FINAL DETERMINATION 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

TABLE OF CONTENTS

I. INTRODUCTION

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. Before making such a determination, the Administrator must consult with the Chief of the Army Corps of Engineers (Corps), the property owner(s), and the applicant where there has been an application for a Section 404 permit. The procedures for implementation of Section 404(c) are set forth in the Code of Federal Regulations, 40 CFR Part 231.

EPA's regulations for implementing Section 404(c) establish procedures to be followed in exercising the Administrator's authority pursuant to that Section. Three major milestones in the process 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 Final Determination 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 that would supply water to James City County residents. Figure 1 shows the location of the proposed project on a regional scale. Figure 2 shows the location of the proposed impoundment relative to James City County.

EPA Region III's Regional Administrator has recommended that EPA prohibit or deny specification or use of described waters of the United States, including wetlands, as a disposal site for dredged or fill material in connection with the construction of any water supply impoundment in the subject area of James City County. Region III's Regional Administrator has based this recommendation upon his finding that the discharge of materials in connection with the above described activities would have an unacceptable adverse effect on wildlife, fishing areas and recreational areas. In addition, the Regional Administrator expressed his belief that several promising environmentally superior, economically feasible alternatives should be more thoroughly investigated.

FIGURE 1. Location of Ware Creek project on a regional scale.

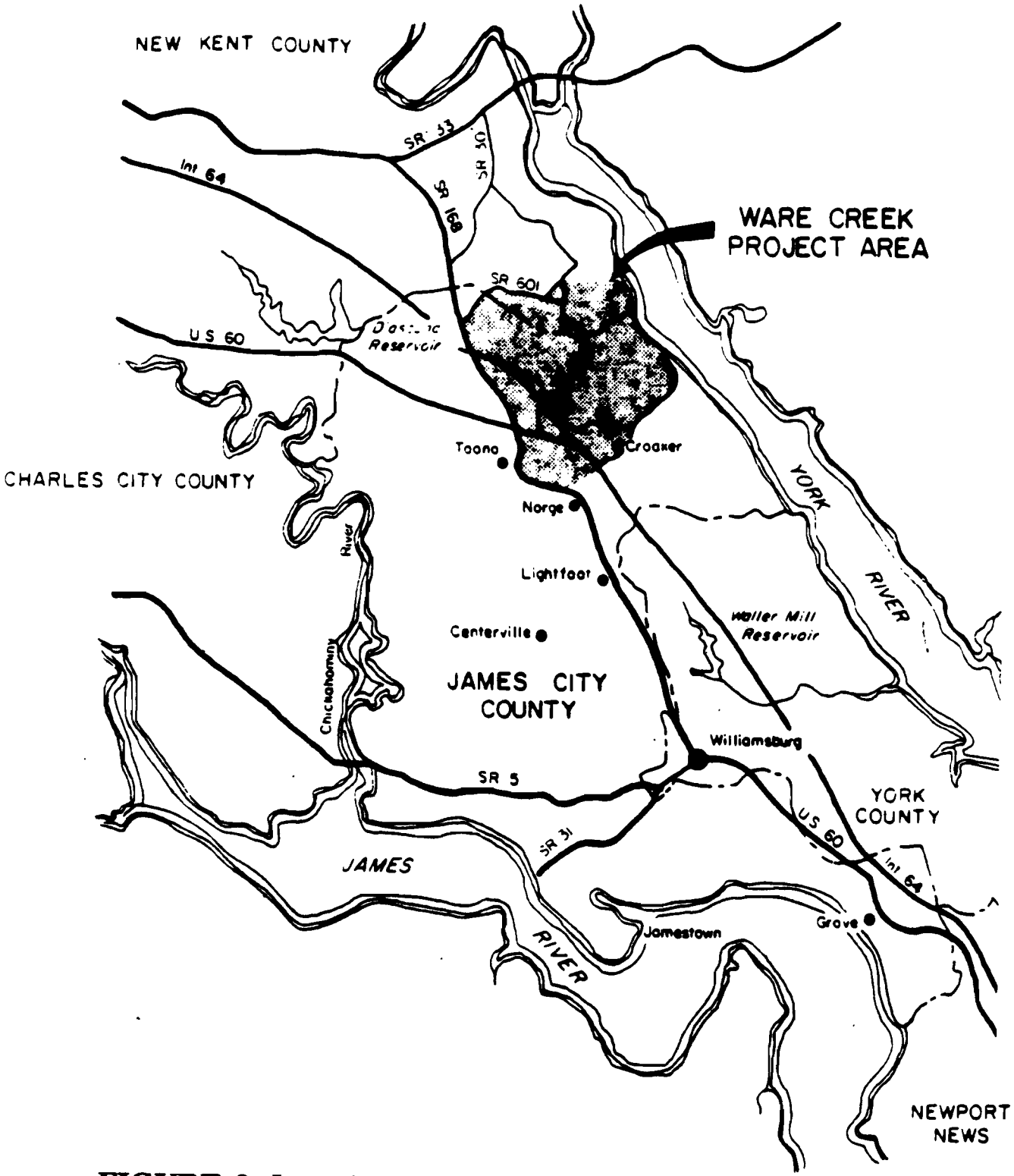

FIGURE 2. Location of Ware Creek project relative to James City County.

This Final Determination is based on consideration of the record developed by EPA and by the Corps in this case, including public comment submitted in response to the Regional Proposed Determination, comment received at the public hearing and comment from other Federal and state agencies. This Final Determination also reflects comment and information received during EPA Headquarters' consultation pursuant to Section 231.6 of the Clean Water Act Section 404(c) regulations.

The administrative record contains references to the need for, and potential use of the proposed Ware Creek impoundment as, a regional water supply for the Lower James River/York River Peninsula.[1] However, the project as proposed is a local water supply for James City County. The analysis in the record regarding project purpose and need, practicable alternatives and their associated environmental impacts, and mitigation is focused on the local water supply project. Any future evaluations of regional water supply proposals would require different environmental analyses which reflect regional environmental circumstances, regional alternatives, appropriate multi-jurisdictional endorsement, and other factors. Therefore, this Final Determination is based solely on an evaluation of the proposed local Ware Creek/James City County water supply project.

The Section 404(c) regulations authorize the prohibition or other restriction of fill at sites where "unacceptable adverse effects on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreation areas" are found to occur. As described in detail below, it is the finding of this Final Determination that the proposed Ware Creek/James City County water supply impoundment would result in the destruction and loss of a diverse wetland habitat that provides substantial and critical ecological support to wildlife in the Ware Creek wetlands system and associated areas. Further, impairment or loss of the functional capacity of the current Ware Creek system would have an adverse impact on downstream aquatic systems including Chesapeake Bay. In addition, there are practicable, less environmentally damaging alternatives that are available to James City County for the purpose of providing a water supply to meet the projected need for the County. Based upon these findings, EPA has determined that the discharge of dredged or fill material in connection with the proposed Ware Creek/James City County local

---

[1] The Lower James River/York River Peninsula is comprised of the Cities of Newport News, Hampton, Poquoson and Williamsburg as well as James City County and York County. This area corresponds to the northside Hampton Roads area or region for which the local, state and Federal regional water supply studies have been conducted.

water supply impoundment would result in unacceptable adverse effects on wildlife[2]. This Final Determination therefore modifies the Regional Recommended Determination and restricts the designation of the subject waters of the United States as discharge sites for dredged or fill material expressly for the purpose of establishing a local water supply for James City County and as such prohibits the placement of fill for that purpose. This Final Determination does not pertain to other types of filling activities or to proposed filling activities in other waters of the United States within the Ware Creek watershed. Other proposals involving the discharge of dredged or fill material on the waters of the United States at issue will be evaluated on their merits within the Corps of Engineers' Section 404 regulatory program.

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

II. PROJECT DESCRIPTION AND BACKGROUND

This Final Determination concerns waters of the United States affected by the local water supply impoundment proposed by James City County, Virginia and activities proposed as mitigation for associated adverse environmental impacts. Review of the Recommended Determination submitted by Region III and the administrative record pertaining to this case indicates that EPA Region III's Recommended Determination accurately reflects background events leading to consideration of the Recommended Determination. The following sections of the Recommended Determination are hereby adopted as part of this Final Determination: Sections III, PROJECT DESCRIPTION (pages 5-6); Section IV, PROJECT HISTORY (pages 6-9); and Section VI.C, MITIGATION (pages 41-42). Below are summary descriptions of the proposed project, mitigation plan and project history based on the Recommended Determination and administrative record, and of EPA Headquarters actions subsequent to the Recommended Determination.

A. PROJECT DESCRIPTION

1. The Water Supply Impoundment

This Section 404(c) action addresses the proposed placement of dredged or fill material in the waters of the United States, as described in the Recommended Determination. James City County, Virginia proposes to discharge dredged and/or fill material into the Ware Creek basin to construct an earthen dam to impound water for a 1,217-acre water supply reservoir. The dam would be constructed on a northwest-southeast axis across Ware Creek approximately 1000 feet downstream from the confluence of Ware Creek and France Swamp (Figures 1 and 3). The proposed reservoir would be located along the border of James City and New Kent Counties. The dam would be 1,450 feet long, 40 feet wide at the crest and 300 feet wide at the base, with a crest elevation of +48 feet mean sea level. The reservoir would have an average depth of 16 feet. Capacity of the reservoir would be 6,355 million gallons at a normal pool elevation of +35 feet mean sea level. The project would provide a safe yield[3] of 9.4 million gallons per day (mgd).

Construction of the impoundment would result in inundation of 425 acres of waters of the United States and 792 acres of primarily forested upland. Of the 425 acres of waters of the United States, 381 are vegetated with scrub-shrub, herbaceous or forested wetland vegetation and the remaining 44 acres are open water less than two meters deep.

---

[3]Safe yield is defined as a water supply sufficient to provide water, without depleting the source, during the drought of record, which in this case occurred in 1980-1981. James City County has advised that it would not impose water use restrictions unless the circumstances exceeded the drought of record.

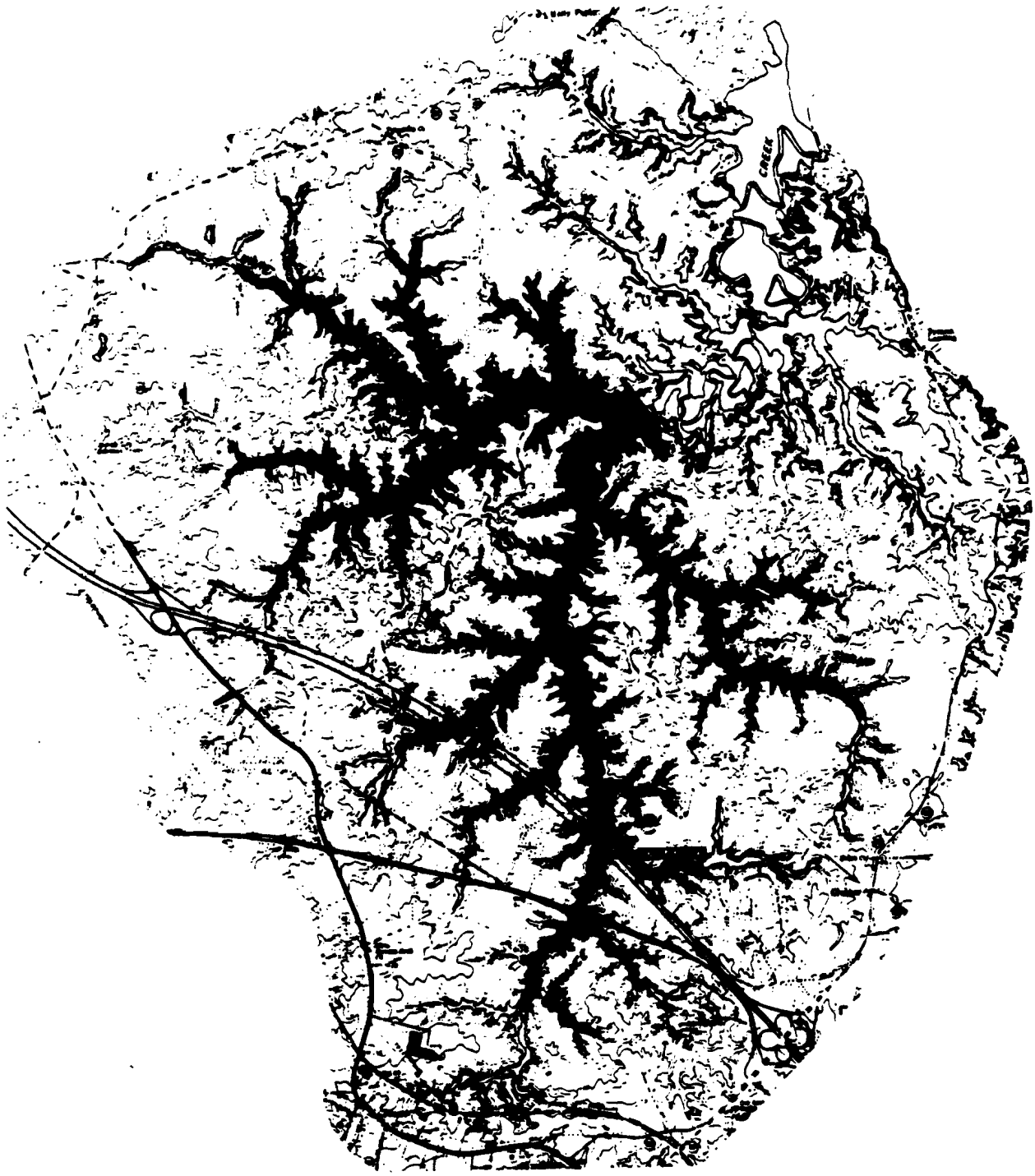

FIGURE 3. Location of Ware Creek project relative to Ware Creek watershed.

2. The Mitigation Plan

James City County proposed plans for mitigating adverse environmental impacts associated with the construction of the proposed water supply impoundment in Ware Creek. As described in the administrative record, the mitigation plan consists of: 1) wetland creation and wetland and upland preservation in the Ware Creek/York River watershed; 2) creation of nesting habitat as mitigation for an existing Great Blue Heron rookery in the Ware Creek watershed; 3) wetland creation and breaching of an existing dam in Yarmouth Creek to reconnect wetlands and reestablish anadromous fish access in the James River watershed; and, 4) extensive preservation of wetlands and uplands in Yarmouth and Powhatan Creeks in the James River watershed. The proposed mitigation plan will be discussed in greater detail in Section V of this Determination.

B. PROJECT HISTORY

As previously stated, review of Region III's Recommended Determination and the administrative record revealed that the Recommended Determination's discussion on project history accurately reflects events leading to consideration of the Regional decision. EPA has raised concerns about environmental impacts of the project since the initial planning stages of the proposed Ware Creek reservoir. In addition, faced with a trend of locally-oriented and uncoordinated proposals for water supply impoundments, all with potentially serious adverse environmental impacts, EPA has also voiced the need for comprehensive water supply projects to address the demand for the Lower Peninsula, in order to minimize adverse impacts to the environment. Indeed, EPA had co-sponsored a symposium with the Corps of Engineers and the Commonwealth of Virginia to address regional water supply solutions. In addition, EPA and the Corps have attempted, albeit unsuccessfully thus far, to convince the Commonwealth of Virginia to take the lead in addressing solutions to the region-wide, inter-jurisdictional water supply problems of the Lower Peninsula. The current institutional framework of the state is such that active state involvement appears to be needed to facilitate the degree of inter-county cooperation necessary to establish a regional water supply solution.

C. EPA HEADQUARTERS ACTIONS

After the close of the public comment period on EPA Region III's Proposed Determination, EPA Region III submitted a Recommended Determination to EPA Headquarters. In the Recommended Determination, dated February 17, 1989, EPA Region III's Regional Administrator recommended that EPA prohibit or deny the specification, or the use for specification, of portions of the Ware Creek floodplain as an area for disposal of dredged or fill material for the purpose of creating an impoundment for water supply. The Recommended Determination was based upon the finding that construction of such an impoundment on Ware Creek would have

unacceptable adverse impacts on wildlife, fishing areas and recreational areas. In addition, the EPA Regional Administrator believed that less environmentally damaging, and economically feasible, alternatives should be more thoroughly investigated. The Recommended Determination was received at EPA Headquarters on February 17, 1989, and the administrative record on March 14, 1989.

EPA subsequently notified by letter representatives of James City County, Mr. John Elmore (Chief of the Operations and Readiness Division, Corps of Engineers), and 65 individuals, businesses or representatives of same who own property located within the project site of their opportunity for consultation. Pursuant to Section 231.6 of the Section 404(c) regulations, the consultation is provided so that the Section 404 permit applicant(s) and the Corps may present information which reflects the intent to take corrective action to prevent unacceptable adverse effects from occurring as a result of the subject activities.

In a letter from Mr. John Elmore dated April 24, 1989, the Corps responded that based on its previous review of the case and the Norfolk District's proposed decision, it did not find any basis for elevating the case for high level review and did not intend to pursue any further action on this case.

Three property owners or representatives thereof also responded to EPA's consultation notification letter. One property owner expressed by telephone her support for EPA Region III's Recommended Determination. Another property owner or representative thereof indicated by telephone her interest in EPA's position in the case. In addition, Chesapeake Corporation, the major property owner of the proposed project site, responded by letter dated April 13, 1989, and indicated its support for the Ware Creek water supply impoundment. Other major issues raised in its letter included: 1) that groundwater should be regarded as a limited component to meet the water supply needs and not as a total solution to the water supply problem; 2) that it intends to develop its property in the Ware Creek basin, with or without the water supply impoundment; 3) that recreational opportunities mentioned in the Recommended Determination have not been accurately described in light of its development plans; and 4) that the "No Project" scenario of the Habitat Evaluation Procedure (HEP) analysis is not consistent with its master plan for development.

Representatives of James City County also responded to the consultation notification by requesting a meeting with the Acting Assistant Administrator for Water. This meeting was held in the morning of April 13, 1989 at the EPA Headquarters Office in Washington, D. C. During the consultation meeting, representatives of James City County did not challenge Region III's conclusions with respect to resource values and adverse environmental effects. However, they did raise four major points. First, they believe that they have exhausted or will exhaust all alternatives (including water conservation measures) and do not see a solution, aside from the Ware Creek

impoundment, to meet the projected water supply needs of James City County and the Lower Peninsula region. In addition, even when faced with a projected water supply deficit, James City County asserted it cannot control growth under current state law. Second, they feel that they have not ignored their natural heritage of valuable wetlands as evidenced by the proposed mitigation plan. They mentioned that benefits of the mitigation plan include preservation of certain valuable wetlands which are being considered for development. Third, the proposed Ware Creek water supply impoundment could be incorporated into a regional water supply system by interconnecting it with the Little Creek reservoir operated by Newport News. However, representatives from James City County also acknowledged that there is no indication that Newport News is willing to pursue this plan with James City County. Fourth, they also repeated the concern they had raised to EPA Region III that EPA's administrative record was incomplete since it did not contain the entire Corps administrative record on the Ware Creek reservoir. In response to this, EPA staff indicated that EPA had reviewed the Corps' files and taken copies of all documents believed to be relevant to the Section 404(c) determination. (The Corps had not compiled an index of documents comprising its record.) EPA stated further that if representatives of James City County believed that EPA had failed to consider documents believed by the County to be relevant, it was incumbent upon the County to identify specific Corps documents that they felt were absent from EPA's record and relevant to EPA's findings. Representatives from James City County indicated that they knew of no such documents at that time. EPA has since obtained and reviewed all outstanding documents from the Corps administrative record.

Subsequent to the consultation meeting, representatives of James City County also forwarded a letter to EPA Headquarters with attached additional written comments which were then included in the administrative record for review. The letter, dated April 18, 1989, reiterated the County representatives' belief that the Recommended Determination: 1) would leave the citizens of James City County without a solution to their legitimate water needs; 2) did not take the County's mitigation proposal into account; and, 3) relies upon conclusions of consultants that the County believes are based upon inappropriate criteria and generic information, and not supported by hard evidence and sound methodologies. The letter attachments included: comments on the technical aspects and conclusions of Region III's Recommended Determination from two consultants on behalf of James City County; a response by the County's Environmental Engineer to the comments regarding water conservation made by the Southern Environmental Law Center; and, a letter by the County's consulting engineer on the regional benefits of an interconnection of the proposed Ware Creek reservoir with the Newport News raw water system. In addition, James City County later submitted a complete evaluation prepared for Newport News of such an interconnection.

Pursuant to Section 231.6 of the Section 404(c) regulations, EPA Headquarters' original deadline for issuing the Final Determination affirming, modifying or rescinding the Recommended Determination was May 15, 1989. However, EPA Headquarters determined that obtaining and reviewing documents from the Corps record required additional time, and that the issues presented by representatives of James City County during consultation warranted additional review of the administrative record for the Section 404 permit decision on the Ware Creek proposal to ensure that all relevant facts were considered. Therefore, pursuant to Section 231.8 of the Section 404(c) regulations, the deadline for the Final Determination was extended to June 16, 1989. Notice of this extension appeared in the Federal Register on May 16, 1989 (54 Fed. Reg. 21125). EPA headquarters subsequently determined that additional time was required to review documents from the Corps record to ensure a thorough examination of all relevant issues, and therefore, extended the deadline for the Final Determination to July 10, 1989. Notice of the second extension appeared in the Federal Register on June 19, 1989 (54 Fed. Reg. 25753).

The Chesapeake Bay Foundation (CBF) and the Southern Environmental Law Center (SELC) also requested a meeting with the Acting Administrator for Water to discuss their concerns over the proposed Ware Creek reservoir. This meeting was held in the afternoon of April 25, 1989 at the EPA Headquarters Office in Washington, D. C. Major points raised by representatives of CBF and SELC included: their support for a Section 404(c) veto of the proposed Ware Creek impoundment; alternatives including desalinization, ground water and conservation measures should be given more consideration, and a combination of different alternatives may serve as an alternative to the Ware Creek impoundment; regional solutions to meet projected water demands are needed, as opposed to individual proposals to meet water supply deficits, to prevent piecemeal loss of wetlands; and, it is SELC's opinion that statutory authority exists that would enable the State Water Control Board to conduct water supply planning to foster regional water supply solutions, in addition to providing water need projections. In addition, subsequent to the meeting, SELC forwarded to EPA Headquarters copies of state statutes pertaining to the State Water Control Board, the Virginia Groundwater Act, and the 1989 Surface Water Management Areas law.

On April 28, 1989, the Acting Assistant Administrator for Water and other EPA staff, accompanied by representatives of James City County, visited various portions of the proposed reservoir site in the Ware Creek watershed, the existing dam in Yarmouth Creek and the Little Creek reservoir operated by Newport News. Prior to the visit, EPA had told representatives of James City County that this was strictly a site visit and not a second opportunity for a Section 404(c) consultation. The County did not raise new factual issues or present new factual claims not previously made.

On May 8, 1989, EPA Administrator William K. Reilly met, at their request, with Senators John Warner and Charles Robb to discuss EPA's recommended Section 404(c)

determination for the Ware Creek water supply impoundment. Other attendees of the meeting included: Mr. John Rayfield of Congressman Herbert Bateman's Office; Secretary John Daniel and Mr. Richard Burton from the Commonwealth of Virginia; representatives from James City County; EPA Acting Assistant Administrator for Water Rebecca Hanmer; Office of Wetlands Protection Director David Davis; and, other EPA staff. A summary of the meeting has been entered into the administrative record. Major points raised by the representatives from James City County included: that the County believes that although "valuable" wetlands would be lost due to construction of the Ware Creek reservoir, they would be compensated for by the mitigation plan; that the County would benefit from the planning associated with the project since it could not preclude development of the project area otherwise; and, that the Ware Creek impoundment could be part of a regional water supply solution, although the County has not reached any agreement with other jurisdictions involved. EPA expressed the need for inter-jurisdictional cooperation in addressing water supply demands and its concern for cumulative loss of wetlands. Representatives from the Commonwealth of Virginia indicated that they support the Section 401 certification issued for the project, and that there are new state laws which recognize the state's role in water supply planning throughout the state but implementation of these laws will take some time.

Substantive issues raised during consultation will be addressed within the context of the discussion and analysis of this case throughout the rest of this document.

III. DESCRIPTION OF PROJECT SITE

This Final Determination concerns waters of the United States affected by the proposed impoundment, known as the Ware Creek/James City County water supply reservoir. Review of the Recommended Determination and the administrative record pertaining to this case confirms that Region III's Recommended Determination accurately reflects environmental descriptions of the proposed project. Section V of the Recommended Determination, NATURAL RESOURCE FUNCTIONS AND VALUES (pages 9-18), is hereby adopted, except to the extent indicated below, as part of this Final Determination. For additional information on the physical and environmental characteristics of the subject site, the administrative record, particularly the Final Environmental Impact Statement prepared by the Corps of Engineers, provides a substantial amount of relevant material. Below is a summary description of the proposed project site based on the Recommended Determination and the administrative record.

Changes to the Recommended Determination:

> The figures for estimated annual primary production in Table 5 of the Recommended Determination and any other references in the text of the Recommended Determination or its Appendices to annual primary production were calculated improperly. Those figures and any other figures derived from the use of Table 4 in the Recommended Determination should be multiplied by the number 0.4047 to correct for this error. This change does not alter relative percent-loss figures presented in the Recommended Determination.
>
> For the purposes of this EPA Section 404(c) Final Determination, EPA does not recognize or use the 10 percent change threshold for determining significance chosen by the consultants utilized by EPA during preparation of the Recommended Determination. Also, EPA does not concur with the percentage change figure for the potential reduction of detrital material exported from the Ware Creek watershed as submitted by ECOLSCIENCES INC Appendix B p.16.

A. SITE DESCRIPTION

1. 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.

2. Vegetation

As previously stated, 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 fresh water 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.

B. WILDLIFE

1. 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.

2. 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

environmental impact statement 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.

a. 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 fresh water 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.

b. 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 *Lepisosteus osseus*
American eel *Anguilla rostrata*
Gizzard shad *Dorosoma cepedianum*
Redfin pickerel *Esox americanus americanus*
Golden shiner *Notemigonus crysoleucas*
Creek chub *Erimyzon oblongus*
White catfish *Ictalurus catus*
Yellow bullhead *Ictalurus natalis*
Brown bullhead *Ictalurus nebulosus*
Pirate perch *Aphredoderus sayanus*
Sheepshead minnow *Cyprinodon variegatus*
Mummichog *Fundulus heteroclitus*
Mosquitofish *Gambusia affinis*
Tidewater silverside *Menidia beryllina*
White perch *Morone americana*
Bluespotted sunfish *Enneacanthus gloriosus*
Pumpkinseed *Lepomis gibbosus*
Orangespotted sunfish *Lepomis humilis*
Bluegill *Lepomis macrochirus*
Largemouth bass *Micropterus salmoides*
Johnny darter[4] *Etheostoma nigrum*
Yellow perch *Perca flavescens*
Spot *Leiostomus xanthurus*

---

[4] Probable misidentification. The Tessellated darter (*Etheostoma olmstedi*) 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* *Ntophthalmus viridescens viridescens*
Spotted salamander *Abystoma maculatum*
Fowler's toad* *Bufo woodhousei fowleri*
Northern cricket frog* *Acris crepitans*
Gray treefrog* *Hyla crysoscelis*
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.

c. 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

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).[5]

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.

---

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

* = observed by USFWS.

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."

d. 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 Whitetail 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 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* *Odatra zibethica*

* = observed by USFWS.

IV. ADVERSE IMPACTS OF PROPOSED PROJECT

This Final Determination concerns waters of the United States affected by the proposed impoundment known as the Ware Creek/James City County water supply reservoir. Review of the Recommended Determination and the administrative record pertaining to this case confirms that Region III's Recommended Determination accurately reflects adverse environmental impacts of the proposed project. Section VI of the Recommended Determination, ADVERSE ENVIRONMENTAL IMPACTS (pages 18-41), is hereby adopted, except to the extent indicated below, as part of this Final Determination. As related above, an extensive examination of project-related impacts to wildlife habitat characteristics is provided in the Habitat Evaluation Procedures found in Appendix A of the Corps Final EIS for the Ware Creek project. Below is a summary, based on the administrative record and the Recommended Determination, of the adverse environmental impacts which would result with implementation of the proposed project.

Changes to the Recommended Determination (in addition to those described on page 13 above):

> The figures for estimated annual primary production in Table 5 of the Recommended Determination and any other references in the text of the Recommended Determination or its Appendices to annual primary production were calculated improperly. Those figures and any other figures derived from the use of Table 4 in the Recommended Determination should be multiplied by the number 0.4047 to correct for this error. This change does not alter relative percent-loss figures presented in the Recommended Determination.
>
> The figure for potential decrease in detrital export on page 28 of the Recommended Determination is not adopted in this Final Determination.

Environmental effects of implementation of the proposed dam and impoundment project would include:

• 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 the removal of a majority of the organic material from the impoundment area;

• the creation of a physical barrier to the naturally occurring passive movement and active migration of fish and other aquatic wildlife;

• the creation of a physical barrier to the influence of brackish and fresh tidal waters above the proposed dam site;

• the profound alteration of the physical and chemical hydrology of the current Ware Creek system including total water discharge volume, discharge timing, Creek water quality, and seasonal discharge of the current freshwater system;

• and, the loss of the area as a basin-exchange site for nutrients which eventually enter downstream estuarine systems of the York River and Chesapeake Bay.

These physical alterations of the present Ware Creek landscapes would result in direct, secondary and cumulative impacts to natural environmental resources and values in the immediate area of the impoundment as well as areas removed from but associated with the project site.

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-anadromous[6] 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.

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.

---

[6] 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.

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 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 Whitetail 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 V 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.

V. 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. Moreover, under the Section 404(b)(1) Guidelines and from the perspective of sound wetlands policy, it would be inappropriate to approve the proposed project based upon the offered mitigation given EPA's finding that there are practicable, less environmentally damaging alternatives to satisfy James City County's projected water supply needs.

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.[7] 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

[7] 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.

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 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 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.

C. DISCUSSION

In conclusion, EPA reiterates that James City County is to be commended for its efforts in formulating the proposed mitigation plan. However, EPA also reiterates the statement in the Recommended Determination that actions to minimize the environmental effects of permit proposals should follow the sequence: avoid, minimize and restore, in decreasing order of preference. As will be discussed later, EPA believes that there are practicable, less environmentally damaging alternatives to satisfy the projected water supply needs of James City County. Therefore, in addition to the concerns expressed above regarding the adequacy of the mitigation plan to compensate for wetlands values which would be lost, EPA believes the mitigation plan to be inappropriate because of the conclusion that the adverse impacts anticipated as a result of the proposed impoundment are unnecessary.

VI. ALTERNATIVES

Review of Region III's Recommended Determination and the administrative record revealed that Region III's discussion and conclusions with respect to alternatives is accurate. Section VII, ALTERNATIVES (pages 43-47) of the Recommended Determination, is hereby adopted as part of this Final Determination. Additional information and discussion is provided below as necessary. EPA reiterates that the Section 404(c) regulations (Section 231.2(e)) provide for EPA to consider the availability of practicable alternatives (Section 230.10(a) of the Guidelines) in reaching its conclusions with respect to the unacceptability of impacts associated with proposed discharges.

A. JAMES CITY COUNTY'S WATER SUPPLY NEEDS

EPA utilized the range of projected water needs contained in the administrative record for the purposes of this Section 404(c) determination. The record reveals that by the year 2030, James City County will require between 16.9 million gallons of water/day (mgd) as projected by the Corps of Engineers and the Virginia State Water Control Board (SWCB), and 18.2 mgd as projected by James City County[8]. These projections are based upon historical water use in four major categories: residential, industrial, commercial and "unaccounted for" water use. Review of the administrative record as well as discussions with the Corps revealed that the discrepancy in these projections is due primarily to James City County's projections of increased residential water use which is based upon more recent data on population growth in the County. The Corps Final EIS on the County's project states that since the County's population had already exceeded the Corps 1990 population projections by 1986, there is reason to believe that the Corps projections may be low. On the other hand, the Corps projections of need for water supply are based primarily upon projections of industrial growth, and James City County's Master Water Plan states that major commercial and industrial customers account for approximately 70 percent of the County's 1985 water

---

[8] The record contains other water need projections for James City County. For example, the Regional Raw Water Study Plan, 1990-2030, March 1989, prepared for the City of Newport News, the City of Williamsburg and York County projected the water demand for James City County to be 19.7/20.1 mgd (with and without conservation, respectively). However, in a letter dated August 18, 1988, James City County stated that it believed its projection of 18.2 mgd to be the most reliable estimate available. The County apparently arrived at this figure after conducting three studies in 1983, in 1986 and in 1987, which projected higher water demands of approximately 18.6 mgd to 18.9 mgd. In addition, the 18.2 mgd projection was included in materials the County submitted at EPA's public hearing on January 18, 1989 and the County has not advised EPA of any revisions to this figure.

demand (water use by Anheuser-Busch (the brewery and Busch Gardens) represents a substantial percentage of this demand). EPA concurs with the Corps Final EIS on the County's proposal that it is not unusual for 50-year projections made by different agencies to differ.

The County has indicated that its current water supplies include available groundwater sources provided by the James City Service Authority (JCSA) totaling 1.6 mgd and existing service from Newport News and Williamsburg totaling 5.4 mgd and .3 mgd respectively, for a total of approximately 7.3 mgd. To address the anticipated need for an additional 9.6 mgd to 10.9 mgd, the County's plans include increasing service from Newport News an additional 2.3 mgd to 7.7 mgd, developing an additional 2.0 mgd of groundwater for a total of 3.6 mgd, and constructing the Ware Creek Reservoir to provide 9.4 mgd. This would provide a total of approximately 20.7 mgd (this figure does not include service from Williamsburg which is scheduled to be terminated in 1999 with JCSA providing service to the affected area). In accordance with a current agreement concerning the Ware Creek reservoir, the adjacent New Kent County is entitled to 30 percent of the proposed reservoir's yield, which would reduce the aforementioned total yield for the County to 17.9 mgd.

B. JAMES RIVER PIPELINE

The Recommended Determination discussed a pipeline from the James River with an intake above Richmond within the context of regionally oriented alternatives. The Corps determined this to be the preferred alternative for the northside Hampton Roads region (which includes James City County) in its water supply EIS for Hampton Roads, Virginia dated December, 1984. The James River pipeline also emerged as a potential alternative to James City County's proposal on Ware Creek. However, the administrative record (specifically the Corps permit decision documents and the James River Pipeline Alternative Analysis prepared by FWS' Gloucester Point Office in conjunction with the Corps EIS on the proposed Ware Creek project) supports the conclusion in the Recommended Determination that minimum in-stream flow requirements of the James River are an aspect of this proposed plan which are currently the subject of an unsettled debate. Indeed, applying the minimum in-stream flows recommended to date by FWS and NMFS would reduce the yield of this alternative from approximately 40 mgd to between 11 mgd and 14 mgd. While this alternative would still provide sufficient water for James City County's purposes under these circumstances, the record indicates that the existing institutional barriers pertaining to the inter-basin transfer of water are such that at this time, a pipeline to the James River may have limited potential as a component of a regional solution, much less as a solution to the County's water supply problems.

C. GROUNDWATER

As the Recommended Determination states, groundwater is currently an important source of drinking and process water for many users in the northside Hampton Roads region. The administrative record contains numerous studies that have been conducted on local, state and Federal levels to determine the feasibility of utilizing groundwater for either local or regional water supplies. Indeed, the analysis of the groundwater available to meet James City County's water supply needs necessarily involves regional as well as local elements.

EPA's review of the administrative record revealed that the potential for utilizing groundwater as an element of a water supply above the currently proposed 3.6 mgd was not considered. In its James Water Supply Plan, the SWCB discusses studies (such as Ground-Water Hydrology of James City County prepared in 1980 by the U.S. Geological Survey) which conclude that an additional 10 mgd of groundwater are available, if obtained with evenly distributed pumping centers, and recommends that the potential benefit of groundwater as a supplemental supply in conjunction with other water sources of the Lower Peninsula be given strong consideration. In its permit decision documents on the Ware Creek proposal, the Corps concluded that James City County's pursuit of the entire 10 mgd would be at the expense of adjacent areas, such as Newport News, which are also investigating potential use of the same groundwater source. The Corps also concluded that this would preclude the available groundwater from being incorporated into a regional water supply plan. EPA's review of the administrative record and EPA's consultation with the County indicated that while state law authorizes the establishment of a Groundwater Management Area within the region as a framework to facilitate regulation of groundwater withdrawal and subsequent use across the various municipal boundaries within the region, and the state is considering establishing such an area, no formal action has been taken to date in this regard. Under this scenario, over-reliance by any municipality, including the County, upon the remaining groundwater resources may result in an undependable water supply as well as deterioration of the water quality of the involved aquifers. The information in the record addressed the potential for and the ramifications of the County's withdrawal of the remaining 10 mgd of groundwater as its sole source to meet its projected water supply needs. There is no information in the record that addresses the potential for the County to withdraw additional quantities of water above the currently proposed 3.6 mgd (but below 9.4 mgd) to meet its future water supply needs.

EPA notes that the record contains information relating to the potential for additional groundwater withdrawals to result in surface water depletion and subsequent wetlands losses. Specifically, the Water Resources Investigations Report 88-4059 by the U.S. Geological Survey reported the results, which included identification of potential areas of increased surface water depletion, of withdrawing additional groundwater under four different scenarios utilizing a digital flow model. James City

County subsequently prepared a report which projected substantial wetlands losses under one of the scenarios which projected the withdrawal of significantly more groundwater than is at issue in this case. EPA is aware of the potential for surface water depletion; however, there is no information in the record that addresses this potential for the withdrawal of between 3.6 and 9.4 mgd.

EPA concludes, therefore, that it has not been demonstrated that groundwater could not provide a larger portion of the projected demand than the 3.6 mgd currently envisioned by the County. Further, it has not been demonstrated that this approach would result in surface water depletion or wetlands losses. The potential for this to occur should be part of any future groundwater investigations.

As with freshwater aquifers, EPA's review of the administrative record revealed that utilizing desalinated groundwater as a component of a water supply was not considered. Aside from using freshwater aquifers, there are several studies in the administrative record which contain analyses of desalinization of brackish groundwater as well as other sources. These include the Corps Water Supply Study for Hampton Roads, which included desalinization of water from the Atlantic Ocean and the Chesapeake Bay as potential alternative water supplies for southside and northside Hampton Roads, respectively, the Corps Final EIS on the Ware Creek proposal which discussed desalinization of groundwater and water from the Chesapeake Bay, and the Final Engineering Report prepared for James City County in October, 1987 which specifically addressed the feasibility of desalinization of groundwater in the County. Generally, the Ware Creek EIS and the aforementioned study prepared on behalf of the County addressed the potential for desalinized groundwater to provide the entire, anticipated yield of the proposed Ware Creek reservoir (9.4 mgd) and concluded that this approach to providing water is energy-intensive, expensive and involves the technical and regulatory problems associated with brine disposal. In addition, these reports generally conclude that the variation in groundwater quality is such that additional site-specific pilot studies would be necessary prior to making conclusions with respect to the applicability of desalinization of brackish groundwater either for local or regional water supplies. For example, the Final Engineering Report prepared for James City County in October, 1987 concluded that reverse osmosis is a technically feasible alternative to the proposed Ware Creek reservoir but emphasized that in the final analysis, the feasibility of a specific project depends entirely on the actual groundwater analysis of the wells developed for the project. In addition, this report recommends the installation of 50 wells spread over an approximate 70-square mile area to provide the anticipated Ware Creek yield and prevent excessive aquifer drawdown as well as impacts to other groundwater users.

While EPA acknowledges that additional studies will be necessary, we also stress that the record contains insufficient information to conclude that desalinization of groundwater is not a potential viable component of a comprehensive water supply

strategy for James City County. The study funded by EPA and completed in 1987 which addressed the feasibility of reverse osmosis in Gloucester County, Virginia, as well as the results of the City of Suffolk's subsequent demonstration project based upon the electrodialysis reversal, are convincing evidence that the treatment of brackish groundwater should receive further investigation as a viable option for meeting at least part of the water supply needs of James City County.

D. THREE DAM ALTERNATIVE

This structural alternative to the Ware Creek proposal would involve the construction of three smaller impoundments in the upper Ware Creek watershed and provide approximately 6.1 mgd of water with correspondingly less environmental impacts. This alternative was discussed in the Corps EIS on the County's proposal and its impacts on wildlife habitat were compared to the County's proposal and the no-project alternative in the FWS' HEP analysis[9]. To summarize, the three dam alternative would result in the loss of less total acreage[10] and less wetlands, and result in less direct loss of wildlife habitat. The Corps Final EIS on the proposed Ware Creek proposal states that this alternative would inundate approximately 275 acres of aquatic systems wetlands (less acreage than the County's proposal) comprised of bottomland hardwood forest, scrub-shrub swamp and open water. The HEP analysis assessed the impacts to habitat values in the following existing cover-types: upland mixed pine-hardwood forest, upland hardwood forest, forested wetland, scrub-shrub wetland, herbaceous wetland, lacustrine (lake) open water, and estuarine open water, and supported the conclusion that construction of this alternative would result in less direct acreage loss for every cover-type predicted to suffer a loss when compared to the County's proposal. The HEP analysis also indicated that the three dam alternative would result in less losses of habitat values in all of the wetland and estuarine open water cover-types. In addition, this alternative would avoid impoundment of the Great Blue Heron rookery and provide larger volumes of freshwater and nutrients to downstream areas, thus reducing impacts to these areas and, ultimately, the Chesapeake

---

[9] The HEP analysis assumes the same mitigation proposal for both the James City County proposal and the three dam alternative. Also, the HEP analysis assumes different baselines for each of these alternatives reflecting different degrees of development and timbering activities associated with each type of impoundment.

[10] The HEP analysis predicts that this alternative will result in a greater loss of habitat values for both the upland hardwood forest and the upland mixed pine-hardwood forest cover-types than the County's proposal. However, this was projected to occur as a result of increased residential development and timbering activities that were predicted to occur in association with this reservoir alignment and not as a direct result of this alternative.

Bay. The Corps Final EIS identifies the creation of silt basins and low water impoundments as well as the "edge" created by the three water supply impoundments themselves as opportunities for mitigation. The HEP analysis conducted by FWS provides information with respect to the wildlife habitat losses anticipated as a result of this alternative which could be incorporated into a more detailed mitigation approach.

EPA concludes, after review of the administrative record and discussions with the Corps Norfolk District, that the three dam alternative would satisfy James City County's projected water needs despite a current agreement which entitles the adjacent New Kent County to 30 percent of the yield of the County's currently proposed reservoir. In its response to the Recommended Determination, James City County's Office of Development Management stated that the Ware Creek reservoir is a joint project with New Kent County which is entitled to receive 30 percent of the reservoir's safe yield, and that New Kent County objected to the smaller impoundments on Ware Creek; in addition, James City County indicated that even if this objection could be overcome, it is likely that 30 percent of the yield of any such project would be allocated to New Kent County, thereby resulting in too small a yield for James City County's purposes. After reviewing the record, EPA has determined that James City County's arrangement with New Kent County --- more specifically, New Kent County's 30 percent entitlement --- has not been consistently factored into the analysis on this project. For example, while the Corps discussed the fact that the three dam alternative would result in insufficient yield when compared to the proposed impoundment in its permit decision documents, it did not mention the New Kent County arrangement as a factor. Discussions with the Corps revealed that it did not consider the 30 percent entitlement a controlling factor in its analysis of James City County's project because current water need projections indicate that New Kent County will not need the water by 2030 and New Kent County does not have the necessary water delivery system in place to utilize the proposed reservoir, nor are there any current plans to construct such a system. Discussions with the Corps also revealed that one of several concerns it had with the three dam alternative was its decreased yield (approximately 6.1 mgd as compared to 9.4 mgd) because it would result in an approximate 3.3 mgd water supply deficit within a regional, as opposed to a James City County, context. It is also noteworthy that the aforementioned study on the feasibility of reverse osmosis that was conducted for James City County addressed a design yield of 9.4 mgd and not 6.6 mgd (9.4 MGD minus the 30 percent entitlement). Presumably, this report could have addressed a design yield of 6.6 mgd, with potentially different conclusions with respect to well size and spacing, since no entitlement to New Kent County would be at issue if water were obtained from this source. EPA also notes that New Kent County is not within the same region as James City County for the purposes of water supply analysis (i.e., is not within the Lower Peninsula region) and reiterates that apparently New Kent County is not projected to need its 30 percent entitlement by the year 2030. Perhaps future negotiations/agreements between James City and New Kent County will reflect these factors. Further, EPA notes that under the three dam alternative the 30 percent

entitlement might apply only to the yield of Dam Site 1, which is the only proposed impoundment which would be located in New Kent County. This would reduce New Kent County's entitlement to approximately one mgd and result in a yield of approximately 5.1 mgd, which, in conjunction with the County's other water supply measures, would provide approximately 16.4 mgd. Further, subtracting the 30 percent entitlement from the entire three dam yield, this alternative would, in conjunction with James City County's currently proposed water supply measures, provide approximately 15.6 mgd which, in conjunction with other approaches (*e.g.*, conservation, additional groundwater withdrawals), is within the range of projected need identified in the record.

In its permit decision documentation the Corps concluded that the three dam alternative would result in 65 percent of the wetlands and vegetated shallows impacts as compared to the County's current proposal but would leave the aforementioned 3.3 mgd water supply deficit for the Lower Peninsula region. The Corps also concluded that since no practicable, less environmentally damaging regional alternative solution had been identified, it must be assumed that the additional 3.3 mgd needed to make up the difference between the three dam alternative and James City County's proposal would come from a more environmentally damaging source. A review of the record reveals, however, that, from a James City County perspective, the yield anticipated from the three dam alternative of approximately 6.1 mgd, in combination with the County's other currently proposed water supply elements, would provide approximately 17.4 mgd which is within the range of projected need identified in the record. As previously stated, there is no information in the administrative record that indicates that additional approaches, such as conservation or groundwater withdrawals, could not be used to meet James City County's needs for water, even without New Kent County's 30 percent entitlement, if necessary.

E. WATER USE AND CONSERVATION

EPA notes preliminarily that the record reflects that James City County cannot unilaterally, without assistance from the state government, decrease the projected water supply demand by restricting or limiting water hookups. The Corps Final EIS cites case law restricting a municipality's legal ability to pursue this course of action. Because the Commonwealth of Virginia adheres to a legal interpretation of the state Constitution, known as the Dillon Rule, municipalities such as James City County cannot adopt and enforce local ordinances not already provided for by state law. This aspect of Virginia state law and its ramifications with respect to the case at issue were reiterated at EPA's public hearing and by James City County representatives during consultation.

EPA's review of the administrative record has revealed that while conservation is an important element of water supply planning for James City County, the record is inconclusive as to how much water could be saved through conservation efforts. James

City County has adopted the Virginia Uniform Statewide Building Code, which has required the installation of water-saving plumbing fixtures in new construction since 1982 and the JCSA has issued Regulations Governing Utility Service which establish standards for flow rates for fixtures, public lavatories and car washes. James City County factored a 13 percent conservation saving into its projected needs based upon its conclusion that over 60 percent of the housing stock which existed prior to 1982 would retrofit older plumbing fixtures at a rate of approximately 1 percent per year until 2030.

Disagreements as to how much water could be conserved in this manner (and how much conservation should be incorporated into the County's water demand projections) stems from differing assumptions concerning how these devices would be used (*e.g.*, whether more efficient toilets would be flushed once or twice) and the rate at which older fixtures would be replaced with more water efficient ones. SELC for example, asserts that the Corps, in its conservation savings estimate of 6 percent for the Lower Peninsula in the Hampton Roads Water Supply Study, inappropriately concluded that water efficient toilets would have to be flushed more often and that persons with flow-restricted shower-heads would take longer showers. SELC argues that 20 percent savings would be realized if these unsupported conclusions were removed.

There is also disagreement in the record regarding the degree of potential for conservation savings for industry. The Corps and the SWCB assumed a 5 percent increase in industrial water efficiency (which, presumably, was incorporated into their respective water demand projections) and SELC, in drawing comparisons to industrial energy conservation accomplishments in the 1970s and 1980s, concluded this projected increase could be as high as 20 percent.

Regarding water supply design, James City County's proposed impoundment is projected to satisfy the County's projected water supply needs for the duration of the drought of record (in this case, that which occurred in 1980-1981). SELC and CBF have argued that drought period restrictions should be incorporated into James City County's water demand projections. SELC has stated that incorporating drought period restrictions for one out of every 20 years into water demand projections would lower the projected deficit for the Lower Peninsula by approximately six mgd.

There is insufficient data in the record to enable EPA to resolve the aforementioned discrepancies regarding potential water conservation savings resulting from the installation and utilization of water saving plumbing fixtures. Potential increases in industrial water efficiency could have a significant effect on future water demand, especially if it reaches the 20 percent figure projected by SELC, since commercial-industrial use is the major portion of the County's current water demand. JCSA adopted a resolution on May 1, 1989 which increased the retail service rate for water service and imposed a summer conservation surcharge. This encourages

conservation more than a declining or constant rate structure would. This new resolution also, presumably, will result in additional reductions in future water demands. However, the effect of these measures cannot be quantified at this time.

As may be seen from the previous discussion, conservation measures have been incorporated into water demand projections and the record reflects there may be additional opportunities to reduce this demand even further by additional conservation measures. EPA encourages the evaluation and consideration of conservation, including the incorporation of drought period restrictions, to lower projected demands, as an alternative to more environmentally damaging water supply components.

F. DISCUSSION

The previous discussion concentrated upon alternative water supply solutions that emerged through the Corps' regulatory permit process and is by no means inclusive. As previously stated, the water supply needs of this area of Virginia have been studied extensively and independently at the local, state and Federal levels and numerous alternatives, regional as well as specific to James City County, have been identified. However, the decision at hand includes a determination as to whether there is a practicable, less environmentally damaging alternative, or combination of alternatives, to supply James City County with sufficient water supply to meet its projected needs. EPA believes that the administrative record supports a finding that there are such alternatives.

EPA continues to believe that conventional and unconventional treatment of groundwater may be a viable option for James City County and that, given the anticipated environmental significance of impoundments in the Ware Creek watershed, additional consideration of these alternatives is warranted. EPA recognizes that the groundwater and desalinization alternatives (as well as the James River pipeline alternative) have regional implications; that is, they are potential components of a comprehensive water supply for the Lower Peninsula region and their implementation involves inter-jurisdictional implications. The County's and the Corps' analyses of the potential use of groundwater and/or desalinization inappropriately focused on each of these alternatives' potential alone to provide the entire anticipated Ware Creek reservoir yield rather than a portion of the total yield. Thus, the analyses exclude the possibility of combining elements of several alternatives to obtain the desired yield.

EPA reiterates the point in the Recommended Determination that the SWCB's establishment of a Groundwater Management Area, pursuant to the Virginia Groundwater Act of 1973, would be very helpful in conjunction with this effort by regulating and protecting the involved aquifers for the benefit of James City County as well as the rest of the region. It should be noted, however, that if, in conjunction with the establishment of such an area, the state does not allow the withdrawal of

groundwater for municipal water supply, as asserted by one official during the aforementioned meeting on May 8 with the Administrator, this would limit this alternative's potential as a component of a water supply to whatever quantities those circumstances allowed. EPA reiterates the Recommended Determination's view that if further evaluation reveals groundwater to be impracticable, then the three dam alternative, with appropriate mitigation, should receive additional consideration.

As has been previously mentioned, the issue of local versus regional water supply problems and potential solutions pervades this case. Since the early 1980s, EPA and the Corps have attempted, unsuccessfully, to convince the Commonwealth of Virginia to take a more active role in facilitating a regional approach to the water supply problems of the Lower Peninsula area. James City County has also been active in this regard. EPA has continued to state its preference throughout the Corps regulatory permit process for an analytical approach that would identify the water supply needs throughout the Lower Peninsula region and the most environmentally sound alternatives (whether small-scale or large-scale) that are practicably available to address the regional needs. In response, James City County has proposed that its Ware Creek proposal has potential for regional application. For example, the County has proposed that the surplus from the reservoir could be made available for regional use until the full need in James City County is realized. During consultation, the County proposed that connecting the Ware Creek reservoir to Newport News' Little Creek reservoir could double the Ware Creek yield to approximately 20 mgd which, when combined with the regional water conservation savings of approximately 17 mgd calculated by SELC, had the potential to address the 40 mgd need projected for the Lower Peninsula. The County subsequently submitted a report to support its view. In its permit decision documents, the Corps stated that connecting the proposed Ware Creek impoundment to the overall Lower Peninsula water supply could have a synergistic, as opposed to merely an additive, effect on the regional safe yield since more water could be stored and subsequently used in a more efficient manner. However, James City County and its neighboring jurisdictions have not mutually agreed on the creation of a regional approach, nor have they conducted an analysis that shows Ware Creek to be a necessary component of such a regional approach. Indeed, such an approach may not include a Ware Creek reservoir.

Throughout, the administrative record reflects a failure to assess practicable alternatives composed of multiple sources. EPA believes that the record does not support a finding that less environmentally damaging alternatives to the proposal do not exist. In fact, EPA believes that the record demonstrates that certain practicable alternatives are available, and that others may prove to be available, to meet the needs of James City County by themselves or in combination.

VII. CONCLUSIONS AND FINDINGS

This Final Determination under Section 404(c) of the Clean Water Act addresses unacceptable adverse effects to wildlife. 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. 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.

Review of the Recommended Determination and the administrative record supports the conclusion that the Ware Creek system in the proposed impoundment area and downstream of the proposed dam is comprised of a mix of diverse, productive vegetated wetland types and that the juxtaposition of these wetlands communities both to each other and to adjacent open water provides exceptional natural habitat upon which a variety of wildlife species depend for all or part of their life cycle. The complex mosaic of wetland, upland and open water systems which would be adversely impacted by the proposed project supports habitat for a multitude of terrestrial and aquatic species. The area supports favorable breeding, nesting, foraging and resting habitat used seasonally by migratory bird species, including a significant population of Great Blue Heron which utilizes a rookery within the proposed inundation area and a concentration of Black Duck which depend upon the Ware Creek wetlands for critical nesting, foraging and wintering habitat. The Black Duck has experienced serious population declines on a National and regional scale due to habitat loss. The administrative record also indicates that the area of the proposed impoundment supports aquatic breeding and nursery habitat utilized by migratory wildlife, including the semi-anadromous White Perch and other species important to commercial and recreational fisheries. The administrative record also indicates that the current Ware Creek system provides suitable seasonal spawning habitat for anadromous fish species. In addition to seasonal use of the subject area by migratory wildlife, the Ware Creek wetlands provide habitat for resident populations of birds, such as the Wood Duck, and mammals, such as Whitetail Deer, which thrive in the rich and varied watershed habitat, as well as aquatic mammals and amphibians which depend upon the blend of vegetated communities and associated aquatic systems. Various mammals, such as the Muskrat and River Otter, depend upon the vegetated aquatic communities of Ware Creek for a majority of their life-cycle.

In addition to direct loss of habitat associated with implementation and operation of the proposed impoundment, the administrative record confirms that the project would alter freshwater flow out of the Ware Creek system and would thereby adversely impact normal energy export processes which provide support for wildlife food-chain mechanisms downstream of the proposed impoundment. The administrative record

indicates that not only would placement of the dam obstruct the flow of organic material through the present system, but also withdrawal of water from the reservoir would substantially decrease both the amount of freshwater leaving the system and the amount of organic material transported from the system.

Review of the Recommended Determination and the administrative record for this case demonstrates that the relatively undisturbed vegetated wetlands and open water in the Ware Creek system which would be affected by the proposed project provide important wildlife habitat from a site-specific and regional standpoint, and contribute to the overall environmental integrity of the York River estuary and Chesapeake Bay. The administrative record corroborates the judgment that elimination of vegetated wetlands and shallow water from the project site would adversely affect a substantial component of the wildlife populations currently utilizing the site and that implementation and operation of the proposed water supply reservoir would result in adverse secondary and cumulative effects to wildlife which currently utilize habitat associated with wetlands in the proposed project site. EPA concludes that the environmental losses and indirect environmental impacts associated with the proposed Ware Creek project would be profound and contrary to the goals of Section 404 of the Clean Water Act.

EPA also concludes that the proposed mitigation plan, although ambitious, would not compensate for the anticipated losses and disagrees with the County's opinion that, on balance, project construction, along with its proposed mitigation, would result in net environmental gains. Inundation of the Ware Creek system would result in the direct loss of less mobile wildlife species and displace more mobile individuals thus inducing stress to surviving individuals by forcing them to compete for food, habitat and other life requirements. This stress would be induced to all species but has the potential to result in the most serious adverse impacts to Great Blue Herons, Black Ducks and larger animals such as Whitetail Deer. The proposed compensatory wetlands creation aspect of the County's mitigation plan would not adequately replace either the acreage of wetlands or the range of wildlife habitat values that would be lost as a result of the proposed project. In addition, EPA believes that the Ware Creek watershed will be developed with or without the proposed reservoir and that the record does not support projections as to the location or the extent of the development or the conclusion that this anticipated development would be accomplished in a less environmentally damaging manner due to the County's RPOD. In addition, while the RPOD will preserve approximately 2500 acres of, this acreage will exist only as a 100-foot to 200-foot buffer zone around the proposed reservoir and will be limited in its wildlife support capabilities. While the proposed reservoir would greatly expand lacustrine habitat, it would do so at the expense of the existing more biologically productive adjacent wetlands as well as uplands and their respective habitat values. The proposed creation and/or preservation of wetlands and the preservation of uplands would not compensate for these losses. EPA also does not concur with the County's conclusion

that, on balance, the best opportunity for the survival of the Great Blue Heron rookery in the Ware Creek watershed is offered by project construction with the proposed mitigation. Project construction would accelerate the loss of nesting trees, and resettlement of the colony in the watershed as provided for in the proposed mitigation is, at best, uncertain. EPA reiterates that the record does not support the conclusion that there would be less noise and, therefore, less disturbance of the colony, or more available nesting trees in the Ware Creek watershed with the RPOD and the proposed reservoir.

The preservation elements of the County's mitigation proposal in Yarmouth Creek and in Powhatan Creek may provide environmental benefits to the extent that they protect areas that would otherwise be developed, and the breaching of Cranston's Pond may result in additional wetlands as well as reconnection of existing wetlands and reestablishment of anadromous fish access to and detrital export from this area. However, even if these benefits materialize (and some are highly uncertain, as discussed previously) this aspect of the proposed mitigation plan would not provide habitat for much of the wildlife displaced as a result of the proposed project. Moreover, under the Section 404(b)(1) Guidelines, the proposed mitigation does not justify approving the project, because there are practicable, less environmentally damaging alternatives to satisfy the projected water supply needs of James City County.

In its permit decision documents, the Corps stated that years of intensive study have not identified a practicable, less environmentally damaging regional alternative than Ware Creek and that it appears likely that both Ware Creek and groundwater will be needed to meet the Lower Peninsula region's water supply needs. Clearly, the Corps applied regional considerations in its evaluation of the availability of practicable alternatives to the Ware Creek proposal as a local water supply project and factored in its concern that a reservoir on Ware Creek is a necessary component of a regional water supply. However, as noted by the Corps and James City County, within the current institutional framework, the County does not have the authority to effect a regional water supply plan. Nor have institutional arrangements with the state and neighboring local jurisdictions been made to even propose such a plan. Therefore, although EPA recognizes the need for a regional water supply solution, EPA must necessarily constrain its review of this case, as well as its findings with respect to unacceptable effects, to the local project and associated purposes presented and analyzed by James City County. While connecting a reservoir in James City County with Newport News' system makes it more "regional in character," it still is not in itself a solution for the Lower Peninsula region. The potential of James City County's current proposal as a solution (or component of same) to the projected water supply needs of the Lower Peninsula region must be considered within a regional analysis of regional water supply demands, potential alternatives, environmental impacts and mitigation opportunities. In addition, this analysis must be accomplished with the full support of all involved municipalities and responsible state and local agencies. Indeed,

information in the record indicates that some of James City County's potential partners in a regional approach may not regard Ware Creek as a necessary component of a regional water supply. Formulating and developing regional alternatives at this time for which institutional barriers exist which have the potential to retard or prohibit their implementation and for which no regional concurrence has emerged is inefficient, not in the best interest of the Lower Peninsula, and simply too speculative to rely upon as a basis for the destruction of wetland communities that currently provide exceptional habitat for diverse species of wildlife. As previously mentioned, EPA, as well as the Corps, has attempted to convince the Commonwealth of Virginia to take a leadership role in this matter. To date, this has not occurred. The record reveals that there are practicable alternatives available to James City County to provide sufficient water to meet its local projected water supply needs at less environmental cost than the Ware Creek proposal. EPA concludes from the record that construction of the Ware Creek proposal for local purposes would result in profound and avoidable adverse impacts to wildlife as well as other environmental factors.

Review of the Recommended Determination and the administrative record confirms that construction of the proposed reservoir in Ware Creek would result in the loss of an area that, from a site-specific and regional standpoint, provides important wildlife habitat as well as environmental contributions to the York River and the Chesapeake Bay. The project would result in a severe direct and cumulative loss of wildlife habitat and would result in serious impacts to and/or losses of involved wildlife species. In addition, the record reveals that there are practicable, less environmentally damaging alternatives that are available to James City County that would provide sufficient water supplies for its projected local needs. EPA therefore concludes that construction of the proposed Ware Creek impoundment would result in unacceptable adverse effects to wildlife. This Final Determination modifies the Regional Recommended Determination and restricts the designation of the subject waters of the United States as a discharge site for dredged or fill material. EPA's Section 404(c) action is based upon the adverse impacts associated with James City County's construction of a dam and reservoir for its local water supply and as such prohibits the placement of fill for that purpose. This Final Determination does not pertain to other types of filling activities or to proposed filling activities in other waters of the United States within the Ware Creek watershed. 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.

Rebecca W. Hanmer — 10 July 1989

Rebecca W. Hanmer
Acting Assistant Administrator
for Water

Date