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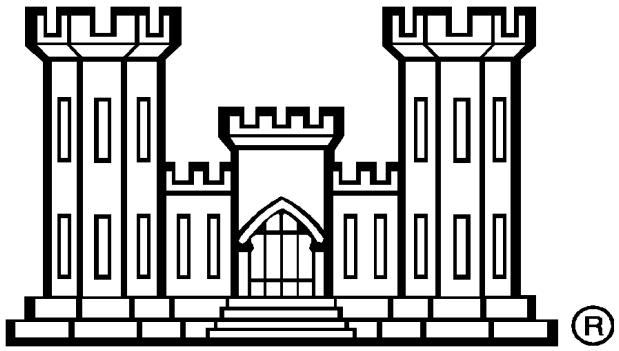
ENVIRONMENTAL ASSESSMENT
REVISED INTERIM OPERATIONS PLAN
FOR SUPPORT OF ENDANGERED AND THREATENED SPECIES
JIM WOODRUFF DAM
GADSDEN AND JACKSON COUNTIES, FLORIDA
AND DECATUR COUNTY, GEORGIA

Prepared by

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



May 2012

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1. INTRODUCTION:

a. Location: Jim Woodruff Dam is located at the confluence of the Chattahoochee and Flint Rivers and marks the upstream extent of the Apalachicola River Navigation project at Navigation Mile (NM) 106.3. The dam can be located on the Chattahoochee, Florida U.S. Geological Survey quadrangle map (Figure 1), in Gadsden and Jackson Counties, Florida, and Decatur County, Georgia. Jim Woodruff Dam is the most downstream dam on the Apalachicola, Chattahoochee, Flint River (ACF) system (Figure 2). Releases from Jim Woodruff Dam are made to the Apalachicola River, which is free-flowing from Jim Woodruff Dam to the Gulf of Mexico, a distance of approximately 106 miles, through Jackson, Gadsden, Liberty, Calhoun, Franklin and Gulf Counties, Florida.

The proposed action directly impacts flows in the Apalachicola River and utilizes the composite conservation storage of the Federal reservoirs within the ACF system. Therefore the project area includes the ACF system upstream of Jim Woodruff Dam and the Apalachicola River, its distributaries, and Apalachicola Bay downstream of Woodruff Dam.

b. Proposed Action: The proposed action is a modification to the Corps' current Revised Interim Operations Plan (RIOP) for Jim Woodruff Dam, which is a component of the water control plan for the ACF system and describes minimum releases describes minimum releases and maximum fall rates for releases from the dam to the Apalachicola River in order to minimize or avoid adverse impacts or provide support to endangered and threatened species and critical habitat which occur on the Apalachicola River. The Corps re-initiated consultation on the RIOP in November 2010 based on new information about the distribution and mortality of endangered fat threeridge mussels in the Apalachicola River. A Revised Amended Biological Assessment describing the proposed action and its effects on listed species was submitted to the U.S. Fish and Wildlife Service (USFWS) on 14 February 2012. The proposed action is based on numerous conference calls and coordination meetings between the Corps and USFWS since the re-initiation began. The intent of the modifications is to further minimize or avoid adverse effects on listed species as a result of Corps' discretionary operations in making releases from Jim Woodruff Dam, while still maintaining storage opportunities and/or reductions in the demand of storage in order to provide continued support to project purposes, minimize impacts to other water users, and provide greater assurance of future sustained flows for species and other users during a severe multi-year drought. The proposed modifications to the RIOP include 1) elimination of the use of volumetric

balancing as described in the May 16, 2007 letter to USFWS; 2) minimum flow releases will match basin inflow when basin inflow is between 5,000 and 10,000 cubic feet per second (cfs) during the months of June through November (this provision is suspended during drought contingency operations); 3) drought contingency operations are not suspended and normal operations reinstituted until such a time as the composite conservation storage has recovered above Zone 2 into Zone 1; 4) when releases are within powerhouse capacity and less than 10,000 cfs the maximum fall rate is limited to 0.25 feet per day (ft/day) or less; and 5) in accordance with RPM 2008-4 of the RIOP BO (USFWS 2008), formal adoption of an additional Gulf sturgeon spawning season (March-May) provision which ensures that river stage declines of 8 feet or more will not occur in less than 14 days when river flows are less than 40,000 cfs (under both normal and drought operations). The proposed action is not a new water control plan for Woodruff Dam or the ACF system; it is a definition of discretionary operations within the limits and rule curves established by the existing water control plan.

The Corps operates five Federal reservoirs on the ACF as a system, and releases made from Jim Woodruff Dam under the proposed action reflect the downstream end-result of system-wide operations as measured by daily releases from Woodruff Dam into the Apalachicola River. The proposed action does not address operational specifics at the four federal reservoirs upstream of Woodruff or other operational parameters at these reservoirs, except for the use of the composite conservation storage of the system and releases from the upstream reservoirs as necessary to assure releases from Jim Woodruff Dam to provide support for and minimize adverse impacts to endangered or threatened species or critical habitat. Like the current RIOP, the proposed action specifies two parameters applicable to the daily releases from Jim Woodruff Dam: a minimum discharge (daily average in cfs) and maximum fall rate (vertical drop in river stage measured in feet/day). Also like the current RIOP, the proposed action places limitations on refill, but does not require a net drawdown of composite storage unless basin inflow is less than 5,000 cfs and during some down ramping periods. The RIOP describes the flow rates as minimum, and not target, releases for Jim Woodruff Dam. During wet periods, releases may substantially exceed the RIOP values, but during dry periods, releases will more closely match the RIOP values in order to conserve reservoir storage for authorized project purposes and future endangered and threatened species needs.

Operations under the proposed action will be implemented and continued until such time as additional formal consultation may again be initiated and completed, either in association with the proposed update and revision of water control plans for the ACF system, or sooner if conditions change or additional information is developed to again justify a possible revision to the RIOP. The most recent approved Water Control Manual for the ACF system is dated 1958. However, a draft Water Control Manual for the ACF was completed in 1989. Since that time, operations have been conducted in accordance with the draft Water Control Plan, with minor adjustments as necessary in recent years to accommodate current needs, such as operations in support of fish and wildlife and endangered and threatened species. The 1989 draft Water Control Manual has not been finalized due to ongoing litigation, beginning with a lawsuit filed by the State of Alabama

in 1990 and followed by several different lawsuits filed by additional parties. The Corps, Mobile District was directed by the Secretary of the Army in 2008 to update and revise the ACF Water Control Manual and to prepare all documentation required by the National Environmental Policy Act (NEPA). It is expected that any update of water control plans would include additional formal consultation under Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq*.) and additional NEPA documentation regarding system operations. In June 2011, a three-judge panel of the Eleventh Circuit reversed a 2009 district court decision, and directed that the case be remanded to the Corps to reconsider and make a final determination as to its legal authority to operate the Buford Project to accommodate Georgia's water supply request. The Corps is complying with the Eleventh Circuit's order to determine its authority. Separately, the Corps is continuing to work to update the ACF Water Control Manual and prepare an Environmental Impact Statement (EIS) for system operations. A detailed description of the proposed action and how it modifies the current RIOP is provided in the "DESCRIPTION OF THE RECOMMENDED PLAN**"** section below.

Figure 1. Jim Woodruff Dam Location

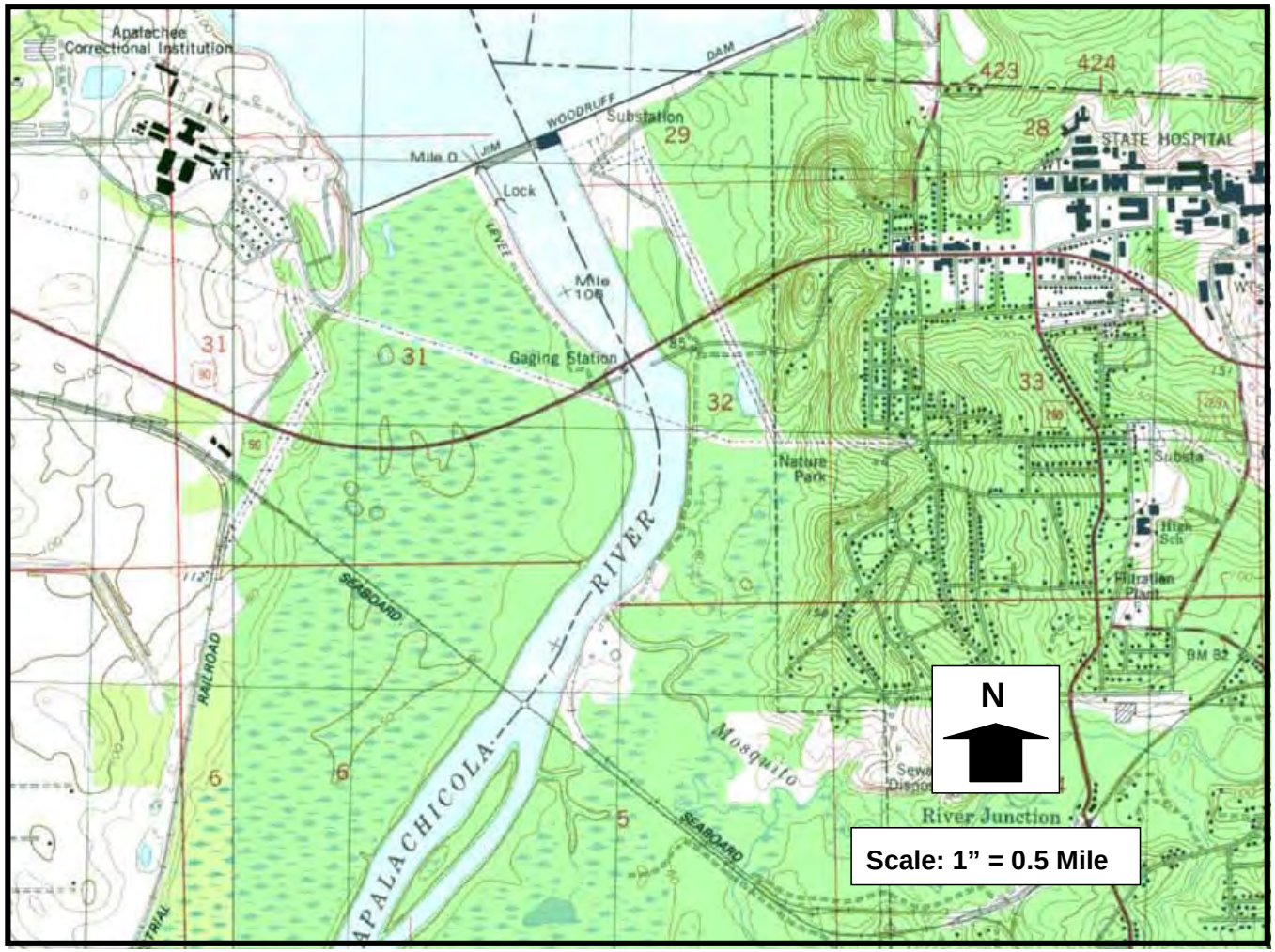
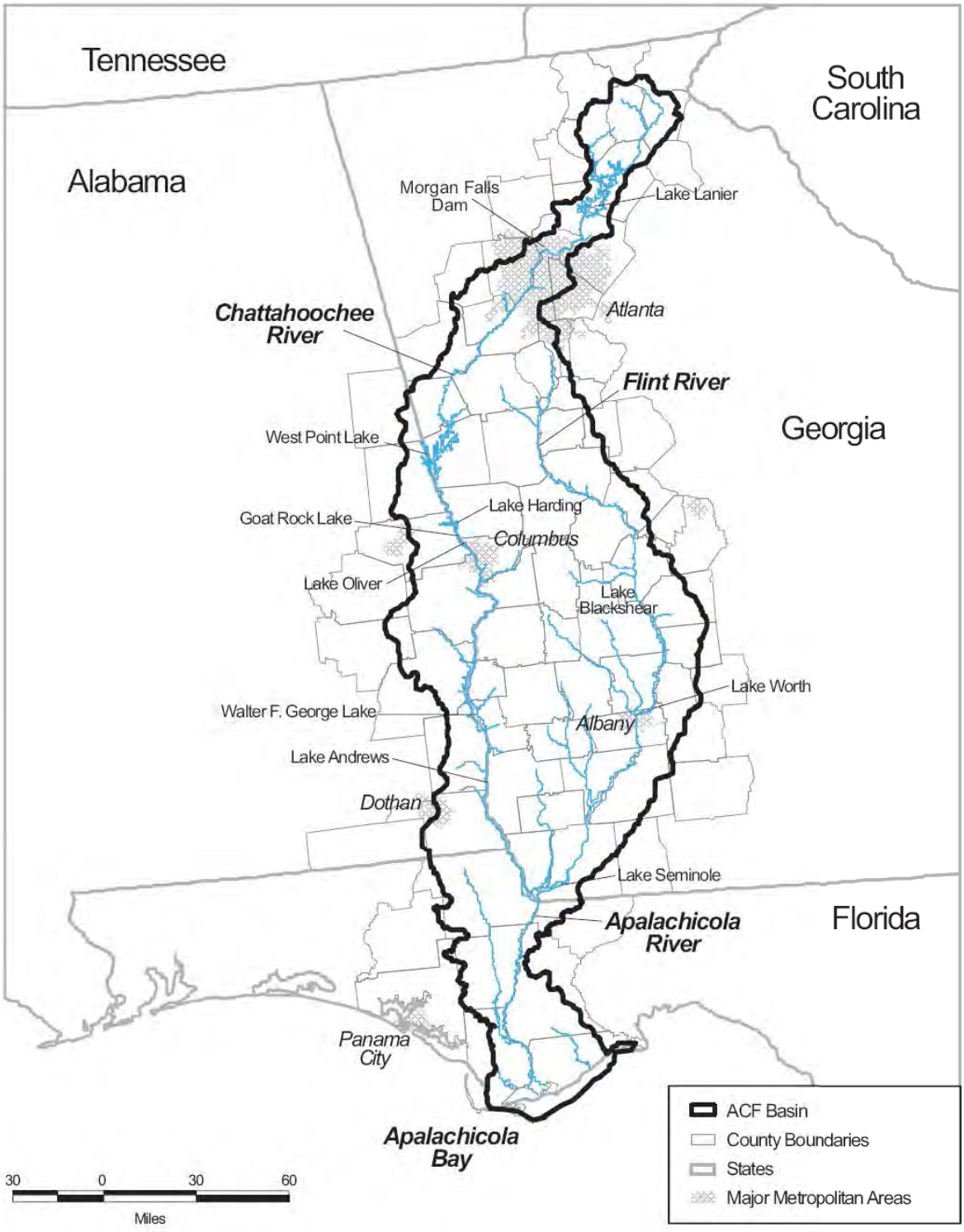


Figure 2. ACF Basin



c. Purpose and Need for the Proposed Action: The Corps re-initiated consultation on the RIOP in November 2010 based on new information about the distribution and mortality of endangered fat threeridge mussels in the Apalachicola River. During the re-initiated consultation, opportunities to further avoid and minimize impacts to the federally endangered fat threeridge (*Amblema neislerii*), federally threatened purple bankclimber (*Elliptoideus sloatianus*), and federally threatened Chipola slabshell (*Eliptio chipolaensis*) mussels; and their designated critical habitat in the Apalachicola River were realized. The purpose of the proposed action is to adopt these modifications into the current RIOP governing releases to the Apalachicola River from Jim Woodruff Dam. A Final Biological Opinion (BO) and Incidental Take Statement for the proposed action was issued by the USFWS, Panama City Field Office on 22 May 2012 (Appendix A).

d. Authority: A Federal interest in the Apalachicola-Chattahoochee-Flint River basin dates to the 1800's when river improvements for navigation were authorized under the River and Harbor Act of 1874. The River and Harbor Acts of 1945 and 1946 provided for the initiation of construction of the Apalachicola River navigation project and a series of multipurpose reservoirs on the system. Modifications of this plan have resulted in the completion of five Corps dams in the basin, four on the Chattahoochee River, and one at the confluence of the Chattahoochee and Flint Rivers. The Buford and Jim Woodruff projects were completed in the late 1950's, the Walter F. George and George W. Andrews projects in 1963. The West Point project was completed in 1984 (operations began in late 1974), pursuant to authorization by the River and Harbor Act of 1962 (Title I) and the Flood Control Act of 1962 (Title II). These projects are operated as a system to provide the authorized project purposes of flood control, fish and wildlife conservation, navigation, hydroelectric power, water supply, water quality, and recreation.

The Endangered Species Act of 1973 (P.L. 93-205) requires consultation with the Department of the Interior, Fish and Wildlife Service or the National Oceanic and Atmospheric Administration, National Marine Fisheries Service and provides authority for operating Federal projects to protect endangered and threatened species.

2. AFFECTED ENVIRONMENT:

a. General Environmental Setting. The ACF basin drains 19,800 square miles in parts of southeastern Alabama, northwest Florida, and central and western Georgia. About 74 percent of the ACF basin lies in Georgia, 15 percent in Alabama, and the remaining 11 percent in Florida. The basin extends approximately 385 miles from the Blue Ridge Mountains to the Gulf of Mexico and has an average width of approximately 50 miles. The basin covers 50 counties in Georgia, 8 counties in Florida, and 10 counties in Alabama.

The ACF system empties into the Gulf of Mexico. The main tributaries of the basin are the Chattahoochee and Flint Rivers. These tributaries merge at Lake Seminole to form the Apalachicola River near the State lines of Florida and Georgia. The Apalachicola River flows into the Gulf of Mexico at Apalachicola Bay.

The ACF basin is a dynamic hydrologic system containing interactions between aquifers, streams, reservoirs, floodplains, and estuaries. Water resources in the ACF basin have been managed to serve a variety of purposes, including navigation, hydroelectric power, flood control, water quality, fish and wildlife conservation, water supply, and recreation. There are 16 reservoirs on the mainstems of the Apalachicola, Chattahoochee, and Flint Rivers (5 Federal and 11 non-Federal projects), which have altered the natural streamflow and provided potential for water supply improvements and recreational opportunities for the public in addition to other project purposes in these resource areas. The interrelationship between operation of the dams and the resulting river flows has resulted in a highly regulated system over much of the basin. The principal rivers, particularly in the lower half of the basin, receive a substantial contribution of water from groundwater baseflow during dry times (Comprehensive Water Resources Study Partners, 1995).

The ACF basin is characterized by a warm and humid, temperate climate due to its latitude, altitude, and proximity to the Gulf of Mexico. Average annual temperature ranges from about 60^{o} Fahrenheit (F) in the north to 70^{o}F in the south. Average daily temperatures in the ACF basin range from about 40 to 50^{o}F in January to 75 to 80^{o}F in July. Summer temperatures are typically in the 70s to the 90s. Freezing temperatures in winter occur for only short periods (USGS, 1996).

Precipitation is highest at the north end of the basin in the mountains and at the south end of the basin near the Gulf of Mexico. Average annual precipitation is about 60 inches per year at both the north and south ends of the basin. The east-central part of the basin receives less precipitation, with an annual average of 45 inches (USGS, 1996). Precipitation varies substantially on an annual basis, however. Precipitation is generally highest in late winter and early spring, and then again in mid- to late summer, when tropical depressions and tropical storms occasionally track up the basin.

Over half the water that falls as precipitation in the ACF basin is returned to the atmosphere as evapotranspiration (direct evaporation plus transpiration by plants). Evapotranspiration ranges from about 32 to 42 inches of water per year in the ACF basin, generally increasing from north to south (USGS, 1996). Average annual runoff basinwide ranges from 12 to 40 inches (or about 25 to 65 percent of average annual precipitation). Runoff is greatest in the Blue Ridge Mountains and near the Gulf coast (USGS, 1996).

The Corps operates the following five dams in the ACF River Basin, in downstream order: Buford, West Point, Walter F. George, George W. Andrews, and Jim Woodruff. All are located wholly on the Chattahoochee River arm of the basin except the downstream-most dam, Woodruff, which is located immediately below the confluence of the Chattahoochee and Flint rivers and marks the upstream extent of the Apalachicola River. Andrews is a lock and dam without any appreciable water storage behind it, but Buford, West Point, Water F. George, and Woodruff dams are impound reservoirs (Lakes Lanier, West Point, Walter F. George, and Seminole, respectively) with a combined conservation storage capacity (relative to the top of each reservoirs' full summer pool) of

about 1.6 million acre-feet (1,087,600 acre-feet at Lanier; 306,100 acre-feet at West Point, and 244,400 acre-feet at W.F. George). Because Jim Woodruff Dam/Lake Seminole is operated essentially as a run-of-river project, only very limited storage is available for support of project purposes. For about half of its length, the Chattahoochee River forms the boundary between Georgia and Alabama. Lake Seminole straddles the boundary between Florida and the southwest corner of Georgia.

The ACF system of reservoirs are operated to provide for the authorized purposes of flood damage reduction, fish and wildlife conservation, navigation, hydroelectric power, water supply, water quality, and recreation. Flow must be stored during wetter times of each year, and released from storage during drier periods of each year in order to provide these authorized purposes. In general this means that water is stored in the lakes during the spring, and released for authorized project purposes in the summer and fall months. However, storage is managed year-round, throughout the system to achieve authorized project purposes. The flood damage reduction purposes at certain reservoirs requires drawing down reservoirs in the fall through winter months to store anticipated flood waters and refilling of pools in the spring months to be used for multiple project purposes throughout the remainder of the year. The multiple, complex water demands on the system require that the Corps operate the system in a balanced operation in an attempt to meet all authorized purposes, while continuously monitoring the total system water availability to insure that project purposes can be achieved to the extent possible during critical drought periods. In order to help do this, the Corps has defined four (4) Action Zones in each of the major ACF storage projects of Buford, West Point, and Walter F. George. Action Zone 1 is the highest in each lake, and defines a reservoir condition where all authorized project purposes can be achieved. As lake levels decline, Action Zones 2 through 4 define increasingly critical system water shortages, and guide the Corps in reducing flow releases as pool levels drop as a result of drier than normal or drought conditions. The Action Zones also provide a guide to the Corps to help balance the remaining storage in each of the three major storage reservoirs. The following describe each of the authorized project purposes in more detail:

1. Flood Damage Reduction. Flood Damage Reduction is achieved by storing damaging flood waters, in order to regulate flows and reduce flood damage. Of the five (5) Corps reservoirs, only the Buford (Lake Lanier) and West Point projects were designed with space to store flood waters. In addition to providing for space above the conservation pool to hold flood waters throughout the year, the Buford project is drawn down one (1) additional foot, and the West Point project is drawn down at least seven (7) additional feet beginning in the Fall season, through winter and into the early Spring season to provide additional capacity to protect life and property within the basin.

2. Fish and Wildlife. In addition to providing for minimum flow and water quality releases, the Corps operates the system in conjunction with other authorized purposes to provide favorable conditions for annual fish spawning, both in the reservoirs and the Apalachicola River. In most water years (1 October – 30 September) it is not possible to hold both lake levels and river stages at a steady or rising level for the entire spawning period, especially when upstream lakes and/or the Apalachicola River

spawning periods overlap. During the fish spawning period for each specific water body, the goal of the Corps is to operate for a generally stable or rising lake level and a generally stable or gradually declining river stage on the Apalachicola River for approximately 4 to 6 weeks during the designated spawning period. When climatic conditions preclude a favorable operation for fish spawn, the Corps consults with the State fishery agencies and the USFWS on balancing needs within the system and minimizing the impacts of fluctuating lake or river levels. These fish spawn operations were incorporated into a draft Mobile District Standard Operating Procedure (CESAM SOP 1130-2-9) in February 2005, following consultation since 2002 with USFWS and state fishery management agencies from Alabama, Florida and Georgia. In addition to fish spawn, the Corps has been in Informal Consultation with the USFWS since 2000, and entered into Formal Consultation in March 2006, November 2007, April 2008, and November 2010 regarding the Gulf Sturgeon and protected mussel species (fat threeridge, purple bankclimber, and Chipola slabshell) in the Apalachicola River. A final BO determining no jeopardy associated with the proposed action and an Incidental Take Statement for the listed mussel species was issued by the USFWS, Panama City Field Office on 22 May 2012 (Appendix A). The proposed action implements the modifications to the current RIOP evaluated in the BO and determined to be necessary to further minimize or avoid adverse effects on listed species as a result of Corps' discretionary operations at Jim Woodruff Dam, while still maintaining storage opportunities and/or reductions in the demand of storage in order to provide continued support to project purposes, minimize impacts to other water users, and provide greater assurance of future sustained flows for species and other users during a severe multi-year drought.

3. Navigation. Congress has authorized the Corps to maintain a 9-foot deep by 100-foot wide waterway from Apalachicola, Florida to Columbus, Georgia, on the Chattahoochee River, and to Bainbridge, Georgia on the Flint River. Conditions on the Apalachicola River have been such in recent years that a 9-foot deep channel has not been available for much of the year. Due to deteriorating channel conditions and limited channel availability during the low flow months, navigation windows were routinely scheduled during the low flow months in the 1990s. Navigation windows were comprised of storing water in the upstream reservoirs for several weeks, and then making increased releases for a 10-day to 2-week period to allow commercial barge navigation to make a round-trip up river for scheduled delivery of commodities. Concerns were raised regarding the fluctuations of both reservoir and river stages associated with navigation window releases, and the continued use of navigation windows became increasingly controversial, especially during sustained low flow periods when observed fluctuations were more extreme. As a result of fluctuating river stages during navigation windows, gradual ramping rates were developed in coordination with the USFWS and Florida Fish and Wildlife Conservation Commission, with the goal to provide for ramping down rates of not more than ½ foot per day during fish spawn activities, and no more than one foot per day during other periods of the year, whenever flows were below 20,000 cfs. The last navigation window was provided in the Spring of 2000, and precipitated complaints that the navigation window was scheduled during the period of fish spawn and had adversely impacted both reservoir and riverine fish spawn activities. No navigation windows have

been scheduled since that time. Dredging on the Apalachicola River also was reduced since the 1980s due to a lack of adequate disposal area capacity in certain reaches of the river. No dredging was conducted in 2000 or 2002 due to sustained drought conditions in the basin, and only very limited dredging was conducted in 2001 and then shutdown due to sustained low flow conditions. No dredging has been conducted since that time, for a variety of reasons related to flow or funding levels, and currently has been indefinitely deferred due to denial of a Section 401 water quality certificate from the State of Florida and recent congressional language that limits funding for dredging operations in the ACF basin. Depths in the Apalachicola River navigation channel have been unreliable for navigation, and commercial navigation has only been possible on a seasonal basis when flows in the river are naturally high, with flow support for navigation suspended during drier times of the year. On a case-by-case basis, limited releases for navigation have been made for special shipments when a determination can be made that other project purposes will not be significantly impacted and any fluctuations in reservoir levels or river stages would be minimal.

4. Hydroelectric Power. The Buford, West Point, Walter F. George, and Jim Woodruff projects include hydroelectric power plants as part of those projects. The installed/operating/marketable capacity of these four (4) ACF plants is 424/413/366 megawatts. Through the Department of Energy's Southeastern Power Administration (SEPA), these power plants provide power to over 300 preference customers throughout the Southeastern United States. Hydroelectric power generation is achieved by releasing water through hydropower generating turbine units. The Buford, West Point, and Walter F. George projects are operated as "peaking plants", meaning that releases are timed to generate electricity during the peak demand periods of each day and week. Hydropower is also generated at other times at these three plants and at Jim Woodruff Dam, where the turbines are operated continually. During dry periods, as the lake levels drop below Zone 1, hydroelectric power generation is reduced proportionally as pool levels decline to as low as 2 hours per day generation at each "peaking plant" project during extreme low flow conditions. Peak generation may be eliminated or limited to conjunctive releases during severe drought conditions.

The main hydropower units and small house unit intakes at Buford Dam/Lake Lanier are located at elevation 919 feet above mean sea level (msl). However, severe cavitations would occur in the main hydropower units when the water surface falls to 1035 ft msl or below, at which time the units would have to be taken out of service.

Because it does not have the ability to store appreciable amounts of flow, the Jim Woodruff plant is operated essentially as a "run-of-the-river" plant where most or all inflows are passed continuously and electricity is generated around the clock. The current RIOP, includes a limited hydropower peaking operation at Jim Woodruff Dam when daily average releases are less than the combined capacity of the powerhouse turbines (about 16,000 cfs) in order to deliver extra power during hours of peak demand for electricity. These peaking releases are included in the daily average discharge computations for the RIOP minimum flow provisions. The peaks are also included in the stage computations for the RIOP maximum fall rate schedule; however, the maximum

fall rate schedule addresses the difference between the average river stage of consecutive calendar days, not the shorter-term differences that result from peaking operations within a calendar day. The relative drop in river stage from the peak to the base release will vary with different flows, but becomes more pronounced as flows decline, typically not more than 2.5 foot fluctuation per day above the base flow. The current RIOP includes a provision that discontinues peaking operations at the Jim Woodruff plant as average daily releases approach 6,000 cfs, in order to maintain instantaneous releases greater than or equal to the 5,000 cfs minimum flow requirement.

5. Water Supply. Various municipal and industry (M&I) entities withdraw water directly from Lake Lanier and others withdraw directly from the Chattahoochee River downstream of Lake Lanier. Water releases to the Apalachicola River are also impacted by agricultural water withdrawals on the Flint River. Agricultural demands vary depending on the climatic conditions, but are generally 1.5 to 2 times the withdrawals for M&I (USFWS, 2012). Water withdrawals within the State of Georgia are made pursuant to water withdrawal permits issued by the Georgia Department of Natural Resources. Previous water supply contracts issued by the Corps for withdrawals from Lake Lanier expired by 1990 and have not been re-issued. No storage within the ACF projects is currently allocated to water supply.

Gwinnett County has multiple elevation intakes ranging from 1062, 1045, and 1025, and has withdrawn from the 1025 intake (within the inactive storage zone) for many years.

City of Cumming intakes range from elevation 1053 down to 1032, but the lowest intake is in a “hole” surrounded by lake bottom at elevation 1045. They are currently making adjustments to that intake that should allow withdrawals down to elevation 1032.

City of Buford intakes are at elevations 1062, 1052, 1042, and 1032. The 1032 intake did have some sediment buildup around it, but that has been removed so that the intake is functional if needed.

City of Gainesville has three intake structures, each with multiple intake ports ranging from elevation 1063 down to 1025 (within the inactive storage zone).

Releases through Buford Dam regulate flows in the Chattahoochee River and enable reliable water supply withdrawals downstream at Atlanta. Flow regulation provides benefits for water supply and other purposes throughout the ACF system.

Flow releases also support cooling water withdrawals for several industries including critical power plants, such as the Farley Nuclear Plant which requires a minimum elevation of 74.5 ft msl and the Plant Scholz located immediately downstream of Jim Woodruff Dam which requires a minimum flow of 5,000 cfs but can temporarily operate at water elevation of 37.5 ft msl (equivalent to flows of 4200 cfs)

6. Water Quality. Buford, West Point, and Jim Woodruff dams all include water quality operations to provide continuous flow releases. Walter F. George has no

minimum flow provision; however, when low dissolved oxygen (DO) values are observed below the dam, spillway gates are opened until DO readings return to an acceptable level. Occasional special releases are also made at Buford to insure adequate DO and water temperature at the Buford Fish Hatchery located downstream of the dam. Additionally, self-aspirating turbines were recently installed at Buford to improve DO levels downstream. At Buford Dam the small turbine-generator is run continuously to provide a minimum flow from the dam of approximately 600 cfs. At West Point Dam, a similar small generating unit provides a continuous release of approximately 675 cfs. In addition to these flows, Buford Dam is operated in conjunction with the downstream Georgia Power Dam at Morgan Falls to insure a minimum instream flow of 750 cfs on the Chattahoochee River at Peachtree Creek to meet State water quality commitments. Currently a 5,000 cfs (4,500 cfs during the most severe drought conditions) minimum flow is maintained as a release from the Jim Woodruff Dam to the Apalachicola River, which assures an adequate water supply for downstream industrial use. No water quality problems below Jim Woodruff Dam have been identified in the Apalachicola River in association with project operations. However, the record drought conditions experienced during much of 2006-2008, resulted in salinity changes in Apalachicola Bay and increased water temperatures and associated localized dissolved oxygen changes due to extended periods of low flow.

Although there is no Corps requirement to maintain minimum flows for assimilative capacity at Columbus, GA, the Georgia Power Projects above Columbus are required in their Federal Energy Regulatory Commission (FERC) licenses to provide 1850 cfs weekly average, 1350 cfs daily average, and 800 cfs instantaneous minimum flow at Columbus. Releases from the Georgia Power Project are dependent on upstream releases from West Point Dam. Georgia Pacific and Farley Nuclear Plant located below George W Andrews Dam have stated a requirement of 2,000 cfs for assimilative capacity needs.

The Florida Department of Environmental Protection (FDEP) monitors salinity levels at several locations in the Apalachicola Bay system throughout the year and data collected during previous drought periods documents the impact of extended low river flow on salinity levels in the bay. Dataloggers located at Cat Point (an oyster bar on the western end of St. George Sound), Dry Bar (an oyster bar on the eastern end of St. Vincent Sound), and Upper East Bay (the northeastern end of East Bay) indicated that all three locations experience relatively high salinity levels during extended periods of low river flow. Oyster mortality during extended drought periods has been attributed to dermo (disease) and predation which is exacerbated by the high salinities and high water temperatures that can occur as a result of reduced fresh water flows from the river that cool down the bay.

Although water temperature or DO data in the Apalachicola River is limited, it is reasonable to assume that the maintenance of an approximately 5,000 cfs flow for an extended period during the hottest months of the year results in increased water temperature and localized declines in DO. The most extreme examples of this would occur in shallow backwater areas with little or no connection to the main channel of the river and in shallow isolated pool habitat occurring in distributaries that no longer have a

hydrological connection to the main channel of the river. However, it should be noted that the exceptional drought conditions that have occurred periodically over the last decade would have resulted in "natural flows" less than 5,000 cfs if the storage from the upstream reservoirs had not been used to augment basin inflow in order to maintain the 5,000 cfs minimum flow. Therefore, the extended low river flow conditions that occur during these events are attributable to hydrology and not discretionary operations at Corps' reservoirs.

According to the FDEP Notice of Intent for FDEP Permit No. 0129424-001-DF (3 December 1998), the majority of the Apalachicola River is designated as Class III waters, which support the designated uses of recreation, and propagation and maintenance of a healthy, well-balanced population of fish and wildlife. The Apalachicola River is also designated as an Outstanding Florida Water (waters of exceptional recreational or ecological significance). Seasonal flooding of the Apalachicola River provides freshwater flows and significant quantities of nutrients and organic matter to the Apalachicola Bay estuary, which are necessary to maintain salinity gradients and support biological productivity within the estuary.

As described in the May 2012 BO, although the State standards adopted consistent with the U.S. Environmental Protection Agency (EPA) criteria generally represent levels that are safe for sturgeon and mussels, these standards are sometimes violated. Point and non-point source pollution have contributed to impaired water quality in the Apalachicola and Chipola rivers resulting in several segments of the rivers within the action area failing to fully serve the designated uses. The impairments identified include turbidity, coliforms, total suspended solids, dissolved oxygen (DO), biology, and unionized ammonia (FDEP 1998 and 2003). Elevated coliform bacteria counts are not known to harm Gulf sturgeon or freshwater mussels; however, elevated unionized ammonia and low DO are associated with adverse effects to fish and mussels (USFWS, 2012). The 5-Year Review for seven listed mussel species (including the three occurring in the action area) published by the USFWS in 2007 states that recent studies have demonstrated early life stages of mussels are generally more sensitive to copper and ammonia than other organisms and that current EPA criteria for copper and ammonia are not protective of mussels (USFWS, 2007). The 5-Year Review also noted that these early life stages may be particularly sensitive to pesticides and herbicides such as glyphosate and atrazine (USFWS, 2007). Mercury-based fish advisories apply to one or more segments of both watersheds, and organochlorine pesticides were found at levels in ACF Basin streams that often exceeded chronic exposure criteria for the protection of aquatic life (FDEP 2002; Frick et al. 1998).

The Apalachicola River is a fast flowing river that is turbid due to the load of suspended floodplain materials and upstream agricultural runoff. Point and non-point source pollution has also contributed to impaired water quality in the Apalachicola River and Chipola River in the project area. Predominant land uses in the drainage area of the Apalachicola River in Florida include upland forests (53.5 percent), wetlands (30.5 percent), agriculture (8.4 percent), and urban/built-up (2.1 percent). The North West Florida Water Management District (NWFWMD) has completed a study of 12 watersheds in the Apalachicola drainage basin to determine relationships between land

use and water quality (Thorpe et al. 1998). Very few water quality differences were noted between silviculture-dominated and naturally forested watersheds. Agriculture-dominated watersheds showed higher loading than natural and silviculture rates for a number of nutrients, such as unionized ammonia, nitrate-nitrogen, total nitrogen, and total phosphorus (Thorpe et al. 1998).

7. Recreation. The ACF basin contains approximately 2 million acres of public lands and resource protection areas including heavily used federal reservoirs, national forests, national and state parks, and resort communities. The five Corps projects in the basin account for 235,291 total acres of land and water. The Corps is authorized to provide or permit the construction of recreational facilities on the grounds of Corps projects, and to provide water access at Corps reservoirs. A wide variety of recreational opportunities are provided at these lakes including boating, fishing, picnicking, sightseeing, water skiing, and camping. These reservoirs support popular sport fisheries, some of which have achieved national acclaim for trophy-size catches of largemouth bass.

Recreation in the Apalachicola River is based primarily on its warm water fishery. Bass, sunfish and catfish are the preferred game species. Public and private land holdings are located throughout the Apalachicola River basin. Significant portions of the Apalachicola River floodplain are owned and managed as natural resource areas by the NWFWMD; the Florida Fish and Wildlife Conservation Commission (FWCC) (Lower Apalachicola River Basin Environmentally Endangered Lands); U.S. Forest Service (Apalachicola National Forest); Florida Department of Environmental Protection (Three Rivers State Recreation Area, Torreya State Park and the Apalachicola National Estuarine Research Reserve); and The Nature Conservancy (Apalachicola Bluffs and Ravines Preserve, “Garden of Eden”). These publicly held lands include wildlife management areas, reserves, refuges, forests, state parks, recreation areas, conservation lands and special feature sites that are used for hunting, as well as non-consumptive recreational uses such as hiking, nature study, and picnicking.

Apalachicola Bay is part of the Apalachicola National Estuarine Research Reserve and thus provides educational and recreational opportunities as well.

All of the Corps lakes have become important recreational resources on the ACF system. Of these projects, Lake Lanier (Buford Dam) is one of the most visited Corps of Engineers’ lakes in the entire United States. The West Point and Walter F. George lakes also rank among the top ten most visited Corps lakes in the United States. A wide variety of recreational opportunities are provided at the lakes including boating, fishing, picnicking, sightseeing, water skiing, and camping. The economic benefits of recreation at the lakes is significant resulting in visitor spending in 2005 of over $125 million at Lake Lanier, $36 million at West Point, and $111 million at Walter F. George. Recreation occurs primarily from May to September. This period corresponds to the dryer months of the year, when inflows decrease and the Corps must release water from storage to achieve other authorized project purposes, according to the ACF system design. Thus, lake levels can and do decline during the primary recreation period,

particularly during drier than normal years. Based on current usage patterns, recreation impact levels have been identified for various lake elevations at each of the reservoir projects (Table 1).

Table 1. Recreation Impact Levels

Corps Project	First Impact Level	Second Impact Level
Lake Lanier (msl)	1066	1063
West Pont (NGVD)	632.5	629
Walter F. George (NGVD)	187	185
Lake Seminole (msl)	76	NA

The first impact level is generally characterized by marginal impacts to designated swimming areas, increased safety awareness regarding navigation hazards, minimal impacts to Corps boat ramps, and minimal impacts to private marina and dock owners. More substantial impacts begin to occur at the second impact level and continue as lake elevations drop due to drought conditions.

b. Significant Resource Description. As described above, the Corps operates the five Federal reservoirs on the ACF as a system, and releases made from Jim Woodruff Dam reflect the downstream end-result of system-wide operations. Therefore, the significant resource description and associated impacts to significant resources sections will primarily focus on the resources in the Apalachicola River and Bay system downstream of the dam. However, a general discussion of the upstream reservoir resources (specifically those related to authorized project purposes) is included also.

1. Fishery Resources. The ACF reservoirs support popular sport fisheries, some of which have achieved national acclaim for trophy-size catches of largemouth bass. Important game species in the Federal reservoirs include crappie, largemouth bass, spotted bass, striped bass, walleye, white bass, gizzard shad, hybrid bass (striped bass-white bass hybrid), threadfin shad, bluegill, and redear sunfish.

Warm water fisheries characterize the Apalachicola River. The Apalachicola River and adjacent floodplain tributaries and distributaries support a remarkable assemblage of freshwater fish species from 22 taxonomic families (Appendix B). Over 180 species of fish have been documented from the river and bay system including eight anadromous species, four endemic species and seven introduced species (NERRS 2005). Anadromous fish species that utilize the river during part of their life cycle include the Gulf sturgeon, Gulf striped bass, Alabama shad, and skipjack herring. The Apalachicola River supports the last remaining native breeding population of the Gulf striped bass. The mouths of cool water springs and other off channel deep-water habitats are used as thermal refugia by the striped bass, and possibly by Gulf sturgeon and other fish species during warm water months. Entrenchment of the river has impacted access to a number of these important refuge areas, especially in the upper river. Approximately 80 to 85 percent of the freshwater fish species collected in the Apalachicola River are known to inhabit floodplain habitats. Numerous species are tolerant of still water habitats and low

dissolved oxygen levels and utilize isolated floodplain ponds and disconnected stream segments in the floodplain during low water conditions. A number of other fish, including suspected host fish for the listed mussels, utilize the inundated floodplain during high water events as habitats for spawning, feeding, shelter from predators, or as nursery grounds (Light et al. 1998).

The Apalachicola Bay estuary is considered one of the most important commercial fishing resources in North America. The primary commercial fishery species in the estuary include American oyster, penaeid shrimp (brown, white, and pink shrimp), blue crab, and estuarine and marine fish species such as striped mullet, speckled trout, menhaden, red drum, flounders and sharks (NERRS 2005). The most abundant of the true estuarine fish species (resident throughout entire life cycle) in the bay estuary is the bay anchovy.

2. Essential Fish Habitat. The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) mandates designation and protection of essential fish habitat (EFH). EFH is defined as … "those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity." The designation and conservation of EFH seeks to minimize adverse effects on habitat caused by fishing and non-fishing activities. The National Marine Fisheries Service (NMFS) has identified EFH habitats for the Gulf of Mexico in its Fishery Management Plan Amendments. These habitats include estuarine areas such as estuarine emergent wetlands, seagrass beds, algal flats, mud, sand, shell and rock substrates, and the estuarine water column. EFH in the project area includes the Apalachicola River/Bay system up to the limit of permanent fresh water. Species managed by NMFS under the Fishery Management Plan that occur in the area of influence for the project include red drum; gray snapper; brown, white, and pink shrimp; and Gulf stone crab.

3. Wildlife Resources. The wildlife assemblages found in the ACF basin vary greatly with the vegetative community, although some generalist species occur throughout the basin in a number of habitat types. Habitat types within the basin include mixed hardwood forests, rock outcrops, grasslands, longleaf pine-turkey oak sandhill communities, bottomland hardwood forests, and maritime communities.

The Apalachicola River floodplain provides natural habitat to a large number of rare, endangered and endemic plant and animal species. The highest species density of amphibians and reptiles in North America north of Mexico occurs in the basin. The Apalachicola River basin is home to more than 40 species of amphibians and 80 species of reptiles including the southern dusky salamander, the gopher frog, Barbour's map turtle (which is endemic to the Apalachicola River), Apalachicola kingsnake and eastern indigo snake (NERRS 2005).

Mammals are also abundant within the basin and Apalachicola Bay. More than 50 species are found within the area including opossum, bats, shrews, mice, moles, voles, rabbits, foxes, weasels, black bears, mink, bobcats, coyotes, deer, feral pigs, bottlenose dolphin and the West Indian manatee (NERRS 2005).

The bay and surrounding drainage basin also provide some of the most important bird habitats in the Southeastern United States. Close proximity to the Mississippi flyway allows large numbers of birds (over 300 species have been recorded) from both the Midwest and the Atlantic Seaboard to utilize the area during migratory periods (NERRS 2005).

a. Aquatic Fauna: The Apalachicola River basin supports a high species density of aquatic vertebrates requiring freshwater to complete their lifecycles, including aquatic turtles, salamanders, frogs, snakes, and lizards and the American alligator. Invertebrates also comprise a significant percentage of the biomass in the Apalachicola River basin. Sixty species of snails and clams (Edmiston and Tuck 1987) and 15 species of crayfish (Couch et al. 1996) comprise a large percentage of wildlife food. Aquatic insects probably constitute the largest and most diverse group of aquatic invertebrates in the basin. However, research into the aquatic insects is limited and comprehensive data regarding taxa and habitat is not available. The Apalachicola River supports the largest number of endemic freshwater gastropods and bivalves and the largest percentage of endemics in a total mollusc population of any western Florida river drainage (Couch et al. 1996) including several federally listed threatened and endangered species.

As described above, Apalachicola Bay supports an important commercial fishery for American oyster, penaeid shrimp (brown, white, and pink shrimp), and blue crab. The bay accounts for approximately 90 percent of the oysters harvested in Florida. In addition to the commercial value of the oyster itself, the oyster reefs of the Apalachicola Bay estuary support numerous fish and aquatic invertebrates that are important components of the estuarine foodweb.

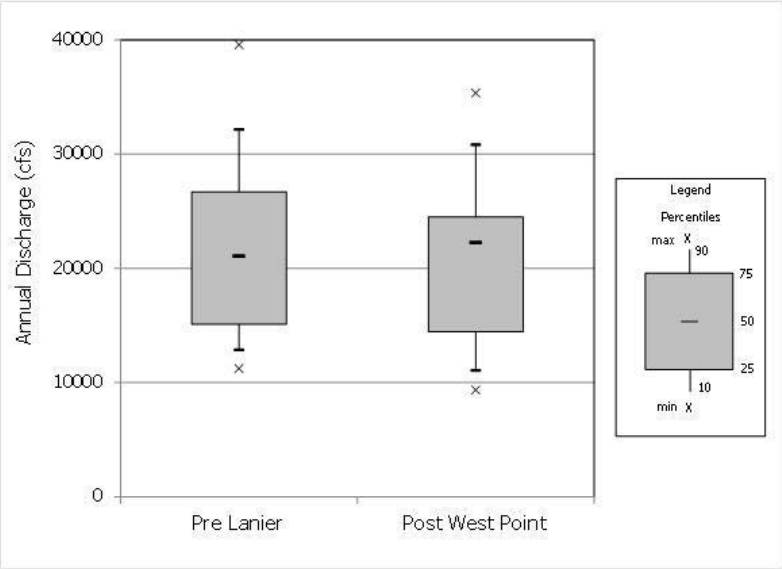
b. Terrestrial Fauna: The Apalachicola River basin supports habitats that range from xeric (such as sandhills and clayhills) to fully inundated. Because the basin exhibits a range of habitats and conditions, the Apalachicola River basin also supports a commensurate variety of terrestrial vertebrates and invertebrates. A list of some of the vertebrate terrestrial species known to occur in the basin is provided in Appendix C.

4. Hydrology. The flow of the Apalachicola River has been altered over time to some degree by land use changes, reservoirs, and various consumptive water uses upstream of Jim Woodruff Dam. The first dam/reservoir completed among the Corps' ACF projects was Buford Dam/Lake Lanier, which began operations in 1956. Therefore the 27-year pre-Lanier flow record of the Apalachicola River's Chattahoochee gage from 1929 to 1955 is used to characterize the pre-impoundment flow regime. The Corps' full complement of ACF projects was not completed until October 1974, when operations of West Point Reservoir began. Therefore the post-West Point years, 1975 to 2008 (31 years) are used to characterize the full history of the present configuration of the Corps' ACF projects. Figure 3 provides an analysis of the annual average discharge for the Apalachicola River during the 1929-1955 pre-Lanier period and the 1975-2008 post-West Point period that suggests the average annual flow prior to the construction of dams in the ACF basin is comparable to the average annual flow currently experienced

(USFWS 2012).

The Apalachicola River experiences seasonal fluctuations in flow associated with rainfall levels. Peak flooding is most likely to occur in January, February, March, and April of each year. Low flow generally occurs in September, October, and November. Although the seasonal fluctuations are generally attributable to basin hydrology, the Corps water management operations likely influence the monthly flow regimes in the Apalachicola River during portions of the year. The ACF federal reservoirs' are generally drawn down in the fall from summer to winter pool levels. The fall drawdown generally results in higher river flows than would otherwise occur during November.

Figure 3. Average annual discharge (cfs) of the Apalachicola River at Chattahoochee, FL, for the pre-Lanier (1929-1955) and post-West Point (1975-2008) periods.



(Source: USFWS 2012)

In February and March, the Corps generally begins refilling reservoirs to summer pool levels, which could reduce flow to the Apalachicola River. However, hydrologic patterns vary from year to year and may not conform to the seasonal trends during any given year. The current water control plan requires a minimum flow of 5,000 cfs in the Apalachicola River provided by releases from Jim Woodruff Dam.

5. Water Quality. As stated above, Buford, West Point, and Jim Woodruff dams all provide continuous flow releases to assist in maintaining downstream water quality. Releases from upstream reservoirs help to maintain sufficient flow for assimilative capacity to handle M&I discharges to the Chattahoochee River. Releases from upstream reservoirs help to maintain sufficient flow for assimilative capacity to handle M&I discharges to the Chattahoochee River. Releases from Buford Dam are made to assist in maintaining a minimum 750 cfs flow on the Chattahoochee River near Peachtree Creek.

Occasional releases are made at Walter F. George to correct low DO readings below the dam. Jim Woodruff Dam has a minimum release of 5,000 cfs (4,500 cfs during severe drought conditions), which serves in part to meet downstream water quality needs. Please reference the Water Quality section above for additional information.

6. Floodplain/Wetlands. The Apalachicola River's 144,000-acre floodplain is alluvial, broad and flat. The expansive floodplain habitats adjacent to the Apalachicola River provide a source of nutrients to the Apalachicola River and Bay ecosystem, and provide important habitat for various fish species during flooded seasons. One hundred and twenty-one thousand acres are bottomland hardwood forests and tupelo-cypress swamps. Shrub swamps and seasonally flooded basins and flats are other wetland types within the Apalachicola River floodplain. Marsh habitat is restricted to the lower ten (10) miles of the floodplain. The species composition of the floodplain is dependent upon the flooding cycle and changes when the flood cycle is altered or interrupted for a significant period of time. Floodplain connection to the mainstem and periods of inundation are important factors determining the makeup of the floodplain. Construction of the Corps reservoir system in the ACF basin has resulted in changes to the Apalachicola River floodplain, due to the degradation of the upper river channel following construction of the upstream dams, and a gradual deepening and widening of the river channel associated with the navigation channel construction and trapping of sediments in the upstream reservoirs. USGS has estimated the amount of adjacent floodplain habitat connected to the Apalachicola River at various flow levels; and has recently documented the gradual decline in river levels over time following construction of the dams (Light et al. 1998). According to USGS, channel degradation and erosion has apparently stabilized since the late 1970s, but spring and summer water levels continued to decline in recent decades because of seasonal decreases in flow from the upstream watershed. Less flow during the spring and summer is likely caused by a combination of natural climatic changes and a variety of human activities in the ACF basin, including agricultural irrigation, M&I water use, flow regulation and reservoir evaporation (Light 2006).

Floodplain inundation during the growing season (generally April through October) is critical to the reproduction of many fish species, including some identified host species for the listed mussels. Analysis of the frequency and areal extent of growing-season (April through October) floodplain inundation in the pre-Lanier and post-West Point periods suggests that despite an increase in the annual duration of flows greater than 50,000 cfs during the post-West Point period, the frequency and extent of floodplain inundation during the post-West Point period is decreased relative to the pre-Lanier period, largely due to altered channel morphology. For example, 20,000 floodplain acres were inundated for 32 percent of the growing-season days in the pre-Lanier period, but for only 18 percent of the growing-season days in the post-West Point period (USFWS 2012).

Fish spawning in floodplain habitats requires periods of continuous inundation, because utilization of these floodplain habitats requires time for movement from the main channel into the floodplain, courtship and spawning behaviors, egg incubation, and juvenile growth to a size capable of moving to and surviving in the main channel when water

levels recede. An analysis of the maximum floodplain acreage inundated for at least 30 days each year in both the pre-Lanier and post-West Point periods (using a 30-day moving minimum) suggests that inundated floodplain habitat availability during the post-West Point period is substantially less than the pre-Lanier period. In 50 percent of the pre-Lanier years, over 23,500 floodplain acres were inundated for at least 30 continuous growing-season days. The median for the post-West Point period is less than half this amount, about 11,000 acres (USFWS 2012).

7. Threatened and Endangered Species. The USFWS has identified 34 threatened and endangered species (including critical habitat if designated) that occur in the ACF River Basin (Table 2), and determined that effects of the proposed action are limited to those species that depend primarily on riverine habitat (Gulf sturgeon, fat threeridge, Chipola slabshell, and purple bankclimber). Operations under the recommended plan will be conducted within the boundaries of the existing water control plans for the upstream reservoir projects, and will not change the top of the flood control pools, conservation pools, or the rule curves of the upstream projects. Therefore, the proposed action will have no effect or an insignificant effect (*i.e.*, any impacts should never reach the scale where take occurs) on all but the riverine- and estuarine-dependent species. Two species of sea turtles and the West Indian manatee may sometimes occur in Apalachicola Bay or the lower Apalachicola River; however, any effects of the proposed action to these species would be insignificant also, due to their low numbers and only occasional seasonal residence in the river and bay. Three listed species of fresh water mussels occur in headwater areas upstream of the Corps' ACF projects: the shiny-rayed pocketbook, Gulf moccasinshell, and oval pigtoe. The proposed action will have no effect on these mussels as they occur outside of the project area. Altogether, the proposed action will have either no effect or an insignificant effect on the species listed in Table 2 and these are not further discussed in this environmental assessment.

Table 2. Species and critical habitat evaluated for effects from the proposed action but not discussed further in this Environmental Assessment (USFWS 2012).

SPECIES OR CRITICAL HABITAT
Frosted flatwoods salamander (*Ambystoma cingulatum*)
Reticulated flatwoods salamander (*Ambystoma bishopi*)
Loggerhead turtle (*Caretta caretta caretta*)
Eastern indigo snake (*Drymarchon corais couperi*)
Atlantic ridley (*Lepidochelys kempi*)
Piping plover (*Charadrius melodus*)
Wood stork (*Mycteria americana*)
Gray bat (*Myotis grisescens*)
Indiana bat (*Myotis sodalis*)
West Indian manatee (*Trichechus manatus*)
Shiny-rayed pocketbook (*Lampsilis subangulata*)
Gulf moccasinshell (*Medionidus penicillatus*)
Oval pigtoe (*Pleurobema pyriforme*)
Little amphianthus (*Amphianthus pusillus*)
Apalachicola rosemary (*Conradina glabra*)
Telephus spurge (*Euphorbia telephioides*)
Harper's beauty (*Harperocallis flava*)
Black-spored quillwort (*Isoetes melanospora*)
Pondberry (*Lindera melissifolia*)
White birds-in-a-nest (*Macbridea alba*)
Canby's dropwort (*Oxypolis canbyi*)
Godfrey's butterwort (*Pinguicula ionantha*)
Harperella (*Ptilimnium nodosum)*
Chapman's rhododendron (*Rhododendron chapmanii*)
Michaux's sumac (*Rhus michauxii*)
Green pitcherplant (*Sarracenia oreophila*)
American chaffseed (*Schwalbea Americana*)
Florida skullcap (*Scutellaria floridana*)
Fringed campion (*Silene polypetala*)
Gentian pinkroot (*Spigelia gentianoides*)
Cooley meadowrue (*Thalictrum cooleyi*)
Florida torreya (*Torreya taxifolia*)
Relict trillium (*Trillium reliquum*)
Gulf sturgeon (*Acipenser oxyrinchus desotoi*)

The Corps determined that implementation of the recommended plan may affect but is not likely to adversely affect Gulf sturgeon and that it may affect but is not likely to adversely modify designated Gulf sturgeon critical habitat. The USFWS concurred with this determination in the 22 May 2012 BO. Only the federally endangered fat threeridge, federally threatened purple bankclimber, and federally threatened Chipola slabshell mussels and designated critical habitat the mussels were identified as potentially being adversely affected by the proposed action. A detailed description of the status and distribution of the mussel species in the project area is provided in the BO for the recommended plan (USFWS 2012).

8. Historic and Archeological Resources. The Apalachicola River valley is an area rich in cultural history with human occupation currently known to date back almost

11,000 years. The earliest peoples known to settle the area Archaeological research in the area began as early as 1928 with William Bartram's travels along the Northwest Florida coast in the 1770s. Clarence Moore ventured up the Apalachicola River in his boat *The Gopher* in the early 1900s and his documentation of the many mounded earthforms left behind by early populations formed the basis for much of the later research by Gordon Willey, and many surveys and excavations by Florida, Alabama, North Carolina, and Ohio universities as well as work by various cultural resources management (CRM) firms.

Because of the dense and lengthy occupational history of the area there are possibly well over one hundred or more historical and archaeological sites near and along the Apalachicola River that have yet to be recorded between the base of Jim Woodruff Dam and Apalachicola Bay to the south. Of the numbers of sites that are recorded, approximately 23 historical and archaeological sites have been listed to the National Register of Historic Places for Jackson, Gadsden, Liberty, Calhoun, Gulf, and Franklin counties. Overall, the listed properties provide a decent representative sample of the history of life along the river, and the types of resources one can expect to find there.

The Bryan (Great Oaks) Mansion in Jackson County is an antebellum Greek Revival home constructed of flush wood siding in 1857 and an important historical property, as is the Marianna Historic District in Marianna, Florida. Also, the Mill Pond Site also in Jackson County is a Late Mississippian Chatot Indian Village consisting of caves and rockshelters dating just before and at the brink of Spanish exploration in the Americas (1200-1500 AD). The U.S. Arsenal-Officers Quarters in Gadsden County constructed of brick in 1839 was first constructed to house the Chattahoochee Arsenal, and then became a center for Confederate troop organization during the Civil War. Two impressive sites in Liberty County include the Yon Mound and Village Site, and Torreya State Park. Yon Mound and Village is believed to be a Mississippian Stage site occupied for hundreds of years beginning around 800 AD. The Torreya State Park encloses a time capsule of significant history beginning with several Late Woodland Stage (800-900 A.D.) archaeological sites, as well as the reconstructed Gregory Mansion which overlooks the Apalachicola and was home to a prominent cotton planter beginning in the late 1840's, and finally several Confederate gunpits and earthen parapets used during the Civil War. Franklin County contains some of the earliest recorded archaeological sites in the area, namely the Yent Mound complex, and the Porters Bar site both originally documented by Clarence B. Moore in 1902 during his journeys up the Apalachicola. These two sites are successive occupations spanning from the Early Woodland through the Late Woodland Stages respectively (~300 B.C. – 600 A.D.). Additionally, it is home to Fort Gadsden, originally constructed by the British during the War of 1812, the fort briefly became a settlement of fugitive slaves and a small contingent of Seminole and Choctaw Indians. The Fort was eventually used as a post for the Confederacy during the Civil War until an outbreak of malaria necessitated its abandonment in 1863. Time periods that are known to have had a significant impact on habitation along the southern Apalachicola River but that are not well documented are the Spanish explorations and colonial settlements beginning in the early 1500's through the early 1800's, and then finally the removal of the Indians beginning in 1823. Finally, at least 26 steamboats were reported to have

sunk, snagged, or exploded in Florida's portion of the Apalachicola River between the nineteenth and early twentieth centuries.

9. Soils/Sediments. As a sand-bed alluvial river, the Apalachicola is a dynamic system constantly changing by ongoing processes of erosion and sedimentation. The river banks are dominated by cohesive sediments that include large quantities of silt and clay (Lidstone and Anderson, Inc. 1989). The main channel substrate consists primarily of coarse sand and sandy/silt material. Additional substrates in the main channel include limestone bedrock, cobble, gravel, and a consolidated hard clay-like material (generally these substrates are confined to the upper river between RM 86 and RM105).

Soft muddy substrates comprise about 78 percent of the open water zone in Apalachicola Bay, with the remainder divided between oyster reefs and sandy sediments with submerged aquatic vegetation (Livingston 1984).

10. Recreation. The ACF basin contains approximately 2 million acres of public lands and resource protection areas including heavily used federal reservoirs, national forests, national and state parks, and resort communities. The five Corps projects in the basin account for 235,291 total acres of land and water. A wide variety of recreational opportunities are provided at these lakes including boating, fishing, picnicking, sightseeing, water skiing, and camping. As described above, these reservoirs support popular sport fisheries, some of which have achieved national acclaim for trophy-size catches of largemouth bass.

Recreation in the Apalachicola River is based primarily on its warm water fishery. Bass, sunfish and catfish are the preferred game species. Public and private land holdings are located throughout the Apalachicola River basin. Significant portions of the Apalachicola River floodplain are owned and managed as natural resource areas by the NWFWMD; the Florida Fish and Wildlife Conservation Commission (FWCC) (Lower Apalachicola River Basin Environmentally Endangered Lands); U.S. Forest Service (Apalachicola National Forest); Florida Department of Environmental Protection (Three Rivers State Recreation Area, Torreya State Park and the Apalachicola National Estuarine Research Reserve); and The Nature Conservancy (Apalachicola Bluffs and Ravines Preserve, "Garden of Eden"). These publicly held lands include wildlife management areas, reserves, refuges, forests, state parks, recreation areas, conservation lands and special feature sites that are used for hunting, as well as non-consumptive recreational uses such as hiking, nature study, and picnicking.

Apalachicola Bay is part of the Apalachicola National Estuarine Research Reserve and thus provides educational and recreational opportunities as well.

11. Hazardous and Toxic Materials. Almost the entire floodplain of the Apalachicola River Basin is forested. Predominant land uses in the drainage area of the Apalachicola River in Florida include upland forests (53.5 percent), wetlands (30.5 percent), agriculture (8.4 percent), and urban/built-up (2.1 percent). There are very few industrial sites located along the river. An EPA review of published accounts of

abandoned contaminated waste sites on the EPA National Priorities List (NPL) indicated that there are no known contaminated sites in the Apalachicola River Basin (USACE 1998 Draft EIS).

3. DESCRIPTION OF THE RECOMMENDED PLAN:

The recommended plan is the Corps' modified RIOP for Jim Woodruff Dam, which describes minimum releases and maximum fall rates for releases from the dam to the Apalachicola River in support of endangered and threatened species and critical habitat (Gulf sturgeon and fat threeridge, purple bankclimber, and Chipola slabshell mussels). The recommended plan is not a new water control plan for Woodruff Dam; rather it is a definition of adjustments to existing operations, within the limits established by the existing water control plan, determined through consultation with the USFWS as necessary to support or minimize adverse affects to Federally listed endangered and threatened species and designated critical habitat for such species. The recommended plan represents the final modified RIOP as proposed by the Corps, with incorporation of the reasonable and prudent measures and the terms and conditions approved by the USFWS in the Final Biological Opinion issued on 22 May 2012. Unless noted in the description below, all other provisions of the current RIOP remain unchanged under the recommended plan.

Like the current RIOP, the recommended plan specifies two parameters applicable to the daily releases from Jim Woodruff Dam: a minimum discharge and a maximum fall rate. Also like the current RIOP, it places limitations on refill, but does not require a net drawdown of composite storage unless basin inflow is less than 5,000 cfs and during some down ramping periods. However, the recommended plan includes several modifications to the current RIOP. The intent of the modifications is to further minimize or avoid adverse effects on listed species as a result of Corps' discretionary operations at Jim Woodruff Dam, while still maintaining storage opportunities and/or reductions in the demand of storage in order to provide continued support to project purposes, minimize impacts to other water users, and provide greater assurance of future sustained flows for species and other users during a severe multi-year drought. The modifications include 1) elimination of the use of volumetric balancing as described in the May 16, 2007 letter to USFWS; 2) minimum flow releases will match basin inflow when basin inflow is between 5,000 and 10,000 cfs during the months of June through November (this provision is suspended during drought contingency operations); 3) drought contingency operations are not suspended and normal operations reinstituted until such a time as the composite conservation storage has recovered above Zone 2 into Zone 1; 4) when releases are within powerhouse capacity and less than 10,000 cfs the maximum fall rate is limited to 0.25 ft/day or less; and 5) in accordance with RPM 2008-4 of the RIOP BO (USFWS 2008), formal adoption of an additional Gulf sturgeon spawning season (March-May) provision which ensures that river stage declines of 8 feet or more will not occur in less than 14 days when river flows are less than 40,000 cfs (under both normal and drought operations).

The recommended plan does not change the current RIOP basin inflow calculation (7-day

moving average daily basin inflow) or use of Chattahoochee gage (USGS number 02358000) to measure releases/river flow. The 7-day moving average dampens the effects of daily fluctuations in basin inflow and results in less extreme day-to-day changes in the minimum release from the dam. This dampening should generally, but not always, yield a minimum release under Table 3 that is also consistent with the Table 4 ramping rate schedule without the release of additional water from storage.

The recommended plan also does not change the limited hydropower peaking operations at Jim Woodruff Dam. The limited hydropower peaking operation occurs at Jim Woodruff Dam when daily average releases are less than the combined capacity of the powerhouse turbines (about 16,000 cfs) in order to deliver extra power during hours of peak demand for electricity. Hydropower peaking involves increasing the discharge for a few hours each day to near the full capacity of one or more of the turbines. These releases are included in the daily average discharge computations for minimum flow requirements under Table 3. The peaks are also included in the stage computations for ramping rate requirements under Table 4; however, Table 4 addresses the difference between the average river stage of consecutive calendar days, not the shorter-term differences that result from peaking operations within a calendar day. The relative drop in river stage from the peak to the base release will vary with different flows, but becomes more pronounced as flows decline, typically not more than 2.5 foot fluctuation per day above the base flow. As average daily releases approach 6,000 cfs, the daily peaking operation will be discontinued in order to maintain instantaneous releases greater than or equal to 5,000 cfs (4,500 cfs during severe drought conditions).

Like the current RIOP, the recommended plan is considered an interim operations plan for Jim Woodruff Dam, pending a future update of the ACF Water Control Plan (WCP). The WCP update is currently ongoing. On June 26, 2012 the Eleventh Circuit Court of Appeals directed the Corps to determine its authority to provide for municipal and industrial water supply from the Buford Dam/Lake Lanier Project in Georgia at the headwaters of the ACF. The Corps is currently complying with the Court's directive. Separately, the Corps is continuing to develop the Water Control Plan updates and EIS. A detailed description of the recommended plan and how it modifies the current RIOP is provided below.

Minimum Discharge: Like the current RIOP, the recommended plan varies minimum discharges from Jim Woodruff Dam by basin inflow, composite conservation storage level, and by month and the releases are measured as a daily average flow in cfs at the Chattahoochee gage. Table 3 shows minimum releases from Jim Woodruff Dam prescribed by the recommended plan and shows when and how much basin inflow is available for increasing reservoir storage. Except when basin inflow is less than 5,000 cfs and during some down-ramping periods, the minimum releases are not required to exceed basin inflow. The current RIOP defines basin inflow threshold levels that vary by three seasons: spawning season (March-May); non-spawning season (June-November); and winter (December-February). The current RIOP also incorporates composite conservation storage thresholds that factor into minimum release decisions. Composite conservation storage is calculated by combining the conservation storage of Lake Sidney

Lanier, West Point Lake, and Walter F. George Lake. Each of the individual storage reservoirs consists of four Zones. These Zones are determined by the operational guide curve for each project. The composite conservation storage utilizes the four Zone concepts as well; i.e., Zone 1 of the composite conservation storage represents the combined conservation storage available in Zone 1 for each of the three storage reservoirs.

During the spawning season (March-May), two sets of four basin inflow thresholds and corresponding releases exist based on composite conservation storage. In accordance with RPM 2008-4 of the RIOP BO (USFWS 2008), the spawning season also includes a special fall rate provision in order to avoid take of larval Gulf sturgeon. The provision ensures that river stage declines of 8 feet or more do not occur in less than 14 days when river flows are less than 40,000 cfs. When composite conservation storage is in Zones 1 and 2, a less conservative operation is in place. When composite conservation storage is in Zone 3, a more conservative operation is in place while still avoiding or minimizing impacts to listed species and critical habitat in the river. When composite conservation storage falls below the bottom of Zone 3 into Zone 4 the drought contingency operations are "triggered" representing the most conservative operational plan. The spawning season fall rate provision is in place under normal and drought operations. A detailed description of the drought contingency operations is provided below. During the spawning season, a daily monitoring plan that tracks composite storage will be implemented in order to determine water management operations. Recent climatic and hydrological conditions experienced and meteorological forecasts will be used in addition to the composite conservation storage values when determining the appropriate basin inflow thresholds to utilize in the upcoming days.

Like the current RIOP, during the non-spawning season (June-November), one set of four basin inflow thresholds and corresponding releases exists based on composite conservation storage in Zones 1-3. However, the recommended plan modifies the current RIOP basin inflow and minimum release provisions while operating in these composite conservation zones. The proposed action modifies the RIOP by further limiting storage opportunities when basin inflow is between 5,000 and 10,000 cfs. This change also requires slight adjustments to the basin inflow levels and minimum release provisions at basin inflows greater than 10,000 cfs. Table 3 reflects the recommended plan with the modifications to the current RIOP. When composite conservation storage falls below the bottom of Zone 3 into Zone 4 the drought contingency operations are "triggered".

Like the current RIOP, during the winter season (December-February), there is only one basin inflow threshold and corresponding minimum release (5,000 cfs) while in composite conservation storage Zones 1-3. There are no basin inflow storage restrictions as long as this minimum flow is met under these conditions. When composite storage falls below the bottom of Zone 3 into Zone 4 the drought contingency operations are "triggered". Like the current RIOP, the flow rates included in Table 3 prescribe minimum, and not target, releases for Jim Woodruff Dam. During a given month and basin inflow rate, releases greater than the Table 3 minimum releases may occur consistent with the maximum fall rate schedule, described below, or as needed to achieve

other project purposes, such as hydropower or flood control.

Maximum Fall Rate: Fall rate, also called down-ramping rate, is the vertical drop in river stage (water surface elevation) that occurs over a given period. The fall rates are expressed in units of ft/day, and are measured at the Chattahoochee gage as the difference between the daily average river stage of consecutive calendar days. Rise rates (*e.g.,* today's average river stage is higher than yesterday's) are not addressed. The recommended plan includes a modification to the maximum fall rate schedule (Table 4) prescribed by the current RIOP. This modification was developed from and is consistent with recommendations made by the USFWS during the re-initiated consultation. The proposed modification consists of limiting the maximum fall rate to 0.25 ft/day or less when releases are within powerhouse capacity and less than 10,000 cfs. When releases are within powerhouse capacity and greater than 10,000 cfs, the maximum fall rate is limited to 0.25 to 0.50 ft/day. No other modifications to the current maximum fall rate schedule are proposed. Unless otherwise noted, fall rates under the drought contingency operation would be managed to match the fall rate of the 1-day basin inflow. Matching the 1-day basin inflow fall rate during drought operations facilitates quicker recovery and a faster return to normal operations.

Managing fall rates to conform with Table 4 is a difficult undertaking at Jim Woodruff Dam when flow rates exceed the release capacity of the powerhouse, which is about 16,000 cfs. Releases of greater than 16,000 cfs require the use of spillway gates in addition to the turbines, and require an operator to open or close the gates using a rail-mounted crane on the crest of the dam. One spillgate opening has previously been estimated to result in a change in release of approximately 2,000 cfs or approximately 1 foot per day, more or less. The water discharge openings of the gates are not fully adjustable and inclement weather, floating debris from the reservoir, and other factors often complicate the procedure of opening and closing the gates. Fall rates are relatively more manageable when releases are less than 16,000 cfs and controlled by the powerhouse, but this control is not a precise operation. Neither turbine nor gate operations provide for precise flow measurement. For these reasons, a lower and an upper maximum fall rate is given in Table 4 for each release range specified. When conditions allow, fall rates will generally conform to the more gradual (lower) rate in each range, consistent with safety requirements, flood control purposes, and equipment capabilities.

Table 3. Recommended Plan Modified RIOP Releases From Jim Woodruff Dam

Months	**Composite Storage Zone**	**Basin Inflow (BI) (cfs)**	**Releases from JWLD (cfs)**	**Basin Inflow Available for Storage[1]**
March - May	Zones 1 and 2	>= 34,000	>= 25,000	Up to 100% BI > 25,000
		>= 16,000 and < 34,000	>= 16,000 + 50% BI > 16,000	Up to 50% BI > 16,000
		>= 5,000 and < 16,000	>= BI	None
		< 5,000	>= 5,000	None – Augment releases from storage
	Zone 3	>= 39,000	>= 25,000	Up to 100% BI > 25,000
		>= 11,000 and < 39,000	>= 11,000 + 50% BI > 11,000	Up to 50% BI > 11,000
		>= 5,000 and < 11,000	>= BI	None
		< 5,000	>= 5,000	None – Augment releases from storage
June - November	Zones 1,2, and 3	>= 22,000	>= 16,000	Up to 100% BI > 16,000
		>= 10,000 and < 22,000	>= 10,000 + 50% BI > 10,000	Up to 50% BI > 10,000
		>= 5,000 and < 10,000	>= BI	None
		< 5,000	>= 5,000	None – Augment releases from storage
December - February	Zones 1,2, and 3	>= 5,000	>= 5,000 (Store all BI > 5,000)	Up to 100% BI > 5,000
		< 5,000	>= 5,000	None – Augment releases from storage
At all times	Zone 4	NA	>= 5,000	Up to 100% BI > 5,000
At all times	Drought Zone	NA	>= 4,500[2]	Up to 100% BI > 4,500

[1] Consistent with safety requirements, flood control purposes, and equipment capabilities.

[2] Once composite storage falls below the top of the Drought Zone ramp down to 4,500 cfs will occur at a rate no greater than 0.25 ft/day drop.

Table 4. Recommended Plan Modified RIOP Maximum Fall Rate Schedule Composite Storage Zones 1,2, and 3*	
Release Range (cfs)	Maximum Fall Rate (ft/day), measured at Chattahoochee gage
> 30,000**	No ramping restriction***
> 20,000 and <= 30,000*	1.0 to 2.0
Exceeds Powerhouse Capacity (~ 16,000) and <= 20,000*	0.5 to 1.0
Within Powerhouse Capacity and >= 10,000*	0.25 to 0.5
Within Powerhouse Capacity and < 10,000*	0.25 or less

*Maximum fall rate schedule is suspended in Composite Zone 4
**Consistent with safety requirements, flood control purposes, and equipment capabilities.
***For flows greater than 30,000 cfs, it is not reasonable and prudent to attempt to control down ramping rate, and no ramping rate is required.

Drought Contingency Operations: Like the current RIOP, the recommended plan incorporates a drought contingency operation (referred to as drought plan). The drought plan specifies a minimum release from Jim Woodruff Dam and temporarily suspends the other minimum release and maximum fall rate provisions until composite conservation storage within the basin is replenished to a level that can support them. The minimum discharge is determined in relation to composite conservation storage and not average basin inflow under the drought plan. The drought plan is "triggered" when composite conservation storage falls below the bottom of Zone 3 into Zone 4. At that time all the composite conservation storage Zone 1-3 provisions (seasonal storage limitations, maximum fall rate schedule, and minimum flow thresholds) are suspended and management decisions are based on the provisions of the drought plan. The drought plan includes a temporary waiver from the existing water control plan to allow temporary storage above the winter pool rule curve at the Walter F. George and West Point projects if the opportunity presents itself and/or begin spring refill operations at an earlier date in order to provide additional conservation storage for future needs as well as provide for a minimum releases less than 5,000 cfs from Jim Woodruff Dam.

The drought plan prescribes two minimum releases based on composite conservation storage in Zone 4 and an additional zone referred to as the Drought Zone (Figure 4). The Drought Zone delineates a volume of water roughly equivalent to the inactive storage in lakes Lanier, West Point and Walter F. George plus Zone 4 storage in Lake Lanier. However, the Drought Zone line has been adjusted to include a smaller volume of water at the beginning and end of the calendar year. When the composite conservation storage is within Zone 4 and above the Drought Zone, the minimum release from Jim Woodruff Dam is 5,000 cfs and all basin inflow above 5,000 cfs that is capable of being stored may be stored. Once the composite conservation storage falls below the Drought Zone, the minimum release from Jim Woodruff Dam is 4,500 cfs and all basin inflow above 4,500 cfs that is capable of being stored may be stored. When transitioning from a minimum release of 5,000 to 4,500 cfs, maximum fall rates will be limited to a 0.25 ft/day drop. The 4,500 cfs minimum release is maintained until composite conservation storage returns to a level above the top of the Drought Zone, at which time the 5,000 cfs minimum release is re-instated. Under the current RIOP, the drought plan provisions remain in place until conditions improve such that the composite conservation storage reaches a level above the top of Zone 3 (i.e., within Zone 2). The recommended plan modifies the current RIOP drought plan by increasing the composite conservation storage level "trigger" for re-instating the normal operations. Under the recommended plan, the drought plan provisions remain in place until conditions improve such that the composite conservation storage reaches a level above the top of Zone 2 (i.e., within Zone 1). At that time, the temporary drought plan provisions are suspended, and all the other provisions are re-instated. During the drought contingency operations a monthly monitoring plan that tracks composite conservation storage in order to determine water management operations (the first day of each month will represent a decision point) will be implemented to determine which operational triggers are applied. In addition, recent climatic and hydrological conditions experienced and meteorological forecasts will be used when determining the set of operations to utilize in the upcoming month.

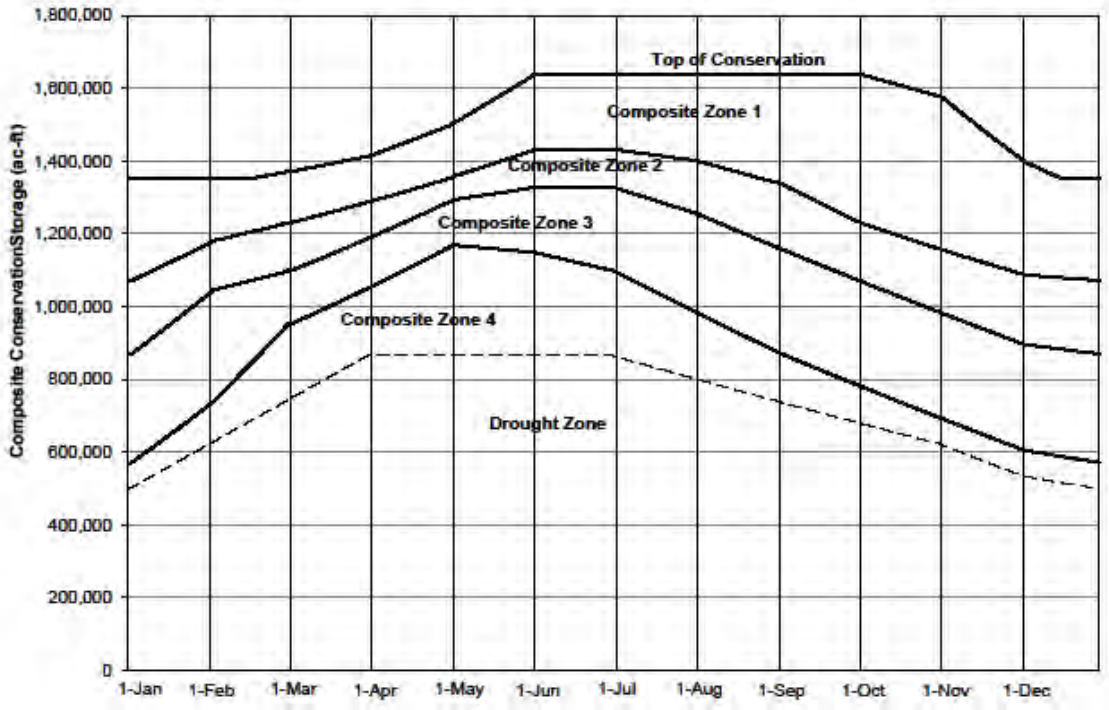


Figure 4. Recommended Plan Drought Composite Conservation Storage Triggers.

4. ALTERNATIVES TO THE RECOMMENDED PLAN:

a. "No Action" Alternative. The CEQ regulations require analysis of the "no action" alternative 40 C.F.R. § 1502.14. Based on the nature of the proposed action, "no action" represents "no change" from the current management direction or level of management intensity. This alternative would represent continuing water control operations at Jim Woodruff Dam under the current RIOP.

Both the recommended plan and the "no action" alternative minimize adverse impacts and provide support to endangered and threatened species and critical habitat occurring in the Apalachicola River. However, the recommended plan was determined to more adequately address the needs of the endangered and threatened species (based on Section 7 formal consultation). Discretionary actions taken by the Corps that fail to adhere to the RIOP as described in the 22 May 2012 Biological Opinion could result in a violation of Section 9 of the ESA.

b. Other Alternatives Considered During Section 7 Consultation. The alternatives and proposed action described in the Amended Biological Assessment (BA) submitted to the USFWS on 25 October 2011 describe the alternatives to the recommended plan and are incorporated by reference. It should be noted that the October 2011 Amended BA included a modification during the winter season that limited storage opportunities when basin inflow is between 5,000 and 10,000 cfs and included a minimum flow release provision to match the basin inflow in this range. This previously proposed modification was removed based on additional analysis and discussions with the USFWS which resulted in the Corps' determination that the provision had little, if any, effect on minimizing or avoiding adverse effects to listed species. Given that this objective was not met, the Corps believes that maintaining operational flexibility to maximize storage opportunities during the winter season and potentially increase the amount of storage available for other authorized project purposes and augmenting releases above basin inflow during drought conditions is the prudent water management action. Therefore, the modifications to the RIOP proposed in the October 2011 BA were not further considered.

5. ENVIRONMENTAL IMPACTS OF THE RECOMMENDED PLAN:

Due to the similarity of the recommended plan to the current RIOP plan, the impacts associated with implementation of the proposed modifications are comparable to those previously described in the June 2008 Environmental Assessment (EA) prepared for the current RIOP. The environmental impacts analysis for the recommended plan is generally consistent with that of the 2008 EA, with the exception of using the HEC-ResSim Model to simulate flow operations in the ACF Basin rather than the HEC-5 model used in 2008 and changes to the assumptions regarding consumptive demands. Details about the ResSim model and a description of the changes to the assumptions regarding consumptive demands are provided below in the MODEL DESCRIPTION section. To determine the future environmental impacts of project operations as

prescribed by the recommend plan, we compared the environmental conditions expected to occur under that plan to those expected to occur if no action were taken (i.e., the current RIOP). This is accomplished by running HEC-ResSim model simulations for the "no action" and recommended plan and generating graphical representations of the results for various analyses (reservoir elevations and river flows). The HEC-ResSim model simulates river flow and reservoir levels using a daily time series of flow data for a certain period of record.

MODEL DESCRIPTION

The HEC-ResSim model was used to simulate flow operations in the ACF Basin. HEC-ResSim is a state-of-the-art tool for simulating flow operations in managed systems. It was developed by the Corps' Hydrologic Engineering Center (HEC) to aid engineers and planners performing water resources studies in predicting the behavior of reservoirs and to help reservoir operators plan releases in real time during day-to-day and emergency operations. This effects analysis used HEC-ResSim Version 3.1 "Release Candidate 3, Build 42" (USACE, 2010a). The label "Release Candidate" means that the software is undergoing final testing before distribution as an official version.

HEC-ResSim has a graphical user interface designed to follow Windows® software development standards. The model's interface can be learned without extensive tutorials. Familiar data entry features make model development easy, and localized mini plots graph the data entered in most tables so that errors can be seen and corrected quickly. A variety of default plots and reports, along with tools to create customized plots and reports, facilitate output analysis.

HEC-ResSim provides a realistic view of the physical river/reservoir system using a map-based schematic. The program's user interface allows the user to draw the network schematic as a stick figure or as an overlay on one or more geo-referenced maps of the watershed. HEC-ResSim represents a system of reservoirs as a network composed of four types of physical elements: junctions, routing reaches, diversions, and reservoirs. By combining those elements, the HEC-ResSim modeler is able to build a network capable of representing anything from a single reservoir on a single stream to a highly developed and interconnected system like that of the ACF Basin. A reservoir is the most complex element of the reservoir network and is composed of a pool and a dam. HEC-ResSim assumes that the pool is level (i.e., it has no routing behavior), and its hydraulic behavior is defined by an elevation-storage-area table. The real complexity of HEC-ResSim's reservoir network begins with the dam. Most reservoirs are constructed for one or more of the following purposes: flood risk management, power generation, navigation, water supply, recreation, and environmental quality. Those purposes typically define the goals and constraints that describe the reservoir's release objectives. Other factors that might influence the objectives include time of year, hydrologic conditions, water temperature, current pool elevation (or zone), and balance operations with other reservoirs in a system. HEC-ResSim uses rule-based description of the operational goals and constraints that reservoir operators must consider when making release decisions.

To provide a potential range of flows that might be experienced while the proposed action scenarios are in effect, the ResSim model simulates river flow and reservoir levels using a daily time series of unimpaired flow data as input for a certain period of record. Whereas basin inflow is computed to remove the effects of reservoir operations from observed flow, unimpaired flow is developed to remove the effects of both reservoir operations and consumptive demands from observed flow. The ResSim model imposes reservoir operations and consumptive demands onto the unimpaired flow time series to simulate flows and levels under those operations and demands. The unimpaired flow data set is the product of the Tri-State Comprehensive Study, in which the States of Alabama, Florida, and Georgia, participated. For this analysis, the consumptive water demands used in the models are the actual reported municipal and industrial (M&I) depletions for the period of 1980-2008 and the estimated agricultural water use. Consumptive water-use values prior to 1980 were hindcasted based on census population data. The method for estimating agricultural water use which varied by month and by year (wet, normal, dry) is consistent with the method utilized during the development of the RIOP and the effects analysis in the 2008 BO. However, the use of actual reported M&I depletions is an update to the previous method which applied an estimate of the highest demand year (2000) to the period of record simulation.

The current unimpaired flow data set represents the years 1939 to 2008. The Corps has not yet computed unimpaired flow for 2009-current day. Unimpaired flow computations require actual water use data from the three States and 2008 is the most recent year of this data provided to the Corps. For purposes of evaluating the recommended plan, a 70-year unimpaired flow hydrologic period of record (1939 through 2008) was used to run the simulations. Since the future hydrologic conditions are unknown, we have utilized the entire period of record (1939-2008) synthesized flow data set in order to assure that the flow data captures a full range of hydrologic conditions from wet to dry. The synthesized flow data set is the input to the HEC-ResSim reservoir system simulation modeling software. HEC-ResSim simulates the recommended plan under various hydrological conditions and generates a potential range of flows and reservoir elevations that might be experienced. A range of future environmental impacts can be assessed based on these generated river flows and reservoir elevations.

The environmental impacts associated with the recommended modifications to the current RIOP fall within the range of environmental impacts previously considered and determined not to be significant. These previous impact analyses are incorporated by reference here (Section 5 of the June 2008 EA). This is due to the similarity of the recommended plan to the previous RIOP plan. Thus we have determined that implementation of the recommended plan will have no significant environmental or human impacts. Appendix D contains additional HEC ResSim model simulation results comparing the hydropower generation, reservoir pool elevations, and river flows of the recommended plan to those of the current RIOP and illustrates the similarities in the resultant river flows and pool elevations. A discussion of the impacts to the basin resources is provided below.

1. Physical Impacts. As previously described, physical habitat conditions in the project area are largely determined by flow regime, and channel morphology sets the context for the flow regime. Based on channel morphology analyses conducted since implementation of the original Interim Operations Plan (IOP) for Jim Woodruff Dam (2006), the Corps has determined that the Apalachicola River appears to be in a relatively stable dynamic equilibrium. We have no ability at this time to predict specific effects on channel morphology due to the influence of the recommended plan on the flow regime. However, it appears unlikely that erosion rates will increase over time unless there are significant changes of the flow regime or reduction in sediment supply, which do not appear likely to occur under the provisions of the recommended plan. Moreover, the influence of the recommended plan on the Apalachicola River flow regime is not expected to adversely impact stream channel stability; nor alter sand, gravel, or cobble bottom substrate. Therefore, the recommended modifications to the current RIOP will not significantly impact physical habitat conditions in the project area including conditions within critical habitat areas.

2. Land Use Changes. Predominant land uses in the drainage area of the Apalachicola River in Florida include upland forests (53.5 percent), wetlands (30.5 percent), agriculture (8.4 percent), and urban/built-up (2.1 percent). The recommended plan does not change land use within the project area and will not impact State, area-wide and local plans and programs for land use in the area.

3. Historic and Archaeological Resources. As described above, implementation of the recommended plan is not expected to impact stream channel stability or alter channel substrates. Therefore, potentially adverse effects to cultural resources in the Apalachicola River, such as increased erosion, increased deposition, and increased access to historic and archaeological sites will not significantly change through implementation. Furthermore, as illustrated in Appendix C the recommended plan results in virtually the same pool elevations at the reservoirs as compared to the current RIOP, which were previously determined to not adversely affect cultural resource sites located along the shorelines. Therefore, there would be no adverse effect on historic or archeological properties listed, eligible for listing in the National Register of Historic Places, or otherwise of historical or archaeological value.

4. Fisheries. The recommended plan does not limit our ability to comply with the Division Regulation SADR PDS-O-1 and draft Corps Mobile District Standard Operating Procedure (CESAM SOP) 1130-2-9 regarding project operations in support of reservoir fish management. The goal of the SOP is to manage the reservoir conditions such that they are relatively stable or rising for a minimum 4-6 week period within the principal fish spawning period for each project site; while also providing for relatively stable or gradually declining Apalachicola River stages for a minimum designated period (Table 5). Generally stable or gradually declining river stages are defined as ramping down of ½ foot per day or less. However, the SOP recognizes that droughts and floods within the basin present specific water

management challenges that may limit our ability to meet both the reservoir and river spawning provisions. The HEC-ResSim simulated pool elevations and the April and May monthly flow durations as measured at the Chattahoochee gage for the recommended plan and the current RIOP are nearly identical (Appendix D). The current RIOP was previously determined to not result in significant impacts to reservoir or river fisheries. Therefore, implementation of the recommended plan will not result in a significant impact to fisheries in the reservoirs and the Apalachicola River.

Table 5. Project specific principal fish spawning period for operational considerations.

Project	Fish Spawn Period
Lake Lanier	01 Apr – 01 Jun
West Point	01 Apr – 01 Jun
Walter F. George	15 Mar – 15 May
Lake Seminole	01 Mar – 01 May
Apalachicola River	01 Apr – 01 Jun

5. Essential Fish Habitat (EFH). The impacts of the recommended plan to hydrology and water quality fall within those previously considered and determined to not be significant. The HEC-ResSim simulated Apalachicola River annual flow duration, as measured at the Chattahoochee gage, for the recommended plan and the current RIOP are nearly identical (Appendix C). The recommended plan provides for slightly lower river flows between 5,000 and 11,000 cfs. In the 2012 BO, the USFWS determined that implementation of the recommended plan is not anticipated to result in changes in salinity or estuarine habitat. If drought conditions continue or return in the future, there may be temporary salinity increases in the Apalachicola Bay but they will be attributable to the drought conditions not implementation of the recommended plan. The EFH impacts of the recommended plan are consistent with those previously considered and determined to not be significant. Therefore, the EFH in the Apalachicola Bay system will not be significantly impacted by the recommended plan.

6. Wildlife. The impacts of the recommended plan to hydrology and water quality are consistent with those previously considered and determined to not be significant. Therefore, aquatic and riparian habitats supporting wildlife species in the Apalachicola River and Bay system and aquatic and terrestrial wildlife resources occurring in the project area will not be significantly impacted by the recommended plan.

7. Threatened and Endangered Species. On 22 May 2012, the USFWS issued a BO on the recommended modifications to the RIOP at Jim Woodruff Dam, and the associated releases to the Apalachicola River, and its effects on the Gulf sturgeon, fat threeridge mussel, purple bankclimber mussel and Chipola slabshell mussel; and habitat designated as critical habitat for the Gulf sturgeon and the mussels, pursuant to Section 7 of the ESA. The USFWS determined

that implementation of the recommended plan, including its provision to reduce minimum releases from Woodruff Dam to as low as 4,500 cfs:

a) may affect but is not likely to adversely affect Gulf sturgeon and that it may affect but is not likely to adversely modify Gulf sturgeon critical habitat;
b) will not jeopardize the continued existence of the fat threeridge, purple bankclimber, and Chipola slabshell; and
c) will not destroy or adversely modify designated critical habitat for the Gulf sturgeon, fat threeridge, purple bankclimber, and Chipola slabshell.

The USFWS determined that the recommended plan could result in incidental take of fat threeridge, Chipola slabshell and purple bankclimber. Take of listed mussels due to the recommended plan may occur when conditions are such that the Corps reduces the releases from Woodruff Dam below 10,000 cfs. The form of this take is mortality that results from habitat modification leading to oxygen stress, temperature stress, and/or increased predation. These conditions may result in immediate or delayed mortality, and as such, mussels that are able to move and remain submerged may still be found dead in the water after the reduction in flows. The take may occur in microhabitats that become exposed or isolated from flowing water when releases from Woodruff Dam are less than 10,000 cfs. In addition, take includes harm that occurs as a result of reduced growth and/or reproduction due to the high temperatures and low dissolved oxygen that has been shown to occur in these habitats. The USFWS determined that a maximum of 30 (60 total) purple bankclimbers may be exposed on the rock shoal near RM 105 and at a few locations elsewhere in the action area during each of these events (flow reduction to 4,500 cfs, and exposure at stages greater than 5,000 cfs following recolonization); and a maximum of 3 Chipola slabshell (6 total) may be exposed in the Chipola River downstream of the Chipola Cutoff. A maximum of 9,150 fat threeridge (18,300 total) may be exposed in the Apalachicola River, Chipola Cutoff, and Chipola River downstream of the Chipola Cutoff when the minimum flow is reduced to 4,500 cfs or when individuals recolonize habitats greater than 5,000 cfs followed by stranding during subsequent low flows. Exceeding this level of incidental take for these three species shall prompt a reinitiation of this consultation.

Designated critical habitat for the fat threeridge and purple bankclimber in the action area includes most of the Apalachicola River unit, and the downstream-most part of the Chipola River Unit. Designated habitat for the Chipola slabshell only occurs within the downstream-most part of the Chipola River Unit. In the 22 May 2008 BO, the USFWS discussed how the recommended plan may affect three of the five PCEs of the mussel critical habitat: 1) permanently flowing water; 2) water quality; and 3) fish hosts. The recommended plan does not appear to reduce the amount of floodplain habitat available to fish hosts, some of which likely rely upon floodplain habitats for spawning and rearing habitat. Droughts substantially change the nature of all of these PCEs compared to normal flows, but the analysis does not show that the recommended plan would appreciably change the quantity or quality of the PCEs (USFWS 2012). In addition, the nature of these effects is dynamic and would not produce permanent or

static alterations to any PCE. Therefore, the threatened and endangered species occurring in the project area will not be significantly impacted by the recommended plan.

8 Recreation. Implementation of the recommended plan will not significantly impact recreational opportunities at the upstream reservoirs. The model simulation results provided in Appendix D demonstrate that pool elevations at Lake Lanier, West Point, Walter F. George, and Lake Seminole will be virtually identical to those of the current RIOP. The recommended plan is also consistent with support of reservoir fish spawning and Apalachicola fish spawn during spring months, and could benefit sport fish accordingly.

The model simulation results provided in Appendix C demonstrate that Apalachicola River flows (measured at the Chattahoochee gage) are almost identical for the recommended plan and no action. Impacts to any component of the National Wild and Scenic Rivers System; and any park, parklands, ecologically critical areas or other areas of ecological, recreational, scenic or aesthetic importance are consistent with those considered in the previous impact analysis and determined not to be significant. Implementation of the recommended plan will not significantly impact recreational opportunities on the Apalachicola River or Apalachicola Bay.

9. Hydrology. As discussed above, and illustrated in Appendix D implementation of the recommended plan does not result in significantly different reservoir levels or river flows than the current RIOP. The current RIOP was previously determined to not significantly impact the hydrology of the Apalachicola River and bay system. Therefore, the implementation of the recommended plan will not significantly impact the hydrology of the Apalachicola River and bay system, or the upstream reservoirs.

10. Water Quality. Buford, West Point, and Jim Woodruff dams all provide minimum continuous flow releases. Walter F. George provides occasional releases, as needed, to maintain acceptable DO values below the dam. Occasional special releases are also made at Buford to insure adequate DO and water temperature at the Buford Fish Hatchery located downstream of the dam. Implementation of the recommended plan will not affect water quality releases at these reservoirs. Implementation of the recommended plan will not result in reservoir levels that limit the ability to support water quality releases. Releases from Buford Dam are able to meet the 750 cfs minimum flow on the Chattahoochee River near Peachtree Creek and provide adequate flows for the estimated assimilative capacity needs on the Chattahoochee River near Columbus, Georgia. The model simulation results provided in Appendix D illustrate that flows at Atlanta, Columbus, and George Andrews are essentially the same under both the recommended plan and the “no action”. We lack sufficient information to determine if the minimum flows prescribed by the recommended plan or the “no action” plan would alter baseline water quality of the action area. However, the Apalachicola River flows resulting from both plans are consistent with those previously determined to not significantly impact water quality.

11. Aesthetics. The recommended plan will not permanently affect the aesthetics in the project area. During periods of drought, the Federal reservoirs could experience sustained low

water conditions and still be in low water conditions during the prime recreational season. In this situation, shoreline and bottom areas could continue to be exposed, boat docks could continue to be exposed, and property values along the lake shore areas could be affected. However this impact is attributable to drought conditions, and not the recommended plan, which should mitigate some of these anticipated drought impacts. The impacts of the recommended plan to aesthetics are consistent with those previously considered and determined to not be significant.

12. Water Supply. Implementation of the recommended plan will not affect water supply for M&I use at the upstream reservoirs or the Chattahoochee and Apalachicola Rivers. The recommended plan will not result in reservoir levels or river levels that limit the ability to support water supply, and the recommended plan includes provisions to conserve storage as much as possible during drought conditions in order to support water supply, water quality, and fish and wildlife needs. The impacts of the recommended plan to water supply are consistent with those previously considered and determined to not be significant.

13. Flood Damage Reduction. Implementation of the recommended plan will not significantly affect flood control operations at the upstream reservoirs. While operating under the drought plan provisions of the recommended plan, a temporary waiver from the existing water control plan would also include provisions to allow temporary storage above the winter pool rule curve at the Walter F. George and West Point projects if the opportunity presents itself and/or begin spring refill operations at an earlier date in order to provide additional conservation storage for future needs. However, the recommended plan will be implemented in a manner that would not result in reservoir levels that limit the ability to manage flood waters. Therefore, the implementation of the recommended plan will not significantly impact flood damage reduction operations. Furthermore, the reservoir levels and river flows simulated under the recommended plan are consistent with those previously considered and determined to not result in significant impacts to flood damage reduction.

14. Navigation. The impacts of the recommended plan to navigation are consistent with those previously considered and determined to not be significant. The lack of dredging and routine maintenance has led to inadequate depths in the Apalachicola River navigation channel, and commercial navigation has only been possible on a seasonal basis when flows in the river are naturally high, with flow support for navigation suspended during drier times of the year. On a case-by-case basis, limited releases for navigation have been made for special shipments when a determination can be made that other project purposes will not be significantly impacted and any fluctuations in reservoir levels or river stages would be minimal. The recommended plan does not limit our ability to support navigation as compared to the “no action”.

15 Hydropower. The HEC-ResSim model simulation results provided in Appendix D illustrate that annual and monthly generation at the Federal reservoirs are essentially the same under both the recommended plan and the “no action”. The impacts of the recommended plan to

hydropower generation are consistent with those previously considered and determined to not be significant. Therefore the implementation of the recommended plan will not significantly impact hydropower generation at Jim Woodruff or the upstream dams as compared to "no action".

16 Floodplain/Wetlands. The amount and duration of inundated floodplain habitat is determined by the flow in the rivers. As described above, the simulated Apalachicola River flows under both the recommended plan and the "no action" plan are essentially identical. The impacts of the recommended plan to floodplain/wetlands are consistent with those previously considered and determined to not be significant. Therefore implementation of the recommended plan will not significantly impact floodplain habitat as compared to the "no action" Alternative.

17. Prime and Unique Farmland. The recommended plan will have no effect on prime farmlands or unique agricultural lands.

18. Environmental Justice. Executive Order (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 recommended plan is not designed to create a benefit for any group or individual. The recommended plan does not create disproportionately high or adverse human health or environmental impacts on any low-income populations of the surrounding area. Review and evaluation of the recommended plan have not disclosed the existence of any identifiable minority or low-income communities that would be adversely affected by implementation.

19. Protection of Children. The 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.

Implementation of the recommended plan does not involve activities that would pose any

disproportionate environmental health risk or safety risk to children.

20. Cumulative Impacts. The CEQ 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 C.F.R. § 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. The resources affected by the recommended plan are described above and are generally limited to habitat conditions and species closely linked to the flow regime in the Apalachicola River.

Within the project area, various past Federal, State, and private actions have impacted the ACF basin and Apalachicola River habitat and natural flow regime including construction of the Corps' dams, urban development, agricultural activities, navigation channel maintenance dredging and disposal, water withdrawals, and small impoundments. 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. The five Corps' dams continue to affect the Apalachicola River by trapping sediment in reservoirs that would otherwise move as bed load through the system. The interruption of this bed load movement and past navigation channel maintenance dredging and disposal activities have contributed to the altered channel morphology in the project area. Channel morphology sets the context for the flow regime. However, the addition of 3.7 million acre ft of reservoir storage (including inactive storage) during the post-West Point period does not appear to have altered the overall relationship between precipitation in the Chattahoochee and Flint Basins and discharge into the Apalachicola Basin (USFWS 2012). Analysis of the historic annual average discharge (1929-1955 pre-Lanier period), current annual average discharge (1975-2008 post-West Point period), and the recommended plan annual average discharge suggest that operations under the recommended plan will not significantly alter the Apalachicola River flow regime. The annual average discharge for the Apalachicola River during the pre-Lanier period and the post-West Point period suggests that average annual flow prior to the construction of dams in the ACF basin is comparable to the average annual flow currently experienced. Analysis of the annual average discharge under the recommended plan indicates that flows are comparable as well. Therefore, implementation of the recommended plan should not significantly contribute to the cumulative impacts affecting riverine habitat and flow regime in the Apalachicola River or habitat in Apalachicola Bay.

Adverse effects to riverine habitat from continued urbanization and agricultural activities in the ACF 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, storm water control, and treatment of wastewater.

Additionally, an increase in net consumptive depletions due to water supply is likely to occur based on increased M&I demands in the ACF basin. In order to assess the potential magnitude of these increases we developed an M&I projection for 2017 based on a trend analysis of M&I water use since the year 2000 (data provided by the Georgia and Alabama water resource agencies). In order to capture regional growth trends, rather than applying uniform growth throughout the basin, the water use data was summed by HEC-ResSim model nodes and a separate trend analysis was computed for each model node by developing formulas for the individual model reaches. The analysis suggests an approximately 27% increase from the 2007 Net M&I Water Use basin wide, with the largest increases occurring on the Flint River near Griffin, GA and Albany, GA and from Lake Lanier, West Point Lake and Columbus, GA area on the Chattahoochee side. When combined with dry or drought conditions, this increase in M&I water use could result in lower reservoir elevations and reduced flows on the Apalachicola River. During extended severe drought conditions, like those experienced in 2006 and 2007, the recommended plan ameliorates these impacts by incorporating a drought plan that conserves storage to support a minimum flow of at least 4,500 cfs in the Apalachicola River even when basin inflow is much less. The "no action" plan could result in depletion of conservation storage and flows as low as 4,500 cfs under the same circumstances.

The Georgia Environmental Protection Division has determined that the most acres in the basin for which irrigation is economically feasible are already irrigated, and that agricultural demand has likely "plateaued" at close to the year 2000 demands. However, increases in the amount of water applied per acre would occur if the current crops are converted to more water intensive crops. Implementation of the recommended plan would not contribute to cumulative impacts affecting resources on the Flint River since there are no Corps projects controlling water releases in this system. However, increases in consumptive depletions for agriculture could adversely affect habitat in the Apalachicola River and Apalachicola Bay by further altering the natural flow regime.

Due to the similarity of the recommended plan to the current RIOP, the cumulative impacts associated with implementation of the proposed modifications are comparable to those previously described in the June 2008 Supplemental EA and determined to not be significant. Therefore, implementation of the recommended plan should not significantly contribute to the cumulative impacts affecting the ACF River Basin resources described above.

6. ANY IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS WHICH WOULD BE INVOLVED SHOULD THE RECOMMENDED PLAN BE IMPLEMENTED:

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. ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED:

Any adverse environmental effects, which cannot be avoided during implementation of the recommended project, are expected to be minor both individually and cumulatively.

8. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY:

The proposed project constitutes a short-term use of man's environment. The proposed action is an interim plan for Jim Woodruff Dam which is a component of the existing water control plan for the ACF basin. It is anticipated that it will be implemented until such time as the existing water control plan is revised or updated and a new Water Control Plan is completed. At that time, additional public coordination, consultation, and NEPA documentation would be prepared for the new water control plan, and elements of the RIOP could change at that time. Also, in the event of additional information or changed conditions, consultation would be re-initiated with the USFWS to determine if any additional changes to the RIOP would be necessary. As noted in the current Biological Opinion completing formal Section 7 consultation, operations under the recommended plan are not expected to result in any permanent changes or impacts to listed species, critical habitat for listed species or other project purposes or resources within the basin. The conditions of the Biological Opinion for the recommended plan also include monitoring and adaptive management, so adjustments could be made in the future, pursuant to additional consultation, in the event any unanticipated impacts are documented.

9. COORDINATION:

Appendix E contains copies of correspondence related to development of the recommended plan.

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