habitat and critical life support to wildlife which depend upon the Ware Creek wetland and aquatic ecosystem, including but not limited to Wood Ducks, Black Ducks, Great Blue Herons, White Perch, Beaver, and River Otter. These wildlife are attracted to and supported by the plentiful food, cover, breeding, and spawning habitats provided by the Ware Creek aquatic environment.

Wood Ducks find nesting trees in the forested areas and a stable source of food in the wetland (especially herbaceous) vegetation and benthic invertebrates. These Wood Ducks also congregate in large communal roosts in Ware Creek wetlands in the fall. Black Ducks, a species which has undergone dramatic population declines in recent years, are attracted to the Ware Creek aquatic system by the ample foods of the freshwater marshes (including the highly favored Wild Rice) and areas of shallow water which provide important wintering habitat for this migratory species. The North American Waterfowl Management Plan has identified loss and degradation of habitat as a major waterfowl management problem in North America, and has indicated that Black Ducks and Wood Ducks (among others) thrive in unaltered, natural environments. The current Ware Creek system provides this needed aquatic habitat.

The Great Blue Heron, a species of special concern to the U.S. Fish and Wildlife Service, also thrives in natural habitats, preferentially nesting in riparian swamps such as the rookery in France Swamp. EPA believes that the dam and reservoir project as proposed would result in the loss of this rookery and would adversely affect the France Swamp Heron population. Movement of the Herons to other locations outside of the Ware Creek watershed would result in increased stress on Heron populations in other rookery areas.

Important fish species found in the Ware Creek system include the semi-anadromous White Perch, the catadromous American Eel and important forage fish species. Anadromous fish (Alewife and Blueback Herring) have not been reported in Ware Creek. However, the administrative record indicates that, according to the National Marine Fisheries Service, the Ware Creek aquatic habitat is suitable for spawning of these species and that they probably use the Creek during periods of high freshwater flow and high population densities. Forage fish species are critical members of the fish fauna, providing a vital trophic link in the food web. The forage fish utilize the herbaceous wetlands for food, nursery and spawning grounds, as well as for shelter and protection from fish predators. The tidal freshwater wetlands are an important source of palatable detritus and forage plants, and also provide a valuable spawning and nursery area for many commercial and recreational fish species as well as forage fish species.

Existing wetlands and open water areas within the Ware Creek system serve as a source of food for resident aquatic mammal populations both directly, in the form of vegetative matter (roots, stems, etc.), and indirectly, as habitat for forage fish and invertebrates. Aquatic mammals in the Ware Creek system also utilize wetlands for living habitat. Aquatic mammal species within the Ware Creek system include commercially important furbearing animals, Beaver, Muskrat, and the relatively rare River Otter.

These, and other, wildlife values and functions of the Ware Creek aquatic system are based upon and depend upon its structural diversity and mosaic of wetland types and open water habitats. Each system sustains important wildlife food and habitat requirements. In addition to the superior habitat values, these systems are among the most productive systems with generally greater productivity than either inland or marine systems, due to their greater variability and diversity of associated plants and animals.

2. Projected Values and Functions of the Ware Creek System Subsequent to Dam Construction and Project Implementation

Lacustrine open water systems, such as the proposed reservoir, do not offer the range and variety of wildlife habitat values and functions currently supported by the Ware Creek wetland and open water aquatic systems. Reservoir systems provide limited or no habitat for the varied types and number of wildlife species that currently utilize

and are adapted to the vegetated, multi-dimensional aquatic system found in Ware Creek. The deeper sections of reservoir systems offer little habitat for food or cover for even those fish species which would utilize the reservoir habitat. If the lake is steep-sided, as would be the case for the proposed Ware Creek reservoir, there is even less habitat for food or cover.

Whereas much of the primary productivity in palustrine and estuarine wetlands is from vascular plants, lacustrine primary productivity is from algae. These aquatic plants are virtually the only plant material living in deep water (>2 meters) areas of a lake. Algae, as phytoplankton, is a valuable source of food to some aquatic organisms. However, its use is limited and it is not directly utilized by the birds and mammals that feed on vascular vegetation.

3. Loss of Ecosystem Values and Functions That Would Result From the Ware Creek Project

From an ecosystem perspective, the largely monotypic habitat that would be provided by the reservoir would be substantially less diverse and productive when compared with the numerous different habitats provided by the Ware Creek system. The invertebrate fauna of the lake would be much less diverse than the existing variety of invertebrates. Amphibians requiring specific habitats for breeding and egg-laying, with conditions such as flowing water of the appropriate velocity and vegetation of a particular size, would suffer. Particularly because of the presence of predatory fish species, the lake would provide fewer successful breeding sites for amphibians than the existing varied system.

Dabbling ducks, such as the Black Duck, would also be negatively impacted by the reservoir. Their food sources would be mostly destroyed by the removal and flooding of vegetation such as Wild Rice, and the reduction in the invertebrate fauna. Dabbling ducks require shallow water habitats (<0.5 meters) to provide a source of food during overwintering.

The Great Blue Heron rookery would be impacted by flooding of the nesting trees, hastening the loss of these nesting trees. EPA believes that the Herons would have abandoned the France Swamp rookery prior to the loss of these trees, due to impoundment related construction disturbances and associated changes to their habitat. Given the Heron's habitat requirements, successful relocation of the Heron rookery, particularly in the area of the proposed reservoir, remains uncertain and it must be accepted that the rookery would probably be lost as a result of this project and that the overall vigor of the present France Swamp Heron population would be adversely affected.

Impacts to fish would be both upstream and downstream of the dam. Upstream, the lake would be stocked with gamefish which would out-compete some of the naturally

occurring fish populations, thereby depleting and eventually removing them. Some species, not adapted to the lacustrine environment, would be eliminated totally. Loss of the open-system nature of the current Ware Creek aquatic system would adversely affect highly mobile or migratory species such as the American Eel and other important commercial species which spend a critical part of their life cycle in freshwater systems but are captured downstream or in Bay environments.

Virginia's coastal marshes comprise about 0.5 percent of the State's land mass, but 95 percent of the Bay and estuarine commercial and sport fishes in Virginia are dependent on these marshes. The loss of such marshes results in the loss of the nursery and feeding grounds for young fish. Many of these small fish species are forage species such as Tidewater Silversides, but others are the juveniles of commercially important species such as the Spot. The current Ware Creek wetland and aquatic system provides vital habitat to both of these groups of fishes and that important function would be lost under the proposed reservoir scenario.

As a result of the proposed project, the semi-anadromous White Perch would lose valuable spawning habitat as the dam would separate and block the estuarine Perch from freshwater spawning areas above the dam. Below the dam, the tidal freshwater areas would be destroyed by increased salinity as the freshwater inflow is reduced by filling of the reservoir and its operation. The White Perch is important as a forage fish and EPA believes that its decline in the Creek would adversely affect faunal populations at higher trophic levels. The National Marine Fisheries Service has not found acceptable fish ladders for use with White Perch, so the loss of spawning habitat in Ware Creek cannot be mitigated in this fashion.

The portion of Ware Creek below the dam would be dramatically affected by the proposed reservoir. Even considering seepage of freshwater through the dam, reduced freshwater discharge would allow a "salt wedge" to move up the Creek to the dam, completely eliminating the tidal freshwater wetlands and reducing the oligohaline (0.5 to 5.0 parts per thousand salinity) wetlands. If freshwater flows are reduced enough, the oligohaline marsh would also be eliminated. The change in vegetation and character from freshwater (and oligohaline) marsh to mesohaline (5.0 to 18.0 parts per thousand salinity) marsh is significant, bringing with it a different assemblage of flora and fauna. This change would result in replacement of the existing faunal communities that are typified by plants such as Arrow Arum and Wild Rice that provide significant seeds and fruits consumed by resident and transitory wildlife. The reservoir would replace these communities with one of lesser diversity dominated by plant species which tend to be less palatable and which tend to degrade less easily and therefore tend to be less readily utilized in the associated aquatic ecosystems. The Virginia Institute of Marine Science stated that the loss of the tidal freshwater wetlands would "significantly weaken the overall ecological value of Ware Creek to the York River."

The loss of the Ware Creek system would add to the cumulative losses of palustrine and estuarine wetlands in Virginia and to cumulative impacts to the Chesapeake Bay. Creation of freshwater impoundments is an important factor, accounting for 25% of the palustrine vegetated wetlands lost in Virginia between the mid-1950s and late 1970s. The incremental loss of palustrine forest wetlands has, cumulatively, had clearly detrimental effects on whole watersheds. Any project, regardless of its size, that causes these types of ecological changes adds to these cumulative effects.

Finally, while the administrative record indicates that the type, nature, and timing of the development proposed for the Ware Creek watershed, with or without the project, remains under development, it is clear that, because the property is primarily owned by a single entity and based on what is known from the administrative record about the plan for development of the area, proposed development of the upland of the Ware Creek watershed is likely to consist predominantly of planned residential, commercial and industrial development. EPA believes that the secondary impacts of this type of development on the wetlands and aquatic ecosystems of the Ware Creek watershed will be substantially less than those associated with the James City County dam and reservoir as proposed. Furthermore, with regard to other proposals that would have direct impacts on the wetlands and aquatic ecosystems of the subject area as a result of distinct discharges of dredged or fill material, EPA notes that these areas are currently subject to regulation under Section 404 and conclusions that such discharges will result in the same adverse impact as the James City County proposal would be highly speculative at this time.

B. REVIEW OF THE 1989 FINAL DETERMINATION

As stated previously, the administrative record was reevaluated by EPA based upon the instructions contained in the remand by the Fourth Circuit. That reevaluation confirmed that the information presented in the 1989 Final Determination correctly reflected information contained in the administrative record. As such, statements in the 1989 Final Determination which reflect project-related effects remain relevant to the current decision before EPA. Therefore, those parts of the 1989 Final Determination that EPA has found to be relevant to the current decision are presented below, in the remainder of this Section, Section III., Adverse Impacts of the Proposed Project, and Section IV., Mitigation. In accordance with the Court's directives regarding this review, portions of the 1989 Final Determination that were not considered relevant and/or contained findings or conclusions concerning alternatives to the Ware Creek impoundment have been omitted; changes in the language of the 1989 document are indicated by brackets.

1. Site Description

a. Hydrology

The project site for the proposed Ware Creek impoundment lies within the coastal plain of the Tidewater region in southeastern Virginia. Ware Creek and associated tributaries, France Swamp, Cow Swamp and Bird Swamp, drain a generally undisturbed watershed of approximately 18 square miles with a majority of the basin land cover currently in hardwood and mixed pine-hardwood forest. The proposed water supply impoundment dam site is situated approximately 1000 feet downstream of the confluence of Ware Creek and France Swamp and is located approximately 4.72 miles upstream of the mouth of Ware Creek where it empties into the York River. The proposed impoundment would be approximately 1217 acres in surface area. The Ware Creek system discharges into the western side of the York River and is approximately 23 river miles from the mouth of the York where the River empties into Chesapeake Bay.

As stated in the Corps Final Environmental Impact Statement (EIS), a majority of the Ware Creek drainage basin lies above the proposed dam site. While drainage from Bird Swamp is interrupted by a minor impoundment, Richardson's Millpond, flow from the remainder of the Ware Creek basin is unobstructed by manmade impoundments until the Creek empties into the York River. Research conducted by the Virginia Institute of Marine Science shows that Richardson's Millpond drains approximately 37 percent of the Ware Creek watershed area above the proposed impoundment. There are relatively few roads crossing the Creek and residential and industrial development is absent from the immediate vicinity of the proposed impoundment as well as edges of the Creek.

The geology of the Ware Creek watershed is characterized by well-drained soils and relatively steep-sloped topography. Because Ware Creek empties into a tidal brackish stretch of the Lower York River Basin, the system normally experiences a semi-diurnal tidal flux which carries brackish waters well into the major creek channels. The relationship of the geomorphology of the Ware Creek drainage and the exchange between the freshwater portion of the Creek and the associated brackish tidal system results in considerable variability in the natural parameters affecting the physical and chemical hydrology of Ware Creek. The administrative record indicates that while there is little reliable data regarding freshwater discharge of Ware Creek, the Creek exhibits significant fluctuations in freshwater flow. Although the average stream flow at the proposed dam site is estimated to be approximately 12.4 million gallons per day (mgd) or 19.2 cubic feet per second (cfs), the maximum figure for flow into the reservoir is estimated at 12,485 cfs. The administrative record also indicates that the variable discharge of freshwater from the Creek and the Creek's depth relative to the estuarine tidal influx of the York River results in large scale fluctuations in the salinity of waters in the creek system over relatively short periods of time. Site measurements during

long-term dry weather conditions indicate that short-term (tidal cycle) salinity variations can be up to 8 parts per thousand (ppt) and long-term variations differ by as much as 16 ppt.

Ware Creek's present hydrologic setting and environment sustains a broad variety of aquatic and wetland functions which are regarded as valuable environmental attributes of the Creek system. The fundamental asset of the current system is maintenance of relatively undisturbed, highly diverse wetland environments which accompany the dynamic physical and chemical interactions of pulsed freshwater flow and estuarine tidal flux. Further, the land use practices of the Ware Creek watershed and the lack of significant alterations to land adjacent to the Creek accommodate the maintenance of this system. In sum, these conditions play a substantial role in supporting the overall plant and animal species composition and richness of the Ware Creek watershed.

The geology and hydrology of the current Ware Creek basin, and particularly the hydrology of the Creek itself, serves to regulate the accumulation and transport of detrital material and manage nutrient flux through the vegetated wetland system and into the York River. In spite of the sediment and nutrient trapping effects of Richardson's Millpond, under the present hydrological regime for the remaining watershed which is not affected by Richardson's Millpond, dissolved inorganic materials, dissolved organic matter and particulate organic matter are exported from the Ware Creek aquatic system and become part of the normal input of dissolved and particulate matter transported by the York River into the Chesapeake Bay. EPA notes that exact quantitative measurement of the amount of material exported from the watershed is not feasible. In reviewing this component of the Ware Creek system EPA is relying upon the unquestionable transport and export of materials through and out of the Creek's aquatic system.

b. Vegetation

[A] majority of the Ware Creek watershed is undeveloped and is characterized by upland areas dominated by hardwood and mixed pine-hardwood forest. The administrative record indicates that while approximately 67 percent of the watershed is forested, nearly 40 percent of the current forested area was previously managed as pine plantation. Agricultural, commercial and residential land use accounts for approximately 25 percent of the watershed area and the remaining 8 percent of the basin consists of wetlands and open waters.

The Recommended Determination and the administrative record indicate that tree species found in the Ware Creek basin include a range of mature (30-50 year old) species including oaks and hickories and that much of this community type is found on the upland side slopes of the basin. These forested upland tree species provide abundant mast crop and contribute structural diversity to wildlife habitat. Understory vegetation in upland areas of the watershed includes fruit bearing tree species such as

Dogwood and Holly as well as various fruit bearing shrubbery such as Blueberry and Huckleberry. As noted above, the Ware Creek basin has been actively managed for the production and harvest of softwood pine species, with the principal evergreen species found in the resulting mixed pine-hardwood portions of the watershed comprising immature Loblolly and Virginia Pine.

The Ware Creek watershed contains approximately 1168 acres of vegetated wetlands and open water systems. The vegetated wetlands found in the Ware Creek basin can be divided by large-scale community type into herbaceous, forested and scrub-shrub and the open water systems can be divided into estuarine, palustrine, and lacustrine open water. EPA notes that the Corps' Final EIS figure 3-4 identifies 44 "WETLAND TYPES FOUND IN THE WARE CREEK WATERSHED." EPA recognizes that these wetland types are based on the Classification of Wetlands and Deepwater Habitats of the United States (Cowardin, et al., 1979), and as such represent classifications officially adopted by the U.S. Fish and Wildlife Service. The classification system presented in the document is based on wetland habitats and therefore reflects important information useful in the evaluation of the Ware Creek area in terms of wildlife habitat suitability.

EPA recognizes the difficulty in obtaining accurate estimates of productivity in vegetated communities, particularly aquatic communities affected by tidal influence, and that representative approximations of primary production rates do not reflect absolute values for the subject watershed. EPA notes that the values presented in Table 4 of the Recommended Determination are approximations of primary production rates for ecosystem types similar to those found in Ware Creek and that extrapolation of those figures to the subject area provides relative estimates of primary production values for the system. EPA regards the use of approximations to provide qualitative analyses of the relative productivity of the communities in Ware Creek as reasonable and useful for the purpose of this determination. Approximate annual production values for wetland cover types encountered indicate that wetlands in the Ware Creek basin are typically the most productive plant communities in the watershed with scrub-shrub and herbaceous wetlands exhibiting relative estimates of net primary production greater than double that of the upland forested communities. Approximate values for forested wetlands show essentially equivalent rates of net primary production as for upland forested areas. Of the open water cover-types, estuarine open water communities exhibit approximate values of net primary production nearly one and one-half times that of upland forested areas. Representative figures of net primary production values for lacustrine open water communities of the type which would be created by implementation of the proposed Ware Creek reservoir are least of all cover-types found in the Ware Creek basin and are less than one-half that of typical values for upland forested communities. Most importantly, representative figures of net primary production values for lacustrine open water communities of the type which would be created by implementation of the proposed Ware Creek reservoir indicate that these systems are approximately 20 per cent as productive as typical scrub-shrub and herbaceous wetland cover types.

Herbaceous wetlands, the most prevalent wetland type found in the Ware Creek basin, are typically vegetated by Cordgrass and Needlerush species in the tidal saline portions of the Creek near the creek mouth. Upstream of the creek mouth, where tidal influence and salinity decrease, wetland vegetation grades from cordgrasses and bulrushes to a range of species including Wild Rice, Cattails, Arrow Arum, Pickerelweed and Bulrushes. Tidal freshwater portions of the Creek support a diverse plant association which are more structurally complex than tidal estuarine communities. Further, edges of the area are characterized by upland tree and shrub species which are excluded from the more hostile saline-estuarine environments downstream and which benefit from the periodic tidal freshwater flooding. In non-tidal freshwater portions of Ware Creek, including areas influenced by Beaver activity, herbaceous wetland communities are characterized by Cattails, Burreeds, Rice Cutgrass, Smartweeds, Sedges, and Wild Rice. Forested wetland systems account for approximately 28 percent of the wetlands in Ware Creek. The overstory of these systems is dominated by tree species such as Sycamore, Green Ash, Red Maple, Black Gum and Sweet Gum. Understory species of tree and shrub in these systems include Willow, Alder, Holly, Spice Bush, Blueberry, Buttonbush and Viburnum. Finally, scrub-shrub wetlands account for approximately seven percent of the Ware Creek wetlands. Species typical of these systems include Alder, Black Willow, Buttonbush, saplings of various forested wetland species and several of the herbaceous species found in non-tidal wetland areas.

The Recommended Determination and administrative record indicate that Beaver have had a significant influence on freshwater wetlands in the Ware Creek basin. Beaver activity has resulted in the obstruction of portions of the Creek and its tributaries and consequently has generated a complex mix of herbaceous, forested and scrub-shrub wetlands which contains plant species typical of all of those wetland types.

The plant communities present in the Ware Creek watershed, including those found in the proposed project site, exhibit a wide range of valuable natural functions and environmental attributes. The upland forested areas provide significant wildlife habitat in the form of both food and cover. Overstory tree species provide hard mast material for many terrestrial mammals as well as resting, nesting and cover habitat for birds and tree dwelling wildlife. Understory vegetation in the upland areas provides additional mast material in the form of fruits and berries as well as resting, nesting and escape cover for various wildlife species.

The diverse wetland communities in the Ware Creek watershed also function to provide significant and valuable wildlife habitat. In particular, the tidal freshwater portions of the system provide substantial ecological niches and habitat opportunities due to the structural complexity of that community and the abundant and diverse food-producing vegetation. Many of the plant species found in the wetland communities of Ware Creek provide food and cover for waterfowl such as Black Duck and aquatic wildlife such as the River Otter as well as other birds and mammals. In addition, the vegetated wetland habitat currently found in Ware Creek is critical for certain life stages

of various amphibians and reptiles. Vegetated wetland areas of the Creek which exhibit sufficient water levels serve as spawning and nursery grounds for resident fish populations and are used by mobile fish populations moving throughout the brackish/freshwater-estuary/creek system. Correspondence from the National Marine Fisheries Service contained in the administrative record indicates that Ware Creek is a suitable site for spawning of anadromous fish species during periods of high [freshwater] flow and sufficient fish population levels.

As noted previously, except for the Richardson's Millpond impoundment and minor obstacles caused by Beaver activity, the aquatic systems within the Ware Creek basin are free from major obstructions which could impair the movement and migration of fish and other aquatic wildlife. In addition, the Ware Creek creek-wetland system serves as a relatively unobstructed corridor utilized by wildlife species which preferentially travel the corridor.

The administrative record suggests that in addition to direct wildlife habitat values, the current wetland systems also have the ability to capture and retain nutrients from basin runoff and process those nutrients for export. The juxtaposition of tidal estuarine, tidal freshwater and non-tidal freshwater wetlands creates a diverse vegetative continuity which influences nutrient cycling and nutrient transport from the Creek's freshwater system into the York River and Chesapeake Bay systems. The Ware Creek vegetation communities also contribute a significant amount of litter material which is available for nutrient cycling and part of which is exported to downstream aquatic systems. Particularly, detritus derived from vegetation in tidal freshwater portions of the Creek system is considered more palatable compared to detritus derived from higher salinity estuarine portions of the system. Because the Ware Creek vegetated aquatic system is basically unobstructed, except for Richardson's Millpond, this attribute is particularly applicable to the wetland communities of the Creek. The administrative record indicates that, in addition to these nutrient cycling support functions, the vegetated wetland communities in the basin also serve to: assimilate peak stream flows; trap sediment; and stabilize the stream bank and deter bank erosion.

2. Wildlife

a. Habitat Evaluation Procedures

As part of the Clean Water Act Section 404 permit and Environmental Impact Statement review, an analysis of project impacts on habitat values was prepared using Habitat Evaluation Procedures (HEP) developed by the U.S. Fish and Wildlife Service. These standardized procedures are routinely used by regulatory and resource agencies to evaluate potential environmental effects of a proposed activity. A thorough description of the HEP analysis performed for the proposed Ware Creek impoundment is provided in Appendix A of the Corps Final EIS for the Ware Creek project. In summary, the HEP analysis prepared for the Ware Creek project generated numerical values based on

wildlife cover-type habitat recognizing selected habitat characteristics of certain representative wildlife species. Species were chosen to represent the range of currently existing habitat cover-types and to reflect changes in cover-type values expected as a result of the project. The final Ware Creek project HEP analysis provides information based on overall future adverse and beneficial impacts to the watershed including estimates of those impacts associated with commercial, residential and industrial development as well as successional changes in the natural watershed environment. The analysis also accounts for environmental benefits associated with the successful implementation and achievement of proposed project mitigation activities as they were proposed when the analysis was performed in 1987. The HEP procedure allowed analysis of cover-type changes for various time periods up to 50 years with and without implementation of the proposed Ware Creek dam and impoundment.

While EPA acknowledges the usefulness of the watershed-wide scope of the HEP analysis, issues of primary concern to this Section 404(c) action are related to impacts to wetlands and other waters of the United States and associated environments. Further, EPA believes that assumptions made regarding long-term (50 year) changes in the Ware Creek watershed as well as the presumption of full and successful mitigation of project impacts may tend to obscure the proposed project's impacts by essentially dispersing those impacts both spatially and temporally. Taking into account these qualifications of the Ware Creek HEP analysis, review of the HEP analysis nevertheless offers useful projections of the watershed environment without project implementation and provides extremely useful information regarding near-term project-related impacts to wetlands and associated habitat.

The HEP analysis of the Ware Creek impoundment proposal shows that, recognizing certain trends in watershed development, over the long-term time frame with construction of the reservoir and fully successful completion of mitigation proposals basically similar to those currently offered by the project applicant, the Ware Creek watershed would experience an overall net loss of wetland wildlife habitat. The "with project" cover-type habitat values for "target year 50" (50 years from completion of the impoundment) indicate that while the scrub-shrub wetland cover-type would experience a relatively minor net decrease, forested and herbaceous wetland cover-types would experience a substantial net decrease approaching and exceeding fifty percent respectively. Under the no-project scenario at "target year 50," the cover-type values for forested wetlands would increase slightly, and herbaceous and scrub-shrub cover-type values would remain essentially unchanged. Review of the same long-term information for estuarine open water shows a slight decrease in that cover-type. As stated in the HEP analysis, implementation of the Ware Creek project would result in an average 30.2 percent decline in wildlife habitat values for vegetated wetlands and estuarine open water over the fifty year analysis time frame. The HEP projections also indicate that with inundation resulting from the proposed impoundment project, lacustrine open water cover-type would increase by an estimated 1298.4 percent.

In addition to forecasts of long-term habitat impacts, the HEP analysis prepared for the proposed Ware Creek project also provides near-term forecasts of impacts to wildlife habitat which would occur upon completion of the project but prior to successful implementation of mitigation plans. These data reveal that as a result of construction of the proposed dam and impoundment, vegetated wetland cover-type habitat values would decrease by approximately 60 percent in the near-term. As with the long-term loss projections, herbaceous wetlands would experience the greatest loss in habitat values and forested wetland communities would experience substantial declines. The "with project" HEP analysis also reveals that in the near-term, scrub-shrub wetland habitat values would decrease to approximately fifty percent of present baseline values. As with the long-term projections, the near-term analysis indicates that with inundation resulting from the proposed impoundment project, lacustrine open water cover-type would increase by an estimated 1298.4 percent.

In summary, the HEP analysis performed for the proposed Ware Creek water supply impoundment shows that in the near-term, there would be a serious loss in wetland wildlife habitat values. Further, the HEP projections indicate that over the long-term, wildlife values for at least two wetland habitat types would be substantially lower than baseline figures for both present environments as well as future without-project environments. Under both time frames, the HEP evaluation indicates a considerable increase in open water habitat as a result of inundation of both wetland and upland habitats.

b. Applied Analyses

The Recommended Determination and administrative record confirm that the Ware Creek watershed, including the proposed project site, supports a substantial and diverse wildlife population and provides superior habitat conditions for a variety of fish, amphibians and reptiles, birds and mammals. Appendix A of the Recommended Determination as well as other documents prepared during development of the [E]nvironmental [I]mpact [S]tatement list a range of wildlife species which are either known to occur or are likely to occur in the Ware Creek area. Appendix A of the Recommended Determination identifies species of fish which have been positively identified as occurring in Ware Creek upstream of the project site and species of other wildlife which have either been seen or positively identified as existing in the affected area of Ware Creek, or are highly likely to exist in the area due to similarity of habitat requirements and known occurrence in nearby ecologically similar communities. Appendix A of the Recommended Determination has been transposed for the purposes of this document and is included in Tables 1-4.

Because of the lack of adequate and long-term field study and the restricted access to property surrounding the Ware Creek impoundment site, it may be assumed that the lists in Tables 1-4 do not fully portray the diverse wildlife community which is likely to occur in the project area. Further, it may be assumed that the lists do not fully

represent the seasonally transient and migratory populations which certainly utilize the Ware Creek project area for such necessary activities as resting and feeding.

As stated previously, Table 1 represents fish species collected upstream of the proposed Ware Creek impoundment and can therefore be assumed to include fish species which are present and which currently utilize the project site. In order to document the presence of animals other than fish in the Ware Creek project site, EPA Headquarters requested the U.S. Fish and Wildlife Service's (FWS) Gloucester, Virginia, Field Office to review the species listed in Appendix A and identify those wildlife species known to utilize the Ware Creek project site. The FWS project biologist has visited the proposed impoundment site many times and was able to provide EPA with professional expertise in identifying wildlife species listed in Appendix A which have been positively identified as occurring in the project site. Wildlife identified by the FWS project biologist as species positively known to utilize the proposed project area includes 83 wildlife species which are marked in Tables 2-4 with an asterisk.

The wildlife tables indicate the presence of numerous species which depend upon the vegetated wetland and open water habitats of the Ware Creek basin for their survival. In addition, many of the non-aquatic wildlife species identified as occurring in Ware Creek wetland communities are species which use the area non-preferentially (*i.e.*, they are not dependent on the wetland characteristics of the site *per se*) but which tend to thrive in the vegetated and relatively undisturbed Ware Creek watershed. Many of the species listed utilize various wetland habitat types as well as upland habitat.

i. Fish

Table 1 identifies 23 fish species which have been collected from stream environments upstream of the proposed Ware Creek dam site and can therefore be presumed to utilize portions of the project site. Species found on this list include important forage fish which provide a source of food for predatory fish and other wildlife. Game fish species found on the list of species found in Ware Creek include freshwater fishes such as Sunfish and Largemouth Bass as well as migratory estuarine fish species such as Spot and White Perch. As previously mentioned, the U.S. National Marine Fisheries Service (NMFS) has stated that Ware Creek is suitable for use as spawning habitat by anadromous species such as Alewife and Blueback Herring. Successful spawning however, depends upon seasonal high [freshwater] flow as well as adequate population levels. The administrative record indicates that use of the Ware Creek system by the species listed above was not recorded by several sampling efforts. NMFS also emphasized the importance of the Ware Creek system for use as spawning and nursery habitat for semi-anadromous White Perch. This species is considered by NMFS to be an important recreational fish species which also provides notable commercial harvest in Chesapeake Bay.

Fish species positively identified as occurring in the proposed Ware Creek project site also include the American Eel, a catadromous species which moves downstream into Chesapeake Bay waters, eventually moving out into the Atlantic Ocean. The presence of this migratory species is further evidence that the Ware Creek system can be considered available habitat for anadromous and catadromous fish species, and "open" to the dispersal, movement and migration of mobile aquatic species between Ware Creek and associated estuarine and oceanic aquatic environments. Also listed in Table 1 are fish species such as Spot, White Perch, Yellow Perch, Silverside, Sheepshead Minnow and Mummichog which utilize habitat throughout the entire tidal portion of the Ware Creek system.

ii. Amphibians and Reptiles

Table 2 identifies amphibian and reptile species that are either known to occur, or can reasonably be expected to occur, in wetland communities of the Ware Creek system. The table identifies species of salamanders, frogs, turtles, snakes and other reptiles and amphibians that commonly occur in and use during part of their life-cycle, areas with similar habitat characteristics (*e.g.*, food sources, cover, breeding and resting sites and other physical requirements) as those found in the proposed Ware Creek project impact area. Of the 20 species listed, 16 have been positively identified as occurring in the impoundment impact area.

Table 1. Fish species collected from Ware Creek stream habitats upstream of the proposed Site V dam (Ayers et al. 1980, J. R. Reed and Associates, Inc. 1982)

Longnose gar	<i>Lepisosteus osseus</i>
American eel	<i>Anguilla rostrata</i>
Gizzard shad	<i>Dorosoma cepedianum</i>
Redfin pickerel	<i>Esox americanus americanus</i>
Golden shiner	<i>Notemigonus crysoleucas</i>
Creek chub	<i>Erimyzon oblongus</i>
White catfish	<i>Ictalurus catus</i>
Yellow bullhead	<i>Ictalurus natalis</i>
Brown bullhead	<i>Ictalurus nebulosus</i>
Pirate perch	<i>Aphredoderus sayanus</i>
Sheepshead minnow	<i>Cyprinodon variegatus</i>
Mummichog	<i>Fundulus heteroclitus</i>
Mosquitofish	<i>Gambusia affinis</i>
Tidewater silverside	<i>Menidia beryllina</i>
White perch	<i>Morone americana</i>
Bluespotted sunfish	<i>Enneacanthus gloriosus</i>
Pumpkinseed	<i>Lepomis gibbosus</i>
Orangespotted sunfish	<i>Lepomis humilis</i>
Bluegill	<i>Lepomis macrochirus</i>
Largemouth bass	<i>Micropterus salmoides</i>
Johnny darter ²	<i>Etheostoma nigrum</i>
Yellow perch	<i>Perca flavescens</i>
Spot	<i>Leiostomus xanthurus</i>

² Probable misidentification. The Tessellated darter (*Etheostoma olmstedti*) is a similar species that is much more likely to be found on the Virginia coastal plain.

Table 2. Amphibians and reptiles that occur (*), or are likely to occur, in the wetland communities of Ware Creek (USFWS 1989, VDGIF 1989, Schwab 1988).

Red-spotted newt* *Ntopthalmus viridescens viridescens*
Spotted salamander *Abystoma maculatum*
Fowler's toad* *Bufo woodhousei fowleri*
Northern cricket frog* *Acris crepitans*
Gray treefrog* *Hyla cryoscelis*
Green treefrog* *Hyla cinerea*
Spring peeper* *Hyla crucifer*
Eastern spadefoot toad *Scaphiopus holbrooki holbrooki*
Bullfrog* *Rana catesbeiana*
Green frog* *Rana clamitans melanota*
Pickerel frog* *Rana palustris*
Southern leopard frog* *Rana sphenocephala*
Eastern painted turtle* *Chrysemys picta picta*
Redbelly turtle* *Pseudemys rubriventris*
Eastern box turtle* *Terrapene carolina carolina*
Five-lined skink* *Eumeces fasciatus*
Broad-headed skink *Eumeces laticeps*
Eastern worm snake *Carphophis amoenus amoenus*
Rough greensnake* *Opheodrys aestivus*
Black rat snake* *Elaphe obsoleta obsoleta*

* = observed by USFWS.

iii. Birds

Table 3 lists bird species that are either positively known to occur, or can be reasonably expected to occur, in wetlands communities of the Ware Creek system. The table identifies 108 species of ducks, herons, hawks, owls, woodpeckers, flycatchers and other birds that commonly occur in and use during part of their life-cycle, areas with similar habitat characteristics (e.g., food sources, cover, nesting and resting sites and other physical requirements) as those found in the proposed project impact area. Of the 108 species listed in Table 3, 59 have been positively identified as utilizing wetland communities in the Ware Creek project area.

The variety of the observed bird species listed in Table 3 which preferentially utilize wetland areas, including the Wood Duck, Red-shouldered Hawk, American Woodcock, Barred Owl and Northern Parula Warbler, reflect the diverse wildlife habitat characteristics available in the Ware Creek wetlands. The administrative record indicates that the Ware Creek area supports substantial populations of Wood Duck, Mallard and Black Duck, the latter being a species with special breeding and nesting habitat requirements which are met in the Ware Creek system. In addition the Ware Creek wetlands, particularly the tidal freshwater communities present in the basin, support a diversity of plants which serve as food for these waterfowl species. Wetlands characteristic of Ware Creek offer a source of high energy foods during migratory seasons when waterfowl can best utilize them either prior to northward migration in the spring or following southward migration in autumn.

The presence of other bird species, which do not preferentially utilize wetlands but which have been identified as utilizing Ware Creek wetland habitat, including various woodpeckers, Red-tailed Hawk, and Wild Turkey, serves to confirm the complex wildlife habitat support aspects of the Ware Creek wetland communities. While these species do not depend upon wetland habitat for critical portions of their life-cycle, they tend to prosper under the current habitat characteristics of the Ware Creek wetland system.

The administrative record and Corps Final EIS for the Ware Creek project indicate that the wetland system in the Creek may be or is utilized by three bird species of special significance. The EIS states that while the species is not known to nest in the area at present, there are anecdotal references to sightings of Southern Bald Eagles in the Ware Creek area. This species prefers open water environments and is likely to limit its activities to those portions of the watershed which provide adequate suitable habitat. In addition, the wetlands of France Swamp support a rookery site for the Great Blue Heron. The Great Blue Heron is a colonial waterbird species which returns to the same area each year and congregates in the Swamp's wooded wetland areas for mating, breeding and nesting. According to the 1987 Final EIS, the France Swamp Great Blue Heron rookery supported 81 nests, an increase from the 35 to 40 nests described in documents prepared for the project applicants in 1982. The rookery is one of several in the same physiographic region as Ware Creek, although correspondence from the FWS

indicates that the rookery may be larger than average for the region. FWS notes that the Great Blue Heron displays a low tolerance for human disturbance and to the extent that relocation of the France Swamp Heron population occurs after severe disturbance or destruction of the rookery, that reestablishment would place stress on this and other affected populations. Finally, as stated above, the Ware Creek area is known to support an important population of Black Duck. This waterfowl species is of particular concern to regional waterfowl management policies because of significant and critical population declines since the mid-1950s. At present, the majority of concern for this species centers on loss of the species' wintering habitat. As such, severe restrictions have been placed on the hunting of Black Duck and the North American Waterfowl Management Plan has set a goal of protecting and enhancing migration and wintering habitat for Black Ducks. Along with the Great Blue Heron, the Black Duck is identified by the Chesapeake Bay Program's Living Resources Task Force as a target species for the development of habitat requirements based upon "... recreational, aesthetic, or ecological significance and the threat to sustained production due to population decline or serious habitat degradation."

iv. Mammals

Table 4 identifies mammal species that are either positively known to occur, or can be reasonably expected to occur, in wetlands communities of the Ware Creek system. The table identifies 22 species of deer, squirrel, mouse, and other mammals that commonly occur in and use during part of their life-cycle, areas with similar habitat characteristics (e.g., food sources, cover, denning and resting sites and other physical requirements) as those found in the proposed project impact area. Of the 22 species listed, seven species have been positively identified as utilizing wetland communities in the Ware Creek project area. Several of the species listed in Table 4, including the Muskrat, Beaver, and River Otter, are species which are commonly found only in wetland areas and which tend to thrive in vegetated wetland systems which offer adequate cover and material for food and denning requirements. Many of the other mammal species listed which are not obliged to utilize the aquatic wetland environment nevertheless take advantage of the abundant food and habitat resources available in the Ware Creek wetland communities and thus flourish as a result of the communities' habitat characteristics.

Included in Table 4 are several species which are important game species, particularly [White-tailed] Deer, and the administrative record indicates that hunters successfully harvest these species. Table 4 also lists numerous small mammal species, such as the Meadow Vole and White Footed Mouse, which are considered an important food source for raptors and larger predatory mammals such as Gray Fox. Finally, the list of mammal species which are known to or are likely to currently utilize Ware Creek wetland communities includes fur-bearing mammals such as Mink, Beaver, River Otter and Muskrat.

Table 3. Birds that occur (*), or are likely to occur, in the wetland communities of Ware Creek (USFWS 1989, VDGIF 1989, Rhodes 1988, USFWS 1983).³

Pied-billed grebe*	Sora
Great blue heron*	American coot*
Great egret*	Killdeer
Green-backed heron*	Greater yellowlegs
Wood duck*	Solitary sandpiper
Green-winged teal*	Spotted sandpiper
American black duck*	Least sandpiper
Mallard*	Common snipe
Northern pintail*	American woodcock*
Blue-winged teal*	Black-billed cuckoo
Northern shoveler*	Yellow-billed cuckoo
Gadwall*	Eastern screech-owl
American widgeon*	Great horned owl
Canvasback	Barred owl
Redhead	Ruby-throated hummingbird
Ring-necked duck*	Belted kingfisher*
Lesser scaup	Red-headed woodpecker*
Common goldeneye	Red-bellied woodpecker*
Bufflehead*	Downy woodpecker*
Hooded merganser	Hairy woodpecker*
Ruddy duck*	Northern flicker*
Osprey	Pileated woodpecker*
Bald eagle*	Eastern wood-pewee*
Sharp-shinned hawk	Acadian flycatcher*
Cooper's hawk	Eastern phoebe
Red-shouldered hawk*	Great crested flycatcher*
Red-tailed hawk*	Eastern kingbird*
Wild turkey	Purple martin

* = observed by USFWS.

³ Common names derived from the "Thirty-fourth Supplement to the American Ornithologists' Union Check-list of North American Birds," Supplement to the Auk, Vol. 99(3), July 1982. Scientific names are not included because accepted common names accurately identify species in this taxonomic group.

Table 3. (Cont)

Tree swallow*	Black-throated green warbler
Blue jay*	Yellow-throated warbler*
American crow*	Palm warbler
Fish crow*	Blackpoll warbler
Carolina chickadee*	Cerulean warbler
Tufted titmouse*	Black-and-white warbler
Red-breasted nuthatch	American redstart*
Brown creeper	Prothonotary warbler
Carolina wren*	Northern waterthrush
House wren	Louisiana waterthrush*
Winter wren*	Kentucky warbler*
Marsh wren	Common yellowthroat*
Golden-crowned kinglet	Hooded warbler
Ruby-crowned kinglet	Northern cardinal
Blue-gray gnatcatcher*	Indigo bunting*
American robin*	Rufous-sided towhee*
Gray catbird*	Song sparrow*
Northern mockingbird	Swamp sparrow*
Brown thrasher	White-throated sparrow*
European starling	Dark-eyed junco*
Red-eyed vireo	Bobolink
Northern parula warbler*	Red-winged blackbird*
Chestnut-sided warbler	Rusty blackbird
Cape May warbler	Common grackle*
Black-throated blue warbler	American goldfinch
Yellow-rumped warbler*	
Yellow warbler*	

* = observed by USFWS.

Table 4. Mammals that occur(*), or are likely to occur, in the wetland communities of Ware Creek (USFWS 1989, VDGIF 1989, Jackson et al. 1976).

Virginia opossum *Didelphis virginiana*
Least shrew *Cryptotis parva*
Southeastern shrew *Sorex loagirostris*
Hoary bat *Lasiurus cinereu*
Big brown bat *Eptesicus fuscus*
Seminole bat *Lasiurus seminolus*
Northern yellow bat *Lasiurus intermedius*
Little-brown myotis *Myotis lucifugus lucifugus*
Gray fox* *Urocyon cinereoargenteus*
Raccoon* *Procyon lotor*
Long-tailed weasel *Mustela frenata*
Mink *Mustela vison*
River otter* *Lutra canadensis*
White-tailed deer* *Odocoileus virginianus*
Gray squirrel* *Sciurus carolinensis*
Beaver* *Castor canadensis*
Marsh rice rat *Oryzomys palustris*
White-footed mouse *Peromyscus leucopus*
Meadow vole *Microtus pennsylvanicus*
Dark meadow vole *Microtus pennsylvanicus nigrans*
Meadow jumping mouse *Zapus hudsonius*
Muskrat* *Ondatra zibethica*

* = observed by USFWS.

III. ADVERSE IMPACTS OF PROPOSED PROJECT

A. IMPACTS TO WILDLIFE

Initial project construction would require the removal or destruction of vegetation at or near the project dam site and in the impoundment area below +28 feet mean sea level and thus the near total loss of unique and valuable vegetated upland and wetland systems in the impoundment area. Clearing activities necessary for reservoir construction would further involve the removal of a majority of the organic material from the proposed reservoir pool. This clearing would result in the direct removal and loss of 425 acres of functional wetland and open water habitat and 792 acres of adjacent forested upland habitat and would have a substantial direct impact on wildlife. Of the aquatic habitat directly lost as a result of the project, 381 acres are vegetated wetlands and the remaining 44 acres are either palustrine, estuarine or lacustrine open water systems. Of the vegetated wetlands which would be lost as a result of clearing activities, the majority are herbaceous wetlands (47%) and forested wetlands (40%), with scrub-shrub wetlands (13%) accounting for the remaining acreage. The vegetated wetlands which would be destroyed by the project represent over 38 percent of the total wetland acreage of the watershed and over 67 percent, approximately 55 percent and over 28 percent of the scrub-shrub, forested, and herbaceous wetlands respectively. The impoundment would result in the inundation and destruction of areas considered as Resource Category 1 by the U.S. Fish and Wildlife Service and as such would destroy wildlife habitat considered to be unique and irreplaceable on a regional basis.

During land clearing activities preceding dam construction, wildlife such as small mammals, reptiles, amphibians, and invertebrates which could not readily escape the impoundment project site would perish. Because of limited mobility, many individuals of these species would be destroyed by land clearing machinery or would die as a result of the loss of suitable hiding or resting cover and source of food. In addition, certain aquatic wildlife, including fish species, would be adversely impacted by initial land clearing activities due to the near-term loss of necessary aquatic life support systems. More mobile terrestrial wildlife and birds, as well as wildlife characteristic of wetland communities, would be forced to migrate out of the impoundment site in search of suitable habitat. The Corps Final EIS, however, indicates that there is limited suitable habitat in the Ware Creek basin available for immigration of wildlife which would be displaced by the proposed project and that migrating individuals would not find adequate habitat or would displace other individuals. This lack of available habitat would result in the further direct mortality of affected wildlife over the near-term.

The administrative record sustains the conclusion that the Ware Creek wetland systems currently support significant and diverse wildlife habitat values and that a broad range of wildlife currently utilize the Ware Creek impoundment site wetland communities. The area exhibits significant habitat characteristics (e.g., food sources, cover, nesting and resting sites and other physical requirements) which are vital to both

resident wildlife populations and species which utilize the area for different stages in their life-cycle. Further, wetlands of the Ware Creek impoundment project area support wildlife species which preferentially depend upon the wetlands for their habitat requirements as well as wildlife species which do not require that habitat type but which tend to benefit from the wetland attributes. As stated previously, implementation of the Ware Creek water supply project would destroy a significant acreage of wetlands and would adversely impact associated wildlife values. The magnitude of this impact is recognized and summarized in the HEP analysis previously cited which concludes that construction of the proposed dam and impoundment would reduce vegetated wetland cover-type habitat values by approximately 60 percent in the near-term with herbaceous wetlands experiencing the greatest loss in habitat values and forested wetland communities experiencing substantial declines. The "with project" HEP analysis also reveals that in the near-term, scrub-shrub wetland habitat values would decrease to approximately 50 percent of present baseline values.

In addition to adverse impacts associated with obstructing the present aquatic system, planned municipal water supply withdrawal would reduce average freshwater stream flow from Ware Creek immediately downstream from the dam site from 12.4 mgd to 3.3 mgd. This change would alter both the downstream vegetated wetland communities and the nutrient transport mechanisms present in the Ware Creek system and would have serious adverse effects on associated ecological communities.

While it is difficult to quantify the exact impact of the impoundment and water supply withdrawal on the Ware Creek system's nutrient flux and export of dissolved organic and detrital material, it is evident that construction of the Ware Creek impoundment would severely and adversely alter the current nutrient regime. Placement of the dam structure would impede or prevent the downstream export of a substantial percentage of the amount of particulate organic material currently passing through the creek system into the York River. Water removed from the water supply reservoir as part of the operation of that facility would further limit the downstream export of dissolved and particulate organic material and freshwater discharge into the York River. The administrative record shows that under normal nutrient loading conditions, nutrients exported into estuarine systems, such as the York River, by freshwater discharge, such as Ware Creek, support both detritus-based and plankton-algae based estuarine food webs. The proposed dam and reservoir project would directly result in decreased nutrient input into the York River estuarine system. The present Ware Creek detrital/nutrient export mechanism contributes to the estuarine food web of the York River and can reasonably be considered to augment the estuarine environment of the Chesapeake Bay.

In addition to adverse impacts to nutrient transport, implementation of the proposed project and operation of the water supply aspects of the reservoir would substantially alter the vegetation communities downstream of the dam. As noted in the administrative record, changes in the physical and chemical hydrologic regimes downstream of the dam would result in a conversion from diverse structurally complex

vegetated communities to less diverse plant communities. Further, implementation and operation of the project would essentially eliminate tidal freshwater wetlands from the Creek system and would thereby eradicate plant species which are known to provide critical support functions to important wildlife species and which contribute readily decomposed and more palatable detrital material to the associated aquatic food chain.

1. Fish

Construction of the dam and impoundment project would substantially alter the overall hydrologic regime of the Ware Creek aquatic system by replacing the current vegetated flowing stream system with a lake system. This change would in turn result in a major modification of the wildlife habitat characteristics of Ware Creek. The Corps Final EIS concludes that some stream species of fish could eventually be eliminated from the Creek due to this change in flow regime. From a habitat perspective, recognizing the incised topography of the Ware Creek basin and reservoir pool, the extent of aquatic areas supporting vegetated shallows necessary for fish habitat would be limited primarily to the upper regions of the impoundment. This decline and change in vegetated aquatic areas which currently serve as spawning, nursery and cover habitat would adversely impact fish species which use those habitats. In addition, the administrative record suggests that the Virginia Department of Game and Inland Fisheries would augment natural fish populations with supplementary stocking of forage and game fish species. It is reasonable to expect that a managed recreational game fishery would substantially alter the abundance and diversity of current natural fish populations and modify the species composition to foster a less diverse population more typically adapted to relatively static lake environments.

In addition to direct project impacts to fish species utilizing aquatic habitat in the impoundment site, placement of the dam structure would adversely affect the movement of fish species in the Ware Creek system. Construction of the reservoir dam would essentially close the aquatic pathway currently available for the natural passage and migration of fish species. The adverse implications of this project-induced change on highly mobile fish species is reinforced by evidence that the present open system provides access for the semi-anadromous⁴ White Perch which is considered a trophic link between the upper Ware Creek watershed and associated estuarine systems and which is also considered an important commercial and recreational fish species by the National Marine Fisheries Service (NMFS). In addition to adverse impacts to a known semi-anadromous species, truncation of the current Ware Creek system would eliminate the availability of suitable spawning habitat for anadromous alosids (*i.e.*, Alewife and Blueback Herring) in the system and would limit future use of the system by the catadromous American Eel.

⁴ Semi-anadromous is defined by the National Marine Fisheries Service as a fish species which spawns in fresh waters but lives most of its life in estuarine waters.

Adverse impacts to fish species are not limited to physical effects to resident and migratory species utilizing the proposed project area. As noted previously, the Ware Creek dam would isolate a significant majority of the Ware Creek watershed from the York River and would result in the uncoupling of the current aquatic continuum between the freshwater stream and the York estuarine system. NMFS has concluded that as a result of implementation of the project, Ware Creek would cease to be a sub-estuary of the York River stating, "[a]bove the dam, Ware Creek will become a freshwater lake having limited ecological interaction with the York; below the dam, Ware Creek will be no more than a lagoon or cove of the York." Implementation of the project would severely limit the ecological link between Ware Creek and the York River.

2. Amphibians and Reptiles

As stated above, implementation of the proposed Ware Creek impoundment would require the removal of a significant portion of the vegetated wetland communities in the basin and would result in the inundation of those areas. The destruction of the unusually diverse vegetated wetland systems present in the project site and their replacement with an open water lake system would substantially reduce the available habitat for reptile species and would have a particularly detrimental impact on habitat utilized by amphibian species.

Clearing of vegetation and removal of organic material from the impoundment area would eliminate a substantial portion of currently available resting, escape, and cover habitat for a broad range of reptiles and amphibians likely or known to occur in the Ware Creek project site. Moreover, removal of the vegetation and alteration of the Creek hydrologic regime would substantially alter the breeding habitat for both reptile and amphibian wildlife species. By the very nature of amphibian biological requirements for both terrestrial and aquatic environments, these species would be adversely impacted by the project. The area's diverse vegetated wetland environment combined with the variable hydrology characteristic of the Ware Creek system provides abundant suitable safe breeding and nursery habitat for amphibian species. Conversely, the relatively deep, expansive open water habitat and relatively abrupt edge which would be created by the proposed impoundment would offer only limited available habitat for amphibian species. As with fish species, the proposed impoundment would provide limited vegetated edge for amphibian habitat except in the upper portions of the impoundment. Furthermore, because the impoundment would be managed for recreational fisheries, predatory fish stocked in the impoundment would decrease the suitability of the proposed impoundment as habitat for amphibian species. In summary, removal of vegetated communities from the impoundment area and inundation of the reservoir would substantially decrease the overall available habitat for both reptile and amphibian species and would be particularly disruptive to the breeding habitat requirements of amphibians. The adverse impacts of the proposed project would reduce both the number of individuals utilizing the area and the diversity of amphibian and reptile species which could successfully exploit the habitat of the altered environment.

3. Birds

Implementation of the proposed impoundment project would have a profound impact on the broad range of bird species which currently utilize the Ware Creek area including the proposed reservoir site. While the proposed open water reservoir with its mitigation islands would provide feeding, nesting and resting habitat for primarily waterfowl species and fish-eating raptors, implementation of the project would severely reduce available territory for other types of birds which currently thrive in the vegetated wetland and upland habitat as well as species which preferentially use the present vegetated wetland habitat. Clearing of the overstory trees from forested upland and wetland areas and removal of scrub-shrub wetlands from the impoundment site would destroy a majority of the diverse structural environment which is utilized by resident and migratory bird species for foraging, breeding, nesting, escape and cover habitat. In addition, removal of understory plant species from the project site would substantially reduce shrubs and vines which supply seeds, berries and soft mast and which provides a varied source of food for bird species. Removal of the herbaceous wetlands in the proposed project site would further impact habitat values of the area by eliminating cover and foraging habitat currently utilized by resident and migratory bird species. Overall, the proposed project would result in a considerable reduction of habitat for a robust variety of bird species and would offer habitat for a limited number of specialized bird species.

As noted in the previous section, the Ware Creek area supports a significant population of Great Blue Heron which returns to the same area in France Swamp each year. The Herons congregate in the Swamp's wooded wetland areas for mating, breeding and nesting. Due to disturbance and removal of vegetation and flooding of nesting trees, implementation of the Ware Creek project would destroy the Heron rookery currently existing in the project site. The Corps Final EIS concurs with the finding that the rookery would be lost and concludes that prospects for resettlement of the colony within the Ware Creek watershed would be highly uncertain. Destruction of the rookery would force the colony to search for an alternative site for mating, breeding and nesting and may place undue strain on other Heron colonies in the Peninsula region as the Ware Creek population invades other rookeries in search of suitable habitat. While EPA recognizes the project applicant's mitigation proposals for loss of the Ware Creek Heron rookery, the administrative record suggests that the unique and poorly understood nature of the Great Blue Heron's habitat requirements make[s] the likelihood of truly successful mitigation extremely uncertain. EPA believes that given the present state of knowledge about the habitat requirements of the Great Blue Heron, it cannot now be stated with any assurance that the loss of the Great Blue Heron rookery to the Ware Creek project can be mitigated.

In addition to adverse impacts associated with destruction of habitat, implementation of the project and alteration of the present Ware Creek hydrologic regime would have a substantial influence on vegetation downstream of the

impoundment. As demonstrated in the results of research conducted by the Virginia Institute of Marine Science, the proposed project would substantially change the salinity of aquatic environments in the middle and lower portions of Ware Creek. As a result of project-induced reductions in freshwater flow and obstruction of the stream channel by the dam, vegetation downstream of the dam would over time convert to vegetation characteristic of brackish tidal estuarine environments. This change would have two impacts on the current Ware Creek environment downstream from the proposed dam. First, the change in creek hydrology and the resulting modification of salinity distribution would result in a profound reduction in the availability of food for various resident and migratory bird species. Bird species which currently utilize the seeds, berries, roots, and tender shoots of the diverse plant species found in tidal freshwater and oligohaline portions of Ware Creek for foraging and feeding would be adversely impacted as vegetation shifts to less diverse and less palatable monotypic plant populations characteristic of the mesohaline reaches of the Creek. Second, modification of the salinity distribution in the middle and lower Ware Creek environment would reduce the structural diversity of the plant species present. According to a report prepared by the Virginia Institute of Marine Sciences, tree and shrub species such as Red Maple, June Berry and Buttonbush, would be lost as a result of the modifications to salinity caused by decreased freshwater input into the Creek system. The affected portions of the stream would become populated by structurally less complex herbaceous species. As a result of this change, resident and migratory bird species which currently utilize the diverse tree and shrub habitat for cover, nesting and resting habitat, would be adversely impacted by the proposed water supply withdrawal.

As stated above, the change in plant diversity which would accompany implementation of proposed water withdrawal strategies would have a grave adverse impact on bird species which preferentially utilize the impacted environment for foraging. One species representative of this population and of particular concern to present waterfowl management policies is the Black Duck. Black Duck populations have been declining steadily since the mid-1950s and there is concern over loss of the species' wintering habitat. As such, the North American Waterfowl Management Plan (Plan) has set a goal of protecting and enhancing migration and wintering habitat for Black Ducks by "protecting 50,000 additional acres of migration and wintering habitat on the east coast of the United States." The Plan is an agreement between the United States and Canada which provides a broad framework for the conservation and management of populations of ducks, geese and swans that occur in North America. The proposed impoundment project and associated adverse environmental impacts would be contrary to the goals of the Plan.

As noted previously, the Black Duck is known to utilize the proposed Ware Creek project site and the area is currently considered by the U.S. Fish and Wildlife Service to be good quality habitat for dabbling ducks such as the Black Duck. While Black Ducks are known to consume a variety of natural foods including fruits, nuts, berries, seeds, aquatic plants, and invertebrate animals, they are less likely than similar species such as

Mallards to utilize residual grains remaining in farm fields. The predicted project-induced changes in vegetation would result in the replacement of current plant species with marsh grass communities and would force the Black Duck and other similar foraging waterfowl species to search for food elsewhere, thereby increasing habitat stress on a representative waterfowl species which is currently experiencing population declines due to habitat loss.

4. Mammals

Clearing of the vegetation from the Ware Creek project site would destroy a significant acreage of upland and vegetated wetland habitat currently used by terrestrial and aquatic mammal species. While removal of the forested areas would reduce cover and denning habitat for arboreal species, such as the Gray Squirrel and Raccoon, reservoir site preparation and inundation of the impoundment would eliminate resting, cover and feeding habitat used by terrestrial mammals, such as [White-tailed] Deer. In addition, because of the topography of the area to be flooded by the water supply impoundment, the proposed project would reduce the available habitat for aquatic mammals such as Beaver and River Otter, which currently utilize vegetated wetlands in the Creek system. As previously noted, the administrative record indicates that wildlife habitat present in the Ware Creek watershed is likely to be unavailable for immigration of species displaced by the proposed project. This factor could preclude "absorption" of mammal populations which would be displaced by the proposed impoundment by the remaining wildlife habitat in the Ware Creek basin.

In addition to impacts to wildlife which would occur as a result of the clearing and inundation of the project site, operation of the water supply aspects of the proposed project would also impact mammal species which utilize the freshwater tidal and oligohaline areas downstream of the proposed dam site. Changes in vegetation which would accompany modification of the Creek's salinity distribution would reduce the availability of suitable cover and foraging habitat for mammal species.

Placement of the dam and impoundment would effectively block a portion of Ware Creek and its tributaries to use by various migratory wildlife species. While the forested nature of the watershed would allow wildlife to avoid the impacted area, wildlife species which are migratory or highly mobile and which depend on the present wetland/aquatic corridor for their movement would be adversely impacted by the proposed impoundment.

B. IMPACTS TO RECREATIONAL AND COMMERCIAL FISHERIES

Impacts to the life history and habitat requirements of fish species are described in the previous section on impacts to wildlife. In addition to those impacts, EPA believes it is important to recognize potential impacts to the substantial benefits the present Ware Creek system provides to recreational and commercial fisheries. As

previously noted the Ware Creek system currently supports a viable population of semi-anadromous White Perch, a species which the National Marine Fisheries Service considers important to both recreational and commercial fisheries. Also, the system unquestionably provides spawning and nursery habitat for other fish species sought by recreational and commercial fishermen as well as providing important habitat for a range of forage fish which serve as prey for larger game and commercial species. While the magnitude of the impact is difficult to predict, inundation of the proposed reservoir site and alteration of the vegetated communities downstream of the dam site would certainly reduce the ability of the Ware Creek system to support fish species and would influence the availability of game and commercial species in associated aquatic systems.

C. IMPACTS TO RECREATION

The administrative record does not indicate that significant recreational fishing exists in the Ware Creek basin except for limited ventures in the area of Richardson's Millpond. The majority of the stream area is currently posted and therefore has restricted public access. EPA recognizes that the proposed impoundment would likely provide greater opportunity for certain types of fishing by creating a 1200-acre lake with public access. As stated previously, implementation of the impoundment project would increase lacustrine open water habitat by a substantial 1298 percent. The project would thus result in a large increase in freshwater lake habitat. The administrative record, however, is unclear with regard to the quality of this habitat for recreational fishing opportunities. The Corps Final EIS states that recreational fishing is usually good in the early years of a reservoir, but may decline as nutrients are used up and the fish populations stabilize. Further, it is reasonable to assume that drawdown of the reservoir which would be required on a periodic basis due to variable rainfall and the resulting mudflat "bathtub ring" might limit the desirability of the impoundment for recreational fishing.

As noted in previous sections, the Ware Creek system supports abundant bird and mammal species which are sought by hunters. The Ware Creek area, including the proposed impoundment site, contains duck hunting blinds and is known to be utilized by hunting clubs during the deer season. Previous sections of this Final Determination explain how populations of terrestrial mammals as well as game bird species would be adversely affected by the direct and secondary impacts of the proposed impoundment. Indeed, even if game species were to continue to prosper in the vicinity of the proposed impoundment, it is reasonable to assume that there would be certain restrictions on the use of firearms on and near the impoundment. Nevertheless, the administrative record does not contain substantial information on impacts to hunting and predictions of the extent of adverse impacts on the recreational aspects of hunting supported by the present Ware Creek system would be speculative.

D. CUMULATIVE IMPACTS

Implementation of the Ware Creek water supply project would result in serious direct environmental impacts including the elimination of a substantial portion of the vegetated wetland acreage in the Ware Creek basin and alteration of the freshwater and organic energy export from Ware Creek. Recognizing the extent of those impacts, the relatively large scope of the Ware Creek proposal and the proposal's potential adverse environmental impacts on associated aquatic systems, cumulative effects of the project must also be considered in EPA's Section 404(c) deliberations.

As proposed, the Ware Creek project would directly eliminate over 38 percent of the vegetated wetland communities in the Ware Creek watershed. Acreage figures provided in the Corps Final EIS indicate that while the proposed project would eliminate over 28 percent of the present herbaceous wetlands, approximately 55 percent of the present forested wetlands and over 67 percent of the present scrub-shrub wetlands would be lost in the watershed in the near-term. Allowing for fully successful completion of the proposed compensatory mitigation offered by the project applicant (which is uncertain and overstated, for reasons discussed below in Section IV of this determination), the administrative record indicates that only scrub-shrub wetlands would approach replacement by the mitigation; forested and herbaceous wetlands would continue to experience a substantial shortfall in habitat values from the present due to adverse impacts from the proposed project. Moreover, as stated previously, the proposed dam would modify wetland communities downstream of the dam.

While the loss of over 38 percent of the vegetated wetland communities over the near-term, and the elimination and/or alteration of a sizable segment of the wetland communities in the Ware Creek basin over the long-term, would represent a substantial impact to the watershed, these losses would also contribute to the loss of wetlands in the York River watershed and the Chesapeake Bay. Information collected by EPA consultants, Gannet Fleming, during EPA Region III's review of the proposed project indicates that the lower York River watershed currently supports approximately 4100 acres of vegetated inland wetlands and that these wetlands comprise 2.26 percent of the watershed area. The research also indicates that, in addition to directly eliminating associated wetland systems through clearing and inundation, impoundment of other creek systems in the lower York River basin has uncoupled approximately one-fourth of the inland vegetated wetland systems from the lower York River estuary. Although the relative severity of effects would be of a different scale, the proposed Ware Creek project would result in similar types of impacts to the environment through impacts from inundation and obstruction of the Creek and would exacerbate adverse impacts which have already taken place in the lower York River basin.

The proposed Ware Creek project would also contribute to cumulative adverse environmental impacts experienced by the Chesapeake Bay. Historically, along with other wetlands in the mid-Atlantic region, Chesapeake Bay wetlands have experienced a

major decline in acreage. Statistics indicate that from the mid-1950s until the late 1970s, the Bay watershed experienced wetland losses averaging over 2,800 acres annually with the majority of the decline taking place in estuarine vegetated and palustrine forested wetlands. Statistics for the same period also indicate a considerable net gain in freshwater ponds. EPA recognizes that wetland losses in the Bay watershed have come about as a result of many factors, many of which are beyond the scope of Section 404 of the Clean Water Act. Nevertheless, research by the Fish and Wildlife Service notes that in addition to other human-induced causes, "[c]reation of freshwater impoundments was another important factor," contributing to wetlands loss in the Chesapeake Bay watershed with pond, lake, and reservoir construction accounting for approximately 30 percent of the losses. In Virginia, pond, lake, and reservoir construction was responsible for approximately 25 percent of the loss of palustrine vegetated wetlands with roughly 80 percent of those losses occurring in the Lower Coastal Plain region, including the James City County area.

EPA believes that the wetlands which are directly associated with the Bay environment, such as those in the lower York River, represent important natural resources which are necessary for maintenance and protection of valuable Bay environments. Further, EPA concurs with the findings of the Fish and Wildlife Service study of wetland trends in the five mid-Atlantic states including the Chesapeake Bay region, where they noted:

We can easily see that huge gains in freshwater ponds and substantial losses of vegetated wetlands have recently taken place in the region. The importance of the gain in pond acreage to fish and wildlife species has not been assessed and is still subject to much discussion. By contrast, the losses of vegetated wetlands (e.g., emergent, scrub-shrub, and forested wetlands) represent known losses of many other environmental quality and socio-economic values provided free-of-charge to society by wetlands. Moreover, the significance of the vegetated wetlands losses is not simply reflected by the acreage lost alone, since prior to the mid-1950s, many wetlands had already been destroyed, making the remaining wetlands more important and future losses more serious.

The incremental loss of functional wetland systems which currently contribute to the environmental well-being of the York River and the Chesapeake Bay and which help maintain and protect the environmental integrity of those systems represents a profound cumulative loss.

E. CHESAPEAKE BAY AGREEMENTS

As noted previously, the Ware Creek impoundment project would contribute to the adverse effects of cumulative environmental impacts in the Chesapeake Bay watershed. EPA's determination regarding the Ware Creek project is supported by commitments made by the Federal government and the Commonwealth of Virginia towards protecting and enhancing Bay environments.

In the 1987 Chesapeake Bay Agreement, the Federal government and states surrounding the Bay, including Virginia, recognized the importance of the Chesapeake Bay's resources and committed to managing those resources to halt and reverse serious declines in the quality and productivity of the Bay. Goals of the 1987 agreement which are relevant to EPA's decision include clear provisions for the restoration and protection of the Chesapeake Bay's living resources, their habitats and ecological relationships. The stated intent of this goal is in part to: "protect, enhance and restore wetlands ... important to water quality and habitat; maintain freshwater flow regimes necessary to sustain estuarine habitats; and restore, enhance and protect waterfowl and wildlife." Compliance with and achievement of each of these management objectives relates directly to the proposed Ware Creek project and EPA's Section 404(c) action.

On January 5, 1989, in fulfillment of a "living resources" commitment of the 1987 agreement, the Chesapeake Executive Council, of which EPA and the Commonwealth of Virginia are members, adopted the Chesapeake Bay Wetlands Policy (Policy). As stated in the adoption statement, the Policy establishes an immediate goal of no net loss of wetlands with a long-term goal of a "net resource gain." The Policy preamble continues, stating:

Wetlands are of importance to the protection and maintenance of living resources associated with the Chesapeake Bay ecosystem as they provide essential breeding, spawning, nesting and wintering habitats for a major portion of the region's fish and wildlife, including migratory birds, endangered species and commercially and recreationally important wildlife.

The Policy asserts that in order to protect existing wetlands and achieve a net resource gain in wetland acreage and function, the signatories must protect existing functioning wetlands. Further, the Policy declares that the underlying principle behind protection of the Bay wetlands is protection from "direct, indirect or cumulative impacts which result in losses of wetland acreage or function." The Policy establishes that the signatories will use existing procedures including regulation and protection standards to limit adverse impacts to wetlands and that "[o]nly in rare instances will losses of wetland acreage or function be allowed or considered justifiable."

Based upon declarations of protection strategy and management commitments made in the 1987 Chesapeake Bay Agreement and the 1989 Chesapeake Bay Wetlands Policy, EPA and the Commonwealth of Virginia have adopted principles and committed themselves to policies and actions which have as their goal the protection, restoration and enhancement of wetland communities associated with the Chesapeake Bay. As noted earlier, the proposed project, including proposed mitigation, would result in the short- and long-term loss of valuable wetland communities which currently support diverse wildlife habitat. Further, operation of the proposed project would diminish the flow of freshwater from the Ware Creek watershed into the York River estuary and Chesapeake Bay and would alter habitat which currently supports regionally important waterfowl, such as the Black Duck, and other wildlife. EPA believes that this Final Determination is consistent with and appropriately implements policies and commitments embraced by EPA and the Commonwealth of Virginia.

IV. MITIGATION

Review of Region III's Recommended Determination and the administrative record revealed that the Region's discussion and conclusions with respect to the technical and policy issues associated with the County's proposed mitigation plan are accurate. Section VI.C, MITIGATION (pages 41-42), of the Recommended Determination is hereby adopted as part of this Final Determination, except for the Region's determination that the existing Ware Creek ecosystem cannot be adequately mitigated. The exceptional complexity and values of the proposed project site certainly represent a significant challenge with respect to any mitigation effort. However, in reaching its findings regarding unacceptable adverse effects resulting from the proposed impoundment, EPA considered the potential for James City County's mitigation proposal to compensate for the anticipated adverse effects to wildlife. As discussed below, EPA has determined that the County's mitigation proposal would not adequately mitigate the environmental losses that would result from the project.

James City County has developed a comprehensive mitigation plan which combines elements of wetland creation and wetland and upland preservation and enhancement in an attempt to compensate for the adverse environmental impacts that would result from the proposed water supply impoundment. The Recommended Determination states that, in all probability, James City County's is the most comprehensive mitigation plan put forth to date in this region. EPA reiterates the Recommended Determination's statement that James City County is to be commended for the effort. However, EPA must disagree with the County's opinion that, on balance, project construction along with the proposed mitigation would result in net environmental gains. EPA concludes that, from a technical perspective, the proposed mitigation plan would not adequately offset the anticipated adverse impacts to wildlife.

A. THE MITIGATION PLAN

James City County's mitigation plan includes wetland creation, wetland and upland preservation and the creation of potential Great Blue Heron nesting sites in Ware Creek (within the York River watershed); removal of an existing dam to facilitate reconnection of the impounded wetlands to the downstream system and reestablishment of anadromous fish access, and wetland creation in Yarmouth Creek (within the James River watershed); and extensive preservation of existing wetlands and uplands in the James River watershed (Yarmouth Creek and Powhatan Creek).

More specifically, in the Ware Creek watershed, James City County proposes to create approximately 103 acres of forested, scrub-shrub and herbaceous wetlands by creating 16 protection basins (impoundments) in the headwaters of the watershed totalling approximately 39 acres and 17 protection basins around the perimeter of the proposed reservoir totalling approximately 64 acres. In addition, the County proposes to create approximately 27 acres of freshwater tidal emergent wetlands downstream from

the proposed dam site by backfilling dam material borrow sites with organic material removed from the proposed impoundment and planting freshwater wetland vegetation. The County also proposes to enhance (by replacing water intolerant species with wetlands species to improve cover and food for wildlife) 155 sites totalling approximately 58 acres. The County's proposal with respect to preservation in the Ware Creek watershed includes preservation and enhancement (via selective planting of wetland species to increase cover and food for wildlife) of 34 wetland sites for a total of approximately 145 acres and to maintain and enhance buffer zones (a requirement of the County's Reservoir Protection Overlay District) of 200 feet and 100 feet around the proposed reservoir and all tributary streams, respectively, for a total of 2500 acres, as well as greenways which would be developed in conjunction with the projected residential development. To attempt to mitigate for the loss of the Great Blue Heron rookery, the County utilized the FWS Habitat Suitability Index Model to locate and design potential nesting sites both within and adjacent to the proposed reservoir.

In the Yarmouth Creek watershed, James City County's mitigation plan includes the removal of an existing dam which would reconnect a waterbody known as Cranston's Pond, as well as approximately 506 acres of wetlands, as estimated by the County, both adjacent to and upstream from the Pond to the James River system, and in conjunction with the replacement of a downstream road culvert, would attempt to reestablish anadromous fish access to the area. In addition, the County proposes to plant forested, scrub-shrub and herbaceous wetlands species in the approximately 37-acre area which is currently open water but would be available for planting after the dam is breached. In addition, James City County has proposed to select potential sites, after consultation with the Virginia Natural Heritage Program (VNHP), Virginia Council on the Environment and the Nature Conservancy, and subsequently acquire and preserve approximately \$1 million worth of wetlands and uplands in the Yarmouth Creek watershed.⁵ Specifically, the County and the Nature Conservancy have proposed the purchase of the 1,320-acre Wright Island Tract, which is located below Cranston's Pond in the lower part of the watershed and contains approximately 873 acres of wetlands, an additional 200-acre tract which is also located below Cranston's Pond and is entirely wetlands and the 167-acre Geddy Tract which is located above Cranston's Pond in the upper part of the watershed and contains approximately 27 acres of wetlands. James City County reports that the Boy Scouts of America own the southern part of the watershed bordering the pond, that there are only two parcels in addition to the Geddy tract along the northern boundary, and therefore, that its efforts would have the effect of preserving most of the watershed surrounding Cranston's Pond. The County has indicated that the availability of the Wright Island, Daniel and Geddy parcels has been confirmed in conjunction with The Nature Conservancy and has proposed to acquire them on or before the date that reservoir construction commences. The County has

⁵ In its "Proposal" attached to a letter dated August 18, 1988, the County Administrator stated the participation of these organizations did not indicate either support for or opposition to James City County's proposed reservoir on Ware Creek.

further indicated that it would utilize the remainder of the \$1 million to purchase additional parcels in the Yarmouth Creek watershed or in other watersheds after consultation with the aforementioned organizations. The second aspect of the County's preservation program involves the potential acquisition of preservation easements in the Powhatan Creek/Long Hill Swamp area in James City County. The County has indicated that VNHP has identified this area as one of top priority for preservation and that this area is developing rapidly. The County has further indicated that it would consult with the aforementioned organizations and subsequently apply \$150,000 toward the purchase of preservation easements immediately after reservoir approval.

B. ANALYSIS OF THE PLAN

Review of the administrative record indicates that the County's proposed wetlands creation efforts are generally feasible. However, EPA concludes that while the County's efforts would provide wetlands creation opportunities, review of results of previous wetland creation efforts reveal the difficulty of obtaining 100 percent success in creating wetlands and, in particular, creating wetland functions and values. For purposes of analysis of the compensatory elements of the County's mitigation plan, however, EPA has utilized a "best case" scenario.

1. Wetlands Creation

In total, the mitigation plan proposes, at best, the creation of approximately 167 acres of wetlands or approximately 44 percent of the 381 acres of existing forested, scrub-shrub and herbaceous wetlands that would be lost as a result of the proposed project. Approximately 103 acres is proposed in the aforementioned protection basins, 27 acres is proposed downstream in the dam material borrow areas and 37 acres is proposed in the "drained area" created by the proposed breaching of Cranston's Pond. EPA believes that these wetlands creation efforts would not adequately replace those wetlands, and their associated wildlife habitat values, that would be inundated and subsequently lost as a result of the proposed project. The proposed acreage is insufficient to replace the extent of wetlands that would be lost. Furthermore, the replacement wetlands would not provide the range of habitat values provided by the existing wetlands. While the aforementioned 37-acre mitigation effort would (if completely successful) increase wetlands acreage and provide their associated habitat values in the adjacent, James River watershed, it would not serve the habitat needs of the mammals, reptiles or amphibians displaced by the proposed reservoir.

Further, the Corps [Final] EIS states that some of the 64 acres to be included in the reservoir perimeter protection basins already includes wetlands and a package submitted by Virginia's Secretary of Natural Resources indicates that approximately 17.5 acres of the proposed 39 acres to be created in the proposed headwater protection basins is already wetlands. Thus, this aspect of the mitigation would in fact create a maximum of only approximately 85 acres of wetlands, assuming that the effort would be

100 percent successful, and considering the unspecified acreage of existing wetlands in the reservoir perimeter protection basins.

The proposed mitigation plan also proposes the enhancement of approximately 58 acres of wetlands at 155 sites. However, the Corps concluded, in its Final EIS, that only a portion of these 58 acres, specifically the area between +32 and +35 feet msl, had the potential to survive as wetlands. Therefore, if completely successful, the mitigation plan would replace approximately 112 acres or 29 percent (plus, possibly some increment of the 58 acres) of the wetlands currently available in the proposed project site. EPA reiterates that this is a maximum estimate which assumes 100 percent success and does not account for the unspecified acreage of existing wetlands in the reservoir perimeter protection basins.

Regarding habitat values, the Corps Final EIS indicates that the 381 acres of wetlands within the proposed reservoir inundation zone are comprised of approximately 152 acres of forested wetlands, 180 acres of herbaceous wetlands and 49 acres of scrub-shrub wetlands. Review of the administrative record indicates that while the County's proposed wetland creation efforts are generally feasible, there is no information suggesting that the wetland creation effort would produce the existing cover-types or produce them in their current proportions or, therefore, that the created wetlands would exhibit the current range of habitat values. The 33 aforementioned protection basins would be created by constructing impoundments which are approximately five feet high to retain surface water in an attempt to inundate a larger area, thereby providing wetland creation opportunities. In its HEP analysis, FWS concluded that the proposed headwater and reservoir perimeter protection basins would develop into scrub-shrub and herbaceous wetlands, and that because the current seasonal hydrology would be replaced by permanent standing water, the scrub-shrub wetlands would not provide winter foraging habitat as they do now (these wetlands would provide brood rearing habitat for Wood Ducks; this habitat quality is currently provided by the existing wetlands). In addition, EPA notes that the projections for increased salinities downstream as a result of impoundment construction may preclude the establishment of species such as Wild Rice and Arrow Arum which have high food value for waterfowl. EPA concurs with the HEP analysis which concludes that the proposed mitigation (which, for the purposes of the HEP analysis, included the compensatory mitigation but did not include the preservation aspects of the County's plan) is insufficient to compensate for the loss of wetland wildlife habitat values.

2. The Great Blue Heron Rookery

EPA does not concur with the County's conclusion that, on balance, the best opportunity for the long-term survival of the Great Blue Heron rookery in the Ware Creek watershed is offered by construction of the proposed impoundment and implementation of the proposed mitigation plan. The County reached this conclusion by utilizing the Habitat Suitability Index for this species and calculating future scenarios

under the current proposal, the three dam alternative and the no project alternative. In conducting this analysis and reaching this conclusion, the County assumed that the Heron colony would eventually be displaced, with or without the proposed project, and that the County's proposed creation of potential rookery sites, the 100-foot to 200-foot buffer provided by its Reservoir Protection Overlay District (RPOD) as well as the deterrent effect of this buffer and the proposed impoundment on residential development and timbering activities, would provide the most conducive environment for recolonization in the Ware Creek watershed. Information in the administrative record indicates that Great Blue Herons nest in a variety of places and that isolation from disturbance is an important criterion for nest site selection. Although the County intends to avoid the colony during reservoir construction, there would be noise associated with impoundment construction activities as well as subsequent recreational activities on the reservoir, and increasing water elevations within the proposed impoundment would accelerate the loss of the nesting trees. Also, it is uncertain that the County's RPOD buffer would be sufficient to prevent disturbance and subsequent vacation of the rookery as a result of residential development and timbering activities after impoundment construction. In addition, as will be discussed below, there have been numerous projections of the extent of timbering activities and residential development in the Ware Creek watershed. EPA does not believe that the record supports the conclusion that all potential nesting trees will be lost in the absence of the project. EPA concurs with the conclusions of the Corps and FWS that, even with the proposed mitigation, the resettlement of the colony in the watershed is highly uncertain. While EPA agrees that the County's mitigation plan provides potential Heron nesting habitat, we do not agree that project construction, in conjunction with the aforementioned preservation/mitigation elements, represents the optimal scenario for continued Heron nesting in the Ware Creek watershed.

3. Preservation/Enhancement

EPA does not agree that the preservation elements in the County's proposed mitigation plan for the Ware Creek watershed represent substantive environmental gains such that, in conjunction with the aforementioned compensatory elements, they compensate for the anticipated adverse impacts to wildlife. EPA's review of the administrative record indicates that there will be development within the Ware Creek watershed with or without the proposed reservoir. However, EPA does not believe that the administrative record supports the conclusion that in the absence of the proposed reservoir and the County's RPOD, development will occur in a more environmentally damaging fashion.

First, the record is inconclusive with respect to the type of development that would occur in the Ware Creek watershed with or without the proposed impoundment. For example, a report entitled "No Action Plan," August 12, 1986, prepared for Delmarva Properties, Inc., a subsidiary of the Chesapeake Corporation, which owns approximately 40 percent of the watershed, made the following points and conclusions:

that without the proposed reservoir, it is unlikely that the County could justify retaining the RPOD Zone designation; that because there is a fundamental conflict between forestry activities and residential development the Chesapeake Corporation, in the absence of the RPOD, would likely timber its watershed holdings and subsequently sell them in piecemeal fashion; that the probable result of removing the controls imposed by the RPOD would be scattered, uncoordinated development first adjacent to Ware Creek and then within the watershed that would be cumulatively detrimental to the watershed; and, that the evidence shows that the watershed will develop under any scenario with or without one or more reservoirs, principally because all of the land in the watershed is in private ownership. In a subsequent letter dated April 20, 1987, Delmarva Properties advised FWS that: the assumptions in the HEP analysis did not reflect Chesapeake Corporation's intentions for the property over the next 50 years; currently, much of Chesapeake's holdings in the interior of the watershed are designated "special interest property" owing to its greater value for commercial, industrial or residential development; in the absence of the proposed reservoir or in conjunction with the three dam alternative, many of these holdings, which include wetlands, would lose the aforementioned designation (timber harvesting would become a more profitable use of the property) and be timbered and subsequently reforested and/or sold to other potential users; if the reservoir is constructed, only selective cutting would occur on most of the property. Subsequent newspaper articles, however, indicate that the Chesapeake Corporation may have changed its intentions, at least with respect to part of its watershed holdings. These articles, published in March 1989, indicate that Stonehouse, Inc., a subsidiary of the Chesapeake Corporation, is planning to construct a 7,230-acre development to include residential, commercial and industrial facilities. Approximately 4400 acres of this proposed development are located within the Ware Creek watershed. The articles further state that Stonehouse has proposed buffer zones, storm water management ponds and wetland areas to protect the Ware Creek watershed and also proposed to preserve the land and build some small lakes if the reservoir were not built. The aforementioned articles suggest that the Chesapeake Corporation has revised not only its intentions with respect to its activities within the watershed, but also its previous conclusions regarding the relationship between the proposed reservoir and residential development.

James City County has opined that the potential for development and timbering activities to result in significant losses of wetlands and uplands habitat is such that, on balance, less environmental loss will be realized if the County's proposal, with the various habitat creation and preservation elements, is allowed to proceed. In its Great Blue Heron mitigation plan, the County projected that under the no-project and the three dam alternatives scenarios, the loss of forested wetlands and uplands due to residential development and timbering activities would be significant enough to potentially deprive the Herons of future nesting sites. EPA notes that the aforementioned newspaper articles appear to contradict the County's conclusions in this regard. In addition, the HEP analysis also made projections after coordinating with Delmarva Properties, Inc., and the James City County Planning Commission and

predicted that while residential development and timbering activities would result in a decline of upland forested habitat, including some selective cutting in forested wetlands, habitat values associated with this cover type would increase as the stands mature.

Further, EPA does not believe that the record supports the conclusion that there will be less habitat or that this habitat will be of lower quality without the County's RPOD. EPA notes that at the time of this writing, the RPOD is in the process of revision. In addition, in response to the County's legal counsel who advised that the County would consider implementing EPA's recommendations with respect to the RPOD (especially if it would affect the outcome of EPA's 404(c) determination), EPA notes that revisions to the RPOD would not address the totality of the Agency's concerns in this matter. The primary purpose of the County's RPOD, which includes the proposed 2500-acre buffer around James City County's portion of the reservoir, is to provide water quality protection for the proposed reservoir. A package submitted by Virginia's Secretary of Natural Resources states that the RPOD does not restrict residential landscaping to residential edges nor assure good habitat along the reservoir edge. Also, discussions with James City County revealed that while the RPOD would prohibit certain types of development (to the extent that this development would produce runoff which has the potential to contain pollutants which are prohibited by the RPOD), it would not, except for the buffer zone around the proposed reservoir, provide for any more conservation than the zoning which would apply in the absence of the RPOD.

EPA also notes that, if the reservoir is not built, the terrain of the Ware Creek watershed may serve to somewhat constrain the extent of development as well as its encroachment on the aquatic resources of the watershed. As the No Action Plan states, the terrain is a deeply incised flat plateau with 5 percent to 20 percent side slopes draining to Ware Creek. The Plan goes on to state that level areas are confined to wetlands, stream beds and the finger-like ridges which are the residuals of the old plateau and that this terrain imposes very definite restrictions on development. Discussions with FWS as well as observations made during field visits (including the April 28, 1989 visit with representatives of James City County) lead EPA to concur with the statements in the Plan and conclude that the terrain in the Ware Creek watershed will serve to limit the amount of development, as well as its encroachment on and subsequent impacts to the aquatic resources of the watershed. In addition, the aforementioned No Action Plan as well as testimony at EPA's public hearing indicates that James City County has the capacity to be strict and innovative in developing land use controls which suggests that, even without the RPOD, residential development and timbering activities will be conducted in accordance with County controls and will not necessarily occur in a more environmentally destructive fashion. Regarding the RPOD's reservoir buffer, the quality of this buffer as habitat or as a corridor to facilitate wildlife movement would be adversely affected by the topography of the proposed reservoir

banks, the abrupt transition from the aquatic to upland habitat, the juxtaposition of the buffer to remaining/compensatory wetland areas, and the degree of fragmentation of adjacent habitats by residential development and/or timbering activities.

Since the record is inconclusive with respect to the extent and type of development which would occur within the Ware Creek watershed, the relative value of the County's proposed preservation and enhancement of approximately 145 acres of forested wetlands cannot be conclusively determined. EPA notes that these existing wetlands continue to be subject to regulation under Section 404 which applies to almost all of the activities we understand to be planned for this area. EPA also notes that according to the package submitted by Virginia's Secretary of Natural Resources, the forested wetland areas would theoretically be protected by the RPOD (that is, to the extent that they are located within the aforementioned 100-foot to 200-foot buffer). Therefore, the County's offer of preservation may, indeed, add relatively little to the existing level of protection for these wetlands and thus provide little real compensation for the actual, certain loss of wetlands associated with the proposed reservoir project.

As previously mentioned, the County's proposed mitigation plan also contains preservation elements in the Yarmouth Creek watershed and in the Powhatan Creek/Long Hill Swamp watershed. EPA believes that this aspect of the plan would produce environmental results if it preserves areas that would otherwise have become developed. However, EPA reiterates that the wetlands in these parcels continue to be subject to regulation under Section 404. In addition, no mitigation "credit" was given in the HEP analysis for the preservation aspects of the plan around Cranston's Pond because it was concluded that it was unlikely that this area would undergo residential development in the foreseeable future because of the current zoning as well as the lack of public utilities. Also, while the breaching of Cranston's Pond may result in additional wetlands as well as reestablishment of anadromous fish access to and detrital export from this part of the Yarmouth Creek watershed, these aspects of the proposed mitigation plan would not provide replacement habitat for wildlife displaced from the Ware Creek watershed as a result of the proposed impoundment.

V. CONCLUSIONS AND FINDINGS

As outlined previously in this document, for the purposes of this decision, EPA's review of the Ware Creek dam and reservoir proposal was limited to a determination of whether the environmental effects of the proposed project would have unacceptable adverse effects under statutory criteria at Section 404(c). The findings and conclusions in this document are based solely on consideration of the environmental effects of the Ware Creek proposal.

The Section 404(c) regulations define an unacceptable adverse effect as an impact on an aquatic or wetland ecosystem which is likely to result in significant degradation of municipal water supplies or significant loss of or damage to fisheries, shellfishing, or wildlife habitat or recreation areas. While Section 231.2(e) of the Section 404(c) regulations states that the evaluation of the unacceptability of such impacts should consider relevant portions of the Section 404(b)(1) Guidelines, for the purposes of this review, EPA did not consider the availability of less environmentally damaging practicable alternatives to the Ware Creek water supply impoundment as set forth in Section 230.10(a) of the Guidelines.

Based upon the specific review of all relevant documents in the administrative record for the July 10, 1989, Ware Creek Final Determination as supplemented for this decision (as indicated in Section I.D. of this determination), EPA finds that the wetlands and open water aquatic ecosystems within the proposed impoundment area, that area that would be directly affected by the proposed dam, support an uncommon and significant natural aquatic resource. The administrative record further supports the finding that the aquatic ecosystem in this area provides exceptional natural habitat upon which a variety of wildlife species depend for all or part of their life cycle. The administrative record provides clear evidence that the aquatic portions of the Ware Creek system which would be directly affected by the proposed dam and reservoir project provide significant habitat for a multitude of wildlife species which are dependent upon that habitat.

EPA's current review of the administrative record supports the finding that the wetland and open water aquatic ecosystem that would be directly affected by the dam and reservoir project provides excellent habitat for a broad range of both resident and migratory bird species which use the area for feeding, breeding, roosting, or other activities. Additionally, EPA finds that the administrative record supports the finding that the aquatic habitat that would be directly affected by the dam and reservoir provides critical habitat to resident and transient fish, amphibian and aquatic mammal species. In addition, EPA finds that the aquatic habitat that would be directly affected by the dam and reservoir project provides superior food and cover habitat for various non-aquatic species which thrive in the mosaic of wetland and open water habitats.

Reexamination of the administrative record confirms that in addition to the direct loss of wetland and open water aquatic ecosystem resources and associated adverse impacts to wildlife that would result from construction and operation of the proposed dam and reservoir, reduced overall freshwater discharge from the Ware Creek system would substantially alter and adversely affect downstream habitats. Further, this reduction in stream discharge would diminish present detrital and nutrient export processes which help maintain aquatic food-chain mechanisms downstream of the "project area." Based on the administrative record EPA finds that the Ware Creek dam would substantially reduce the output of organic material from the present aquatic ecosystem. Further, EPA finds that withdrawal and consumptive use of waters impounded by the reservoir would substantially decrease the amount of freshwater flowing from the Ware Creek system. Thus, based on a review of the administrative record, EPA finds that construction of the proposed dam and reservoir on Ware Creek would result in the elimination of a wetland and aquatic ecosystem that directly provides significant habitat for aquatic wildlife, including fish, and indirectly contributes to the overall welfare of the aquatic environment of the York River and the Chesapeake Bay.

Based upon the review of the administrative record and upon an independent review of the acceptability of project related effects under Section 404(c), EPA concludes that the direct and significant impact on the Ware Creek wetland and open water aquatic ecosystem that would result from the proposed Ware Creek project would result in a significant loss of and damage to wildlife habitat. EPA concludes that the Ware Creek dam and reservoir project would result in unacceptable adverse effects to wildlife, including fish. EPA concludes that considerations of environmental effects alone of the James City County water supply dam and reservoir, as proposed, justify action under Section 404(c).

Upon reevaluation of the administrative record, EPA finds that the mitigation plan as proposed by James City County does not adequately offset adverse impacts to aquatic resources resulting from project implementation. EPA finds that the post-project reservoir system in conjunction with preservation and compensatory mitigation efforts proposed by the County would not adequately replace or compensate for the loss of or impacts to aquatic resource functions and values associated with the current Ware Creek wetlands and aquatic ecosystem. EPA therefore concludes that the mitigation proposed by James City County does not render the project acceptable under Section 404(c).

Thus, this determination withdraws the specification of the subject waters of the United States as described in the Department of the Army Section 404 permit number 84-0614-06 dated March 1, 1991, and restricts the disposal of dredged or fill material in the subject waters of the United States for the purpose of constructing the James City County water supply dam and reservoir as proposed. Because the Corps of Engineers permit issued under Clean Water Act Sections 404(a) and 404(b) is subject to the Environmental Protection Agency's findings under Clean Water Act Section 404(c), this

determination supersedes and renders ineffective the Corps Section 404 permit issued to James City County on March 1, 1991. This Final Determination does not pertain to other types of filling activities or discharges or to proposed filling activities or other discharges in other waters of the United States associated with Ware Creek. Other proposals involving the discharge of dredged or fill material in the waters of the U.S. at issue will be evaluated on their merits within the Corps of Engineers' Section 404 regulatory program.

Lajuana S. Wilcher

Lajuana S. Wilcher
Assistant Administrator
for Water

3/27/92

Date