DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, MOBILE DISTRICT
P.O. BOX 2288 MOBILE, AL 36628-0001

CESAM-PD-EI **August 09, 2021**

**U.S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT**

NOTICE OF AVAILABILITY FOR THE

RELEASE OF TRIPLOID GRASS CARP FOR AQUATIC PLANT MANAGEMENT WALTER F. GEORGE LAKE

ALABAMA AND GEORGIA

TO ALL INTERESTED PARTIES:

The U.S. Army Corps of Engineers (USACE), Mobile District requests your review and comment on the proposed Release of Triploid Grass Carp for Aquatic Plant Management, Walter F. George Lake, Alabama and Georgia. A copy of the draft environmental assessment is located on the following website: https://www.sam.usace.army.mil/Missions/Planning-Environmental/Environmental-Assessments/. The document is being circulated to resource agencies and interested members of the public for a 30-day comment period.

The proposed action consists of four components: 1) Continue release of maximum allowed triploid grass carp density of 15 fish per vegetative acre; 2) Continue chemical treatments at minimal levels for areas that triploid grass carp are present, and for areas that have unpalatable invasive aquatic plants; 3) Mechanical manipulation as a means to quickly reduce biomass; and 4) Assist and encourage establishment of native aquatic plants through continued relocation and transplanting. Coordination with the U.S. Fish and Wildlife Service and the Alabama State Historic Preservation Officer is ongoing.

Correspondence concerning this draft Environmental Assessment should be directed via email to Ms. Velma Diaz at velma.f.diaz@usace.army.mil or via mail to U.S. Army Corps of Engineers, Mobile District, CESAM-PD-EI, Attention: Ms. Velma Diaz, Post Office 2288, Mobile, Alabama 36628. Comments must be received within 30 days of date of this notice.

Jeremy M LaDart
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Date: 2021.08.16 13:37:32 -05'00'

Jeremy M. LaDart
Chief, Planning and Environmental Division

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, MOBILE DISTRICT
P.O. BOX 2288
MOBILE, AL 36628-0001

FINDING OF NO SIGNIFICANT IMPACT FOR ENVIRONMENTAL ASSESSMENT TRIPLOID GRASS CARP FOR AQUATIC PLANT MANAGEMENT WALTER F. GEORGE LAKE ALABAMA AND GEORGIA

1. PROPOSED ACTION. The proposed action is to reduce the acreage of invasive aquatic plants predominately hydrilla (*Hydrilla verticillate*) within Walter F. George Lake. The proposed action consists of four components: 1) Continue release of maximum allowed triploid grass carp density of 15 fish per vegetative acre; 2) Continue chemical treatments at minimal levels for areas that triploid grass carp are present, and for areas that have unpalatable invasive aquatic plants; 3) Mechanical manipulation as a means to quickly reduce biomass; and 4) Assist and encourage establishment of native aquatic plants through continued relocation and transplanting. The following describes the characteristics of each of the proposed action components.

Increase Maximum Allowed Triploid Grass Carp Density. The first component of the proposed action action continues to release the maximum stocking rate of 15 fish per vegetated acre.

To assure that an effective age-class population of grass carp would remain in the lake, it is assumed that up to 4 fish per hydrilla vegetated acre would be stocked every 3 to 5 years for maintenance control to maintain the existing 15 fish per hydrilla vegetative acre. Using the same 1,120 acre area representing 40% plant density for hydrilla infested area considered to determine the initial stocking quantities, a total of 3,500 fish would be restocked at 3 to 5-year intervals for maintenance control. The actual maintenance stocking density would be based upon prevailing hydrilla growth occurring at the time of release.

Chemical Treatment. The second component of the proposed action consists of applying herbicides at the high priority areas on the lake that primarily involve USACE operation areas, designated recreational areas, Congressionally authorized navigation channel, marked mall boat channels, and recreation boat ramps. This component of the plan would treat 329 acres once a year.

Chemical treatments would be conducted only to augment the beneficial effects of grass carp in reducing hydrilla.

Mechanical Manipulation. The third component of the proposed action would use a variety of equipment to physically remove or reduce the impact of aquatic plants. Mechanical manipulation of aquatic plants typically involves cutting, pulling, or shredding the aquatic plants at or below the surface of the water. Harvesters cut or pull the aquatic plants and load on a conveyor to onboard storage which is then off-loaded on shore for disposal. Cutters use sickle-bar blades to cut the aquatic plants, but require a separate rake vessel to collect the cut biomass. Shredders cut the aquatic plants into small pieces which are not collected and are left to disperse with current.

Establish Native Submersed Aquatic Plants. The fourth component of the proposed action would involve encouraging native aquatic plants to become established in areas of the lake having depths less than 10 feet. This would be accomplished principally by controlling the spread of hydrilla so that more desirable native submersed aquatic plants have an increased opportunity to colonize areas of the lake in the absence of competition from the considerably more aggressive hydrilla and other non-native invasive plant species.

Opportunities will be pursued when available to promote the establishment of plants through plantings, transplanting, and assisting the research of others. Costs associated with this effort are expected to vary and gradually decline as more native plants are established providing stock for future plantings.

2. <u>ALTERNATIVES</u>.

a. <u>No Action Alternative</u>: With the No Action Alternative, there would be no change to current conditions at Walter F. George Lake. The stocking rate of 12 grass carp per hydrilla acre would remain the same. Chemical treatment of the invasive aquatic vegetation would continue at minimal levels. Transplanting native submersed aquatic plants would continue but the long-term success may be in jeopardy. This action would continue with current management which may be unable to keep up with current growth rates which would cut off access to boat traffic, decreasing fisheries habitat and recreational opportunities.

b. <u>Insects As Biological Agents</u>: Several insect species have been identified that feed on hydrilla. A number of these species have been investigated as potential biological control agents. Insects that have received the most attention include the tuber-feeding weevil (*Bagous affinis*), the Australian stem-boring weevil (*Bagous hydrillae*) and the leaf-mining fly (*Hydrellia pakistanae* and *Hydrellia balciunasi*).

c. <u>Confined Release Of Grass Carp</u>: Following an extensive field experiment at Lake Seminole during the mid-1990's, a larger release of triploid (sterile) grass carp (i.e., white amur or *Ctenopharyngodon idella*) was successfully accomplished into confined areas on Lake Seminole following the recommendation contained in the 1998 Hydrilla Action Plan for that lake. Subsequent monitoring indicates that grass carp have been effective in reducing hydrilla within the confined areas. The confined areas involve tributary embayments to the lake that are around 1,000 acres or less in size.

Confined areas were selected for the release of grass carp into Lake Seminole that would allow the fish to be concentrated in high vegetative areas. The grass carp were confined to prevent individual fish from escaping from the lake and migrating into the downstream Apalachicola River and to other locations upstream of the lake. The confining barriers were constructed from fencing materials and equipped with low voltage electronic fish barrier devices to discourage grass carp from exiting through the boat passage openings that were constructed into the barrier fencing. The addition of electric fish barrier component to the physical barriers was required to document unacceptable levels of grass carp escape during demonstration tests in 1995-1996. Due to the cost of the construction materials, sites were selected at constricted locations near the mouths of tributary embayments to minimize the length of the confining barriers and reduce construction costs.

Walter F. George Lake is considerably different from Lake Seminole. First, Walter F. George Lake is a much deeper lake which means that the cost of barrier fencing would be significantly higher. Second, the ratio of the lake's surface area associated with its tributary embayments to the area of open water in the main lake is much smaller than is the case at Lake Seminole. Third, many of the existing hydrilla problem areas on Walter F. George Lake occur within open water portions of the mid to upper reaches of the lake that experience seasonally high flows from the Chattahoochee River. High current conditions could prove to be problematic for the construction of rigid barriers that must be able to withstand river current forces and the debris carried by high flows. This represents an additional consideration that would further contribute to higher construction costs.

To accommodate the above conditions in a workable fashion, the cost of constructing confined enclosures on Walter F. George Lake would be considerable. Also, construction of an electric fish barrier at the lock, hydropower turbine intakes, and dam spillway areas to prevent the downstream movement of grass carp would be extremely cost prohibitive. Due to the depths occurring at these locations, the higher voltages required to discourage fish from passing through and over these structures would pose potential safety issues. Another drawback with the use of electric fish barriers at the spillway and hydropower intakes (areas experiencing high water flows) would be their lack of effectiveness in containing grass carp within the lake, as the flowing water would carry an "stunned" fish downstream into George W. Andrews Lake. In addition, the deeper waters would reduce the effectiveness of the electric fish barriers.

d. Lake Drawdown: The Drawdown Alternative would involve lowering Walter F. George Lake by 10 feet from the normal summer elevation 190 feet to 180 feet. A drawdown of this magnitude would expose all 14,600 acres of the lake bottoms having a depth of less than 10 feet. The lake drawdown would occur at some point during the summer growing season that extends from May through September. The lowered pool level would be maintained for a minimum of 6 weeks to provide sufficient time for the plants occurring on the exposed lake bottoms to be stranded and allowed to die and decompose before water levels would be allowed to return.

e. Mechanical Manipulation. Mechanical manipulation of aquatic plants uses mechanical devices to cut, rip or shred submersed aquatic plants. The cut portions of the plants may be removed from the water and loaded on a work barge for transportation to a central collection area from which the plant matter would be removed from the waterbody, placed on dry land, and allowed to die through drying and decomposition of the organic matter.

Mechanical manipulation provides only short-term control. Most equipment allows the plants to be cut only to depths up to 6 feet. This leaves the roots and lower portions of the plants to remain intact to resume growth following harvesting. Aquatic vegetation like hydrilla can recover relatively quickly to pre-harvest levels within as short a time as 30 days during the warm summer months. Thus, this approach to aquatic plant control can require multiple harvests of an area during a typical growing season.

f. Minimum Chemical Treatment. The Minimum Chemical Treatment Alternative would rely upon the use of chemical herbicides to control submersed aquatic vegetation, allowing the current population of triploid grass carp reduction through attrition. This alternative represents a level of chemical treatment that could be reliably accomplished within the anticipated annual budget amounts received by the Walter F. George Site.

The objective of the Minimum Chemical Treatment Alternative would be limited to preventing aquatic plant infestations from interfering with the use of specific facilities occurring on the lake. Due to the high costs involved, treatment could not be directed at controlling the growth of aquatic plants in the existing large expanses of the lake affected by this plant outside of the priority areas or its continued spread to other areas of the lake.

g. Maximum Chemical Treatment. The Maximum Chemical Treatment Alternative would also depend entirely upon the application of herbicides. This alternative would be directed at treating the entire 2,100 acres of submersed aquatic plants that are projected to cover Walter F. George Lake in 2019. The objective of this alternative would be to prevent the hydrilla coverage from expanding beyond this acreage.

The Maximum Chemical Treatment Alternative would provide a more aggressive level of herbicide treatment program than the No Action Alternative. The 2,100 acres of the lake's surface area projected to be infested in 2020 would be treated at least once each year, with specific areas receiving a second treatment if warranted. The same herbicides used in the No Action and Minimum Chemical Treatment Alternatives would also be used and the same methods employed to apply the chemicals.

h. Flow-assisted Herbicide Delivery System. The Flow-Assisted Herbicide Delivery System Alternative would take advantage of the flow of water through Walter F. George Lake produced by the upstream Chattahoochee River inflows and selected smaller tributaries entering the lake. The use of a contact and systemic mix of herbicides to control hydrilla in medium-flow moving waters have been successfully accomplished in Lake Seminole by the U.S. Army Corps of Engineers (USACE), Mobile District. The effectiveness of this method of chemical treatment utilizes water movement to treat downstream portions of the system during the active half-life of the herbicide. All water passing the injection site is treated at a known concentration of the herbicide for the 5 and 10 days of the treatment. The half-life, and therefore, the effective downstream treatment zone of endothall is dependent upon water temperature. Since the herbicide's half-life is longer in cooler water, more area can be treated downstream of the injection point during cool weather treatments.

i. Release of Triploid Grass Carp Only. Grass carp at a minimum of 10-12 inches in length that have been certified to be triploid (i.e., sterile) would be released into Walter F.

George Lake. This alternative would depend entirely upon the feeding behavior of grass carp to control the hydrilla infestations and would not include the use of any herbicides.

A stocking rate of 20 to 22 fish per hydrilla vegetated acre would be followed, with the lower rate being used if stocking took place during the cooler months of the year and the higher rate being used if stocking occurred in the more unfavorable warmer months when mortality would be expected to be higher. A high stocking rate is included with the “grass carp only” alternative since this alternative does not include other control methods such as herbicides. This stocking density is based upon an examination of the literature and experience gained for other large multipurpose reservoirs in which grass carp have been used to control hydrilla infestations.

3. <u>FACTORS CONSIDERED IN DETERMINING THAT NO ENVIRONMENTAL IMPACT STATEMENT IS REQUIRED</u>. Based on the Environmental Assessment, the proposed action will not significantly affect human health and the environment. The proposed project is in compliance with all applicable environmental laws and regulations.

4. <u>CONCLUSIONS AND FINDINGS</u>. The environmental analysis supports the conclusion that the proposed project will not significantly impact health and the human environment; consequently, an Environmental Impact Statement is not required.

DATE:______________________________ ______________________________

Jeremy J. Chapman, P.E.
Colonel, U.S. Army
District Commander

DRAFT ENVIRONMENTAL ASSESSMENT
FOR
RELEASE OF TRIPLOID GRASS CARP FOR AQUATIC PLANT MANAGEMENT
WALTER F. GEORGE LAKE
ALABAMA AND GEORGIA

Prepared By:

U.S. Army Corps of Engineers, Mobile District
Planning and Environmental Division
Environment and Resources Branch
Inland Environment Team

August 2021

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1.0 INTRODUCTION

The Council on Environmental Quality (CEQ) published its Final Rule: Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA) in the Federal Register July 16, 2020. The new CEQ NEPA Regulations went into effect September 14, 2020. Preparation of this Release of Triploid Grass Carp for Aquatic Plant Management EA, Walter F. George Lake, Alabama and Georgia commenced prior to enactment of the new NEPA regulations. USACE may only apply the prior CEQ NEPA regulations from 1978, as well as relevant Corps regulations and guidance, to such pending reviews. As such, this EA has been prepared in accordance with the NEPA and the CEQ 1978 regulations.

This Environmental Assessment (EA) was prepared utilizing a systematic, interdisciplinary approach integrating the natural and social sciences and the design arts with planning and decision making. The proposed action and its alternatives are evaluated in multiple contexts for short-term and long-term effects and for adverse and beneficial effects. This assessment indicates the effects on the human environment are well known and do not involve unique or unknown risk. It is not anticipated that this is a precedent-setting action, nor does it represent a decision in principle about any future consideration.

1.1 LOCATION

Walter F. George Lake is located on the Chattahoochee River that forms a portion of the southern Alabama-Georgia state line. Although Walter F. George Lake is the official name given to the lake by the U.S. Congress, it is also known as Lake Eufaula in Alabama and is frequently referred to by the latter name in sport fishing circles. Figure 1 contains a map of the lake.

Walter F. George Lake is formed by an earthen dam and lock of the same name. The U.S. Army Corps of Engineers (USACE) completed construction of the project in 1963. At normal summer pool level 190 feet National Geodetic Vertical Datum (NGVD), the lake has a surface area of 45,181 acres. The lake extends 85 miles upstream of the Walter F. George Lock and Dam to Columbus, Georgia and Phenix City, Alabama, where the impounding effects of the lake are no longer observed on the Chattahoochee River. At elevation 190, the lake has a shoreline length of 640 miles.

The Walter F. George Project is a multipurpose project created primarily to aid navigation on the Chattahoochee River and to generate hydroelectric power. Additional benefits include public recreation, regulation of stream flow, and fish and wildlife conservation.

The Walter F. George Project is a component of the Apalachicola-Chattahoochee-Flint navigation system as shown in Figure 2. The system was designed to provide a 9-foot navigation channel on these three rivers from the Gulf Intracoastal Waterway upstream to the head of navigation at Columbus, Georgia, on the Chattahoochee River and to Bainbridge, Georgia, on the Flint River. While sufficient depths are provided for navigation through much of the lower reaches of the lake, dredging is periodically required at selected locations in the lake's narrow upper reaches to provide the authorized 9-foot navigation depth. The elevation of the upper miter sill in the lock chamber is 172 feet NGVD, which means that if the lake levels drop below 181 feet, commercial navigation is no longer possible through the lock upstream into the lake.

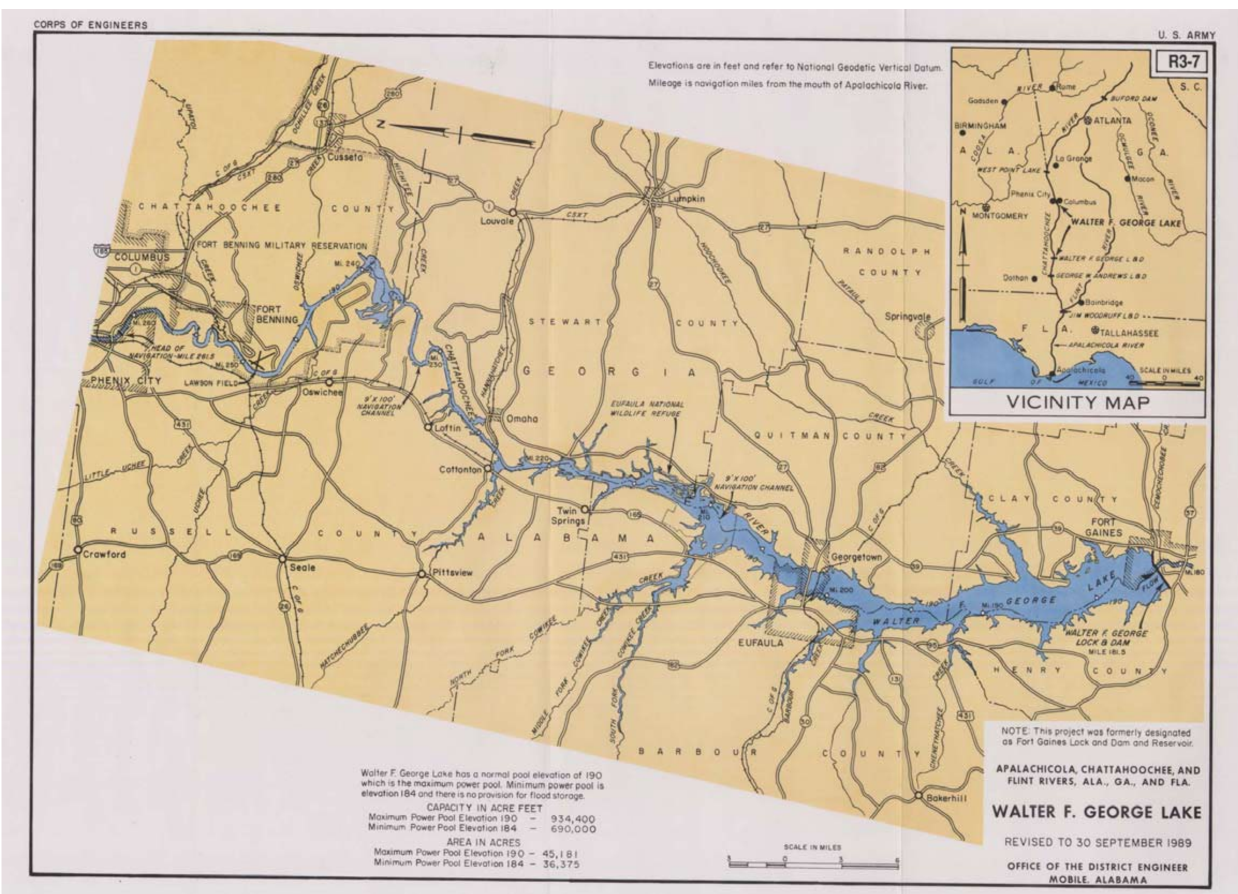

Figure 1: Walter F. George Vicinity Map

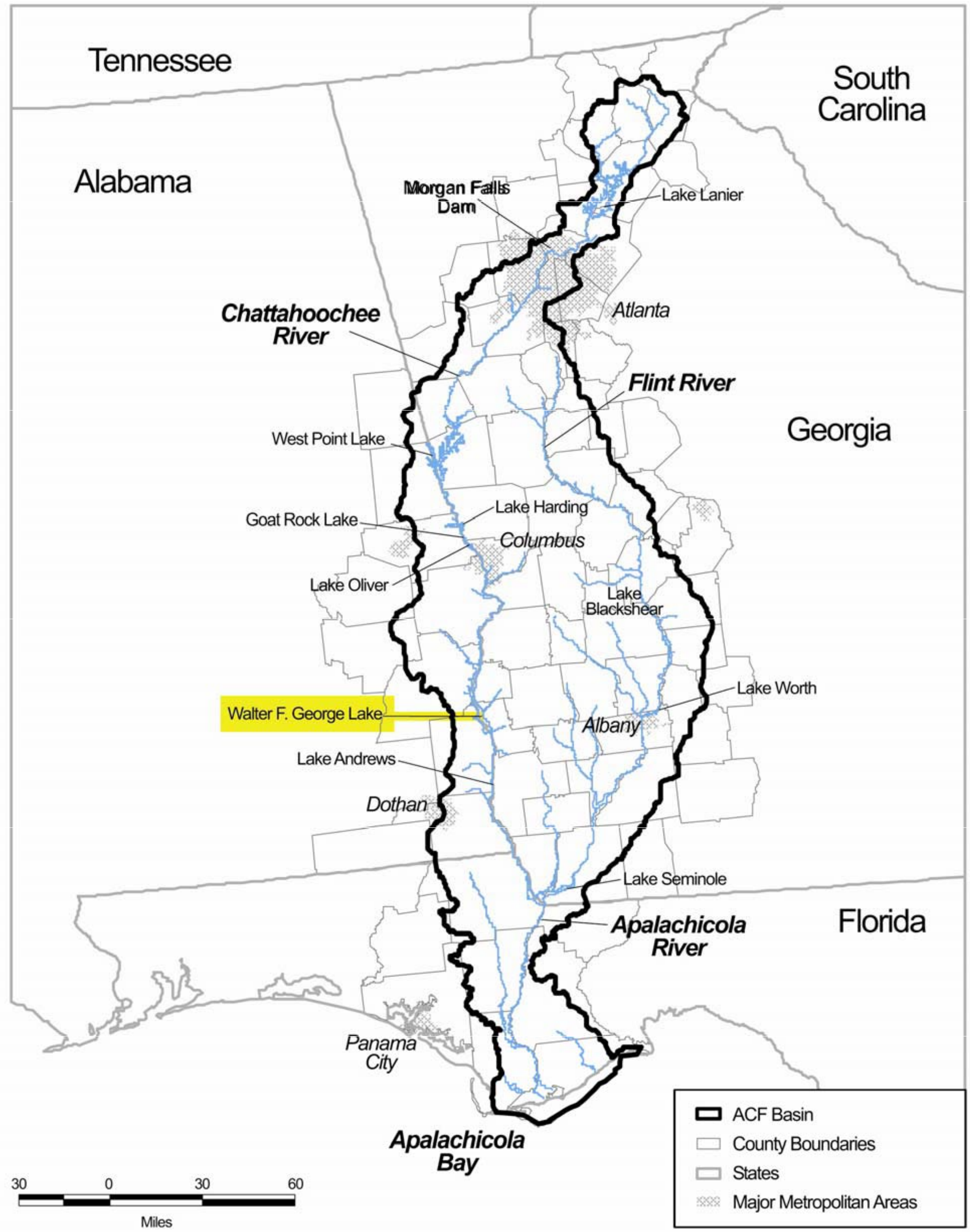

Figure 2: Location of Walter F. George Lake within the Apalachicola, Chattahoochee, and Flint Rivers Basin

1.2 PROPOSED ACTION

The proposed action is to reduce the acreage of invasive aquatic plants predominantly hydrilla (Hydrilla verticillata) within Walter F. George Lake. The proposed action consists of four components:

- Continue release of maximum allowed triploid grass carp density of 15 fish per vegetative acre.
- Continue chemical treatments at minimal levels for areas that triploid grass carp are present, and for areas that have unpalatable invasive aquatic plants.
- Mechanical manipulation as a means to quickly reduce biomass.
- Assist and encourage establishment of native aquatic plants through continued relocation and transplanting.

The following describes the characteristics of each of the proposed action components.

Release of Maximum Allowed Triploid Grass Carp Density. The first component of the proposed action continues to release the maximum stocking rate of 15 fish per vegetated acre.

To assure that an effective age-class population of grass carp would remain in the lake, it is assumed that up to 4 fish per hydrilla vegetated acre would be stocked every 3 to 5 years for maintenance control to maintain the existing 15 fish per hydrilla vegetative acre. Using the same 1,120 acre area representing 40% plant density for hydrilla infested area considered to determine the initial stocking quantities, a total of 3,500 fish would be restocked at 3 to 5-year intervals for maintenance control. The actual maintenance stocking density would be based upon prevailing hydrilla growth occurring at the time of release.

Assuming that maintenance stocking of fish will be required to maintain hydrilla at the desired level of control, a recurring cost of $21,000 would be required every 3 to 5 years. It should be noted that it is likely the maintenance re-stocking costs could increase over time due to inflation and other factors. However, because of the uncertainty associated with those factors, the projected maintenance stocking costs are based on a consistent cost of $6.00/fish.

Chemical Treatment. The second component of the proposed action consists of applying herbicides at the high priority areas on the lake that primarily involve USACE operation areas, designated recreational areas, Congressionally authorized navigation channel, marked mall boat channels, and recreation boat ramps. This component of the plan would treat 329 acres once a year.

Chemical treatments would be conducted only to augment the beneficial effects of grass carp in reducing hydrilla. It is anticipated that during the first five years following release of the fish, approximately $100,000 per year would be expended on herbicides. As the grass carp began to effectively reduce the coverage of hydrilla in the lake, the cost of herbicides is anticipated to decline to around $50,000 during the next five years. Thereafter, it is anticipated that approximately $25,000 may be required each year to continue treating the high priority areas since the level of stocking proposed is not intended to completely eradicate hydrilla from the lake.

Mechanical Manipulation. The third component of the proposed action would use a variety of equipment to physically remove or reduce the impact of aquatic plants. Mechanical manipulation of aquatic plants typically involves cutting, pulling, or shredding the aquatic plants at or below the surface of the water. Harvesters cut or pull the aquatic plants and load on a conveyor to onboard storage which is then off-loaded on shore for disposal. Cutters use sickle-bar blades to cut the aquatic plants, but require a separate rake vessel to collect the cut biomass. Shredders cut the aquatic plants into small pieces which are not collected and are left to disperse with current.

Establish Native Submersed Aquatic Plants. The fourth component of the proposed action would involve encouraging native aquatic plants to become established in areas of the lake having depths less than 10 feet. This would be accomplished principally by controlling the spread of hydrilla so that more desirable native submersed aquatic plants have an increased opportunity to colonize areas of the lake in the absence of competition from the considerably more aggressive hydrilla and other non-native invasive plant species.

Walter F. George Lake has been impounded for 58 years. During that period, desirable aquatic plants have become established in some areas of the lake. However, large portions of the lake having depths sufficient to support submersed aquatic plants are still devoid of native vegetation. A number of factors undoubtedly contribute to the lack of native aquatic plants in much of the lake. Lake fluctuations and the large open expanses of the lake shoreline that are exposed to periodic high wave energy conditions likely contribute to the difficulty of aquatic plant species to become established and thrive in the lower regions of the lake. In addition, flow conditions through the lake and periodic high turbidity levels may at times not be conducive to successful native plant growth. It is also possible that the characteristics of the lake sediments may not be adequate to facilitate the establishment and growth of a diverse native aquatic plant community.

Opportunities will be pursued when available to promote the establishment of plants through plantings, transplanting, and assisting the research of others. Costs associated with this effort are expected to vary and gradually decline as more native plants are established providing stock for future plantings.

For the purposes of this EA, a 30-year period of analysis has been selected to evaluate the alternatives considered to implement the proposed action. The 30-year period was selected based on the potential for hydrilla to expand at a linear rate to eventually cover 14,600 acres (32%) of Walter F. George Lake having depths less than 10 feet over that period of time.

This estimate is believed to be a very conservative projection of the rate of expansion, it is possible that hydrilla could spread at a much faster rate to cover the 14,600 acres. Further, it is also possible for hydrilla to extend to depths of around 20 feet which means that an additional 11,120 acres of the lake (i.e., 25%) having depths ranging between 10 and 20 feet could become infested with hydrilla under a worst-case scenario.

1.3 PURPOSE AND NEED

The purpose of this EA is to evaluate the environmental effects that would result within Walter F. George Lake and contiguous upstream and downstream waterbodies from the release of triploid grass carp (*Ctenopharyngodon idella*) to assist in the management of invasive submersed aquatic plants such as hydrilla (*Hydrilla verticillata*), East Indian hygrophila (*Hygrophila polysperma*), milfoil species (*Myriophyllum spp.*), and parrotsfeather (*Myriophyllum aquaticum*).

The Environmental Impact Statement (EIS) prepared in 1979 for the operation and maintenance of the Walter F. George Project addressed the myriad of operational activities required to maintain the project's various features. Among those activities addressed was the performance of the necessary operational measures to maintain boat ramps and docks, small boat channels, and other facilities required to support recreation demands, including the "…implementation of programs pertaining to the conservation, development and utilization of the project resources for the safe and maximum enjoyment of the public." One of the programs addressed was the control of nuisance aquatic plants.

The 1979 EIS addressed the Walter F. George aquatic plant control program in only a conceptual fashion. That is because the lake did not have a significant problem with invasive aquatic plants at that time, and no problems with any submersed aquatic plants. The combination of chemicals and some biological control measures were effective in controlling the floating and emergent plants that did present localized problems around the lake. The use of the chemical herbicide 2,4-D to control water hyacinth (*Eichhornia crassipes*) and biological agents such as alligatorweed flea beetles (*Agasicles hydrophila*) and alligatorweed stem borer moth (*Vogtia malloi*) to control alligatorweed (*Alternanthera philoxeroides*) were the only specific aquatic plant control measures identified in the EIS.

1.4 AUTHORITY

The River and Harbor Act of 1946 (House Document 300. 80th Congress. First Session) and a resolution adopted in 1953 by the House Committee on Public Works, modified the comprehensive plan for development of the Apalachicola, Chattahoochee and Flint

River basin. Provision was made for the authorization of the “Fort Gaines Project,” a navigation dam and the development of a nine-foot navigation channel to extend upstream on the Chattahoochee River to Columbus, Georgia. This project was officially designated as the Walter F. George Lock and Dam by Public Law 85-363, approved in 1958. The impoundment of the lake began in November of 1962 and was brought up in stages, reaching its intended elevation the next year.

2.0 THE INVASIVE PLANT PROBLEM

As Walter F. George Lake has aged over the 58 years since it was initially impounded, the lake has experienced an increase in aquatic plants. This is a typical consequence of ecological succession in aquatic environments.

Aquatic plant communities in moderation provide many benefits to a lake ecosystem by stabilizing sediments; removing excess nutrients from the water; improving water clarity; and providing quality habitat for fish, waterfowl, and other organisms.
While a diverse native aquatic plant community is a desirable feature of an aquatic ecosystem, excessive growths of invasive aquatic plants can cause serious and costly management problems and interfere with the use of the affected waterbody. Problems occur when extensive populations of a single species (monotypic growths) develop very high levels of biomass and have a growth form that produces a dense canopy of vegetation at the water surface. Problems created by such monotypic growths of plants include blocking of navigation channels and boat ramps; hindering swimming and other waterborne recreational activities; interfering with water intakes; increasing sedimentation; restricting photosynthesis to only a shallow zone near the water surface; preventing the growth of other aquatic plant species; impeding gas exchange between the water-air interface; minimizing wind generating mixing of water; obstructing water circulation; depletion of dissolved oxygen concentrations; and contributing to algal blooms as limiting nutrients (i.e. phosphorus) are released to the water during periods of plant die-off.

Plants that are not native to the United States pose the most severe problems for large multipurpose impoundments due to the lack of natural predators. At Walter F. George Lake, invasive aquatic plants have increasingly affected larger portions of the impoundment as the lake has aged. In addition to hydrilla, other problematic invasive aquatic plants that occur at Walter F. George Lake are water hyacinth, hygrophila, Cuban bulrush (*Oxycaryum cubense)*, water primrose (*Ludwigia peploides)* alligatorweed, giant cane (*Arundinaria gigantean),* phragmites (*Phragmites australis)*, and giant cutgrass (*Zizaniopsis miliacea)*. Through the years, the USACE has had to devote significant resources to manage these species. To date, the methods used to control nuisance growths has been the application of chemical herbicides and unconfined triploid grass carp.

Of the non-native aquatic plants occurring in Walter F. George Lake, hydrilla is the species of most concern from an operational, recreational, and environmental standpoint. Hydrilla poses a very serious threat to the project’s continued ability to provide the multipurpose functions for which the lake project is intended.

3.0 ENVIRONMENTAL SETTING WITHOUT THE PROJECT

3.1 GENERAL ENVIRONMENTAL SETTING

The environmental setting of the Walter F. George Project was described in the 2007 Release of Triploid Grass Carp for Hydrilla Management EA which incorporated the 1979 EIS that addressed the effects associated with the operation and maintenance of the overall Project. That document is incorporated by reference within this EA. Only those aspects of the environmental setting of the project area that have changed since the EA was prepared or require elaboration to facilitate analysis of the effects of the proposed action are presented.

3.2 AFFECTED ENVIRONMENT

3.2.1 FISHERY RESOURCES

During the 1960s and 1970s following its impoundment, Walter F. George Lake was known as the “Bass Capital of the World” because of the numerous sizable largemouth bass (*Micropterus salmoides*) that were caught. Typical of large manmade reservoirs, the fertility of Walter F. George Lake has diminished over the years as the remnant terrestrial vegetation decomposed following impoundment and nutrients either became associated with the sediments or were transported downstream. In addition, increased levels of wastewater treatment for municipal and industrial dischargers has reduced the nutrient loading on the Chattahoochee River and associated chlorophyll production. As the gradual loss of fertility occurred, the initial “boom” period in the lake fishery that followed impoundment has given way over the 58-year life of the reservoir to a somewhat smaller, but more sustainable sport fishery in which largemouth bass is still the most highly sought after species.

The fish community within the lake is dominated by species that either prefer lacustrine habitats or are tolerant of low to nonexistent flow conditions. In addition to largemouth bass, other predatory sunfishes such a spotted bass (Micropterus salmoides), bluegill (*Lepomis macrochirus)*, redear (*Lepomis microlophus)*, redbreast (*Lepomis auritus)*, longear (*Lepomis megalotis)*, and crappie (*Pomoxis spp.)* are abundant. The lake also supports a viable catfish fishery that is comprised primarily of channel catfish, with some blue catfish (*Ictalurus furcatus)* and white catfish (*Ameiurus catus)*. Threadfin shad (*Dorosoma petenense)* and gizzard shad (*Dorosoma cepedianum)* make up the primary forage base upon which largemouth bass and crappie depend. In addition, the Georgia Department of Natural Resources stocks the lake with both striped bass (*Dorosoma cepedianum)* and hybrid striped bass (*Morone saxatilis x M. chrysops)*. Small numbers of tilapia (*Tilapia, Oreochromus spp.)* of unknown origin have also been collected in the lake. A variety of nongame species, such as carp (*Cyprinus carpio)*, suckers (Catostomidae family), drum (Sciaenidae family) and small minnow-like cyprinids, form the balance of the lake’s fish community.

Because of Walter F. George Lake's shared boundary between Alabama and Georgia, the state's respective fisheries agencies are both involved in monitoring and management of the lake's fisheries. Alabama's Wildlife and Freshwater Fisheries Division and Georgia's Department of Natural Resources – Wildlife Resources Division sample the lake in the spring and fall of each year. Information gained from the sampling efforts has documented the cyclic nature of the gizzard shad, threadfin shad, and largemouth bass populations that have characterized the lake since the 1980s. Variability in nutrient levels, water clarity, forage fish abundance, rainfall patterns, other weather parameters, drought conditions, aquatic vegetation, fishermen catch and release patterns, and a viral disease known as the Largemouth Bass Virus have all been attributed as factors influencing the structure of largemouth bass populations in Walter F. George Lake. These factors interact in a complex fashion that is not completely understood.

The characteristics of Walter F. George Lake's largemouth population provide an interesting insight into the overall dynamics of the lake's fish community. The annual fisheries data indicate that a major factor influencing the distribution of numbers and their respective sizes between respective year classes of largemouth bass are determined in part by the relative abundance of threadfin shad. Although the numbers of young, smaller largemouth bass are fairly high, the older individuals demonstrate slow rates of growth and low weights. This disparity between numbers and size of fish is attributed in part to the lack of a sufficient forage base (i.e., lower threadfin shad numbers) to allow all of the largemouth bass produced in the lake to reach a quality size.

This led the states of Alabama and Georgia in 2000 to reduce the minimum size limit fishermen were allowed to keep from 16 inches to 14 inches. The intent of the size reduction was to encourage fisherman to keep more small fish in order to reduce competition for food between the remaining fish so that larger more desirable largemouth bass would be produced. According to data provided by Georgia fisheries personnel, the percentage of 16-inch and larger bass voluntarily released has steadily increased through the years, from 12.5% in 1984 to 39.3% in 1987, 65% in 1991, and 92% in 1999. To date, the success of the reduction in the minimum size in improving the growth rate and size of the lake's largemouth bass fishery has not yet been determined because of the fishermen's continuing tendency to practice voluntary "catch and release".

State fisheries personnel also expressed concerns over the possible effects of the increasing aquatic plant communities, particularly hydrilla, on the lake's future fish community. The concern results from the utilization by rooted vegetation of dissolved and suspended nutrients which removes them from use by plankton. As plankton levels decrease in response, the threadfin shad and gizzard shad community that forms the forage base for largemouth bass and other predatory sport fish would be expected to decline in numbers and size. In addition, the filtering effects of submersed aquatic plants like hydrilla contribute to increased water clarity which could further adversely affect the abundance of forage fish.

As the shad populations decrease in the lake in response to an increasing growth of rooted vegetation, an increase in the numbers of sunfishes would be expected to occur. Over time, this could produce a shift from the present shad dominated forage community to one in which sunfish provide the forage base used by largemouth bass, white bass, striped bass, and hybrid striped bass. Should hydrilla spread to occupy the 14,600 acres of the lake with depths less than 10 feet, this shift in the forage base may occur. This could result in a smaller overall largemouth bass population in the lake.

3.2.2 WILDLIFE RESOURCES

The Eufaula National Wildlife Refuge (NWR) occupies 11,184 acres of Walter F. George Project lands above the normal pool elevation 190 NGVD. The refuge's lands are located on both sides of the lake and are centered on the Cowikee Creek embayment. The refuge provides habitat for both resident and migratory waterfowl, wading birds, and rookeries for colonial nesting egrets and herons. Data from the period 2000-2006 showed that the refuge averaged about 20,000 ducks and geese per year. The refuge benefits from the open waters of the lake through the added feeding and resting sites provided for waterfowl within the lake. Although hydrilla has little nutritional value, the vegetation provides substrates upon which waterfowl browse for crustaceans, insects, and other invertebrates.

A major feature of the Eufaula NWR is the management of its system of 17 impoundments totaling 645 acres. These impoundments are typically planted with crop plants and slowly flooded during the late fall and winter with water pumped from the lake to provide supplemental foods for waterfowl. Table 1 provides information on the impoundments.

The Eufaula NWR has 8 pumps that pump approximately 3 billion gallons of water a year to manage water levels in the impoundments. There are two major pumping cycles each year. Water is pumped out of the impoundments beginning March 1 over a period of 4–6 weeks depending on the area and amount of rainfall. After the impoundments are sufficiently dried, crops are planted and not harvested. Then, beginning on November 1, water is pumped from the lake in phases to gradually flood the impoundments over a period of 2 -3 weeks to make the planted food more accessible to waterfowl.

Table 1: Waterfowl Impoundments at Eufaula National Wildlife Refuge

Name of Impoundment	Number of Sub-Impoundments [1/]	Total Acreage
Kennedy	NA	300
Bradley	7	200
Houston	4	60
Molnar	2	20
Upland	NA	40
Goose Pen	NA	15
Hourglass	NA	10

[1/] NA – Impoundment consists of a single cell.

3.2.3 LAND USE

The seven-county region in which Walter F. George Lake is located is rural in nature, with agriculture and forest production being the dominant land uses. Eufaula, Alabama, and Fort Gaines, Georgia, are the two largest towns located near the lake.

In addition to the lake, the Walter F. George Project includes an additional 37,640 acres of land above elevation 190 feet NGVD. A sizable portion of this acreage is concentrated in 27 recreation areas that are operated by the USACE and other entities at selected areas around the lake. Within the recreation sites, the level of development varies from intense such as at the Lakepoint Resort State Park to less intense at a number of day use areas scattered around the lake. Most of the recreation areas are associated with the many tributary embayments that empty into the lake. Since hydrilla has displayed a tendency to date to become established first in the more tranquil conditions present within the tributary embayments, it is anticipated that increasingly over the 30-year period of analysis hydrilla vegetation will become so dense as to adversely affect the use of most of the recreation areas.

The U.S. Fish and Wildlife Service operates the 11,184-acre Eufaula NWR on Project lands. The refuge is managed to improve the quality of waterfowl and terrestrial wildlife habitat occurring on these lands. The refuge lands include a considerable portion of the Project's lower elevation shoreline areas on the Alabama and Georgia sides of the lake upstream of Cowikee Creek.

The remainder of the project lands is contained within a narrow strip of land of varying width that separates the 640 miles of the lake shoreline from adjacent private property. Over the years since the lake was impounded, much of the private lands bordering the lake has been developed for lakefront homes, both as primary residences and as secondary vacation homes. Through the USACE Shoreline Management Program, permits have been issued for 1,100 private piers associated with some of these homes.

Over the next 30 years, it is anticipated that hydrilla will continue its expansion in the lake, with the vegetation producing thick mats along the shoreline. That vegetation will envelop most of the private piers, interfering with their use. In addition, excessive growths of hydrilla may detract from the water views available from the many private homes around the lake, possibly adversely affecting property values at those locations around the lake with the heaviest hydrilla infestations.

3.2.4 WETLANDS

In the 58 years since the lake was impounded, minor wetlands have developed at various locations around Walter F. George Lake. Where the wetlands occur, they are generally small in coverage and occur as narrow strips along segments of the shoreline interface with the lake. The wetlands are generally associated with areas having gentle slopes and/or are located in the extreme upper reaches of the lake's many embayments having developed on sediment accumulations derived from the surrounding drainages.

Aquatic plants can have a substantial influence on the rate of sedimentation in waterbodies. Dense growths of submersed aquatic plants like hydrilla can dampen wave action and local currents, encouraging even the smallest of suspended particles to settle and accumulate at a faster rate than would be the case in the absence of the plants.

The projected expansion of hydrilla to cover up to 14,600 acres of Walter F. George Lake over the next 30 years is expected to produce localized changes in water depths. The changes will be more pronounced in the shallow nearshore littoral areas as sediment runoff from the surrounding lands is trapped by the thick hydrilla vegetation. In addition, suspended sediments originating from areas upstream of the lake will also demonstrate an increasing to settle in the dense plant growth that could cover all areas of the lake having depths of less than 10 feet.

A long-term consequence of the hydrilla infestations will be the acceleration of sediment deposition in the nearshore littoral areas and the concomitant reduction in water depths. As water depths diminish over time, they will gradually be invaded by emergent plants, cypress trees, and other plants that are tolerant of moist soil conditions. Eventually, a pronounced band of wetland vegetation could begin to make its appearance at selected locations around the lake near the end of the 30-year period of analysis.

For the purposes of this analysis it is assumed that the upper one foot of the lake between normal pool elevation 190 and 189 feet NGVD will be the most susceptible depth for the accumulation of sediments delivered to the lake via sheet flow runoff. While sediment deposition will certainly vary geographically around the lake in response to a variety of factors, with some areas receiving larger amounts than others, insufficient data is available to accurately identify the differences between locations. Therefore, in the absence of definitive information, it was assumed that the sediments would accumulate evenly around the lake. Table 2 shows that 1,516 acres is contained in the upper one foot of the lake. The 1,516-acre band varies in width around the lake depending upon local elevation contours.

The upper lake above the U.S. Highway 82 causeway is more conducive than the lower lake for wetland development because of the relative abundance of shallow flats. For example, 62% of the lake's surface acreage less than 10 foot deep is located above the causeway. Below the causeway, the lake is characterized by steeper slopes and shoreline erosion creates conditions that are not favorable for wetland development. Application of the 62% to the 1,516-acre band between elevation 189 and 190 feet NGVD, indicates that approximately 940 acres of littoral wetlands could develop in Walter F. George Lake over the next 30 years as a result of the anticipated excessive hydrilla growth that is anticipated to occur if changes are not made to the aquatic plant management program administered for the lake.

3.2.5 FLOODPLAIN

Should hydrilla expand over the next 30 years to cover 14,600 acres of Walter F. George Lake having depths less than 10 feet, the extensive volume of vegetative matter associated with that level of plant growth would occupy a considerable volume of the lake. Examination of Table 2 shows that the total volume of water contained within the upper 10 feet of the lake is 378,100 acre-feet. Less than 30% of that volume (i.e. less than 113,000 acre-feet) occurs over the 14,600 acres of the lake having depths less than 10 feet.

While theoretically, excessive hydrilla growth could be assumed to displace a portion of the lake's storage volume, in actuality this may not be the case since a considerable portion of the plant materials is comprised of water. Although the water is an important constituent of the make-up of hydrilla plants, when the vegetation is exposed during low lake levels, the water is released during plant decomposition and either evaporates into the air or is freed to return to the lake.

Since flood control is not an authorized purpose of the Walter F. George Project, the condition of the submersed aquatic plant community within the lake is not believed to have an effect on floodplains either within the lake or areas downstream of the dam.

Table 2: Area-Capacity Data for Walter F. George Lake

	Area (acres)		
Elevation (Feet- NGVD)	Total Area	Incremental Area	Incremental Storage (acre-feet)
180	30,577	*30,577	*556,300
181	31,897	1,320	31,300
182	33,396	1,499	32,600
183	34,880	1,484	34,200
184	36,375	1,495	35,600
185	37,784	1,409	37,100
186	39,210	1,426	38,500
187	40,375	1,525	39,900
188	42,210	1,475	41,600
189	43,665	1,455	42,900
**190	45,181	1,516	44,400
191	46,850	1,669	46,100
192	48,615	1,765	47,600
193	50,356	1,741	49,500
194	52,250	1,894	51,400
195	54,045	1,795	53,100

* Total surface area and storage volume at elevation 180 NGVD
** Normal pool elevation

3.2.6 VEGETATION

Areas within Walter F. George Lake that tend to be inhabited by aquatic plants include the extensive littoral shoreline areas of the main lake and the tributary embayments. These areas are generally less than 10 feet in depth, and flank the original Chattahoochee River channel that is now impounded. A total of 14,600 acres of the lake are less than 10 feet deep, with approximately 62% of those acres being above the U.S. Highway 82 causeway that crosses the approximate mid portion of the lake.

A mix of native and non-native aquatic plants now occurs within Walter F. George Lake, with both groups having some problematic invasive representatives. Historically, the problematic invasive plants found in the lake have been hydrilla, water hyacinth, egeria (*Egeria densa*), and giant cutgrass. The lake's aquatic plant community has developed gradually through the years in response to natural colonization processes and introductions by man.

The 1979 EIS did not reveal the presence of any problem aquatic plants. That document was prepared approximately 15 years after the lake was impounded and it is likely that sufficient time had not passed as of that time to allow for substantial aquatic plant communities to have become established.

A comprehensive aquatic plant survey of Walter F. George Lake was conducted in 1991, two years before hydrilla was first reported from the lake. The 1991 survey showed Walter F. George Lake as having a much different plant community than what is in place now. The most common plants encountered were alligatorweed, water willow (*Justicia americana*), maidencane (*Panicum hemitomon*), and black willow (*Salix nigra*). The only submersed species found were chara (*Chara* spp.) and coontail (*Ceratophyllum demersum*). Based on the 1991 survey results, it was concluded that submersed aquatic vegetation was very scarce in Walter F. George Lake and similar to the conditions that existed when the 1979 EIS was prepared.

Since 1991, submersed aquatic vegetation has greatly expanded its coverage in the lake. Egeria was the initial submersed aquatic plant of concern. However, the more aggressive hydrilla has replaced egeria as the principle component of the submersed aquatic community.

The first account of hydrilla in the Walter F. George Lake was reported in 1993. Since that time, the hydrilla population in the lake has continued to increase despite repeated chemical treatments. Hydrilla coverage has increased every year since 2000 and peaked in 2007 despite rigorous herbicide control attempts. The continued expansion of hydrilla around the lake has caused concerns for both the USACE and stakeholders who have a great interest in the lake.

In response to the concerns over hydrilla and egeria, the USACE began conducting annual aquatic weed surveys in 2002 to better monitor the expanding coverage of submersed aquatic plants. While the surveys consider the entire spectrum of aquatic plants occurring on the lake, the principle focus is on hydrilla.

The 2002 aquatic plant survey showed a significant increase in the total number of submersed aquatic plant species from that reported in the 1991 survey. Seventeen species of submersed aquatic plants were recorded: hydrilla, egeria, chara, coontail, variableleaf pondweed (*Potamogeton diversifolius*), narrowleaf pondweed *(P. pusillus*), Illinois pondweed (*P. illinoiensis*), southern naiad (*Najas guadalupensis*), spinyleaf naiad (*N. minor*), lyngbea (*Lyngbea* spp), slender spikerush (*Eleocharis acicularis*), creepingrush (*Juncus repens*), fanwort (*Cabomba caroliniana*), parrotsfeather (*Myriophyllum aquaticum*), bladderwort (*Utricularia sp.),* and water hyssop (*Bacopa caroliniana*).

The results of these surveys reveal that despite the increasingly aggressive treatments of the hydrilla infestations, this invasive aquatic plant has continued to expand its coverage within Walter F. George Lake.

Hydrilla coverage has now expanded within Walter F. George Lake to the extent that it is no longer economically feasible to treat all areas of the lake within which the plant occurs with herbicides. Budget limitations will not allow the level of expenditures on herbicides to be continued into the future. As a result, the rate of hydrilla spread in the lake is anticipated to increase, eventually affecting most if not all of the lake's 14,600 acres having depths less than 10 feet. Should this occur, the dominance of hydrilla within the lake will increase to the detriment of the more desirable native aquatic plants that will decline in coverage and abundance.

3.2.7 ENDANGERED AND THREATENED SPECIES

Threatened and endangered species known to occur in the seven counties that border Walter F. George Lake are the Red-cockaded Woodpecker (*Picoides borealis*), Wood Stork (*Mycteria americana*), Eastern Indigo Snake (*Drymarchon corais couperi*), Gopher Tortoise (*Gopherus polyphemus*), Reticulated Flatwoods Salamander (*Ambystoma bishopi*), Oval Pigtoe (*Pleurobema pyriforme*), Shinyrayed Pocketbook (*Lampsilis subangulata*), Georgia Rockcress (*Arabis georgiana*), Relict Trillium (*Trillium reliquum*), Michaux's Sumac (*Rhus michauxii*), and American Chaffseed (*Schwalbea americana*). A brief habitat description for each species is listed below:

Red-cockaded Woodpecker (Endangered): The red-cockaded woodpecker primarily utilizes mature pine forests. Commonly preferred is the longleaf pines but other species of southern pine are acceptable. The red-cockaded woodpecker excavates cavities exclusively in living pine trees and nesting occurs in the breeding male's roost cavity.

No critical habitat has been designated for this species.

Wood stork (Threatened): The wood stork primarily utilizes freshwater habitats, such as marshes, swamps, lagoons, ponds, flooded fields, and also sometimes brackish wetlands for both foraging and nesting. Nesting occurs mostly in upper parts of cypress trees, mangroves, or dead hardwoods in close proximity to a body of water.

No critical habitat has been designated for this species.

Eastern Indigo Snake (Threatened): The eastern indigo snake occurs in xeric habits, closely associated with gopher tortoise where the burrows provide shelter from winter cold and desiccation. This dependence is especially pronounced in Georgia, Alabama, and the panhandle area of Florida, where eastern indigo snakes are largely restricted to the vicinity of sandhill habitats occupied by gopher tortoises.

No critical habitat has been designated for this species.

Gopher Tortoise (Candidate): Gopher tortoises prefers well-drained sandy areas (in which it can burrow) and is absent from extensive wetland areas (e.g., the Everglades and Okefenokee). It was a resident of the fire-dependent longleaf pine belt that is now highly fragmented. Now it persists only in areas where the canopy is open enough to allow for a dense understory on which it can feed.

No critical habitat has been designated for this species.

Reticulated Flatwoods Salamander (Endangered): The reticulated flatwoods salamander occupy longleaf pine-wiregrass flatwoods and savannas in the southeastern coastal plain. The salamanders spent most of their lives underground, in crayfish burrows, root channels, or burrows of their own making. They emerge in the early winter rains to breed in small, isolated seasonal wetlands.

Critical habitat has been designated for this species and the location along Walter F. George Lake is outside of the critical habitat.

Oval pigtoe (Endangered): Preferring a variety of softer habitat substrate from silty sand to gravel, this mussel species can be found in medium sized creeks to small rivers with flows generally slow to moderate velocities. More recent finds within the Apalachicola Chattahoochee Flint river basin shows an even wider range of habitat types, such as those with a mixture of sand and detritus, sand and cobble, as well as sand and clay or sand and silt more commonly occurring in the current prone mid-channel areas.
Critical habitat has been designated for this species and the location along Walter F. George Lake is outside the critical habitat.

Shinyrayed Pocketbook (Endangered): The shinyrayed pocketbook inhabits stable sandy and gravelly substrates in medium-sized streams to large rivers, often in areas swept free of silt by the current.

Critical habitat has been designated for this species and the location along Walter F. George Lake is outside the critical habitat.

Georgia Rockcress (Threatened): Georgia rockcress generally occurs on steep river bluffs often with shallow soils overlaying rock or with exposed rock outcroppings. These specialized soil conditions result in micro-disturbances, such as sloughing soils with limited accumulation of leaf litter or canopy gap dynamics, possibly with wind-thrown trees, which provide small patches of exposed mineral soil in a patchy distribution across the river bluff.

Critical habitat has been designated for this species and the location along Walter F. George Lake is outside the critical habitat.

Relict Trillium (Endangered): The relict trillium is found primarily in moist hardwood forests that have had little or no disturbance in the recent past. The soils on which it grows vary from rocky clays to alluvial sands, but all exhibit a high organic matter content in the upper soil layer.

No critical habitat has been designated for this species.

Michaux's Sumac (Endangered): Michaux's sumac grows in sandy or rocky open woods in association with basic soils. In the fall line sandhills region it occurs in submesic loamy swales. In the eastern Piedmont, it occurs on sand soils derived from granite. In the central Piedmont, it occurs on clayey soils derived from mafic rocks.

No critical habitat has been designated for this species.

American Chaffseed (Endangered): American chaffseed occurs in fire-maintained longleaf pine flatwoods and savannas. It is often found in transition zones between peaty wetlands and xeric (dry) sandy soils where habitat has been described as open grass-sedge systems in moist acidic sandy loams or sandy peat loams.

No critical habitat has been designated for this species.

3.2.8 CULTURAL RESOURCES AND HISTORIC PROPERTIES

In accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended) and its implementing regulations at 36 Code of Federal Regulations (CFR) § 800, the USACE must consider potential effects of this project on historic properties (cultural resource sites potentially eligible for, or listed on, the National Register of Historic Places (NRHP)). In addition, the USACE must provide State Historic Preservation Officers (SHPO), Native American Tribes, and other interested parties the opportunity to comment on its determination of effects to historic properties. In order to identify any historic properties within the Walter F. George property and determine the potential of this project to affect any properties, the USACE reviewed records and literature for information and data regarding the existing conditions within the project area.

The Walter F. George Reservoir project area and the surrounding region have a long history of archaeological interest, especially in regards to Native American mounds. These were described by scholars like William Bartram while travelling through the region as early as 1775. The subsequent history of archaeological research in this region is significant and by the early 1960s, approximately 280 pre-Contact Native American sites had been described, recorded, or excavated within the Water F. George Reservoir property. In fact, many of these sites were investigated prior to the construction of the Walter F. George Dam and impoundment of the lake during reservoir salvage projects in 1958–1962. Most of these investigations were conducted by the Smithsonian, the University of Georgia, and the University of Alabama and produced a significant body of new archaeological data. Based on the results of these investigations, conclusions from previous work were resynthesized leading to new classifications, new culture-histories, an improved understanding of cultural relationships in the southeast, and laid the ground-work for modern discussions of regional pre-Contact history. Upon completion of the construction of the dam, 144 of these sites were inundated (Night and Mistovich 1984).

In 1983–1984 the University of Alabama, Office of Archaeological Research conducted a Cultural Resource Survey and Evaluation of all USACE fee-owned property along the Walter F. George Reservoir shoreline including a 50 meter wide strip of land along the lake shore in Eufaula NWR. This survey identified 106 sites, 41 of which had been previously recorded. Seventeen of these sites were recommended for future consideration including the Roods Landing Mississippian Period mound center and the late seventeenth century Spanish Fort Apalachicola (Night and Mistovich 1984).

Based on Night and Mistovich's (1984) recommendations, additional investigations and assessments were conducted (Night and Mistovich 1986, Simpkins and Davis 1990, Ledbetter and Braley 1989, Wood 1991, Reid 1999) and in 1995 the USACE, Mobile District prepared a Historic Properties Management Plan (HPMP) to identify historic properties that were listed, eligible for listing, of potentially eligible for listing on the NRHP and establish guidelines for their management within the Walter F. George Reservoir and Project lands (USACE 1995). The 1995 HPMP identified 20 historic properties within the Walter F. George property (Table 3). Fifteen of these 20 properties are located north of Walter F. George Lock and Dam.

Table 3: Historic Properties within Walter F. George Reservoir Property

Site No.	Site Name	Site Type
1BR25**	Blackburn	Native American artifact scatter
1BR35*	Creek Town	Historic Creek village
1HE3	Purcell's Landing	Native American midden with burials
1HO3	Omussee Creek	Native American artifact scatter
1HO27	Omussee Mound	Native American mound site
1RU70*	Fish Camp	Native American artifact scatter
1RU27/101*	Fort Apalachicola	Spanish Fort
1RU141*	Big Island	Native American artifact scatter

9CY62	Cemochechobee/Brick Kiln	Native American artifact scatter and historic brick kiln
9ER103	Hutchins Landing	Native American artifact scatter
9QU55*	Soap Stone	Native American midden
9QU58*	Cool Branch	Native American stone mound
9SW1*	Roods Landing	Native American mound complex
9SW7*	Unnamed	Native American midden
9SW12*	High Bank	Native American midden
9SW34*	Unnamed	Native American midden
9SW49/124*	Florence Marina	Native American midden
9SW50*	Hitichiti	Native American village and artifact scatter
9SW70*	Unnamed	Native American midden with burials
9SW71*	Riprap	Native American midden

*Properties located north of WFG Lock and Dam, near or along reservoir shoreline
**Properties located within reservoir below maximum gross pool level

These 15 historic properties are spread throughout the reservoir project area with most situated away from the edge of the shoreline or at elevations above the gross pool level of the reservoir and experience either no erosion or only minor levels of erosion. Sites 9SW1 and 9SW71, however, have experienced significant erosion and metal sheet pile and riprap, respectively, have been placed along the boundaries of these properties to protect them from further erosion. Site 1BR25 is located within the reservoir below maximum gross pool level and is only exposed during low water levels during which it has been subject to looting, and vandalism. The condition of all these properties are periodically inspected by USACE park rangers and archaeologists and the primary threats to these properties observed during these inspections include shoreline erosion, looting, and vandalism.

3.2.9 RECREATION

Recreation has been an important activity at Walter F. George Lake since it was first impounded and made available for public use. Recreation has grown over the years in response, at least in part, to its reputation as an excellent lake in which to fish for largemouth bass.
Through an outgrant arrangement with the USACE, the State of Alabama operates the Lakepoint State Park, while the State of Georgia operates the George T. Bagby State Park. Two marinas are also located on the lake: Chewalla Marina in Alabama and Florence Landing Marina in Georgia.

The USACE has also outgranted 11,184 acres of project lands to the U.S. Fish and Wildlife Service which manages them as the Eufaula NWR. Portions of the refuge are located in Alabama and Georgia. Recreation activities available within the refuge include nature trails, fishing, wildlife observation, photography, and hunting (including youth hunts). The refuge receives about 325,000 visitors per year. Of this figure, approximately 600 people visit for the purposes of waterfowl hunting and over 4,000 people visit to bird watch. From 2000 to 2006, waterfowl harvests ranged from 750 to 1,500 per year.

The USACE operates campgrounds at Bluff Creek, Cotton Hill, Hardridge Creek, and White Oak Creek. In addition, 19 other day use areas are located around the lake that provide picnicking facilities, with 16 also having boat launches.

It is estimated that Walter F. George Lake receives around 4.5 million visitors a year at all of the recreation facilities occurring around the lake. The USACE operated facilities received on the average over three million visitors a year. Recreational activities include fishing, birding, hiking, swimming, boating, camping, canoeing and a variety of other sports associated with water. The annual fishing tournaments held on Walter F. George Lake are a significant source of income for the local communities. Most of the tournaments are headquartered at Lakepoint State Park.

In addition to the designated recreation areas, a large number of permanent residences and vacation homes are located on adjacent private lands neighboring the USACE lands that fringe the lake. A considerable amount of recreational use of the lake is based from these homes, with almost all of the 1,100 permitted private boat docks being associated with these homes.

Should the hydrilla infestations continue to expand over the next 30 years to eventually cover 14,600 acres of the lake less than 10 feet deep, it is likely recreational visitations will gradually decline. The excessive vegetation will make it difficult for boating, swimming, fishing, skiing, and other water oriented activities. If the recreational experience is not pleasurable, many visitors will not return. In addition, the owners of the 1,100 private boat docks may experience difficulties as hydrilla expands and interferes with the ability to swim, fish and boat from the docks.

3.2.10 WATER QUALITY

Walter F. George Lake is classified by the Georgia Environmental Protection Division and by the Alabama Department of Environmental Management for recreation and fish and wildlife.

The USACE contracted for a water quality management study of Walter F. George Lake in April 1978 through December 1979. The parameters studied included temperature, dissolved oxygen, pH, conductivity, heavy metals, sediment grain size, pesticides, oil, grease, fecal bacteria, phytoplankton, zooplankton, macroinvertebrates, and nutrients. The following conclusions resulted from the study.

- The measured levels of the physical-chemical water quality data indicated no problems that would be environmentally degrading within the lake. Dissolved oxygen concentrations in the surface waters were consistently above 5.0 mg/L during summer months and good water clarity. However, dissolved oxygen levels in the deeper portions of the lake are typically depressed and have created water quality problems in the Chattahoochee River downstream of the dam during power generation discharges.

- A fairly constant low level of nutrients (Nitrogen & Phosphorus) occurred in the lake with only a slight peak during the spring and early summer months. This peak was attributed to farm runoff through non-point sources (tributaries) entering the lake.

- No heavy metal concentrations were indicated that would seriously affect natural aquatic biota distribution patterns or affect the river as a water supply source or recreational water body.

- Walter F. George Lake stratifies seasonally, with lower dissolved oxygen concentrations occurring in the bottom waters. Stratification occurs at an approximate depth of 30 feet in the deeper portions of the lower lake.

- Seasonal variations occurred in some constituents such as suspended matter, nutrients, and conductivity.

- The biological sampling showed the lake at that time to be highly productive with a balanced aquatic community structure. Plankton and invertebrate populations were found to be sufficient to support secondary consumers such as fry, juvenile, and adult gamefish. Greatest phytoplankton abundance was seen during the summer months when nutrient availability was greater. Zooplankton populations tended to follow the population shifts of phytoplankton which is their food source. Benthic micro invertebrates also followed the same seasonal population increase.

- Aquatic biota was observed to be relatively diverse, indicative of good water quality, and demonstrated seasonal variations common to aquatic biological communities.

The 1978-1979 water quality management study was conducted when the lake had been impounded for approximately 15 years and was near the end of the “boom” period for productivity that is typical of new reservoirs. The results at that time indicated the lake was a highly productive system, with the upper reaches of the lake having somewhat higher nutrient levels.

3.2.11 AIR QUALITY

Walter F. George Lake is located in a rural environment. The two largest communities in the area, Eufaula, Alabama, and Fort Gaines, Georgia, are small by typical metropolitan standards and do not generate large quantities of automobile emissions. The largest industry producing air emissions in the region is the WestRock Corporation’s paper and pulp plant located in the upper portion of the lake south of Phenix City, Alabama. However, the plant’s air emissions are in compliance with applicable standards and create no problems for the immediate lake environs. The ambient air quality in the seven-county region surrounding Walter F. George Lake is judged to be good and in attainment for all criteria pollutants as measured against the U.S. Environmental Protection Agency's standards.

3.2.12 NOISE

Most sounds on Walter F. George Lake are those dealing with nature or recreation activities. The lake is home to several egret rookeries and numerous species of waterfowl and other birds. The major sound breaking the solitude of the lake is associated with the hum of outboard motors and other watercrafts that are regular fixtures on the lake.

Herbicides will continue to be applied over the 30-year period of analysis to treat 230 acres of hydrilla infestations occurring within the above identified priority areas. Treatment will be accomplished periodically during the growing season using airboats which generate considerable noise when in operation.

The priority areas are concentrated in the recreation areas that are frequented by the public. The noise produced by the airboats may be considered by most people to be offensive. Fortunately, herbicide applications will typically be conducted in the daylight hours from Monday through Friday when fewer members of the recreational public are present, thus avoiding potential noise conflicts.

3.2.13 AESTHETICS

The large expanses of water associated with this wide and elongated impoundment provide numerous locations to enjoy the beauty of Walter F. George Lake. Despite the existence of the 27 recreation areas and the numerous private homes located around the lake, there are still significant shoreline areas that have not been developed as of yet.

The water views provided by the lake remain the primary focal point of the recreation areas. Further, the water views are also the principal factor that has led to the construction of the many homes located on private lands bordering the lake.
The excessive growth of hydrilla projected to occur in the lake's nearshore areas over the next 30 years will be viewed negatively by the visiting public and the home owners around the lake. Should the level of the future hydrilla infestations continue most users of the lake will consider those conditions to detract from the visual appeal of the lake.

3.2.14 HAZARDOUS, TOXIC AND RADIOLOGICAL WASTE

Due to the wide range of activities involved in operating and maintaining the Walter F. George Project, a variety of hazardous and toxic materials are used by USACE and contractor personnel. These materials include paints, solvents, oils, pesticides, etc. Each of these materials are handled, used, stored, and disposed of in accordance with label recommendations and by applicable USACE regulations and standard operating procedures. All activities involving these materials are conducted in consistency with state regulatory guidelines and specifications.

The description of the environmental setting recognizes that chemical herbicides will be routinely used to control hydrilla infestations on the lake over the next 30 years. Therefore, this discussion of hazardous and toxic materials concentrates on an evaluation of the herbicides that will be or could be routinely used in the aquatic plant management program for the lake. Herbicides currently used to control submersed aquatic vegetation include fluridone, dipotassium endothall, mono salt of endothall, diquat, a diquat/copper mix, penoxsulam, flumioxazin, imazamox, topramezone, flopyrauxifen-benyzl, triclopyr, 2,4-D amine, and bispyribac-sodium.

- **Fluridone**. Fluridone products are harmful if swallowed, absorbed through skin, or inhaled. They can cause moderate eye irritation. The average half-life for fluridone in an aquatic system like Walter F. George Lake is about 20 days. While fluridone does adhere to sediments, it is slowly desorbed into the water column where it is susceptible to photodegradation.

- **Dipotassium Endothall**. Dipotassium endothall products are corrosive and can cause irreversible eye damage. Dipotassium endothall is harmful if inhaled or absorbed through the skin. Where fish are present, the lower concentrations should be applied to avoid fish mortalities. Dipotassium endothall is effective against a broad range of aquatic vegetation with a margin of safety to fish. The half-life of endothall is between 3 to 7 days, although endothall tends to break down quickly in water.

- **Mono Salt of Endothall**. Mono salt of endothall is a non-seletive contact herbicide that inhibits the protoporphyrinogen oxidase (PPO) enzyme causing cell membrane and respiration disruption. Mono salt of endothall products are corrosive and can cause irreversible eye damage. Mono salt of endothall is harmful if inhaled or absorbed through the skin. This product is toxic to fish by applications exceeding 0.3 ppm. Where fish are present, the lower concentrations should be applied to avoid fish mortalities. The half-life of mono salt of endothall is less than 7 days, although endothall tends to break down quickly in water due to microbial metabolism.

- **Diquat**. Diquat is toxic and can be fatal, if swallowed. Contact with undiluted liquid products can cause damage to the skin and eyes. Great care must be taken to avoid exposure during handling operations and application in the field. Where inhalation exposure to aerosols containing diquat is likely, proper respiratory protection equipment should be used. Diquat can be toxic to aquatic invertebrates if applied improperly. Once in the soil, diquat has a typical half-life of 1000 days, but is unavailable to plants or microbes due to its strong affinity for clay particles.

- **Diquat/Copper Mix**. Diquat and Copper are often applied simultaneously for effective control of submersed aquatic vegetation. The toxicity information stated above for diquat also applies to the diquat/copper mix. Chelated copper is the preferred form and is applied as elemental copper. Chelated copper persists indefinitely and becomes unavailable in sediment or is recycled by aquatic plants as a micronutrient. Copper herbicides are corrosive and can cause irreversible eye damage and skin irritation. Due to their corrosive nature, they may be harmful or fatal if swallowed. Some products may be toxic to trout and other species of fish depending upon water hardness.

- **Penoxsulam**. Penoxsulam is a selective herbicide that inhibits the acetolactate synthase (ALS) enzyme in the biosynthesis of branch-chained amino acids. Penoxsulam is often applied alone or in combination with dipotassium endothall due to the additive effect they exhibit in hydrilla. The primary pathway of degradation is photolysis with a half-life of 20-50 days. Penxsulam is harmful if inhaled.

- **Flumioxazin**. Flumioxazin is a non-seletive contact herbicide that inhibits the PPO enzyme causing cell membrane disruption. The primary form of degradation if from hydrolysis (minutes-four days) and photolysis (3 days). Flumioxazin is harmful if inhaled or absorbed through the skin and causes moderate eye irritation.

- **Imazamox**. Imazamox is a fast acting systemic herbicide that inhibits the ALS enzyme shutting down the production of proteins. The primary pathway of degradation is photolysis. Imazamox is harmful if absorbed through the skin or inhaled and will cause moderate eye irritation.

- **Topramezone**. Topramezone is a selective systemic herbicide that inhibits carotene formation in plants. Primary form of degradation is photolysis with a half-life of 4-6 weeks. Topramezone is harmful if swallowed or absorbed through the skin and causes moderate eye irritation.

- **Flopyrauxifen-benyzl**. Flopyrauifen-benzyl is a synthetic auxin which causes disruption in the growth processes of susceptible plants. It is classified as reduced risk by the USEPA compared to other registered aquatic herbicides. Flopyrauifen-benzyl can cause moderate eye irritation if it comes into contact with the eyes. Due to rapid photolysis and aerobic aquatic metabolism Flopyrauifen-benzyl will dissipate quickly in the water. It shows low mobility in soils and readily binds to soil or sediment.

- **Triclopyr**. Triclopyr is an auxin-mimic that interferes with normal expansion and division of plant cells. Degradation pathway is photolysis with a half-life of 2.5-14 days depending on time of the year and water depth. Triclopyr is corrosive and will cause irreversible eye damage. It is harmful if swallowed or absorbed through the skin.

- **2,4-D Amine**. 2,4-D Amine is a fast acting growth-regulating auxin-mimic that causes uncontrolled growth. Degradation pathway is microbial action with a half-life of 7-14 days. It may be toxic to fish and aquatic invertebrates if not applied according to the label instructions. 2,4-D Amine is corrosive and will cause irreversible eye damage. It is harmful if swallowed or absorbed through the skin.

- **Bispyribac-sodium**. Bispyribac-sodium is a selective herbicide that inhibits the ALS enzyme in the biosynthesis of branch-chained amino acids. The degradation pathway is microbial metabolism with a half-life of 30 days. Bispyribac-sodium is harmful if swallowed or absorbed through the skin and will cause moderate eye irritation.

While there is always a risk to human safety and for environmental contamination whenever herbicides are applied, the risk is greatly minimized when the chemicals are stored, handled, and applied in accordance with label directions that have been approved by the U.S. Environmental Protection Agency, the federal agency responsible for registration of pesticides.

3.2.15 SOCIOECONOMICS

Walter F. George Lake is bordered by seven counties. The three Alabama counties are Barbour, Henry and Russell. The four Georgia counties are Chattahoochee, Clay, Quitman, and Stewart. The counties are rural in nature, with agriculture and forestry being the major land use activities.

According to the 2010 Census, the Alabama counties 2019 population estimates as well as percentage change from 2010 for Barbour is 24,686, a decrease of 10.1 percent; Henry is 17,205, a decrease of 0.5 percent; and Russell is 57,961, an increase of 9.4 percent. Georgia counties 2019 population estimates and percentage change from 2010 for Chattahoochee is 10,907, a decrease of 3.2 percent; Clay is 2,834, a decrease of 11 percent; Quitman is 2,299, a decrease of 8.4 percent; and Stewart is 6,621, an increase of 9.3 percent.

The median household income for 2014 – 2018 in Barbour County is $34,186.00 and the per capita income is $18,461.00; Henry County is $48,610.00 and the per capita income is $24,069.00; Russell County is $40,978.00 and the per capita income is $22,055.00; Chattahoochee County is $46,453.00 and the per capita income is $23,651.00; Clay County median household income is $25,000.00 and the per capita income is $16,199.00; Quitman County median household income is $30,000.00 and the per capita income is $19,371.00; and Stewart County median household income is $25,385.00 and the per capita income is $16,359.00. There are 30.9 percent of individuals in Barbour County living below the poverty level; 17.9 percent of individuals in Henry County living below the poverty level; 21.7 percent of individuals in Russell County living below the poverty level; 17.3 percent of individuals in Chattahoochee County living below the poverty level; 29.8 percent of individuals in Clay County living below the poverty level; 25.5 percent of individuals in Quitman County living below the poverty level; and 37.9 percent of individuals in Stewart County living below the poverty level.

Employers in the counties include manufacturer shipment, merchant wholesalers, retail sales, accommodations and food service sales, health care and social assistance receipts/revenue, minority-owned firms, women-owned firms, men-owned firms, veteran-owned firms and nonveteran-owned firms (U.S. Census Bureau, 2020).

4.0 ALTERNATIVES TO THE PROPOSED ACTION

4.1 NO ACTION

With the No Action Alternative, there would be no change to current conditions at Walter F. George Lake. The stocking rate of 12 grass carp per hydrilla acre would remain the same. Chemical treatment of the invasive aquatic vegetation would continue at minimal levels. Transplanting native submersed aquatic plants would continue but the long-term success may be in jeopardy. This action would continue with current management which may be unable to keep up with current growth rates which would cut off access to boat traffic, decreasing fisheries habitat and recreational opportunities. Therefore, this alternative was not further considered.

4.2 INSECTS AS BIOLOGICAL AGENTS

Several insect species have been identified that feed on hydrilla. A number of these species have been investigated as potential biological control agents. Insects that have received the most attention include the tuber-feeding weevil (*Bagous affinis*), the Australian stem-boring weevil (*Bagous hydrillae*) and the leaf-mining fly (*Hydrellia pakistanae* and *Hydrellia balciunasi*).

For a variety of reasons, only a few of these insect species have proven to be effective for use in the United States. The stem-boring weevil (*B. hydrillae*) was released in 1992 in Lake Seminole (downstream of Walter F. George Lake) in an attempt to control hydrilla. However, that insect failed to become established in the lake.
During 1990-1993, the leaf-mining fly (*H. pakistanae*) was also introduced into Lake Seminole. Although subsequent surveys indicate this insect appears to have become established within the lake, there is no evidence that this species has significantly impacted hydrilla in the lake. According to the 1998 Hydrilla Action Plan for Lake Seminole, monitoring of hydrilla in the lake as of that time had not indicated damage levels had reached the threshold level necessary to reduce biomass and the surface matting capacity of hydrilla on the lake.

The 1998 Hydrilla Action Plan for Lake Seminole concluded that based on the literature and field data observed for Lake Seminole it is unlikely the use of insects as biological control agents will be able to reduce hydrilla on Lake Seminole in the near future. No evidence has been generated since 1998 to invalidate that earlier conclusion. Therefore, the use of insects as biological control agents was eliminated from consideration as an alternative to implement the proposed action at Walter F. George Lake, which is 50 miles upstream of Lake Seminole.

4.3 CONFINED RELEASE OF GRASS CARP

Following the conduct of an extensive field experiment at Lake Seminole during the mid-1990's, a larger release of triploid (sterile) grass carp (i.e., white amur or *Ctenopharyngodon idella*) was successfully accomplished into confined areas on Lake Seminole following the recommendations contained in the 1998 Hydrilla Action Plan for that lake. Subsequent monitoring indicates that grass carp have been effective in reducing hydrilla within the confined areas. The confined areas involve tributary embayments to the lake that are around 1,000 acres or less in size.

Confined areas were selected for the release of grass carp into Lake Seminole that would allow the fish to be concentrated in high vegetative areas. The grass carp were confined to prevent individual fish from escaping from the lake and migrating into the downstream Apalachicola River and to other locations upstream of the lake. The confining barriers were constructed from fencing materials and equipped with low voltage electronic fish barrier devices to discourage grass carp from exiting through the boat passage openings that were constructed into the barrier fencing. The addition of electric fish barrier component to the physical barriers was required to document unacceptable levels of grass carp escape during demonstration tests in 1995-1996. Due to the cost of the construction materials, sites were selected at constricted locations near the mouths of tributary embayments to minimize the length of the confining barriers and reduce construction costs.

Walter F. George Lake is considerably different from Lake Seminole. First, Walter F. George Lake is a much deeper lake which means that the cost of barrier fencing would be significantly higher. Second, the ratio of the lake's surface area associated with its tributary embayments to the area of open water in the main lake is much smaller than is the case at Lake Seminole. Third, many of the existing hydrilla problem areas on Walter F. George Lake occur within open water portions of the mid to upper reaches of the lake that experience seasonally high flows from the Chattahoochee River. High current conditions could prove to be problematic for the construction of rigid barriers that must be able to withstand river current forces and the debris carried by high flows. This represents an additional consideration that would further contribute to higher construction costs.

To accommodate the above conditions in a workable fashion, the cost of constructing confined enclosures on Walter F. George Lake would be considerable. Also, construction of an electric fish barrier at the lock, hydropower turbine intakes, and dam spillway areas to prevent the downstream movement of grass carp would be extremely cost prohibitive. Due to the depths occurring at these locations, the higher voltages required to discourage fish from passing through and over these structures would pose potential safety issues. Another drawback with the use of electric fish barriers at the spillway and hydropower intakes (areas experiencing high water flows) would be their lack of effectiveness in containing grass carp within the lake, as the flowing water would carry any "stunned" fish downstream into George W. Andrews Lake. In addition, the deeper waters would reduce the effectiveness of the electric fish barriers. For these reasons, the confined release of grass carp alternative was eliminated from further consideration.

4.4 LAKE DRAWDOWN

The Drawdown Alternative would involve lowering Walter F. George Lake by 10 feet from the normal summer elevation 190 feet to 180 feet. A drawdown of this magnitude would expose all 14,600 acres of the lake bottoms having a depth of less than 10 feet.

Drawdown would occur at some point during the summer growing season that extends from May through September. The lowered pool level would be maintained for a minimum of 6 weeks to provide sufficient time for the plants occurring on the exposed lake bottoms to be stranded and allowed to die and decompose before water levels would be allowed to return.

The actual timeframe required to accomplish the drawdown operation would be considerably longer than the 6 weeks during which the target elevation of 180 feet would be maintained. The physical actions of lowering the lake would have to begin several weeks and possibly months prior to the specified exposure dates. In addition, the time required for lake levels to return to normal operating levels could extend well into the following year. Should the drawdown occur during a drought situation, it is possible that up to two years could be required for lake levels to fully recover.

The lake's recreation areas would not be usable during an extended period of reduced water levels. Actions would have to be taken to close recreation areas and signage would have to be installed within the lake to warn against navigation hazards. More intensive monitoring of the recreation facilities would also be required by Project staff during the drawdown period to assure that the special actions implemented to safely manage the drawdown were not being violated by the public.

Given the importance of Walter F. George Lake to the cities of Eufaula, Alabama, Fort Gaines, Georgia, Georgetown, Georgia, and the surrounding areas, an extended drawdown would have serious repercussions as the effects of reduced recreation visitations to the area multiplied throughout the local economies. Businesses dealing with lodging; restaurants; bait and tackle; boat services, etc. would be especially hard-hit, with the possibility that some may not be able to withstand a prolonged drawdown period when the lake is essentially closed to recreation. The regional loss in business income and tax revenues associated with a drawdown event would create a serious impact for the local communities and their municipal and county governments.

A significant consequence of a lowered pool level would be the curtailment of hydropower generation from the Walter F. George powerhouse. The loss of the Project's power generation potential for an extended period of time would require that advance measures be pursued to assure that adequate replacement power sources would be available to meet anticipated peak power demands when needed during the period the powerhouse was out of operation. Once it is determined that the USACE could not fulfill power supply commitments specified in the contracts between the Southeastern Power Administration and its customers, alternate sources of power would be required. The replacement power would be purchased at higher costs that would be passed on to the consumer.

As the major industry located on the lake depending upon water for its operations, an extended drawdown of this magnitude would essentially force a prolonged shutdown of WestRock Corporation's paper and pulp plant located in the upper portion of the lake south of Phenix City, Alabama, or require that industry to install water withdrawal pump intakes deeper into the river channel.

Although commercial navigation is not currently a major activity in the Apalachicola-Chattahoochee-Flint River system, an extended drawdown would prevent navigation in the authorized 9-foot channel through Walter F. George Lake to Columbus, Georgia.

The 10-foot drawdown would be targeted toward killing all hydrilla occurring in areas less than that depth. While it should be theoretically possible to accomplish this objective in the short term, experience at other locations indicates that the exposed sediments may not dry enough to kill the tubers/turions and the mats of vegetation may retain sufficient moisture to allow some plants to survive. An unwanted long-term consequence of this alternative would be the creation of temporary conditions that would encourage hydrilla to spread to deeper portions of the lake. The lowered lake levels would temporarily improve growing conditions below the normal 10-foot bottom contour that would make it easier for hydrilla to gain a foothold in these deeper so that hydrilla could continue to thrive and grow once the lake returned to normal levels. Further, the plants growing at the deeper levels would in time provide a source of new plants to re-colonize the shallower areas after the lake levels recovered. Therefore, it is likely that the drawdown option would actually exacerbate the hydrilla infestation in Walter F. George Lake over the long-term. This is consistent with the results of research conducted by the Hestand and Carter 1974 and Doyle and Smart 2001 that has led to the finding that hydrilla is unlikely to be controlled by drawdown because of the resiliency of the species and its ability to successfully exploit habitat opportunities available within aquatic systems.

After considering the above, the drawdown alternative was not considered in detail for the following reasons:

- This alternative would create significant economic losses that would have to be borne by the local businesses, communities and governments.

- The losses that would result from the inability of the Water F. George Project to generate power for an extended period of time would be considerable and the higher replacement power costs would be passed along to the power consumers.

- A lake drawdown would actually encourage hydrilla to spread to deeper levels within the lake which would then serve as a reservoir of plants to facilitate re-colonization of the shallow lake areas after pool levels returned to normal.

- A drawdown would temporarily remove from use important habitat critical for spawning and rearing of many members of the lake's fish community. In addition, desirable native submersed aquatic plant species would be lost during a drawdown event.

- Despite incurring the high costs that would be required, a drawdown of Walter F. George Lake would not represent a permanent solution to the problem as the hydrilla infestation would be expected to redevelop within the lake over an unknown period of time after the drawdown is completed.

4.5 MECHANICAL MANIPULATION

Mechanical manipulation of aquatic plants uses mechanical devices to cut, rip or shred submersed aquatic plants. The cut portions of the plants may be removed from the water and loaded on a work barge for transportation to a central collection area from which the plant matter would be removed from the waterbody, placed on dry land, and allowed to die through drying and decomposition of the organic matter.

Mechanical manipulation provides only short-term control. Most equipment allows the plants to be cut only to depths up to 6 feet. This leaves the roots and lower portions of the plants to remain intact to resume growth following harvesting. Aquatic vegetation like hydrilla can recover relatively quickly to pre-harvest levels within as short a time as 30 days during the warm summer months. Thus, this approach to aquatic plant control can require multiple harvests of an area during a typical growing season.

Aquatic plants like hydrilla which have the capability to be spread through fragmentation of stems, mechanical manipulation can actually contribute to the spread of undesirable vegetation in an aquatic environment. This is because removal of the cut portions of plants during harvest is not 100% efficient, leaving a considerable amount of the smaller cut plant materials in the water. The resulting small stem fragments can be carried by flow and wind driven currents to other locations within the lake to become established and add to the overall aquatic plant problem affecting the lake. Mechanical manipulation may exacerbate the hydrilla problem in Walter F. George Lake.

Major factors determining the cost to mechanically harvest plants from a waterbody are the following:

- Acreage to be cut

- Frequency of harvest
- Harvest rate of equipment used
- Operation and maintenance cost of the harvesting equipment
- Travel distances to treatment areas
- Travel distances to disposal sites
- Cost of landfill disposal
- Labor
- Supplies and other miscellaneous costs

Experience has shown that mechanical manipulation is labor and energy intensive, resulting in significant costs. Thus, the control of aquatic vegetation by mechanical means only is not typically cost-competitive with other methods of plant control. As a result, mechanical manipulation is generally used only for selected situations.

For the purposes of this analysis, it was assumed that the Mechanical Manipulation Alternative would be used to control "topped out" hydrilla infestations only at Walter F. George Site Office, USACE operations areas and within the Bagby State Park, Cottonhill Campground, Barbour Creek, Tobannanee Creek, Bluff Creek Campground, Cheneyhatchee Creek, Cool Branch, Drag Nasty, Grass Creek, Hardridge Creek, Hatchechubbee Creek, Lakepoint State Park, Cowikee Creek, Little Barbour Creek, Rood Creek, Old Creek Town Park, Pataula Creek Park, Sandy Branch, Soapstone Creek, and Bustahatchee Creek where vegetation densities are high. It is anticipated that 230 acres would be harvested up to three times over the course of the growing season that extends from May through September. At a cost of up to $1,700 per acre to harvest and remove the cut hydrilla from the lake, the estimated average annual cost for the Mechanical Manipulation Alternative is $1,173,000. This would represent an average cost of over $5,100 per acre harvested each year, while less than 11% of the total acreage (considering the projected 2019 estimate) infested with hydrilla would be managed.

After considering the above, the mechanical manipulation-only alternative was dropped from detailed evaluation for the following reasons:

- This method would in the long term likely contribute to the increased spread of hydrilla in the lake through the production of copious amounts of stem fragments, with each one potentially representing a new plant.

- This method is extremely costly, resulting in the highest cost per managed acre of all the alternatives considered.

- Only a small portion of the lake's hydrilla problem areas could be addressed with this method, with multiple re-treatments of the same areas being required each year.

- Merely cutting the plants tops provides no real control of the hydrilla infestation since the plants are not killed and are allowed to remain within the lake in an actively growing condition.

4.6 MINIMUM CHEMICAL TREATMENT

The Minimum Chemical Treatment Alternative would rely upon the use of chemical herbicides to control submersed aquatic vegetation, allowing the current population of triploid grass carp reduction through attrition. This alternative represents a level of chemical treatment that could be reliably accomplished within the anticipated annual budget amounts received by the Walter F. George Site. This alternative would represent a reduced level of treatment conducted during the last three-year period (i.e. 2016, 2017 and 2018) as shown in Table 4.

Table 4: Walter F. George Chemical Treatment Cost

Year	Cost of Herbicide Used	Herbicide Purchased	Budget for Aquatic Maintenance*
2013	$99,279.00	$0	$120,000.00
2014	$41,666.00	$0	$350,000.00
2015	$54,957.00	$0	$300,000.00
2013-2015 Total	**$195,902.00**	**$0**	**$770,000.00**
2016	$96,798.00	$0	$0
2017	$304,792.00	$112,865.00	$350,000.00
2018	$103,204.00	$278,508.00	$420,000.00
2016-2018 Total	**$504,794.00**	**$391,373.00**	**$770,000.00**

Table 4 shows the cost of the herbicide used, cost of herbicide purchased, and the initial budget for aquatic maintenance. Treatments in the years 2016-2018 increased by 2.5 times the cost of years 2013-2015, and spending on purchased herbicide increased significantly for two of the three years between 2016 and 2018 compared to the prior three years. The initial budget for the aquatic maintenance was relatively consistent for years 2013-2015 and 2016-2018.

The total Operation and Maintenance (O&M) budget allocation for the Project remained at a relatively consistent level. The aggressive level of chemical treatment performed in those three years was possible only because of specific budget packages approved at the District level for the project made additional funds available to purchase increased quantities of herbicides beyond the amounts that could have otherwise been supported by the project's budget for those years. The funds used for the aquatic plant control activities were obtained through approval of requested budget packages. It will not be possible to sustain into the future the level of expenditures on herbicides observed during that three-year period without dedicated budget packages for the purchase of herbicides.

There are significant financial constraints that will prohibit the level of chemical treatment performed between 2016 and 2018 from being continued indefinitely into the future. First, policy changes have elevated re-programming authority decisions to higher levels within the agency. This change will make it more difficult in the future to shift O&M funds between projects to assist in meeting non-budgeted needs for specific projects.

Second, due to the future unreliability of re-programmed funds to sustain the level of chemical expenditures that occurred during 2016 through 2018; an increasingly larger portion of Walter F. George Site annual maintenance budget would have to be diverted from other project activities (i.e. recreation, navigation, and hydropower) to the aquatic plant control program. This approach would prove to be detrimental over the long-term to other Project assets as maintenance suffered because of the diversion of funds. Currently, the unmet funding needs of recreational facilities have resulted in temporary closures of campsites and other facilities. This trend would continue to accumulate and pose significant infrastructure issues. This would negatively affect the utility of these facilities and could present safety hazards for both Project staff and the visiting public.

As a result of the above considerations, for the purposes of this analysis, it is assumed that the annual cost of herbicides for the No Action Alternative would be $139,000, and that approximately 328 acres of hydrilla infested areas would be treated. Herbicides would typically be applied by airboat during the growing season that extends from March through October.

Chemical applications would be made in the following order of priority:

- USACE operational areas
- USACE public use areas (boat ramps, swimming beaches, campgrounds, day use areas, etc.)
- Environmentally sensitive areas (isolated patches which could impact larger areas)
- Other areas (State and County recreation areas, subdivisions, etc.)

The objective of the Minimum Chemical Treatment Alternative would be limited to preventing aquatic plant infestations from interfering with the use of specific facilities occurring on the lake. Due to the high costs involved, treatment could not be directed at controlling the growth of aquatic plants in the existing large expanses of the lake affected by this plant outside of the priority areas or its continued spread to other areas of the lake.

The EPA-labeled herbicides that have traditionally been used to control submersed aquatic vegetation would continue to be applied in accordance with prescribed label rates and instructions. The major herbicides include liquid and/or granular formulations of copper, diquat, dipotassium endothall, mono salt of endothall, fluridone, flumioxazin, penoxsulam, imazamox, topramezone, triclopyr, 2,4-D amine, bispyribac-sodium and florpyauxifen-benzyl. The following summarizes pertinent information about each herbicide.

- Liquid chelated copper compounds are a contact herbicide used to kill a variety of algae and aquatic plants mainly hydrilla. The cost of treating with copper as a tank mix for hydrilla is around $150 per acre. Waters treated with most copper products may be used for swimming, fishing, drinking, livestock watering or irrigating turf, ornamental plants or crops immediately after treatment. The effectiveness of copper may be affected by the alkalinity of the water.

- Diquat is a fast-acting broad spectrum contact herbicide that is effective at controlling aquatic plants in close proximity to structures such as boat docks, marinas, boat ramps, bridges, channel markers, dams, etc., where accurate placement of herbicide is necessary and/or access is limited. Absorption and herbicidal action is rapid with effects visible within a few days. Diquat interferes with photosynthesis within green plant tissue and destroys cell membrane. A major consideration for use of diquat is that this herbicide is rapidly inactivated in turbid waters as the active ingredient binds onto clay particles and renders the herbicide ineffective. The cost of treatment is approximately $119 per acre. Water use restrictions apply to diquat and include restrictions on drinking water, livestock consumption, fishing, and swimming. The time length of restrictions depends on the concentration used and the formulation of the product.

- Dipotassium endothall is a broad spectrum contact herbicide for use in both quiescent and flowing water. The active ingredient is water soluble and tends to diffuse from the treatment area; therefore, marginal treatments of large water bodies require higher rates. The cost of a dipotassium endothall treatment is about $452 per acre. Applications should not be made within 600 feet of a potable water intake in quiescent.

- Mono salt of endothall is a broad spectrum contact herbicide and algaecide for use in drainage canals, lakes, and ponds. The herbicide is absorbed by foliage or underwater tissues. It breaks down rapidly in water so dissipation is minimal. The cost of a mono salt of endothall treatment is about $788 per acre. Applications should not be made within 600 feet of a potable water intake

- Fluridone is a selective systemic herbicide that targets the plant specific enzyme phytoene desaturase that protects chlorophyll. It is intended for use in ponds, lakes, reservoirs, drainage canals, irrigation canals, and rivers. Fluridone is absorbed from water by plant shoots and from hydrosoil by plant roots. It inhibits the synthesis of carotenoid pigments and is usually applied to hydrilla in late winter or early spring for maximum effectiveness. It has a relatively low toxicity to fish and is the most popular of the herbicidal controls. Some hydrilla biotypes have shown resistance to fluridone within Walter F. George Lake. Fluridone requires a contact time of 30 to 90 days which necessitates multiple treatments to maintain concentrations. Fluridone costs $250-$350 per acre of treatment. Fluridone should not be applied within ¼ of a mile of any functioning potable water intake. Irrigation of crops with treated water is discouraged for periods ranging from 7 to 30 days.

- Flumioxazin is a broad spectrum contact herbicide that affects the plant specific enzyme protoporphyrinogen oxidase required by plants for chlorophyll biosynthesis. Rapid injury that occurs is similar to other contact herbicides. It is used in both surface and submerged applications in water bodies with limited or no outflow. Effectiveness is limited in pH above 8.5 as it breaks down rapidly above pH 8.5. Treated water is restricted from irrigation for 5 days after application. Flumioxazin cost $800 per acre of treatment.

- Penoxsulam is a selective herbicide that inhibits the plant specific enzyme acetolactate synthase. It is used to control floating species as well as submersed species. The herbicide is absorbed by vascular aquatic plants through emergent or floating leaves, submerged plant shoots, or hydrosoil by plant roots. Symptoms include immediate growth inhibition, chlorotic growing point with tissue reddening, necrosis of the terminal bud after 2 weeks of exposure, and slow plant death over 60 to 120 days. Penoxsulam cost $400 per acre of treatment.

- Imazamox is a systemic herbicide that inhibits the production of acetolactate synthase enzyme. It is quickly absorbed by leaves and shoots and moves to areas of new growth shutting down plant growth almost immediately. It is used to control floating, emergent and submersed species. Imazamox cost $284 per acre of treatment.

- Topramezone is a selective systemic herbicide that inhibits 4-Hydroxy-phenyl-pyruvate-dioxygenase (4-HPPD) enzyme. Inhibiting the 4-HPPD enzyme prevents the formation of carotene, which rapidly degrades chlorophyll in sunlight. It is used to control floating, emergent and submersed species. Topramezone cost $492 per acre of treatment.

- Triclopyr is a selective systemic herbicide that is absorbed by foliage and translocate throughout plant tissues. The herbicide is an auxin mimic that causes stimulated growth in some plant tissues and retards growth in other tissues. It is used to control floating, emergent and submersed species. Triclopyr cost $304 per acre of treatment.

- 2,4-D Amine is a systemic herbicide that is quickly absorbed by broadleaf plant leaves, stems, and roots. The herbicide is an auxin mimic that translocate in the plant meristems and causes uncontrolled, unsustainable growth. It is used to control floating, emergent and submersed species. 2,4-D Amine cost $148 per acre of treatment.

- Bispyribac-sodium is a selective systemic herbicide to control aquatic weeds in lakes, ponds, non-irrigation canals and other water bodies with limited or no outflow. It inhibits the acetolactate synthase enzyme preventing the production of proteins. Symptoms occur slowly and may take 2 months to fully affect the plant. It is used to control floating, emergent and submersed species. Bispyribac-sodium costs $239 per acre of treatment.

- Florpyauxifen-benzyl is a selective herbicide that mimic the plant growth hormone auxin which causes excessive elongation of the plant cell. Initial effects will be displayed within hours to a few days, with plant death occurring over 2-3 weeks. It is used to control floating, emergent and submersed species and intended for quiescent waters including shoreline and riparian areas adjacent to these sites. Florpyauxifen-benzyl cost $700 per acre of treatment.

4.7 MAXIMUM CHEMICAL TREATMENT

The Maximum Chemical Treatment Alternative would also depend entirely upon the application of herbicides. This alternative would be directed at treating the entire 2,100 acres of submersed aquatic plants that are projected to cover Walter F. George Lake in 2020. The objective of this alternative would be to prevent the hydrilla coverage from expanding beyond this acreage.

The Maximum Chemical Treatment Alternative would provide a more aggressive level of herbicide treatment program than the No Action Alternative. The 2,100 acres of the lake's surface area projected to be infested in 2020 would be treated at least once each year, with specific areas receiving a second treatment if warranted. The same herbicides used in the No Action and Minimum Chemical Treatment Alternatives would also be used and the same methods employed to apply the chemicals.

The Maximum Chemical Treatment Alternative does not recognize the existing budget constraints that presently influence the hydrilla control program. Instead, this alternative assumes additional funds would be provided to accommodate the increased treatment activities without diverting funds from other Project activities. The estimated annual cost of this alternative is $1,470,000. Over the 30-year period of analysis, it is possible that additional funds may have to be added to this amount should the hydrilla infestation spread beyond the projected 2,100 acres in 2019.

4.8 FLOW-ASSISTED HERBICIDE DELIVERY SYSTEM

The Flow-Assisted Herbicide Delivery System Alternative would take advantage of the flow of water through Walter F. George Lake produced by the upstream Chattahoochee River inflows and selected smaller tributaries entering the lake. The use of a contact and systemic mix of herbicides to control hydrilla in medium-flow moving waters have been successfully accomplished in Lake Seminole by the USACE. The method used a continuous application of endothall at a concentration of 2.0 ppm applied over a period of 5 days and a simultaneous application of penoxsulam at a concentration of 20 parts per billion applied over a period of 10 days. The effectiveness of this method of chemical treatment utilizes water movement to treat downstream portions of the system during the active half-life of the herbicide. All water passing the injection site is treated at a known concentration of the herbicide for the 5 and 10 days of the treatment. The half-life, and therefore, the effective downstream treatment zone of endothall is dependent upon water temperature. Since the herbicide's half-life is longer in cooler water, more area can be treated downstream of the injection point during cool weather treatments.

The flow-assisted herbicide delivery system would ideally be employed once a year, in either February or March due to the increased longevity of the herbicide's half-life in the cooler waters associated with these months. However, due to monoecious hydrilla being dominate in Walter F. George Lake treating in the cooler months is not an option because monoecious hydrilla is not actively growing. The exact timing of treatment would be determined based upon actively growing hydrilla and prevailing flow rates.

Since this method of chemical treatment requires that adequate flow rates be available within the area treated to adequately dilute and disperse the herbicide applied, its use used was not considered for the main body of the lower lake downstream of the U.S. Highway 82 causeway. Downstream of the causeway, increased depths would slow the horizontal movement of treated water. The short half-life of the herbicide then becomes a limiting factor. Further, there may be a tendency for the Chattahoochee River flows to be funneled down the impound former channel, which means higher quantities of herbicide may have to be applied to achieve the necessary concentrations in the shallow littoral areas some distance away from the old river channel.

Other potential sites for use of this method may exist within some of the lower lake's embayments (White Oak Creek, Pataula Creek, and Thomas Mill Creek) that have larger tributary streams. Application of land-based herbicide delivery systems have not been included in the cost analysis or benefits for this alternative. Additional analysis would be required for the streams in the lower lake.

Discussions with representatives from the companies that distribute endothall and penoxsulam have indicated consideration of this alternative should proceed with caution because of the large size, depths and physical configuration of Walter F. George Lake. Dye studies should be conducted to fully evaluate the potential effectiveness of this alternative to manage hydrilla.

4.9 RELEASE OF TRIPLOID GRASS CARP ONLY

Grass carp at a minimum of 10-12 inches in length that have been certified to be triploid (i.e., sterile) would be released into Walter F. George Lake. This alternative would depend entirely upon the feeding behavior of grass carp to control the hydrilla infestations and would not include the use of any herbicides.

A stocking rate of 20 to 22 fish per hydrilla vegetated acre would be followed, with the lower rate being used if stocking took place during the cooler months of the year and the higher rate being used if stocking occurred in the more unfavorable warmer months when mortality would be expected to be higher. A high stocking rate is included with the "grass carp only" alternative since this alternative does not include other control methods such as herbicides. This stocking density is based upon an examination of the literature and experience gained for other large multipurpose reservoirs in which grass carp have been used to control hydrilla infestations.

Triploid grass carp have been present in Walter F. George Lake in various densities since the initial stocking in 2007 of 13,440 fish which equated to 8 fish per hydrilla vegetative acre. Although grass carp are already present in Walter F. George, the current stocking rate of 12 fish per vegetative acre is currently insufficient to measurably influence the hydrilla infestations.

The area covered by hydrilla reached a peak in 2007 at 4,000 acres. The acreage was gradually reduced through herbicide treatments, grass carp, and weather conditions until 2015 when it began to increase by 3,577 acres in 2018. Additional maintenance stocking of 12,000 and 35,000 fish were conducted in 2015 and 2017 respectively. As a result, it is projected that the area covered by these plants will be further reduced to 2,100 acres, with the density of coverage of hydrilla-dominated vegetation increasing from 30% to 40% (i.e., 630 acres to 840 acres) within the infested areas. The number of grass carp that would be released with this alternative was calculated using the 2,100-acre estimate. Using that acreage and the above stocking rate, the total number of fish that would be released would range between 42,000 and 46,200 individuals. For the purpose of this analysis, the higher number of fish is used to calculate the cost and to assess the environmental impacts of the initial stocking effort.

Since triploid grass carp would be used, these fish would be sterile and incapable of reproduction. Literature indicates the average lifespan of triploid grass carp to be approximately 10 years, approximately two-thirds the longevity of genetically normal fish (Kirk and Socha 2003). However, predation, disease, migration, and other factors will combine to gradually reduce the number of fish that would remain in the lake each year following the initial release. Mortality rates are low around 5% in the short-term (less than 5 years) and increasing to 20% in the long-term (greater than 10 years) (Zajicek et al. 2009). To assure that an effective population of grass carp remains in the lake, it is assumed that up to 5 fish per hydrilla vegetated acre would be stocked every 3 to 5 years for maintenance control. Using the same 840-acre area representing 40% plant density for hydrilla infested area considered to determine the initial stocking quantities; a total of 4,200 fish would be restocked at 3- to 5-year intervals for maintenance control. The actual maintenance stocking density and time intervals between maintenance stocking events would be based upon prevailing hydrilla growth occurring at the time of release.

Triploid grass carp of 10-12 inches in length are estimated to cost approximately $6.00 per individual. At this price, the initial stocking cost to increase the current estimated population from 41,507 to 46,200 would be $27,923 depending upon the time of year at which the fish would be released. Assuming that maintenance restocking of fish will be required to maintain hydrilla at the desired level of control, a recurring cost of $24,990 would be required every 3 to 5 years. Amortizing these costs over the 30-year period of analysis would produce an average annual costs of $931 for the initial stocking effort and $4,998 for the six individual maintenance restocking efforts that would be required 5, 10, 15, 20, 25 and 30 years following the initial increase in grass carp population. Adding these two amounts results in a total average annual cost of $5,929. It should be noted that it is likely the maintenance re-stocking costs could increase over time due to inflation and other factors. However, because of the uncertainty associated with those factors, the projected maintenance stocking costs are based on a consistent cost of $6.00 per fish.

5.0 POTENTIAL ENVIRONMENT IMPACTS

5.1 FISHERY RESORCES

The proposed action would be beneficial to the fishery resources. Each component of the plan would work in conjunction with one another to control the expansion of hydrilla and the other invasive aquatic plant species in Walter F. George Lake.

Without the recommended plan, the invasive aquatic plants in particular hydrilla would continue to expand and become increasingly detrimental to the fishery resources of Walter F. George Lake. Habitat quality would begin to develop due to the hydrilla infestation resulting in deteriorated water quality, low dissolved oxygen and reduced nutrient availability.

5.2 WILDLIFE RESOURCES

Wildlife resources are not expected to be impacted by the recommended plan.

5.3 LAND USE

The proposed action would not affect land use activities associated with the lake’s recreation areas and operation of the Eufaula NWR.

5.4 WETLANDS

The proposed action would have no impact on wetlands. However, if there were favorable conditions present in the shallow lake areas near the shoreline due to higher rates of sedimentation with sediment accumulation then the development of emergent wetlands could be possible. Resulting in less acreage of wetlands.

5.5 FLOODPLAIN

There would be no impacts to the floodplain associated with the proposed action.

5.6 VEGETATION

The proposed action would not adversely affect submersed aquatic vegetation. Components of the plan would be beneficial to native submersed aquatic vegetation over time as they work to reduce the acreage of the invasive aquatic plant species predominately hydrilla. The plan would also encourage the establishment of native aquatic plants in areas of the lake with depths less than 10 feet.

5.7 ENDANGERED AND THREATENED SPECIES

Federally listed species with potential habitat to occur in the proposed project area are the Red-cockaded Woodpecker, Wood Stork, Eastern Indigo Snake, Gopher Tortoise, Reticulated Flatwoods Salamander, Oval Pigtoe, Purple Bankclimber, Shinyrayed Pocketbook, Georgia Rockcress, Relict Trillium, Michaux's Sumac, and American Chaffseed. Habitat for the Red-cockaded Woodpecker, Wood Stork, Eastern Indigo Snake, Gopher Tortoise, Reticulated Flatwoods Salamander, Relict Trillium, Michaux's Sumac, and American Chaffseed would not be affected by the proposed project.

Listed species with the potential to be impacted by the proposed action are the Oval Pigtoe, Shinyrayed Pocketbook, and Georgia Rockcress. Each of these species has the potential to exist within the habitat of the proposed project area of Walter F. George Lake. The mechanical manipulation component's short-term use of a variety of equipment to cut, pull or shred the invasive aquatic plants at or below the surface of the water could be affected by the equipment if it disturbs the habitat. There is a slight chance some grass carp could escape from the lake and make their way either downstream into Lake Seminole or upstream into the Flint River where they could feed on vegetation in those waterbodies. However, the effects of such an impact would be insignificant and likely not observable.

The USACE, Mobile District has determined that the proposed action may affect, but not likely to adversely affect the Oval Pigtoe, Shinyrayed Pocketbook, and Georgia Rockcress and has requested concurrence from U.S. Fish and Wildlife regarding our determination.

5.8 CULTURAL RESOURCES AND HISTORIC PROPERTIES

As most of the historic properties are situated above the normal pool elevation of 190 feet NGVD, the continued expansion of hydrilla within Walter F. George Lake over the next 30 years, potentially covering 14,600 acres of the lake, should have no impact on the historic properties located on the Project lands within the reservoir pool.
Based on the review of background materials, most historic properties aside from 1BR25 within the project area located away from the shoreline or above the maximum gross pool level of the reservoir. Additionally, no construction or significant ground disturbing activities are required for the Project. While mechanical pulling, cutting, and shredding hydrilla could result in some ground disturbance, this component of the project will only be used in limited cases for "topped out" infestations and will not be employed in the vicinity of historic properties. The USACE has, therefore, determined that this action will result in **no historic properties affected** in accordance with 36 CFR §800.4(d)(1). The results of the literature and records review is summarized in Section 3.2.8 and this information, along with USACE, Mobile's determination of effect, has

been coordinated with both the Alabama and Georgia SHPOs and Federally Recognized Tribes.

5.9 RECREATION

The recommended plan would not be expected to adversely affect recreation activities within Walter F. George Lake. This plan should improve conditions for recreation by allowing for visitors to continue to use the lake in particular for fishing, swimming, boating, canoeing, other water sports and annual fishing tournaments.

5.10 WATER QUALITY

Water quality would not be adversely affected from the chemical treatment component of the recommended plan due to the quantity and frequency of the chemical treatment. As well, the potential for problems with phosphate levels generated by the proposed stocking rate of 20 fish per hydrilla acreage would not be a factor. Therefore, the proposed action would not adversely affect water quality in Walter F. George Lake while preventing the spread of hydrilla or other invasive aquatic plant species.

5.11 AIR QUALITY

The proposed action would have no effect on air quality at Walter F. George or the surrounding areas.

5.12 NOISE

There would be no permanent noise impacts associated with the proposed action. Noise impacts would be temporary, associated with the equipment used to treat the invasive aquatic plants, and cease upon completion of the action.

5.13 AESTHETICS

The proposed action would have positive benefits to aesthetics.

5.14 HAZARDOUS, TOXIC AND RADIOLOGICAL WASTE

The chemical herbicides to be utilized as part of the proposed action are not anticipated to pose any risk to the environment or humans. The herbicides will be stored in approved locations that comply with applicable regulations, standards and policies. The herbicides will be transported, handled, and applied in accordance with U.S. Environmental Protection Agency's approved label instructions. All individuals conducting the herbicide treatments will be certified in the application and knowledgeable of appropriate actions to take should a spill occurs or accidental exposure to the herbicides.

5.15 SOCIOECONOMICS

The proposed action could provide some economic benefits to the area. Benefits could be realized through support of local businesses for the purchase of chemical herbicides as well as the purchase/rental of equipment.

5.16 PROTECTION OF CHILDREN

The Executive Order (EO) 13045, Protection of Children from Environmental Health Risks and Safety Risks (21 April 1997), recognizes a growing body of scientific knowledge that demonstrates that children may suffer disproportionately from environmental health risks and safety risks. These risks arise because children's bodily systems are not fully developed; because children eat, drink, and breathe more in proportion to their body weight; because their behavior patterns may make them more susceptible to accidents. Based on these factors, the President directed each Federal agency to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children. The President also directed each Federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. The proposed action does not pose any disproportionate environmental health risk or safety risk to children.

5.17 ENVIRONMENTAL JUSTICE

The EO 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations (11 February 1994) requires that Federal agencies conduct their programs, policies, and activities that substantially affect human health or the environment in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under such programs, policies, and activities because of their race, color, or national origin. The proposed action will not create disproportionately high or adverse human health or environmental impacts on any low-income or minority populations of the surrounding area.

5.18 CUMULATIVE EFFECTS

The Council of Environmental Quality regulations define cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other action" 40 CFR § 1508.7. Actions considered in the cumulative impacts analysis include implementation of the recommended plan and other Federal, State, Tribal, local or private actions that impact the resources affected by the recommended plan.

Within the project area, various past Federal, State, and private actions have impacted the Walter F. George Lake within the Apalachicola-Chattahoochee-Flint River Basin habitat and natural flow regime including construction of the U.S. Army Corps of Engineers' dams, urban development, agricultural activities, navigation channel maintenance dredging and disposal, small impoundments and water withdrawals. Urban development and agricultural activities have adversely affected water quality and riverine and floodplain habitat. The associated water withdrawals have also impacted the flow regime.

Adverse effects to riverine habitat from continued urbanization and agricultural activities in the basin are reasonably certain to occur. However, state and local governments have regulations in place to minimize these effects, including regulations regarding construction best management practices, stormwater control, and treatment of wastewater.

Therefore, there would be no significant cumulative effects posed by the recommended plan.

6.0 ANY IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS WHICH WOULD BE INVOLVED SHOULD THE RECOMMENDED PLAN BE IMPLEMENTED

The four components of the recommended plan could not be removed and restored to current if future conditions are warranted. Therefore, any irreversible or irretrievable commitments of resources involved in the proposed action have been considered and are either unanticipated at this time, or have been considered and determined to present minor impacts.

7.0 ADVERSE ENVIRONEMNTAL EFFECTS WHICH CANNOT BE AVOIDED

The four components of the recommended plan represents impacts that cannot be avoided should the project be implemented. The impacts, as previously discussed is expected to be minor individually and cumulatively.

8.0 THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USE OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The proposed plan constitutes a short-term use of man's environment and is not anticipated to affect long-term productivity. The recommended plan will reduce the acreage of invasive aquatic plant species predominately hydrilla in Walter F. George Lake.

9.0 COORDINATION

As required by the National Environmental Policy Act, the USACE, Mobile District will coordinate this project with the various local, state, and Federal agencies.

Coordination with the general public will be accomplished by making the EA available through means of a notice of availability being placed on the USACE, Mobile District website and emailing to interested parties. Comments received from the public and agencies on the proposed action will be incorporated into the EA.

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