APPENDIX E

COORDINATION DOCUMENTATION

APPENDIX E
List of Correspondence and Other Documentation

E-1 Memorandum for Record of 26 October 2006 meeting with USFWS regarding compliance with terms and conditions of the BO

E-2 Mobile District (CESAM) email to U.S. Fish and Wildlife Service (USFWS), dated 1 November 2006, providing Concept 2 modeling results

E-3 Florida Department of Environmental Protection (FDEP) letter to CESAM dated 1 November 2006, requesting status of compliance with RPM3

E-4 CESAM letter to FDEP, dated 6 November 2006, providing status update regarding compliance with RPM3

E-5 CESAM email to ACF Basin stakeholders, dated 27 November 2006, announcing Drought Provision Workshop in Columbus, Georgia on 13 December 2006

E-6 Memorandum for Record of 13 December 2006 Drought Provision Workshop

E-7 Gwinnett County, Georgia letter to CESAM dated 5 January 2007, providing comments on the concepts presented at the Drought Provision Workshop

E-8 Georgia Environmental Protection Division (GA-EPD) letter to CESAM dated 9 January 2007, providing comments on the concepts presented at the Drought Provision Workshop

E-9 Atlanta Regional Commission (ARC) letter to CESAM dated 10 January 2007, providing alternative RPM3 concept

E-10 Southeastern Power Administration (SEPA) letter to CESAM dated 10 January 2007, providing comments on the IOP and RPM3

E-11 FDEP letter to CESAM dated 16 January 2007, providing comments and an alternative RPM3 concept

E-12 FDEP letter to CESAM dated 29 January 2007, providing comments on the GA-EPD and ARC alternative RPM3 concepts

E-13 CESAM letter to USFWS dated 30 January 2007, requesting extension of RPM3 implementation date from 30 January 2007 to 28 February 2007

E-14 CESAM letter to USFWS dated 31 January 2007, submitting fiscal year 2006 Annual Report in accordance with RPM1

E-15 USFWS letter to CESAM dated 2 February 2007, granting extension of RPM3 implementation date

E-16 CESAM letter to USFWS dated 16 February 2007, submitting Concept 5 proposal and Biological Assessment (BA)

E-17 USFWS email to CESAM dated 21 February 2007, requesting additional information regarding consideration of RPM3 comments and alternatives provided by stakeholders

E-18 CESAM letter to USFWS dated 23 February 2007, response to request for additional information

E-19 USFWS letter to CESAM dated 28 February 2007, approving Concept 5 proposal in accordance with RPM3

E-1 Memorandum for Record of 26 October 2006 meeting with USFWS regarding compliance with terms and conditions of the BO

CESAM-PD-EI 7 November 2006

MEMORANDUM FOR RECORD

SUBJECT: Jim Woodruff Interim Operations Plan – Meeting with US Fish and Wildlife Service to Discuss Compliance with Terms and Conditions of the Biological Opinion

1. Representatives of the US Army Corps of Engineers, Mobile District (CESAM) met with representatives of the US Fish and Wildlife Service (USFWS) at the Panama City Field Office on 26 October 2006, to discuss status of operations under the IOP and measures taken and planned to assure compliance with the terms and conditions of the Biological Opinion (BiOp), issued by USFWS on 5 September 2006. This meeting represented the first semi-annual meeting, as well as a planning meeting for implementation of the BiOp. The following representatives participated in the meeting discussions.

Gail Carmody, USFWS	850-769-0552, Ext. 225
Jerry Ziewitz, USFWS	850-769-0552, Ext. 223
Joanne Brandt, CESAM-PD-EI	251-690-3260
Brian Zettle, CESAM-PD-EI	251-690-2115
Memphis Vaughan, CESAM-EN-HW	251-690-2730
Cheryl Hrabovsky, CESAM-EN-HW	251-694-4018
James Hathorn, CESAM-EN-H	251-690-2735
Bill Stubblefield, CESAM-EN-HH	251-690-3116

2. Update on Current Operations. Immediately upon issuance of the BiOp, we began operating under the terms and conditions of RPM 2, and set up a procedure to track the number of taking days (days when daily releases are less than basin inflow when the daily basin inflow is between 8,000 cfs and 10,000 cfs) pursuant to RPM 5. Cheryl showed the spreadsheets which are set up on the Mobile District website, to track both the 3-day and 7-day, as well as daily inflows and releases from Jim Woodruff Dam. Cheryl also showed the spreadsheet that tracks the number of taking days. Cheryl also noted that there had been frequent "over-releases" (releases of greater than 5,000 cfs when basin inflows were below 5,000 cfs) which were due to head limits at Jim Woodruff Dam. At 5,000 cfs release the head limit is approximate elevation 76.5 feet.

3. EA/FONSI for IOP. Joanne noted that an Environmental Assessment and Finding of No Significant Impact was prepared following receipt of the BiOp. The EA describes the operation described in the terms and conditions of the BiOp, compared to a baseline/No Action alternative which describes how operations were being conducted prior to the initiation of formal Section 7 consultation (i.e., in early 2006). Copies of the EA and FONSI have been posted on the Mobile District website, under the Hot Topics item of Jim Woodruff Section 7 Consultation.

4. Draft Implementation Plan. Joanne distributed a copy of a draft plan and schedule for implementing the RPMs and terms of the BiOp. Each RPM was discussed and updates/revisions made to the plan or schedule accordingly, as noted below.

a. RPM 1: Adaptive Management.

(1) Semi-Annual Meetings. It is proposed that semi-annual meetings be conducted in the early fall and early spring, with August and February suggested as the appropriate meeting dates. This is the first semi-annual meeting, and also serves as the planning meeting for future actions. It was suggested that the February meeting be held in conjunction with the annual fish management/Morone meetings, either immediately prior to or following those annual meetings.

(2) Update Evaluation Tools. Mobile District is currently in process of converting the HEC-5 hydrologic model to HEC-ResSim. The ResSim model will be more flexible, and can be programmed to run model simulations with if/then/else statements. This conversion should be completed by January 2007 for the existing operations conditions, with the IOP as reflected in the BiOp integrated into the existing operations.

Mobile District also plans to extend the unimpaired flow data set through 2004 (and possibly through 2005 if additional demands data can be obtained from the States) – this will capture the recovery from the 1998-2002 drought. It is planned to use Georgia's Flint River Ag demand numbers as part of the unimpaired flow dataset.

USFWS suggested Mobile District investigate the use of the NWFWMD hydrodynamic model of Apalachicola Bay in order to assess potential impacts to sturgeon feeding habitat in the estuarine areas in future consultations. This model was developed by Florida State University during the Comprehensive Study and used in the ACF Water Allocation Draft EIS; the model is based on Sumatra gage data; run by folks in St. Petersburg; and then model data was post-processed by NWFWMD; model outputs were used to characterize anticipated impacts on oyster mortality, but can also measure changes in salinity in sturgeon feeding areas. If the Interim Storage Contracts at Lake Lanier would result in substantive changes in IOP operation and potential changes in freshwater flows, this model could assist in the required Section 7 consultation regarding potential modifications to sturgeon habitat in Apalachicola Bay and the estuarine channel areas.

Precipitation/flow relationship could also be investigated. Memphis will check with the Southeast River Forecasting Center to see if they have new or better predictive tools. He also offered to invite USFWS to attend a future meeting with the SRFC folks, who meet periodically with Mobile District to update us on their procedures and services.

Mobile District also has on hand flow/velocity meters that could be used to measure velocities at particular sites and depths, as determined necessary.

(3) Annual Report. Report will be due 31 January 2007.

b. Adjust June to February Lower Threshold to 10,000 cfs (RPM 2). As noted above, this RPM was implemented immediately upon issuance of the BiOp. Whenever the 7-day basin inflow is less than 10,000 cfs, at least basin inflow but not less than 5,000 cfs will be released. A

copy of the revised IOP table was provided to USFWS by letter dated 7 September 2006 and has been posted on the Mobile District website: http://www.sam.usace.army.mil/ACF.htm.

c. Drought provisions (RPM 3). RPM 3 requires the Mobile District to identify the reservoir, climatic, hydrologic, and/or listed species conditions that would allow supporting a higher minimum flow in the Apalachicola River, and identify recommended water management measures when conditions reach the identified drought "triggers". Gail suggested that the Chattahoochee gage conditions be identified that would provide a "flow-through" conditions at swift Slough and adequate depths at the impacted "hooks and bays"; and also that we determine if there were ways to store more water in the March – May timeframe that would provide sufficient storage to augment flows in later months for support of mussels. Based on the sturgeon spawning habitat data, Jerry suggested that lower thresholds for March – May be considered in three preliminary modeling scenarios (as shown in the below table); with the absolute minimum flow set at 5,800 cfs, 6500 cfs, and 7,000 cfs respectively for the three scenarios (revised thresholds shaded below):

		Basin Inflow (cfs)	Release
Mar-May	High	≥ 25,000	not less than 25,000
	Mid	≥ 16,000 and <25,000	≥ 70% BI, not less than 16,000
	Low	<16,000	≥ BI, not less than 5,800 (Scenario 1) 6,500 (Scenario 2) 7,000 (Scenario 3)
Jun-Feb	High	≥ 23,000	not less than 16,000
	Mid	≥ 10,000 and < 23,000	≥ 70% BI, not less than 10,000
	Low	< 10,000	≥ BI, not less than 5,800 (Scenario 1) 6,500 (Scenario 2) 7,000 (Scenario 3)

(The 5,800 cfs and 6,500 cfs scenarios were selected based on operational constraints while making releases through the turbines during low flow conditions.)

James agreed to run these preliminary model scenarios and provide outputs to Jerry for his review during the first week in November. The prelim model runs will be used as a screening tool to see if the system "breaks" in attempt to meet the higher minimum flows and/or if these adjustments would provide any meaningful benefits in providing higher support flows for mussels. This will allow for some discussions; "tweaking" of additional model runs; and a re-grouping meeting in Tallahassee, FL on 6 December (when public scoping meetings on Lanier interim storage contracts are scheduled). Additional discussions would occur as necessary to identify possible drought provisions by January 2007.

d. Sediment dynamics and channel morphology evaluation (RPM 4). RPM 4 requires Mobile District, in coordination with USFWS, and other experts jointly identified, to evaluate the current status of sediment transport and channel stability in the Apalachicola River as it relates to the distribution of listed mussels and their vulnerability to low flow conditions, based on available information and tools and best professional judgement. The goal is to identify (1)

feasible water and/or habitat management actions that would minimize listed mussel mortality; (2) current patterns and trends in morphological changes; and (3) additional information needed, if any, to predict morphological changes that may affect the listed mussels. The evaluation is to be completed and recommendations are to be completed by 30 March 2007.

Joanne noted that the Corps draft plan suggests that a panel of experts be selected, with first meeting scheduled in November 2006, and second meeting in Feb 2007 with a report due in March 2007. However, due to budget constraints (the Corps is currently operating under continuing resolution funding) and the time required to procure expert services, it was jointly agreed to defer a panel meeting until around the second week in January. Bill noted that Mobile District has discussed the needed expert services with Dr. Biedenharn of the Corps Engineer Research and Development Center (ERDC) in Vicksburg, MS, and also with a 3rd party private consultant that reviewed the previous Simon and Li report on the Apalachicola River. It was also suggested that a potomologist from St. Louis District (Claude Strauser) or other expertise from Missouri River District could be consulted, or perhaps those involved in the Lidstone and Anderson report be considered. It was recommended that the Mobile District provide an expert from ERDC and/or a private consulting geomorphologist or potomologist. USFWS also recommended inclusion of the USGS geomorphologist from Denver, CO (Kirk Vincent) that worked with USGS on the recent study on declining river levels on the Apalachicola River. The Mobile District would fund services for the ERDC, other Corps, and/or private consultant; and USFWS would fund the services of USGS (another DOI agency).

Additional funding constraints could delay initiation or completion of this action. We will revisit the situation in January 2007 or before, and initiate additional consultation with UFWS if necessary regarding completion of this action.

e. Monitoring (RPM 5).

(1) Monitoring for take. The BiOp requires monitoring for take, as defined by the number of days when daily releases are less than the daily basin inflow when basin inflows are between 8,000 cfs and 10,000 cfs. Take would occur whenever the total number of days in this range is greater than 39. Consultation would be re-initiated immediately if take occurs. This take is being monitored based on a count of the number of days in the calendar year, beginning 1 January 2006.

As previously noted, Mobile District has set up a system to monitor the number of day falling within this range and the number of potential "taking days". The monitoring system is based on the current water management database, as posted on the water management web site; and automatically computes the number of "taking days". USFWS was pleased that the system was comprised of a database, which would help in developing a future interactive "query-based" system. Memphis indicated we were consulting with our counterparts in Savannah District to assist in setting up such a system in the future. Due to sustained low flows and several recent rain events, there have been several days since 1 June that fall within this range. At the time of the meeting the number of days was approaching 20 days. Dependent upon future hydrological conditions between now and the end of the year, there was concern that we may approach the taking limit before the end of the calendar year. It was agreed to continue to monitor the "taking

days" and it they reach 30 prior to 15 November, then we would immediately telephonically consult with USFWS to determine the recommended operations for the remaining 45 days of the calendar year.

It was agreed that we would not publicly post the "takings" table on the public access web site, but wanted USFWS to understand how we were tracking our operations. We could make it accessible to USFWS for monitoring purposes, if necessary.

(2) Develop plan for monitoring total abundance of listed mussels in the action area and fraction of the population located in habitats that are vulnerable to low-flow impacts. This plan is to be developed on or before 30 March 2007.

Joanne summarized a recon level study, as suggested by Dr. Drew Miller (retired from ERDC), comprised of Drew and a river hydraulic scientist to review aerial photography and/or flow down the river to observe potential habitat and river hydraulic conditions. The purpose would be to identify those areas with potential habitat and those areas with stable or unstable river conditions, which would assist in development of a survey/sampling design. This effort is currently delayed due to funding constraints (continuing resolution level of funding). Gail and Jerry also recommended recent research papers that may assist in developing a study design. (Strayer, flow habitat limitations publication (hydraulic study on flow/velocity relationships; flow refuges for mussels; Univ of Iowa study on stable areas used by mussels; Morales, et al; and Weber?)

Additional funding constraints could delay initiation or completion of this action. We will revisit the situation in January 2007 or before, and initiate additional consultation with UFWS if necessary regarding completion of this action.

Encl
Agenda
BiOp Terms & Conditions
Draft Implementation Schedule

JOANNE BRANDT
Compliance Manager
Inland Environment Team

Jim Woodruff Dam
Interim Operations Plan
Implementation of the Biological Opinion Reasonable and Prudent Measures
Planning Meeting
26 October 2006

AGENDA

Update on Current Operations

EA/FONSI for IOP

Draft Implementation Plan

RPM1 Adaptive Management

Semi-Annual Meetings
Update Evaluation Tools
Annual Report

RPM2 Adjust June to February Lower Threshold to 10,000

RPM3 Drought Provision

Possible drought triggers?

Assess how IOP would have affected previous operations/releases; affects to spawning habitat and floodplain inundation; and Flow/velocity effects?

Additional Consultation

RPM4 Sediment Dynamics and Channel Morphology Evaluation

Panel to assess current status, patterns and trends
ID feasible management actions to minimize mortality
ID additional information needed to predict morphological changes

RPM5 Monitoring

Monitor No. Days < BI for flows between 8,000 – 10,000 cfs ($\leq$ 39 days)

Develop Plan to monitor total abundance mussels/fraction in vulnerable habitats

Implement Mussel Monitoring Plan

Next Actions?

10-01-06

JWD Interim Operations Plan - Implementation Schedule

Reasonable and Prudent Measures/Terms and Conditions:	FY 2006 Sep 2006	FY-2007 Oct 2006	Nov 2006	Dec 2006	Jan 2007	Feb 2007	Mar 2007	Apr 2007	May 2007	Jun 2007	Jul 2007	Aug 2007	Sep 2007	FY 2008
RPM1 - Adaptive Management:														
Semi-Annual Meetings		Meeting				Meeting						Meeting		2 Meetings
Evaluate Refinements to tools Convert to HEC-ResSim Update Unimpaired Flow Dataset Precip/Flow relationship trends		Define Actions											Complete	ID Add'l tools
Annual Report					Report due									Ann Rpt
RPM2 - Adjust Jun-Feb Lower Threshold	Done													
RPM3 - Drought Provision														
Identify Drought provision -Assess how IOP would have affected operation/releases in 2003-2005? -Assess affects to spawn habitat and floodplain inundation (135 days) -flow/velocity data collection?		Define DP Initiate BA	Follow-up Mtg	Complete BA	Due Date			Implement??						
RPM4 - Sediment/Morphological Evaluation														
Panel to assess current status, patterns, and trends in morphological change -ID Feasible management actions to minimize mortality -ID additional information need to predict morphological changes		ID Panel/Plan			1st Panel Mtg	2nd Panel Mtg	Panel Rpt Due							Add'l Study
RPM5 - Monitoring														
Monitor # days < BI for flows between 8,000 - 10,000 cfs (≤ 39 days)	Implement													
Develop plan to monitor total abundance mussels/fraction in vulnerable habitats		Discuss actions		Recon/Mtg			Plan due date							
Implement Mussel Monitoring Plan -Review mussel data & aerial photos -Recon survey -Abundance/depth/distribution surveys														Collect Data

Jim Woodruff Dam Interim Operations Plan
Section 7 Consultation Biological Opinion
Reasonable & Prudent Measures, Terms & Conditions, and Conservation Recommendations

7.3 REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of incidental take of fat threeridge and purple bankclimber on the Apalachicola River.

RPM1. Adaptive management. Identify ways to minimize harm as new information is collected.

Rationale. Additional information will be collected about the listed species and their habitats in the action area, water use upstream, and climatic conditions. This information needs to be evaluated to determine if actions to avoid and minimize take associated with the Corps' water management operations are effective or could be improved.

RPM2. Adjust June to February Lower Threshold to 10,000 cfs. Replace the proposed 8,000 cfs threshold in the IOP with a threshold of 10,000 cfs.

Rationale. Mussels may be in vulnerable areas where take may occur when flows are less than 10,000 cfs. Not increasing reservoir storage when basin inflow is 10,000 cfs or less from June to February will avoid and minimize the potential for take in the zone of 8,000 to 10,000 cfs.

RPM3. Drought provisions. Develop modifications to the IOP that provide a higher minimum flow to the Apalachicola River when reservoir storage and hydrologic conditions permit.

Rationale. Take of listed species due to the IOP may occur when the Corps is using a portion of basin inflow to increase ACF reservoir storage. The Corps can minimize mussel mortality due to low-flow conditions by supporting a higher minimum flow when total reservoir storage and/or hydrologic conditions permit. As proposed, the IOP uses reservoir storage to support a 5,000 cfs minimum flow. The available data indicates that higher minimum flows are supportable during normal and wet hydrologic periods, and during dry periods when the reservoirs are relatively full. Conversely, during extended drier than normal conditions, it may be prudent to store more water than allowed under the IOP during certain times of the year to insure minimum water availability later. Possible components and triggers of the drought plan could be, but are not limited to: Corps reservoir action zones, cumulative reservoir storage remaining, total basin inflows, indictors of fish spawn, climatic condition indices, and flow levels at gages downstream of the Chattahoochee gage, such as the gage at Wewahitchka.

RPM4. Sediment dynamics and channel morphology evaluation. Improve our understanding of the channel morphology and the dynamic nature of the Apalachicola River.

Rationale. The dynamic conditions of the Apalachicola need to be evaluated to monitor the zone at which take may occur and to identify alternatives to minimize effects to listed mussels in vulnerable locations. Both sediment transport and channel morphology need to be considered to provide a basis for predicting changes in morphology that may affect the relative vulnerability of mussels to take due to the IOP. The amount of mussel habitat and thus IOP-related take depends on channel morphology. This evaluation will inform alternatives that may be considered under RPM1 and RPM3.

RPM5. Monitoring. Monitor the level of take associated with the IOP and evaluate ways to minimize take by studying the distribution and abundance of the listed mussels in the action area.

Rationale. Take needs to be monitored monthly to insure that the level of take identified in the biological opinion is not exceeded. As natural conditions change, the populations of the species need to be assessed and the amount of take evaluated relative to any new information. Since this is an interim plan and there will be additional consultations on the overall operations of the ACF project for flood control, water supply contracts, hydropower, and navigation, the monitoring information is needed to prepare the biological assessments for these future consultations.

7.4 TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are mandatory. Studies and other outreach programs in the RPMs and conservation measures are subject to the availability of funds by Congress. The Corps will exercise its best efforts to secure funding for those activities. In the event the necessary funding is not obtained to accomplish the RPM activities by the dates established, the Corps will reinitate consultation with USFWS.

7.4.1 Adaptive management (RPM1)

a. The Corps shall organize semi-annual meetings with the Service to review implementation of the IOP and new data, identify information needs, scope methods to address those needs, including, but not limited to, evaluations and monitoring specified in this Incidental Take Statement, review results, formulate actions that minimize take of listed species, and monitor the effectiveness of those actions.

b. The Corps shall assume responsibility for the studies and actions that both agencies agree are reasonable and necessary to minimize take resulting from the Corps' water management actions.

c. The Corps shall evaluate refinements to predictive tools.

d. The Corps shall provide an annual report to the Service on or before January 31 each year documenting compliance with the terms and conditions of this Incidental Take Statement during the previous federal fiscal year, any conservation measures

implemented for listed species in the action area; and recommendations for actions in the coming year to minimize take of listed species.

7.4.2 Adjust June to February Lower Threshold to 10,000 cfs. (RPM2)

a. The Corps shall immediately release the 7-day moving average basin inflow, but not less than 5,000 cfs, when the 7-day moving average basin inflow is less than 10,000 cfs for the months of June to February, and shall incorporate this revision into the IOP table of minimum discharges.

7.4.3 Drought provisions (RPM3).

a. The Corps, with Service concurrence, shall initiate by January 30, 2007, IOP drought provisions that identify the reservoir, climatic, hydrologic, and/or listed species conditions that would allow supporting a higher minimum flow in the Apalachicola River, and that identify recommended water management measures to be implemented when conditions reach the identified drought trigger point(s).

b. If modifications to the IOP parameters for the months of March through May are adopted as part of the drought provisions, the Corps shall assess potential affects to Gulf sturgeon spawning and floodplain inundation. The Corps shall provide the models and a biological assessment of the effects of the drought provisions on listed species at least 135 days in advance of implementing the drought provisions in order to reinitiate this consultation relative to any proposed changes in the IOP.

7.4.4 Sediment dynamics and channel morphology evaluation (RPM4).

a. In coordination with the Service, and other experts jointly identified, the Corps shall evaluate before March 30, 2007, the current status of sediment transport and channel stability in the Apalachicola River as it relates to the distribution of listed mussels and their vulnerability to low-flow conditions. The goals of the evaluation are to identify: 1) feasible water and/or habitat management actions that would minimize listed mussel mortality; 2) current patterns and trends in morphological changes; and 3) additional information needed, if any, to predict morphological changes that may affect the listed mussels. This evaluation shall be based on available information and tools and best professional judgement.

7.4.5 Monitoring (RPM5).

a. The Corps shall monitor the number of days that releases from Woodruff Dam (daily average discharge at the Chattahoochee gage) are less than the daily basin inflow when daily basin inflow is less than 10,000 cfs but greater or equal to 8,000 cfs. If the total number of days of releases in this range in a calendar year is projected to exceed the total number of days of daily basin inflow in this range by more than 39, the Corps shall reinitiate consultation immediately.

b. In coordination with the Service, the Corps shall develop on or before March 30, 2007, a feasible plan to monitor listed mussels in the action area. The goals are to:
1) periodically estimate total abundance of listed mussels in the action area; and
2) determine the fraction of the population that is located in habitats that are vulnerable to low-flow impacts.

c. The Corps shall implement the studies outlined above as soon as is practicable.

d. The Corps shall include monitoring results in the annual report provided to the Service under Condition 1.c.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that the action will result in no more than 39 days per year when project operations reduce basin inflow when it is in the range of 8,000-10,000 cfs. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring the reinitiation of consultation and review of the reasonable and prudent measures provided. The Corps must immediately provide an explanation of the causes of the taking, and review with the Service the need for possible modification of the reasonable and prudent measures.

8 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by conducting conservation programs for the benefit of endangered and threatened species. Towards this end, conservation recommendations are discretionary activities that an action agency may undertake to minimize or avoid the adverse effects of a proposed action, help implement recovery plans, or develop information useful for the conservation of listed species.

The Service recommends that the Mobile District of the U.S. Army Corps of Engineers:

1. Identify watershed-planning opportunities that would assist in identifying alternatives to reduce overall depletions in the ACF basin, particularly the Flint River, thereby increasing baseline flow to the Apalachicola River.

2. Improve the public understanding of water management of the ACF system, the related conservation needs of listed species, and the management of the multiple purposes of the federal reservoirs.

3. Consider alternatives that would increase flexibility in the management of reservoir storage including the feasibility of flood control alternatives (e.g. moving structures from the floodplain, land acquisition) and providing for recreational access at a variety of pool elevations.

4. Provide additional data and hydrodynamic models that would assist in determining areas of bed stability that should be surveyed for listed mussels.

5. Implement freshwater mussel recovery actions including developing habitat suitability indices, conducting a population assessment of the listed mussels of the Apalachicola River, restoring reaches to provide stable habitat, and validating aging techniques for these species.

6. Use the models developed for the Tri-State Comprehensive Study to determine if changes in flow compared to pre-Lanier flows are significant relative to Gulf sturgeon juvenile growth and if changes in the operation of the reservoirs will benefit Gulf sturgeon recovery.

7. Implement Gulf sturgeon recovery actions such as studies of Gulf sturgeon ecology in Apalachicola Bay and possible effects of reduced basin inflow on the ability of the bay to support sturgeon and providing for fish passage at Jim Woodruff Dam.

8. Establish a clearinghouse for biological and water resource information about the ACF system and make such information readily available in several key locations in the basin.

9. Participate in stakeholder discussions to develop a long-term biological monitoring program for the ACF system and support, as feasible, implementation of a long-term program.

10. Update, as soon as practicable, tools for assessing the effects of ongoing and future system operations, including estimates of basin inflow and consumptive demands. The tools should assist in identifying flows that provide sufficient magnitude, duration, frequency, and rate of change to support the survival and recovery of the listed species in the ACF.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

E-2 Mobile District (CESAM) email to U.S. Fish and Wildlife Service (USFWS), dated 1 November 2006, providing Concept 2 modeling results

Brandt, Joanne U SAM

From: Hathorn, James E Jr SAM

Sent: Wednesday, November 01, 2006 5:14 PM

To: Jerry_Ziewitz@fws.gov

Cc: Brandt, Joanne U SAM; Vaughan, Memphis Jr SAM; Hrabovsky, Cheryl L SAM

Subject: HEC-5 Modeling of Proposed Conditions

Attachments: iop_7000_1990s.jpg; iop_7000_1980s.jpg; iop_6500_1980s.jpg; iop_6500_1990s.jpg; iop_5800_1980s.jpg; iop_5800_1990s.jpg; SpawningPeriodFlowDemand.pdf; COE IOP Table_Proposed_Conditions.xls

Hey Jerry,

I have placed 3 zipped DSS files on our FTP Server for your download. They are located at the following site
ftp://ftp.sam.usace.army.mil/pub/actacf/
The file names are :
IOP_5800-10KI.zip
IOP_6500-10KI.zip
IOP_7000-10KI.zip

They represent to three flow target scenarios of 5800, 6500 and 7000 discussed during our meeting last week. The file name corresponds to the flow target in the model. To provide additional clarification I have attached an excel file with the Jim Woodruff release targets for each scenario (there is sheet for each scenario). Finally the PDF file graphically displays the spawning season target for the 5800 target scenario. This same graph can be applied to the other two scenario by replacing the 5800 with the appropriate value. You will notice that there is gradual increase in the Jim Woodruff release from 16,000 to 25,000. This was done to eliminate the abrupt change that would appear as a vertical green line on the chart. For your information 70% of the BI at 35,800 is equal to 25,000. Therefore for flows above 35,800 we are only required to release 25,000.

The attached jpeg files are the composite storage comparisons you requested. These were plotted directly from the compressed DSS files. The B-part is COMPOSITE-STOR for plotted pathnames. I have include plots of the 1980's and 1990's. When you view the plots of the 1990's you will notice shortages that occur for all 3 model runs in the year 2000. The values for 5800 are relatively small, but the others are significant. This would indicate that we will be able to support a value close to 5800 but nothing more. During the shortages the composite storage is below Zone 1. This is a really could analysis plot, I am glad Memphis and Cheryl presented to concept.

James E. Hathorn, Jr.
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Revised 05 Sept 2006

U.S Army Corps of Engineers, Mobile District
Interim Operations Plan at Jim Woodruff Dam
and Releases to the Apalachicola River
In Support of Listed Mussels and Gulf Sturgeon

Minimum Releases

Months	Basin Inflow (BI) (cfs)	Releases from JWLD (cfs)
March - May	>= 35,800	not less than 25,000
	>= 16,000 and < 25,000	>= 70% BI; not less than 16,000
	< 16,000	>= BI; not less than 7,000
June - February	>= 23,000	not less than 16,000
	>=10,000 and < 23,000	>= 70% BI; not less than 10,000
	< 10,000	>= BI; not less than 7,000

Down Ramping Rates

Release Range	Maximum Fall Rate (ft/day), measured at Chattahoochee gage
Flows greater than 30,000 cfs*	No ramping restriction**
Flows greater than 20,000 cfs but <= 30,000*	1.0 to 2.0 ft/day
Exceeds Powerhouse Capacity (~16,000 cfs) but <= 20,000 cfs*	0.5 to 1.0 ft/day
Within Powerhouse Capacity and > 8,000 cfs*	0.25 to 0.5 ft/day
Within Powerhouse Capacity and <=8,000 cfs*	0.25 ft/day or less

*Consistent with safety requirements, flood control purposes, equipment cababilities.
**For flows greater than 30,000 cfs, it is not reasonable or prudent to attempt to control down ramping rate, and no ramping rate is required.

Revised 05 Sept 2006

U.S Army Corps of Engineers, Mobile District
Interim Operations Plan at Jim Woodruff Dam
and Releases to the Apalachicola River
In Support of Listed Mussels and Gulf Sturgeon

Minimum Releases

Months	Basin Inflow (BI) (cfs)	Releases from JWLD (cfs)
March - May	>= 35,800	not less than 25,000
	>= 16,000 and < 25,000	>= 70% BI; not less than 16,000
	< 16,000	>= BI; not less than 6,500
June - February	>= 23,000	not less than 16,000
	>=10,000 and < 23,000	>= 70% BI; not less than 10,000
	< 10,000	>= BI; not less than 6,500

Down Ramping Rates

Release Range	Maximum Fall Rate (ft/day), measured at Chattahoochee gage
Flows greater than 30,000 cfs*	No ramping restriction**
Flows greater than 20,000 cfs but <= 30,000*	1.0 to 2.0 ft/day
Exceeds Powerhouse Capacity (~16,000 cfs) but <= 20,000 cfs*	0.5 to 1.0 ft/day
Within Powerhouse Capacity and > 8,000 cfs*	0.25 to 0.5 ft/day
Within Powerhouse Capacity and <=8,000 cfs*	0.25 ft/day or less

*Consistent with safety requirements, flood control purposes, equipment cabability.
**For flows greater than 30,000 cfs, it is not reasonable or prudent to attempt to control down ramping rate, and no ramping rate is required.

Revised 05 Sept 2006

U.S Army Corps of Engineers, Mobile District
Interim Operations Plan at Jim Woodruff Dam
and Releases to the Apalachicola River
In Support of Listed Mussels and Gulf Sturgeon

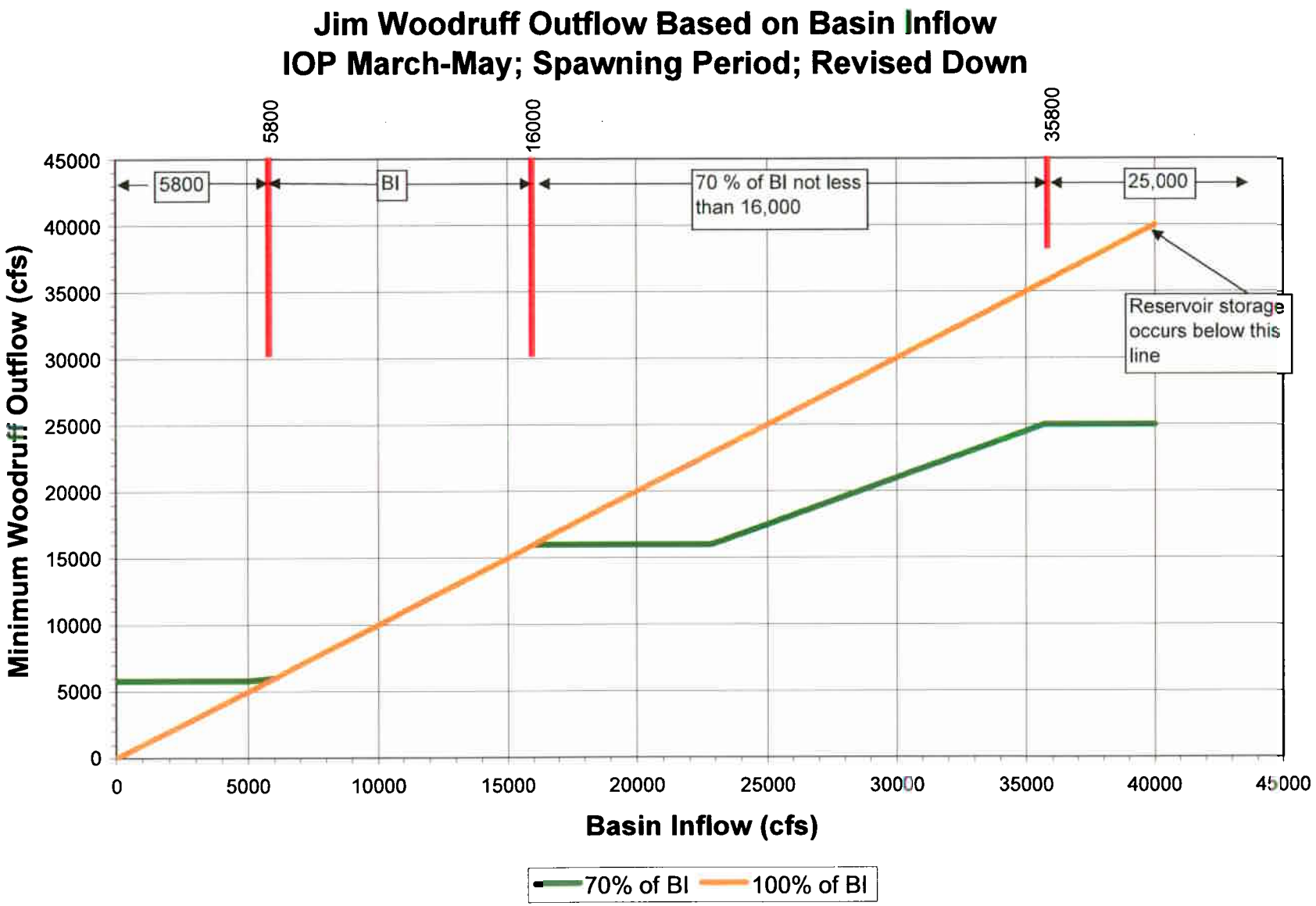
Minimum Releases

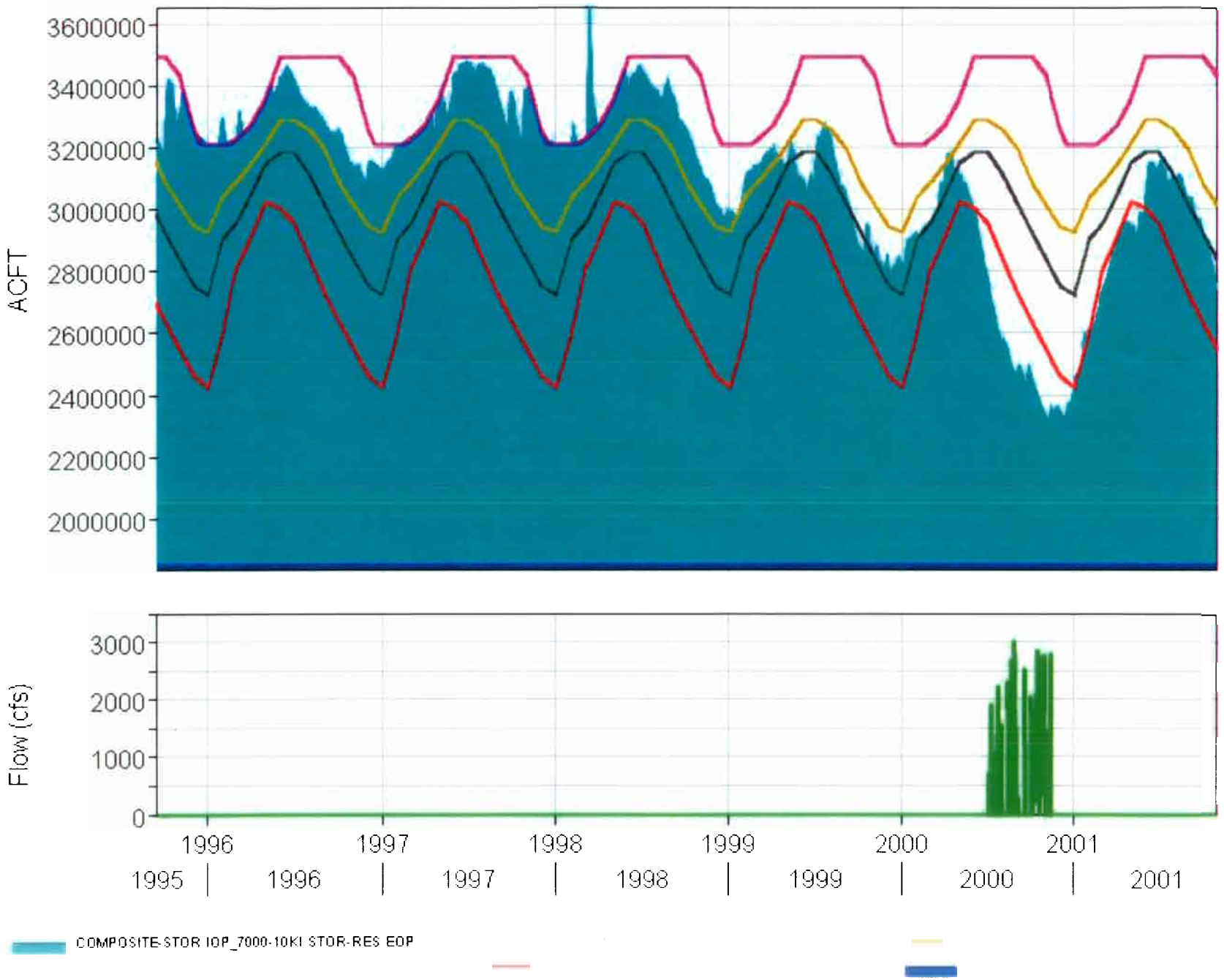
Months	Basin Inflow (BI) (cfs)	Releases from JWLD (cfs)
March - May	>= 35,800	not less than 25,000
	>= 16,000 and < ~~25,000~~ 35,800	>= 70% BI; not less than 16,000
	< 16,000	>= BI; not less than 5,800
June - February	>= 23,000	not less than 16,000
	>=10,000 and < 23,000	>= 70% BI; not less than 10,000
	< 10,000	>= BI; not less than 5,800

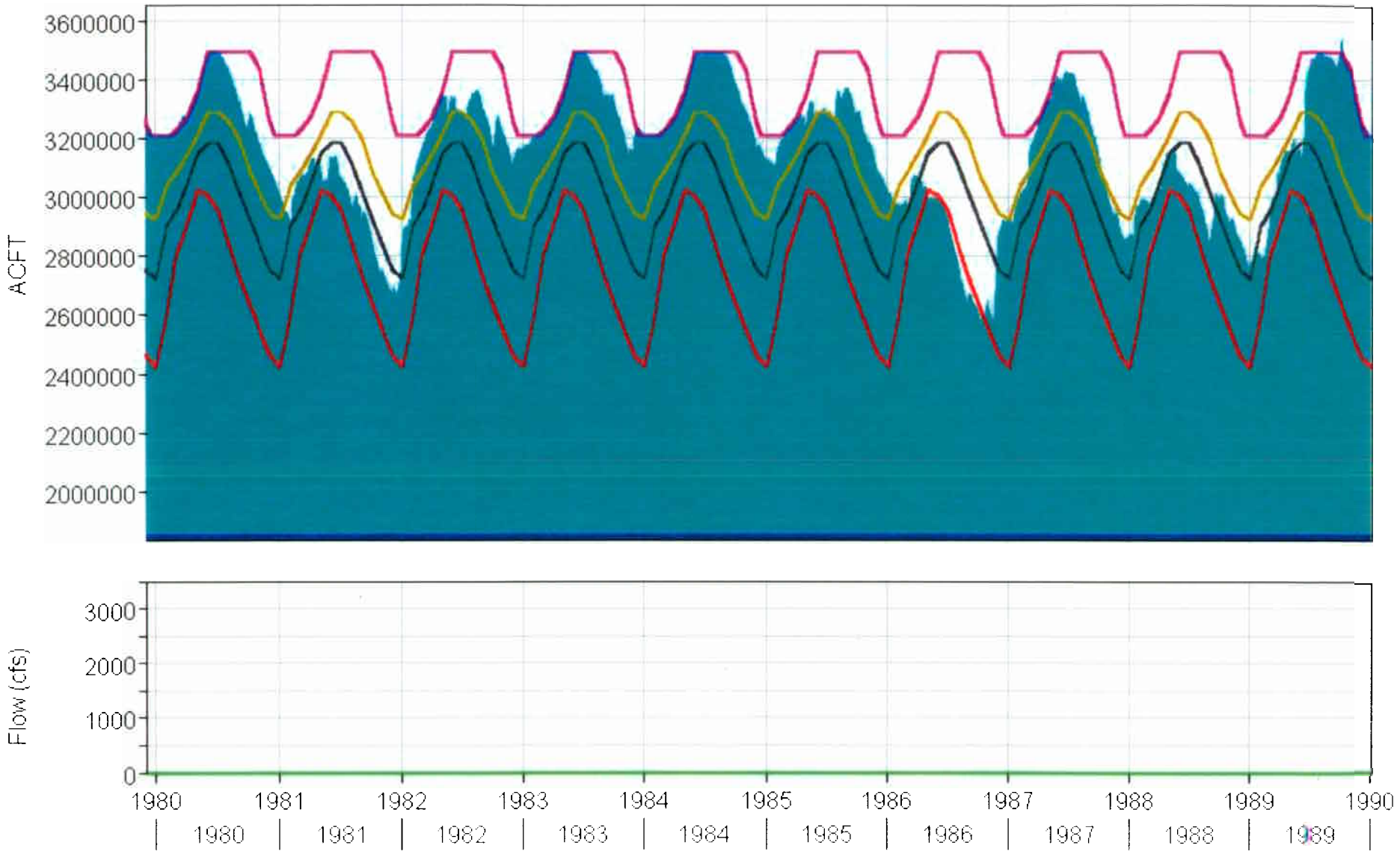
Down Ramping Rates

Release Range	Maximum Fall Rate (ft/day), measured at Chattahoochee gage
Flows greater than 30,000 cfs*	No ramping restriction**
Flows greater than 20,000 cfs but <= 30,000*	1.0 to 2.0 ft/day
Exceeds Powerhouse Capacity (~16,000 cfs) but <= 20,000 cfs*	0.5 to 1.0 ft/day
Within Powerhouse Capacity and > 8,000 cfs*	0.25 to 0.5 ft/day
Within Powerhouse Capacity and <=8,000 cfs*	0.25 ft/day or less

*Consistent with safety requirements, flood control purposes, equipment cabilities.
**For flows greater than 30,000 cfs, it is not reasonable or prudent to attempt to control down ramping rate, and no ramping rate is required.


Jim Woodruff Outflow Based on Basin Inflow
IOP March-May; Spawning Period; Revised Down
5800
16000
35800
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
5800
BI
70 % of BI not less than 16,000
25,000
Reservoir storage occurs below this line
Minimum Woodruff Outflow (cfs)
0
5000
10000
15000
20000
25000
30000
35000
40000
45000
Basin Inflow (cfs)
70% of BI
100% of BI


ACFT
3600000
3400000
3200000
3000000
2800000
2600000
2400000
2200000
2000000
Flow (cfs)
3000
2000
1000
0
1996
1997
1998
1999
2000
2001
1995
1996
1997
1998
1999
2000
2001
COMPOSITE-STOR IOP_7000-10KI STOR-RES EOP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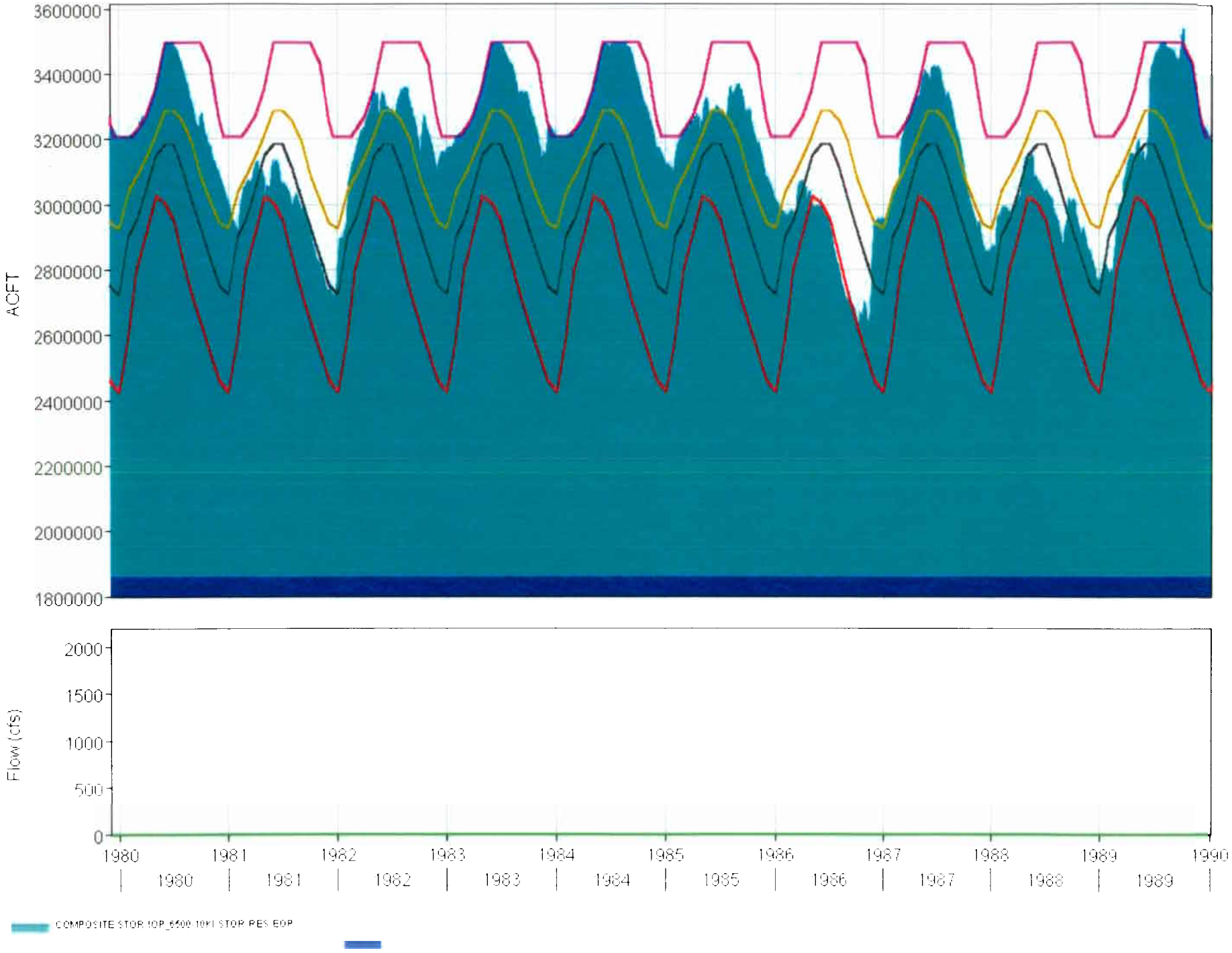
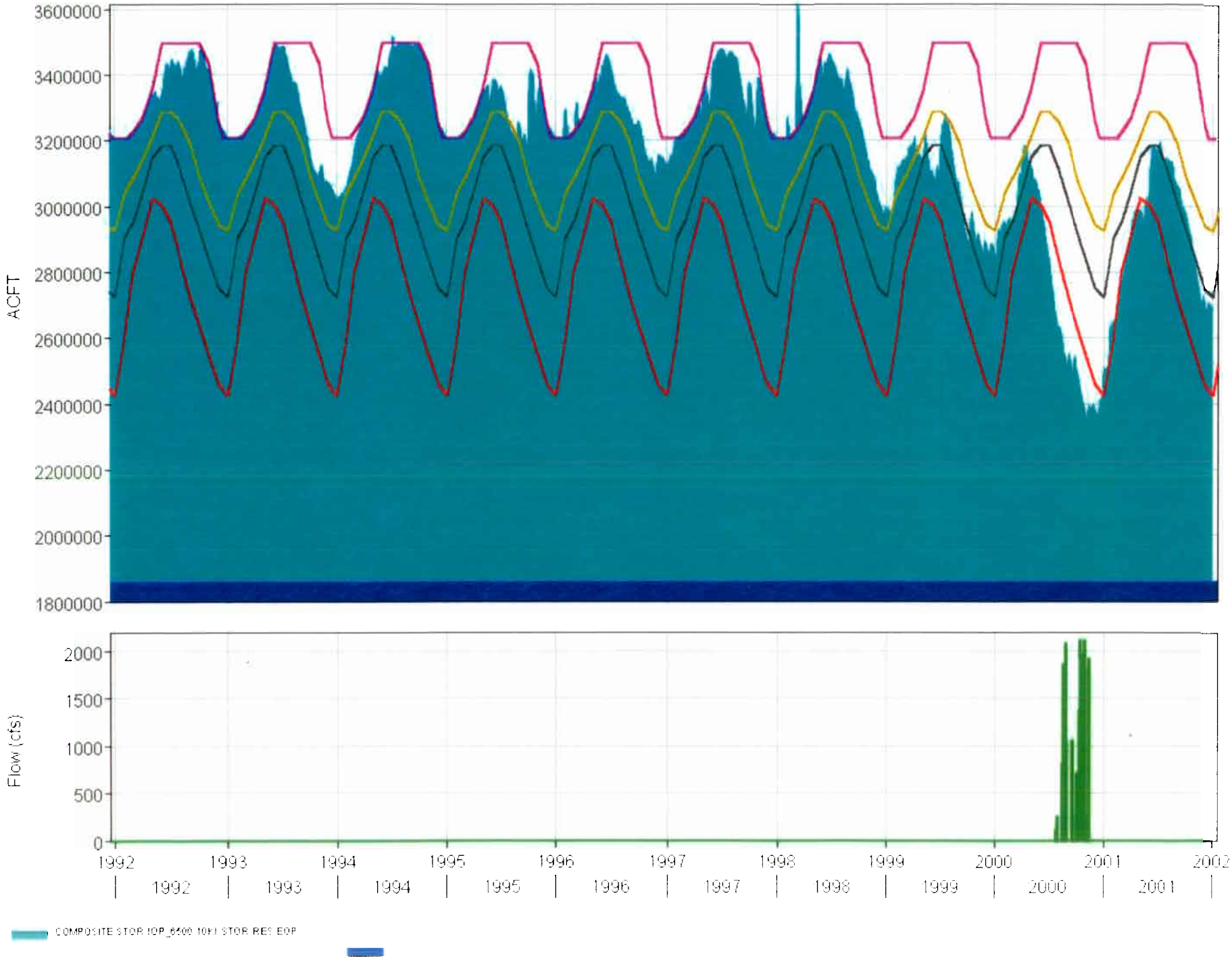
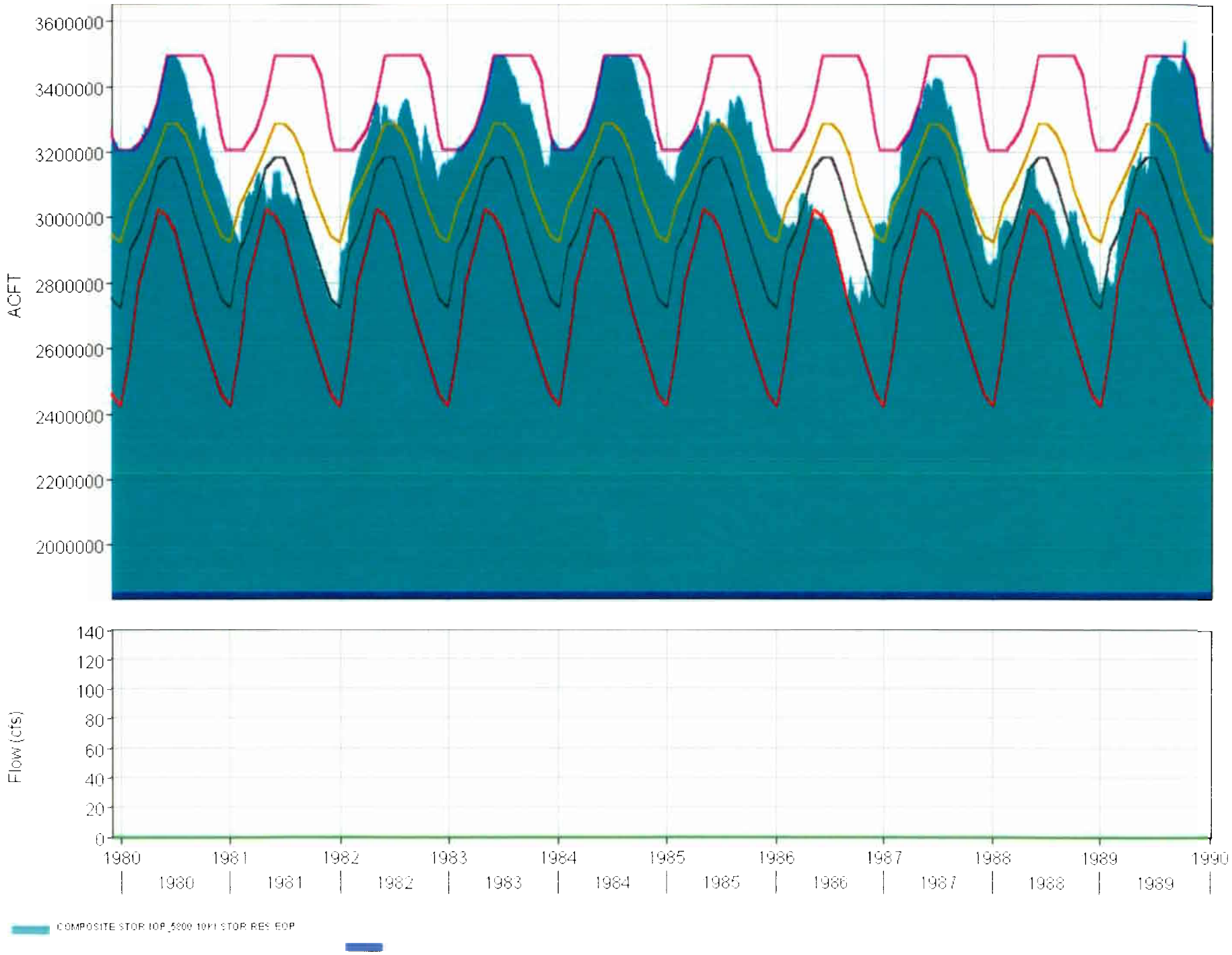
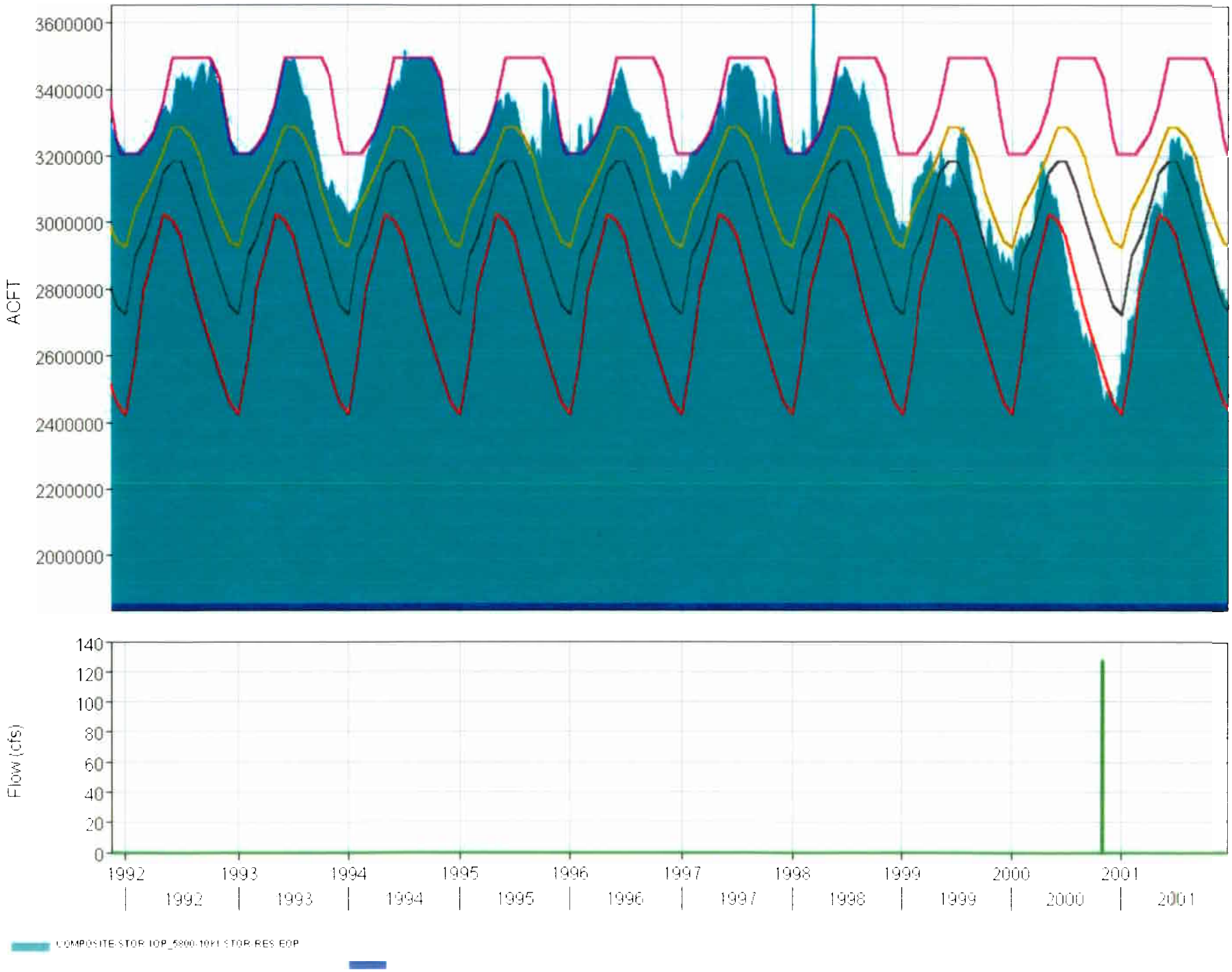
3400000
3200000
3000000
2800000
2600000
2400000
2200000
2000000
ACFT
3000
2000
1000
0
Flow (cfs)
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
COMPOSITE-STOR IOP_7000-10KI STOR-RES EOP


3600000
3400000
3200000
3000000
2800000
2600000
2400000
2200000
2000000
1800000
ACFT
2000
1500
1000
500
0
Flow (cfs)
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
COMPOSITE STOR TOP_6500 10K1 STOR RES EOP


3600000
3400000
3200000
3000000
2800000
2600000
2400000
2200000
2000000
1800000
ACFT
2000
1500
1000
500
0
Flow (cfs)
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
COMPOSITE STOR IOP_8500 10K1 STOR RES EOP


3600000
3400000
3200000
3000000
2800000
2600000
2400000
2200000
2000000
ACFT
140
120
100
80
60
40
20
0
Flow (cfs)
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
COMPOSITE STOR IOP_5800 10K1 STOR RES EOP


ACFT
3600000
3400000
3200000
3000000
2800000
2600000
2400000
2200000
2000000
Flow (cfs)
140
120
100
80
60
40
20
0
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
COMPOSITE:STOR IOP_5800-10K1 STOR RES EOP

E-3 Florida Department of Environmental Protection (FDEP) letter to CESAM dated 1 November 2006, requesting status of compliance with RPM3

Department of
Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Colleen M. Castille
Secretary

November 1, 2006

Col. Peter F. Taylor, Jr.
Department of the Army
Mobile District, Corps of Engineers
Attention: CESAM-DE
Post Office Box 2288
Mobile, Alabama 36628-0001

RE: Plans to Comply with RPM 3 (Drought Provisions)

Dear Col. Taylor:

The U.S. Fish and Wildlife Service ("FWS") issued its *Biological and Conference Report on the U.S. Army Corps of Engineers, Mobile District, Interim Operating Plan for Jim Woodruff Dam and the Associated Releases to the Apalachicola River* ("BiOp") on September 5, 2006. The BiOp provided the U.S. Army Corps of Engineers ("Corps") an incidental take statement for the taking of mussels in the Apalachicola River. BiOp at 140-147. Among the reasonable and prudent measures contained in the incidental take statement is "RPM 3 Drought Provisions." The purpose of this letter is inquire regarding the status of the Corps' efforts to comply with RPM 3 and to request a meeting to discuss implementation of that requirement of the incidental take statement.

The Corps must implement the "reasonable and prudent measures" enumerated in the incidental take statement to maintain authority to take mussels in the Apalachicola River. *See, e.g.*, 16 U.S.C. § 1536(b)(4)(ii); 16 U.S.C. § 1536(o)(2); 50 C.F.R. § 402.14(i)(1)(ii). RPM 3 provides: "**RPM3. Drought provisions**. Develop modifications to the IOP that provide a higher minimum flow to the Apalachicola River when reservoir storage and hydrologic conditions permit." BiOp at 142. The BiOp elaborates on the rationale for this requirement:

> Rationale. Take of listed species due to the IOP may occur when the Corps is using a portion of basin inflow to increase ACF reservoir storage. The Corps can minimize mussel mortality due to low-flow conditions by supporting a higher minimum flow when total reservoir storage and/or hydrologic conditions permit. As proposed, the IOP uses reservoir storage to support a 5,000 cfs minimum flow. *The available data indicates that higher minimum flows are supportable during normal and wet hydrologic periods, and during dry periods when the reservoirs are relatively full.* Conversely, during extended drier than normal conditions, it may

> be prudent to store more water than allowed under the IOP during certain times of the year to insure minimum water availability later. Possible components and triggers of the drought plan could be, but are not limited to: Corps reservoir action zones, cumulative reservoir storage remaining, total basin inflows, indictors of fish spawn, climatic condition indices, and flow levels at gages downsream of the Chattahoochee gage, such as the gage at Wewahitchka.

Id. (Emphasis supplied).

Reasonable and prudent measures like RPM 3 are implemented through compliance with mandatory "terms and conditions." 16 U.S.C. § 1536(b)(4)(iv); 50 C.F.R. § 402.14(i)(1)(iii). Accordingly, the Corps' incidental take statement contains the following terms and conditions to implement RPM 3:

> **7.4.3 Drought provisions (RPM3).**
>
> a. The Corps, with Service concurrence, *shall initiate by January 30, 2007, IOP drought provisions that identify the reservoir, climatic, hydrologic, and/or listed species conditions that would allow supporting a higher minimum flow in the Apalachicola River*, and that identify recommended water management measures to be implemented when conditions reach the identified drought trigger point(s).
>
> b. If modifications to the IOP parameters for the months of March through May are adopted as part of the drought provisions, the Corps shall assess potential affects to Gulf sturgeon spawning and floodplain inundation. The Corps shall provide the models and a biological assessment of the effects of the drought provisions on listed species at least 135 days in advance of implementing the drought provisions in order to reinitiate this consultation relative to any proposed changes in the IOP.

BiOp at 144 (Emphasis supplied).

Florida has challenged the BiOp in *State of Florida v. U.S. Fish & Wildlife Serv.*, 4:06 CV 410 RH-WCS 9 (N.D. Fl.). Nevertheless, unless and until the BiOp is set aside, the Corps is obligated to comply with the forgoing RPM 3 to retain its authority to take mussels. Florida is modeling various scenarios under which the Corps can readily provide increased flows to the mussel species as contemplated by RPM 3 without seriously compromising reservoir storage on the Chattahoochee River. Florida assumes the Corps is engaged in similar analyses in furtherance of its obligations under RPM 3.

Florida hereby requests the courtesy of a written response from you not later than November 5, 2006 explaining the Corps' progress in complying with RPM 3 to date. Further, Florida requests an update on any modeling activities you have undertaken. In addition, Florida

would like to meet with appropriate representatives from the Corps not later than November 15, 2006 to discuss the Corps' future plans concerning RPM 3. I look forward to your timely response.

Sincerely,

Gregory M. Munson
General Counsel

E-4 CESAM letter to FDEP, dated 6 November 2006, providing status update regarding compliance with RPM3

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

November 6, 2006

REPLY TO
ATTENTION OF:

Office of Counsel

Gregory M. Munson, Esquire
Florida Department of Environmental Protection
Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399

Dear Mr. Munson:

I have received your letter dated November 1, 2006, regarding the provisions of the U.S. Fish and Wildlife Service (USFWS) Biological Opinion issued on September 5, 2006, relating to our water management operations at Jim Woodruff Dam and associated releases to the Apalachicola River, pursuant to the Interim Operations Plan (IOP). In particular, you requested an update on the status of the U.S. Army Corps of Engineers' efforts to comply with the Reasonable and Prudent Measure No. 3 (RPM 3), Drought Provision, which requires the Mobile District to develop modifications to the IOP that provide a higher minimum flow the Apalachicola River when reservoir storage and hydrologic conditions permit. The terms and conditions of the USFWS Biological Opinion require Mobile District to initiate IOP drought provisions by January 30, 2007, with the concurrence of the USFWS, that identify the reservoir, climatic, hydrological and/or listed species conditions that would allow supporting a higher minimum flow in the Apalachicola River, and those water management measures that would be implemented when conditions reach the identified drought "trigger" points.

The Mobile District has begun discussions with the USFWS regarding the identification of drought provisions or drought "triggers" for incorporation into the IOP. We met with the USFWS, Panama City Office staff on October 26, 2006, to discuss information and modeling data that could assist in evaluating possible drought provisions. Both agencies agreed that the first step is to model how various possible reductions in the spring releases may impact composite storage within the basin, and to evaluate whether and under what conditions available composite storage may allow sustained higher releases in the summer months during drought conditions. We have initiated some preliminary modeling and intend to meet again with USFWS in early December to share the preliminary modeling results. We are also contemplating hosting a workshop with the ACF basin stakeholders, before the end of the year, to share our preliminary modeling results and any suggested drought provisions. At that time we would welcome comments, suggestions, and information developed by other stakeholders that could assist

in refining the IOP operations during drought conditions, as well as during normal to wet conditions. Our intent is to identify any proposed components of a drought provision not later than January 30, 2007, in compliance with the terms of RPM 3. Proposed revisions to the spring release schedule (March – May), or other elements of the IOP, may require completion of additional Section 7 consultation prior to implementation under the IOP.

We intend to keep you and the other ACF basin stakeholders informed of our progress in developing a drought provision in accordance with RPM 3 and any proposed changes to the IOP.

Sincerely,

Peter F. Taylor, Jr.
Colonel, Corps of Engineers
District Commander

E-5 CESAM email to ACF Basin stakeholders, dated 27 November 2006, announcing Drought Provision Workshop in Columbus, Georgia on 13 December 2006

Brandt, Joanne U SAM

From: Brandt, Joanne U SAM
Sent: Monday, November 27, 2006 6:07 PM
To: Trey Glenn; Colleen Castille (colleen.castille@dep.state.fl.us); 'Carol Couch'; Dow Johnston; 'Alice_Lawrence@fws.gov'; 'Sandy_Tucker@fws.gov'; 'Gail_Carmody@fws.gov'; Jerry_Ziewitz@fws.gov; doug.barr@nwfwmd.state.fl.us; 'Douglas Spencer'; 'Herb R. Nadler'; Ken Legg; Nap Caldwell (nap_caldwell@dnr.state.ga.us); 'Wei_Zeng@dnr.state.ga.us'; 'Kim_Shugar@dep.state.fl.us'; Hoehn, Ted; 'Littlepage, Tom'; William Little (BLittle@ago.state.al.us); Wilmoth, Tom; rob_weller@mail.dnr.state.ga.us; 'jerrick.saquibal@nwfwmd.state.fl.us'; 'menghong_wen@dnr.state.ga.us'; 'Patricia Stevens'; cmstover@southernco.com; 'lbjones@KSLAW.com'; 'RSullivan@gov.state.ga.us'; 'LCASTER@FCLAW.com'; 'rsasser@sasserlawfirm.com'; 'Brown, Bruce'; 'tsilliman@mckennalong.com'; 'JKUEHNERT@bradleyarant.com'; 'mlembke@bradleyarant.com'; 'JTBanks@HHLAW.com'; 'EALLEN@balch.com'; Wilmoth, Tom; 'dblankenau@Blackwellsanders.com'; 'Tom.Beason@dep.state.fl.us'; wcox@LFWLAW.com; 'craig.kneisel@adeca.alabama.gov'; 'Mark.Crisp@chguernsey.com'; 'gmcmahon@arcadis-us.com'; 'dpeterson@warnell.uga.edu'; 'lwa@lwasf.com'; 'TCMOORER@southernco.com'; 'mbauer@sasserlawfirm.com'; 'tmorgan@mwwssb.com'; 'lradney@lfwlaw.com'; 'fal@adem.state.al.us'; 'clj@adem.state.al.us'; 'wcdykes@southernco.com'; 'staylor@balch.com'; 'drandall@hydrologics.net'; 'Jon Hornsby (E-mail)'; 'Steve Leitman'; 'PBarmeyer@KSLAW.com'; 'CBonham@meagpower.org'
Cc: Zettle, Brian A SAM; Eubanks, Michael J SAM; Bradley, Kenneth P SAM; Burke, Roger A SAM; Flakes, Curtis M SAM; Otto, Douglas C Jr SAM; Hathorn, James E Jr SAM; Vaughan, Memphis Jr SAM; Hrabovsky, Cheryl L SAM; Anderson, John W-OP-T SAM; Flanagan, Patricia A SAM; Day, Kenneth SAM; Fulton, Gerald P SAM; Smallwood, William L SAM; Bond, William J SAM; Lovelady, Christopher E SAM; Logan, Stephen F SAM; Chitwood, Robert W SAM; Davis, Jonathan A SAM; Shoemake, Deborah J SAM; Feldmeier, Paula M SAM; Brasfield, David C SAM; Cromartie, Leon M Jr SAM; 'James.A.Maysonett@usdoj.gov'; 'Ruth.Ann.Storey@usdoj.gov'; Mark.Brown@usdoj.gov; Taylor, Peter F COL SAM; Wells, Craig A LTC SAM; Robbins, Ervin P SAM; Mauldin, Gary V SAD; Purcell, Cornelius W HQ@SAD; Prince, George R Jr SAD; Simpson, Stanley L SAWatSAS; Rowden, Rebecca A SAS; Durham-Aguilera, Karen L NWD
Subject: Jim Woodruff Dam Interim Operations Plan, Drought Provision Workshop, 13 December 2006, Columbus, GA (UNCLASSIFIED)

Importance: High

Classification: **UNCLASSIFIED**
Caveats: NONE

On 5 September 2006, US Fish and Wildlife (USFWS) issued a Biological Opinion to the US Army Corps of Engineers, Mobile District, pursuant to Section 7 of the Endangered Species Act, regarding operations at Jim Woodruff Dam in support of endangered and threatened species and critical habitat on the Apalachicola River. In the Biological Opinion USFWS specified as a reasonable and prudent measure (RPM 3) that the Mobile District develop modifications to the IOP that provide a higher minimum flow to the Apalachicola River when reservoir storage and hydrological conditions permit. A term and condition of the Biological Opinion therefore requires that:

> *The Corps, with Service concurrence, shall initiate by January 30, 2007, IOP drought provisions that identify the reservoir, climatic, hydrologic, and/or listed species conditions that would allow supporting a higher minimum flow in the Apalachicola River, and that identify recommended water management measures to be implemented when conditions reach the identified drought trigger point(s).*

Mobile District has been consulting with the USFWS to identify possible elements of a drought provision, and has initiated some preliminary modeling for a conceptual drought provision. The Corps and USFWS have agreed to jointly host a one-day workshop on 13 December in order to share the conceptual drought provision elements currently being considered, and preliminary modeling results. The workshop will be structured similar to the previous technical modeling workshops held during the Section 7 consultation process; i.e., the Corps and USFWS will present background information and preliminary modeling results; other stakeholders will be allowed to present their concepts and/or modeling results; and there will be opportunity for technical discussion of the elements being considered.

The workshop will be held on **Wednesday, 13 December, 9:00 a.m. - 4:00 p.m. EST, at the Columbus Convention and Trade Center (Room 103), 801 Front Street, Columbus, GA (Telephone: 706-327-4522).**

A copy of the final Biological Opinion is posted on the Mobile District website at http://www.sam.usace.army.mil/ACF.htm.

If you have any questions regarding the workshop, please feel free to contact me.

Joanne Brandt
Compliance Manager
Inland Environment Team
US Army Corps of Engineers, Mobile District
Telephone: 251-690-3260
Email: joanne.u.brandt@sam.usace.army.mil

Classification: **UNCLASSIFIED**
Caveats: NONE

E-6 Memorandum for Record of 13 December 2006 Drought Provision Workshop

CESAM-PD-EI 14 December 2006

MEMORANDUM FOR RECORD

SUBJECT: Jim Woodruff Dam Interim Operations Plan, Biological Opinion RPM3 – Drought Provision Workshop, 13 December 2006

1. On 13 December 2006, the US Army Corps of Engineers (Corps), Mobile District, and the US Fish and Wildlife Service (USFWS) hosted a 1-day workshop in Columbus, Georgia, relating to the Jim Woodruff Dam Interim Operations Plan (IOP) and requirements of the Biological Opinion issued by the USFWS on 5 September 2006. The purpose of this workshop was to present to the States of Alabama, Florida, and Georgia, and other stakeholders, a draft concept for a drought provision as developed by the Corps in consultation with the USFWS over the past couple of months. Technical comments on the draft concept were also anticipated from the workshop participants, as well as alternative concepts or considerations for incorporation into a drought provision. A copy of the draft agenda for the workshop and the list of workshop participants is attached.

2. Joanne Brandt, Mobile District, presented a summary of the IOP and requirements contained in the Biological Opinion. Reasonable and Prudent Measure No. 3 (RPM3) and associated terms and conditions of the Biological Opinion require the Corps to initiate a drought provision by 30 January 2007. The purpose of the drought provision is to identify the hydrologic and/or climatic conditions that would allow a higher minimum flow than the 5000 cfs minimum specified in the IOP to be released to the Apalachicola River; and identify the drought provision or "drought triggers" that would determine when the lower 5000 cfs minimum flow rather than the higher flows would be released. An excerpted summary of the RPMs and terms and conditions of the Biological Opinion are attached for reference.

3. Rob Erhardt and Memphis Vaughan, Mobile District, presented data on the 2006 drought conditions relative to previous droughts within the ACF basin, including the 1941, 1956, 1981, 1988, and 2000 drought conditions. We are currently experiencing a moderate El Nino climatic condition. Rob noted that the 1960s and 1970s may have presented an anomalous wetter than normal condition, with conditions since the 1980s exhibiting the normal variations between extremes of wetter and drier climatic conditions. El Nino conditions typically produce wetter than normal conditions in the southern Gulf state region along the coast, but normal to drier than normal in the northern portions of Alabama and Georgia. Memphis demonstrated the comparative impacts on reservoir levels in 2006 compared to the previous historic droughts.

4. James Hathorn presented several concepts for a drought provision as developed over the past few months in consultation with USFWS. Concept 1 through Concept 4 represent an evolution of concepts considered and then either incorporated or ruled out as an element of a drought provision. It should be noted that the proposed Concepts 3 and 4 are still considered draft concepts at this time, and the Corps and USFWS are interested in technical comments on these concepts.

a. Concept 1 represents the first iterations of model runs, in an attempt to determine whether a higher minimum flow than 5,000 cfs could be supported. Several higher minimum flows were modeled, including 6,000 cfs, 6,300 cfs, 6,000 cfs and 8,000 cfs. All of these flows demonstrated significant draw downs of the reservoirs during critical drought periods.

b. Concept 2 included a provision to reduce the Spring upper flow threshold from 37,400 cfs to 25,000 cfs; and the Spring lower flow threshold to 16,000 cfs. These adjusted flow thresholds were suggested by USFWS for demonstration purposes. The models were run for higher minimum flows of 5,800 cfs, 6,500 cfs and 7,000 cfs, based on "real-world" operating system constraints. All scenarios showed shortages during the 2000-2001 drought conditions. In some cased, even the 5,000 cfs minimum flow could not be maintained.

c. Concept 3 includes the adjustments of the Spring upper and lower flow thresholds as described in Concept 2, and operate for a higher minimum flow of 6,500 cfs (desired flow) during normal to wetter conditions; with a drought trigger based on system composite storage used to determine when the minimum flow would revert back to the 5,000 cfs minimum (required flow) included in the current IOP. The drought provision concept would provide for release of the desired flow (6,500 cfs) until the composite storage fell below the Zone 3 boundary; at which time the drought trigger would provide for a minimum release of 5,000 cfs. This 5,000 cfs required minimum release would be in place until the composite storage recovered to the bottom of Zone 1, at which time the drought trigger would be de-activated and the desired minimum flow of 6,500 cfs would be re-implemented. Modeling did not demonstrate any shortages for any of the historic drought flow conditions.

d. Concept 4 includes Concept 3 operations, with the additional modification that the maximum amount of storage retained when operating between the upper and lower flow thresholds would be increased from 30 percent stored to 50 percent stored. This alternative had not been previously discussed with USFWS, but was presented just to demonstrate whether there would be any additional benefit in storage that could assist in providing a higher minimum flow. There were no significant differences in reservoir impacts observed between Concept 3 and Concept 4, although additional or more detailed modeling could demonstrate some differences.

5. Wei Zeng of GA-EPD noted he was encouraged by the concepts presented by the Corps, and he may use these concepts to assist in his additional evaluations of the IOP. Wei gave a presentation regarding spring flow needs for the sturgeon spawning, relating to availability of habitat by flow, and corresponding velocities by flow. Wei asserted that based on the two known gulf sturgeon spawning sites, the greatest efficiency in area of habitat provided may be provided by flows between 11,000 cfs and 18,000 cfs, since higher flows may make some habitat areas unusable due to depth and/or velocity (USFWS determined successful spawning occurs between 8.5 ft and 17.8 ft depth over hard bottom habitat, based on egg collections in 2005 and 2006, and less suitable habitat may be available when water depth over hard bottoms exceeds this range). Wei also noted the Biological Opinion states acceptable ranges of velocities for various life stages of sturgeon, and recommended that these be considered in any drought provision or modification to the IOP.

6. Dan Sheer and Megan Rivera of Hydrologics (representing ARC) presented modeling results for an alternative concept for a drought provision and IOP operation. This concept would use either the Hirsch or NWSRFS methods of forecasting hydrological conditions within the basin to make water management decisions on a weekly basis. The concept would attempt to provide the highest minimum flow while also assuring refilling of the reservoirs in the system by 1 June of each year, and uses the 90 percentile flow projections. Lake Lanier was used as a surrogate for determining whether the system was full. Once the system was full, additional flows would be use to meet public health and safety (water supply and water quality demands), or to enhance endangered species flows (up to a release of 10,000 cfs from storage). The intent of this concept is to use forecasting to identify the largest minimum flow that can be released without compromising the next year's flow. No hydropower generation or other project purpose operations were included in the model (other than conjunctive release generation).

7. DISCUSSION.

a. It was suggested that additional evaluation of modeling results include showing pool elevations in relation to the action zones for each reservoir, so it could be determined how frequently the reservoirs were in specific zones between the different scenarios (Concept 3 and 4). James suggested that the DSS files could be posted for download by the various modelers for analysis and comparison of modeling outputs. The Corps agreed to post their modeling results for Concept 3 and 4 on a .FTP site for technical modeler use.

b. It was requested that a table of the Corps modeling assumptions be provided. The Corps agreed to provide a spreadsheet/table including a listing of the model settings and assumptions.

c. It was suggested that additional modeling runs be conducted, even if just for "sensitivity analysis" purposes, showing any differences in results due to storage of greater than 50 percent of basin inflows.

d. Another possible drought trigger or component of a trigger could be consideration of basin inflow on the Flint River. States and stakeholders were encouraged to recommend any other elements as appropriate.

e. ARC asked what USFWS would use for a baseline for comparison of the effects of the drought provision. Gail indicated that first we must determine that the drought provision would avoid or minimize adverse effect or harm to the mussels. Gail noted that there would also be evaluation of potential impacts to sturgeon spawning habitat availability. The Corps would conduct the analysis of the drought provision operation similar to that incorporated in the Biological Opinion, which compared impacts of the IOP operation to a baseline of post-West Point Lake operating conditions. Results of the IOP and the drought provision operations could also be compared with one another. Gail also noted that the administrative record for the IOP which was recently provided to the States includes all the tools used by USFWS in the Biological Opinion analyses.

f. FWCC was concerned that analysis of impacts of the drought provision or any modification to the IOP take into account impacts to floodplain connectivity and inundation, which is important for reproduction and other life cycle needs of host fish for mussel species. It was noted that this analysis was included in the Biological Opinion and would be replicated for the drought provision analyses.

8. The Corps agreed to post copies of the workshop presentations on the Corps website: http://www.sam.usace.army.mil/ACF.htm. Comments on the draft drought concept were requested by 10 January 2007.

JOANNE BRANDT
Compliance Manager
Inland Environment Team

Jim Woodruff Dam Interim Operations Plan
Drought Provision Workshop
Columbus Convention and Trade Center
Columbus, GA
13 December 2006
9:00 a.m EST – 4:00 p.m EST

DRAFT AGENDA

9:00 a.m.	Welcome and Introductory Remarks	Corps/USFWS
9:30 a.m.	Background on Biological Opinion and RPM3	Corps/USFWS
10:00 a.m.	Drought (2006 and Previous Droughts)	Rob Erhardt – Corps
10:30 a.m.	Draft Concept for RPM3 Drought Provision	Corps
11:00 a.m.	Discussion of Draft Concept	ALL
12:00 p.m. – 1:00 p.m.	LUNCH	
1:00 p.m.	State Presentations of Alternative Concepts	State Participants
2:00 p.m.	Stakeholder Presentations of Alternative Concepts	Stakeholders
3:00 p.m.	Discussion	ALL
4:00 p.m.	ADJOURN	

Jim Woodruff Dam Interim Operations Plan
Biological Opinion RPM3
Drought Provision Workshop
13 December 2006

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E-7 Gwinnett County, Georgia letter to CESAM dated 5 January 2007, providing comments on the concepts presented at the Drought Provision Workshop

GWINNETT COUNTY
Department of Public Utilities
(678) 376-6700

DNR
cc PD-EPD
PD-EHE
Joanne

January 5, 2007

Col. Peter F. Taylor
District Engineer
U.S. Army Corps of Engineers
109 St. Joseph St,
Mobile, Alabama 36602

RE: Comments on RPM3, Biological Opinion, Jim Woodruff Dam Interim Operations Plan

Dear Col. Taylor:

I attended the workshop held in Columbus, Georgia by your staff on December 13, 2006 on RPM3 of the Biological Opinion on the Interim Operations Plan (IOP) for Jim Woodruff Dam. Your staff asked for comments on the draft drought concept by January 10, 2007.

I am a Technical Assistant to the Director of the Gwinnett County Department of Water Resources. I have practiced as a Civil and Environmental Engineer in the water resources field for over forty years as an employee of NRCS, EPA and Gwinnett County.

My comments are based on the presentations by your staff at the workshop, the presentation of the EPD staff, the presentation of the ARC consultants, Dr. Dan Sheer and Dr. Megan Rivera of Hydrologics and review of the materials and methodologies presented. In the example model run presented by Dr. Sheer and Dr. Rivera the water demands of the metropolitan Atlanta area found in the Metropolitan North Georgia Water Planning District's Water Conservation and Water Supply Plan were used. Included in this plan is an aggressive water conservation program that is now being implemented.

I am now convinced that the Mobile District can do a much better job of managing the water in the ACF system to meet all project purposes, particularly protecting public health and safety, recreation in the lakes and protecting the endangered species below Jim Woodruff Dam than was demonstrated during calendar year 2006. I also believe that the Mobile District can develop a revised IOP and a future Operating Plan to provide to the U.S. Fish and Wildlife Service that will satisfy the requirements of the Endangered Species Act and store more water in the system during 2007 and future years than occurred in 2006.

It seems very clear to me that releases above 10,000 cfs are not beneficial for sturgeon spawning habitat and are of little or no value to the mussels. The methodology presented by Hydrologics of predicting the water available statistically and then subtracting the necessary amounts to meet the mandated uses and then storing the remaining amounts is very straightforward and logical.

I believe that making sure the lakes are full by June 1 of each year is very important for recreational uses and preserves water for future droughts without endangering the protected biology below Jim Woodruff Dam. The apparent excess releases by the COE during 2006 seem detrimental to the system and its purposes, as well as contrary to common sense and detrimental to the biology in the lakes and the recreational values associated with having lakes maintained at the highest levels possible during the main recreational season.

I urge you to use the methodology presented by Hydrologics to develop a revised Interim Operations Plan that will optimize the water available to better serve all project purposes and users of the ACF system, as well as, protect the endangered species.

Thank you for the opportunity to participate in the development of the revised Interim Operations Plan. The workshop in December, 2006 was a valuable tool in keeping us informed of the issues and your progress on these issues of vital importance to our county. Please continue to keep stakeholders informed and allow our input in similar forums for the future.

Sincerely,

James H Scarbrough

James H. Scarbrough
Executive Technical Assistant
Gwinnett County Water Resources Department

C: Chairman Bannister
Jock Connell
Frank Stephens
Pat Stevens/ARC
Carol Couch/EPD
William Droze/Troutman Sanders LLC
Gregory Blount/Troutman Sanders LLC

E-8 Georgia Environmental Protection Division (GA-EPD) letter to CESAM dated 9 January 2007, providing comments on the concepts presented at the Drought Provision Workshop

Georgia Department of Natural Resources

2 Martin Luther King Jr. Drive, Suite 1152 East Tower, Atlanta, Georgia 30334
Noel Holcomb, Commissioner
Carol A. Couch, Ph.D., Director
Environmental Protection Division
(404) 656-4713

January 9, 2007

Ms. Joanne Brandt
Environmental Compliance Manager
Inland Environmental Team
U.S. Army Corps of Engineers, Mobile District
P.O. Box 2288
Mobile, Alabama 36628-0001

Re: Alteration of IOP in Response to RPM3

Dear Ms. Brandt:

Thank you for holding the December 13, 2006 workshop in Columbus, Georgia to discuss potential alterations of the Interim Operations Plan ("IOP") in response to Reasonable and Prudent Measure No. 3 ("RPM3") of the Biological Opinion ("BO") that the United States Fish & Wildlife Service issued on September 5, 2006. We appreciate the opportunity to participate and to comment on potential revisions to the IOP in light of RPM3.

RPM3 instructs the Corps to "[d]evelop modifications to the IOP that provide a higher minimum flow to the Apalachicola River [above 5,000 cfs] when reservoir storage and hydrologic conditions permit." BO at p. 141. The rationale for RPM3 states, in part:

> The available data indicates that higher minimum flows are supportable during normal and wet hydrologic periods, and during dry periods when the reservoirs are relatively full. Conversely, during extended drier than normal conditions, it may be prudent to store more water than allowed under the IOP during certain times of the year to insure minimum water availability later. Possible components and triggers of the drought plan could be, but are not limited to: Corps reservoir action zones, cumulative reservoir storage remaining, total basin inflows, indicators of fish spawn, climatic condition indices, and flow levels at gages

> downstream of the Chattahoochee gage, such as the gage at Wewahitchka.

Id. While Georgia does not agree with some of the key findings of the BO[1], Georgia agrees with the rationale of RPM3 in several important respects. First, Georgia very much agrees that the Corps needs to take into account reservoir levels ("reservoir action zones" and "reservoir storage remaining") as well as the actual (observed) spawning activity of the Gulf sturgeon in establishing appropriate reservoir releases during the Gulf sturgeon spawning season (March-May). Second, Georgia concurs with the finding that the flows prescribed in the IOP for Gulf sturgeon spawning can and should be reduced. We further agree that storing more water during the Gulf sturgeon spawning season, which corresponds to the same time period when top of conservation of all major storage reservoirs in the Basin rise to their summer levels, should make more water available for releases in excess of 5,000 cfs during June-February, provided that safe reservoir levels (levels that allow the reservoirs to refill safely) are maintained.

Georgia's specific concerns regarding the IOP provisions for the Gulf sturgeon spawning period and our suggestion of modifications to the IOP in response to RMP3 are set forth in greater detail below.

Flaws in the IOP During the Spawning Season

The IOP's flow thresholds are flawed and warrant revision consistent with RPM3 for the following reasons.

1. The releases that the IOP prescribes from March through May are not warranted by any demonstrated need of the Gulf sturgeon. The Corps established the 37,400 cfs and 20,400 cfs flow thresholds[2] based solely on the finding that Gulf sturgeon eggs were detected on a few days in 2005 when the flow was within that range. The assumption that the Gulf sturgeon required such flows to spawn appears to have been invalidated by data collected by Pine *et al.*, in 2006. Pine collected Gulf sturgeon eggs on 12 specific 2-3 day periods when flows were between 12,700 cfs and 22,400 cfs. Slides 3 and 4 of Dr. Wei Zeng's presentation to the workshop (a copy of which is attached) illustrate the 2006 data.

2. Even if one assumes that maximizing the amount of available Gulf sturgeon habitat at known Gulf sturgeon spawning sites in the Apalachicola River significantly benefits spawning activity (which has not been proven or suggested by any available data or studies of which we are aware), the IOP's flow thresholds

[1] As the Corps is aware, Georgia has filed a legal challenges to the BO in federal court. This submission in no way waives the positions taken by the State of Georgia in the litigation.

[2] The IOP provides that from March through May, when Basin Inflow ("BI") is equal to or greater than 37,400 cfs, the Corps will release not less than 37,400 cfs; when BI is between 20,400 cfs and 37,400 cfs, the Corps will release not less than 20,400 cfs; and when BI is less than 20,400 cfs, the Corps will release an amount equal to BI.

still are wasteful, counterproductive, and may even be detrimental as compared with a regime that would allow the Corps to store more water. Slide 5 of Dr. Zeng's presentation (a marked version of Figure 3.6.1.4.C from the BO) illustrates that the cumulative amount of available habitat at known Gulf sturgeon spawning sites increases as flow in the Apalachicola River increases from 5,000 cfs to between 10,000 cfs and 11,000 cfs, then levels off until the flow is in excess of 20,000 cfs; that less than four acres of habitat is gained as the flow increases from 20,000 cfs to approximately 23,000 cfs; and that available habitat actually decreases after the flow exceeds approximately 23,000 cfs, with available habitat at flows of between approximately 27,000 cfs and 38,000 cfs being *less* than the amount of habitat available when flows are in the 10,000-11,000 cfs range. Similarly, slide 7 (a marked version of Figure 3.6.1.4.D from the BO) illustrates that little, if any, habitat is gained, and habitat instead may actually decrease, at eight potential Gulf sturgeon spawning sites as the flow exceeds 10,000 cfs. Slide 6 (showing the flow velocity above which small pallid sturgeon cannot tolerate, based upon the information on page 72 of the BO) illustrates that the velocity associated with a flow in excess of 28,000 cfs could be harmful to young sturgeon.

3. Release decisions under the IOP are dictated almost entirely by Basin Inflow ("BI"), which is a computed quantity of inflows to Lakes Lanier, West Point, Walter F. George, and Seminole. If one does not consider the locations at which inflows enter the Basin, one might conclude that when BI is high enough, the Corps necessarily would be able to store water. In reality, however, because more than 55% of the drainage area upstream of Jim Woodruff Dam is not regulated by Lake Lanier, West Point Lake, or Lake Walter F. George, a large portion of actual inflows to the Basin cannot be not stored. Thus, major inflows to the system from the Flint River and from the Chattahoochee River downstream of Walter F. George are released, not stored. The opportunity to store water when BI is high in many instances is only an illusion.

4. Even putting aside the fact of where inflows enter the Basin, the IOP as currently written does not allow sufficient opportunity for the reservoirs to refill. During the Gulf sturgeon spawning season in particular, only when BI is higher than 20,400 cfs (which happened only in 9 days in the spawning season in1999 and 18 days in 2000) can there be even a theoretical opportunity to store *any* water. Only when BI is higher than 37,400 cfs (which did not happen in a single day in the Gulf sturgeon spawning season in either 1999 or 2000) does the IOP allow a substantial quantity of water to be stored. This problem exists during the June-February timeframe as well, but the effect on the refilling of the reservoirs is less pronounced. At the same time, the IOP requires the Corps to sustain a minimum flow of no less than 5000 cfs and to augment BI with releases from system storage as necessary to meet the 5,000 cfs minimum. The Corps' BI computation shows 73 days in 1999 and 125 days in 2000 when BI was lower than 5,000 cfs, meaning that augmentation would have been needed on those days to release 5,000 cfs. The IOP allows few opportunities to gain any storage, while imposing

on the system a heavy burden to augment flows during dry periods. Our analysis indicates that this manner of operations could cause flows to drop to 5,000 cfs during droughts more often then it would if it was able to store more water, and that the IOP could deplete storage to the point where the Corps could not even sustain a release of 5,000 cfs.

5. The IOP's ramping limitation further prevents storing of water. Again, this may be most pronounced during the Gulf sturgeon spawning season, when BI is high. What is even worse is that the ramping limitation has an unnaturally mild slope (the permitted rampdown is more gradual than would occur in nature), meaning that it requires significant augmentation. In many instances, this requirement to augment eliminates potential gains in storage and actually causes depletion of storage during high flow periods.

6. The net effect of the foregoing is that the months of March through May, which should be the time period when storage is replenished for use later in the year, ends up being a time of flow augmentation and consequently net storage loss. This further means that under the IOP, much of the time the ACF Basin system will be run in a year-round augmentation mode, causing the system to lose storage on a sustained basis and to lose its capability to meet the needs of all interests, including those of the protected species, under adverse conditions.

7. The year 2006 provided an example of the catastrophic effect that the IOP could have. Early in the year, before the IOP when into effect, the ACF Basin reservoirs were nearly full. By mid-October, system storage had declined to approximately 60% of full. This loss of system storage was worse than the loss that occurred during the severe drought years of 1986, 1988, 1999, and 2000 and was mitigated only by the return of near-normal precipitation later in the year.

Needed Changes Consistent with RPM3

Based on the foregoing, the following alterations to the IOP are needed.

1. The Corps should establish flow thresholds that are soundly supported by the best available scientific information. For the months of March through May, the best available scientific information appears to be the 2006 Gulf sturgeon egg collection data and data concerning the relationship between flows and the amount of available Gulf sturgeon spawning habitat. Based upon this data, flows of approximately 10,000 cfs to 11,000 cfs appear to be adequate and potentially preferable to higher flows for Gulf sturgeon spawning habitat. For the period of June-February, the best available information would appear to show that there may benefits to providing flows in excess of 5,000 cfs when the water is available to provide it, but that the Corps must be cautious of providing such higher flows particularly during droughts and must have as its highest priority maintaining sufficient storage to refill the reservoirs and thereby ensure that the 5,000 cfs can be maintained at all times.

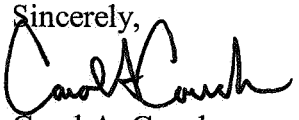
2. If it does not replace the IOP entirely, at a minimum the Corps should make the following specific adjustments to the flow thresholds under the IOP: (A) abolish the year-round 37,400 cfs upper flow threshold completely; (B) for the Gulf sturgeon spawning season, establish 10,000 to 11,000 cfs as the desired flow when inflow permits, and store inflows above this level; (C) avoid releases above 23,000 cfs except when necessary for flood control operations; and (D) for the months of June-February, store 100% of inflow above the 5,000 cfs minimum flow unless reservoir levels are such that, based upon best available climate forecasts, the reservoirs are likely to refill during the following spring.

3. Loosen rampdown rate restrictions and offset loss of storage due to rampdown by releasing less than actual BI as BI rises and peaks and at other times.

4. Establish as a primary factor determining reservoir release rates the current reservoir levels (for Lake Lanier in particular, given its size and limited drainage area) and remaining system storage. When there is sufficient water in storage so as to not prevent refilling of the federal reservoirs, the Corps can and should provide higher flows than 10,000-11,000 during the Gulf sturgeon spawning season and 5,000 cfs during the non-spawning season, in conjunction with other purposes.

Please let know if you have any questions. If further information or analysis from Georgia would assist in the Corps' consideration of revisions to the IOP, we would be pleased to provide it.

Sincerely,



Carol A. Couch

cc: Brig. Gen. Joseph Shroedel, Commander, South Atlantic Division, U.S. Army Corps of Engineers
Col. Peter F. Taylor, District Commander, Mobile District, U.S. Army Corps of Engineers
Ms. Gail Carmody, U.S. Fish & Wildlife Service

E-9 Atlanta Regional Commission (ARC) letter to CESAM dated 10 January 2007, providing alternative RPM3 concept

PROPOSED REVISION
TO THE INTERIM OPERATIONS PLAN FOR JIM WOODRUFF LOCK AND DAM FOR THE IMPLMENTATION OF "REASONABLE AND PRUDENT MEASURE #3"

January 10, 2007

Prepared for
the Atlanta Regional Commission
the City of Atlanta, Georgia
Fulton County, Georgia
Atlanta-Fulton County Water Resources Commission
Cobb County-Marietta Water Authority
DeKalb County, Georgia
Gwinnett County, Georgia and
the City of Gainesville, Georgia

by

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FIGURES AND TABLES

Figures

Tables

ATTACHMENTS

1. Daniel P. Sheer, *Analyzing the Risk of Drought: The Occoquan Experience*, 72 Journal of the American Water Works Association 246-253 (May 1980).

2. Robert M. Hirsch, *Stochastic Hydrologic Model for Drought Management*, 107 Journal of the Water Resources and Management Division, ASCE 303-313 (October 1981).

3. CD Containing Input and Output files for MSRR Model Results.

(Attachments available upon request)

1. EXECUTIVE SUMMARY

The Atlanta Regional Commission is pleased to propose the following revision to the Interim Operations Plan ("IOP") for Jim Woodruff Lock and Dam ("JWLD") for implementation of Reasonable and Prudent Measure #3 ("RPM3") in accordance with the Biological Opinion issued by the Fish and Wildlife Service ("USFWS") on September 5, 2006.

The basic concept of the proposed revision is to provide the Maximum Sustainable Release that can be supported by JWLD, up to 10,000 cfs. The Maximum Sustainable Release is calculated each week as a function of the total available storage using forecasting techniques established by USGS. A release is deemed to be "sustainable" if the storage is available to support it without comprising the long-term performance of the system, including ability of the system to refill by June 1 each year. Calculations necessary to implement the proposed alternative are easily made using a spreadsheet and real-time data maintained by USGS.

As is shown in greater detail below, the proposed alternative is superior or equal to other alternatives for the implementation of RMP3 for almost every operational objective. This alternative substantially improves the performance of the IOP on the key biological performance measures evaluated by USFWS in the Biological Opinion. In some cases there are trade-offs, but the costs are generally marginal and the benefits are high. Overall the proposed alternative would have a substantial beneficial impact on protected species. At the same time, by keeping significantly more water in storage, the proposed alternative would provide substantial benefits to other project purposes. The proposed alternative would not have any adverse impact on flood plain connectivity, hydropower generation, flood control, or, to our knowledge, any other operating objective.

Although the proposed alternative substantially improves the IOP on every important operational objective, the IOP can be improved still further. Therefore the IOP should *still* be considered an "interim" plan, even after it is revised by adopting the Maximum Sustained Release Rule as per RPM3. Additional modifications to the revised IOP will need to be made, in particular, to accommodate long-term water supply demands. For now, however, the proposed revision should be adopted.

2. BACKGROUND

This proposal is submitted in response to a Biological Opinion issued by USFWS on September 5, 2006 to review the Interim Operations Plan for Jim Woodruff Lock and Dam ("JWLD"). The Biological Opinion (BiOp) studies the effect of the Interim Operations Plan ("IOP") for JWLD on certain threatened and endangered species present in the Apalachicola River — the threatened Gulf sturgeon and three species of threatened or endangered mussels.

As is explained further below, the Biological Opinion concludes that reservoir operations under the IOP are generally acceptable. The BiOp also recommends, however, that the IOP be revised to provide minimize instances when discharge at the Chattahoochee gage (below JWLD) is less than 10,000 cfs.

2.1 Legal Framework

The Endangered Species Act protects threatened and endangered species in two ways — by prohibiting "takings" and by prohibiting federal agencies from supporting or taking action that would "adversely impact" critical habitat.

The prohibition on "takings" is contained in Section 9. 7 U.S.C. § 1538. The act defines "take" to mean "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" it. 16 U.S.C. § 1532(19). Although "takings" "may include significant habitat modification or degradation," that is true only if the action "actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering." *See* 50 C.F.R. § 17.3. *See also Babbitt v. Sweet Home Chapter of Communities for a Great Oregon*, 515 U.S. 687 (1995). The prohibition against takings applies to all persons.

The second set of protections, applicable only to federal agencies, are contained in Section 7. *See*16 U.S.C. § 1536. Section 7 requires federal agencies to consult with the Fish and Wildlife Service ("USFWS") (or, for marine species, with the National Oceanic and Atmospheric Administration Fisheries Service (formerly known as the National Marine Fisheries Service), to ensure that their actions do not "jeopardize the continued existence" of any protected species or result in the "destruction or adverse modification" of "critical habitat." *Id.*

The result of formal consultation under Section 7 is a Biological Opinion indicating whether the proposed activity is likely to jeopardize the continued existence of listed species and/or result in the destruction or adverse modification of critical habitat. When USFWS issues a no-jeopardy opinion but concludes that "takings" of individual animals are nonetheless likely, USFWS is required to include an Incidental Take Statement (ITS) as part of the Biological Opinion. *See* 7 U.S.C. § 1536(b)(4). The ITS authorizes "takings" that would otherwise be prohibited by Section 9 of the ESA. *See* 7 U.S.C. § 1536(o)(2) ("any taking that is in compliance with the terms and conditions specified in [an ITS] shall not be considered to be a prohibited taking of the species concerned.").

2.2 Threatened and Endangered Species Potentially Affected by Reservoir Operations

The Corps initiated formal consultation with USFWS on March 7, 2006 to study the effects of reservoir operations on the Gulf sturgeon and the three mussel species. Detailed information concerning these species is provided in the Biological Opinion.

2.2.1 Gulf sturgeon

The Gulf sturgeon was listed as a "threatened" species in 1991. The Apalachicola River was designated critical habitat for the sturgeon in 2003. The Apalachicola River Critical Habitat Unit constitutes approximately 10% of the total river miles included within the designation.

According to USFWS reservoir operations have the potential to affect Gulf sturgeon habitat by reducing the flow of the river at times when flows are stored (i.e., when cumulative storage is increased) and by increasing flows in the river when reservoir storage is released (i.e., when stored water is released to augment the flow of the river). BiOp at 107. Such operations could potentially affect "flow regime" and "water quality" elements of the Gulf sturgeon critical habitat. The primary concern is for spawning habitat during the spring spawning season.

USFWS has identified 117 acres of potentially suitable spawning habitat, including about 30 acres at two sites where sturgeon eggs have been collected. BiOp at 69. Two sites are known to support sturgeon spawning within the action area. BiOp at 69. The most important spawning site is a rough limestone outcrop at RM 105. *Id.* The other known site is a smooth consolidated clay outcrop at RM 99. USFWS has also identified eight other sites that contain hard-bottom substrate potentially suitable for spawning. *Id.*

2.2.2 Mussels

The other species of concern are two species mussels — the endangered fat threeridge and the threatened purple bankclimber.[1] The main concern for the mussel species is to provide them with flowing water at all times.

USFWS has also indicated that "floodplain connectivity" may be important for the host fishes that support the larval stages of these animals. The Biological Opinion nonetheless concludes that reservoir operations are not likely to have a substantial effect on floodplain connectivity.

2.3 The IOP

The Interim Operations Plan for Jim Woodruff Lock and Dam ("IOP") was included as an attachment to the letter initiating formal consultation. The IOP was developed to ensure that operations at JWLD will not adversely affect Gulf sturgeon spawning grounds or critical habitat for listed mussels. The IOP sets flow levels for the spring spawning season based on a

[1] The Biological Opinion also addresses one other species — the Chipola slabshell — but notes that only one individual of this species has ever been documented within the action area. Therefore USFWS concluded that the probability of adverse impacts to this species resulting from reservoir operations was negligible. BiOp at 67.

percentage of "basin inflow." The plan also establishes certain minimum flow levels for the protected mussels.

The Corps adopted the Interim Operations Plan ("IOP") for Jim Woodruff Lock & Dam (JWLD) on March 7, 2006. A revised plan was adopted on June 12, 2006. The IOP was revised again on September 5, 2006 in accordance with the Biological Opinion issued on that date by USFWS.

2.3.1 Flow requirements in the IOP

Flow requirements under the IOP are computed in relation to Basin Inflow ("BI"). Basin inflow is the total inflow into the ACF Basin above Jim Woodruff Dam, less any water lost through evaporation or water withdrawals.

Specific flow requirements in the IOP, as amended through September 5, 2006, are as follows:

Time period	**Basin inflow (BI) (cfs)**	**Minimum Release (cfs)**
March – May	37,400 ≤ BI	Not less than 37,400
	20,400 ≤ BI < 37,400	≥ 70% of BI Not less than 20,400
	BI < 20,400	≥ BI, but not less than 5,000
June - February	23,000 ≤ BI	Not less than 16,000
	10,000 ≤ BI < 23,000	≥ 70% of BI, but not less than 10,000
	BI < 10,000	≥ BI, but not less than 5,000

2.3.2 Ramp-down requirements in the IOP

The IOP also imposes certain "ramp-down" requirements to ensure that river levels do not fall too rapidly all at once. The "ramp-down" is the speed with which river levels are allowed to fall after periods of high flow. Ramp-down requirements are prevent animals from getting stranded on the margins of a stream when the water recedes.

The ramp-down restrictions in the IOP are as follows:

Release range	**Maximum fall rate (ft / day) measured at Chattahoochee gage**
Flows greater than 30,000 cfs	No ramping restriction
Flows greater than 20,000 cfs but <= 30,000 cfs	1.0 to 2.0 ft / day
Exceeds powerhouse capacity (16,000 cfs) but <= 20,000 cfs	0.5 to 1.0 ft /day
Within powerhouse capacity and > 8,000 cfs	0.25 to 0.5 ft /day
Release within powerhouse capacity, but less than 8,000 cfs:	0.25day / less

2.3.3 Drought Operations

The IOP does not specify how the reservoirs will be operated in the event that there is insufficient storage to meet the 5,000 cfs minimum flow requirement.

2.4 The Biological Opinion

USFWS issued the Biological Opinion on September 5, 2006. The Biological Opinion is a "no jeopardy opinion" -- USFWS concluded that operations under the IOP will not threaten the survival of any listed species or adversely affected critical habitat. The Biological Opinion does, however, conclude that "takings" of individual mussels species "may occur" when flows fall below 10,000 cfs. BiOp at 140.

A more detailed overview of the "effects analysis" for each species is provided below.

2.4.1 Gulf sturgeon

For the Gulf sturgeon, the Biological Opinion concludes that the IOP will have a "small beneficial effect relative to the baseline on habitat availability at known spawning sites downstream of JWLD. BiOp at 137.

The Biological Opinion is primarily concerned with effects of the IOP on the flow regime for spawning habitat during the spring spawning season. The primary analysis employed to evaluate these effects was to quantify the amount of habitat at known and potential spawning sites inundated during the spawning season to depths appropriate for spawning. BiOp at 111. Based on egg collections during 2005 and 2006, USFWS considers habitat to be "available" if

the habitat is inundated to depths between 8.5 feet and17.8 feet. BiOp at 70-72 (text) & 103-04 (figures). Channel configuration dictates that habitat availability is not necessarily proportional to flow, as intermediate flows can make some areas too deep while newly inundated areas are not deep enough for expected spawning.

Operations under the IOP provide slightly more water to the potential spawning grounds at the appropriate depths than historical or "run-of-river" operations. Therefore USFWS concluded that the IOP will result in a small benefit to the Gulf sturgeon.

2.4.2 Fat threeridge and purple bankclimber

For the fat threeridge and the purple bankclimber, the Biological Opinion concludes the IOP will have a "small, but not appreciable additional impact on the survival and recovery" of the species. Although the BiOp concludes that the IOP "will not appreciably diminish the ability of proposed critical habitat to function for the conservation of" either species, BiOp at 123, USFWS concluded that "takings" — in the form of "habitat modification" — "may occur" when flows are less than 10,000 cfs. BiOp at 123.

Of the five constituent elements of purple bankclimber and fat threeridge habitat, the BiOp concludes that the IOP is likely to adversely affect only the "flowing water" element. BiOp at 121. USFWS developed low-flow measures to assess this impact.

a) Low flow effects

The Biological Opinion is primarily concerned with the potential for mussels to be exposed during periods of low flow. Although mussels move in response to changing water levels, they sometimes are caught in areas too far from the receding shoreline or areas in which down-slope movement does not lead to adequately deep water. BiOp at 78. This risk of stranding is greatest when high flows are followed by low flows because mussels that move to higher ground during the high flow period may be stranded when the water level falls. Therefore, to evaluate the effect of reservoir operations, USFWS is primarily concerned with (1) rate of flow change and (2) the frequency and duration of low flows.

To study the potential impact of reservoir operations, USFWS considered the location of known mussel beds and determined whether and how often these areas would be exposed during low flows. Because the purple bankclimber prefers deeper portions of the channel, this animal is not as vulnerable to low-flow impacts as the fat threeridge. BiOp at 139. According to the Biological Opinion, fat threeridge mussels have been found in locations that are exposed at discharges as high as 10,000 cfs.

The BiOp acknowledges that flows less than 10,000 cfs occur "in almost all years" on the Apalachicola River — and hence that most mussel beds are located in areas that would not require flows of this magnitude to remain inundated. BiOp at 140. Nonetheless, USFWS speculates that, "during a series of wet years with few or no low-flow events, a fraction of the population may naturally occur at relatively high on the stream bed." BiOp at 140. USFWS also notes that "mussels may be deposited at higher elevations during flood events." *Id.* The BiOp concludes that "adverse effects will occur when low flows follow an extended period without

low flows or follow a flood event that reshapes mussel habitat and/or redistributes mussels." BiOp at 141.

b) Host fish

USFWS also noted a concern for host fish necessary to support the larval stages of the protected mussels. Although host fish for the purple bankclimber are not known, the Biological Opinion indicates that the fat threeridge is a host fish "generalist" that may infect at least three different fish families, including certain species that utilize floodplain habitat. BiOp at 120. USFWS studied "floodplain spawning habitat availability" as the principal measure of effects to potential host species. BiOp at 121.

2.4.3 Reasonable and Prudent Measures

As a condition of the ITS, USFWS is required to impose mandatory "reasonable and prudent measures" ("RPMs") to minimize the take that will occur.

The third RPM is the subject of this proposal. RPM3 provides as follows:

> **RPM3. Drought provisions**. Develop modifications to the IOP that provide a higher minimum flow to the Apalachicola River when reservoir storage and hydrologic conditions permit.
>
> As proposed, the IOP uses reservoir storage to support a 5,000 cfs minimum flow. The available data indicates that higher flows can be supportable during normal and wet hydrologic periods, and during dry periods when the reservoirs are relatively full. Conversely, during extended drier than normal conditions, it may be prudent to store more water than allowed under the IOP during certain times of the year to insure (sic) minimum water availability later.

3. CONCEPTS PRESENTED BY THE CORPS TO IMPLEMENT RPM3

At a technical workshop on December 12, 2006, the Corps presented four "concepts" in response to RPM3. For each concept, the Corps has provided detailed modeling results; these output files were used to prepare the comparative graphs in the evaluation of alternatives in Section 4.

The Corps has described the four concepts under consideration as follows:

3.1.1 Concept #1

The first concept presented was to determine the maximum low-flow the system can support. As a modeling exercise, the Corps increased the 5,000 cfs minimum flow in the IOP to higher values — 6,000 cfs, 6,300 cfs, 6,600 cfs and 8,000 cfs. The Corps reported that the results were not acceptable for any of these increased minimum flows.

3.1.2 Concept #2

The second concept presented was to decrease spawning period high flows in connection with an increase in the low flow target. The 37,400 cfs high-flow target in the IOP was reduced to 25,000 cfs; the intermediate target of 20,400 cfs was reduced to 16,000 cfs; and the 5,000 cfs minimum flow was increased to 5,800 cfs (variation 1), 6,500 cfs (variation 2) and 7,000 cfs (variation 3). Again, the Corps reported that the results were not acceptable for any of these variations.

3.1.3 Concept #3

The third concept presented was to use "system composite storage" as a drought trigger for "desired flow" of 6,500 cfs and the "required flow" of 5,000. Under this concept, the drought trigger is activated when "system composite storage" is in Zone 3. The drought trigger would be deactivated when the system composite storage recovers to Zone 1. The Corps reported that het results for this concept appeared to be promising.

3.1.4 Concept #4

The fourth concept was to increase the percentage of flows that can be stored when Basin Inflow is greater than 10,000 cfs from 30% to 50%. This concept was modeled as an "add-on" to Concept #3. The Corps stated that this concept appeared to produce few benefits in addition to Concept #3.

4. PROPOSED ALTERNATIVE CONCEPT FOR THE IMPLEMENTATION OF RPM3

The proposed alternative for RPM3 is superior or equal to Concept #3 for almost every operational objective. This alternative, which will be called the Maximum Sustainable Release Rule ("MSRR"), substantially improves the performance of the IOP on the key biological performance measures evaluated by USFWS in the Biological Opinion. In some cases there are trade-offs, but the costs are generally marginal and the benefits are high. Overall the proposed alternative would have a substantial beneficial impact on protected species. At the same time, by keeping significantly more water in storage, the proposed alternative would provide substantial benefits to other project purposes. The proposed alternative would not have any adverse impact on flood plain connectivity, hydropower generation, flood control, or, to our knowledge, any other operating objective.

4.1 Overview

The basic concept of the MSRR is to provide the maximum sustainable release from Jim Woodruff Dam, up to 10,000 cfs, that can be maintained while also allowing the reservoirs upstream in the Chattahoochee Basin to refill by the following June 1. The maximum sustainable release is calculated based on the current storage in the reservoirs and a forecast of future inflows. The forecast is made using probabilistic streamflow forecasting techniques developed and published by the USGS.

Although the MSRR does not utilize reservoir storage to provide flows in excess of 10,000 cfs, such flows occur from Flint River flow and when the reservoirs are full. Because the MSRR allows the reservoirs to refill early and often, flows in excess of 10,000 cfs are provided in a pattern that is at least as beneficial (and often more beneficial) for the protection and enhancement of threatened and endangered species than the flows provided by the IOP, as demonstrated in the evaluation below.

The MSRR increases the minimum flow whenever sufficient water is available to meet the increased minimum, provide for the long-term support of all uses, and still refill the reservoirs by the following June 1. The calculation of the water available includes a conservative forecast of expected inflows (inflows expected to be exceeded 90% of the time) based on basin conditions. The forecast is done using a USGS developed technique that relies only on antecedent inflows, and not on weather forecasts. Documentation of this technique is available from the USGS, and is attached.

As stated above, the refilling of the reservoirs is crucial to the improved performance of the MSRR relative to the IOP for the protection of endangered and threatened species. Because the reservoirs fill early and often in the spring, crucial spawning flows are most often maintained at levels equal to the full basin inflow. Moreover, because the reservoirs do not often empty, there is usually sufficient water to maintain minimum flows well in excess of 5000 cfs, as envisioned in RPM3.

The MSRR stores the water necessary to meet the increased minimum whenever the inflow between Lake Eufala and Lake Seminole, including the Flint River inflow, rises above the maximum sustainable release. A new maximum sustainable release is computed each week so that as storage improves, the maximum sustainable release also rises. In addition, the MSRR restricts releases to 5000 cfs whenever there is not enough water in the system to sustain that flow over a repeat of the worst historical drought and still have a margin of safety. This ensures enough water will remain in the system to "insure minimum water availability later."

As will be shown below, the rules contained in the MSRR implement RPM3 in a manner that substantially improves the IOP in its protection threatened and endangered species and many other performance measures.

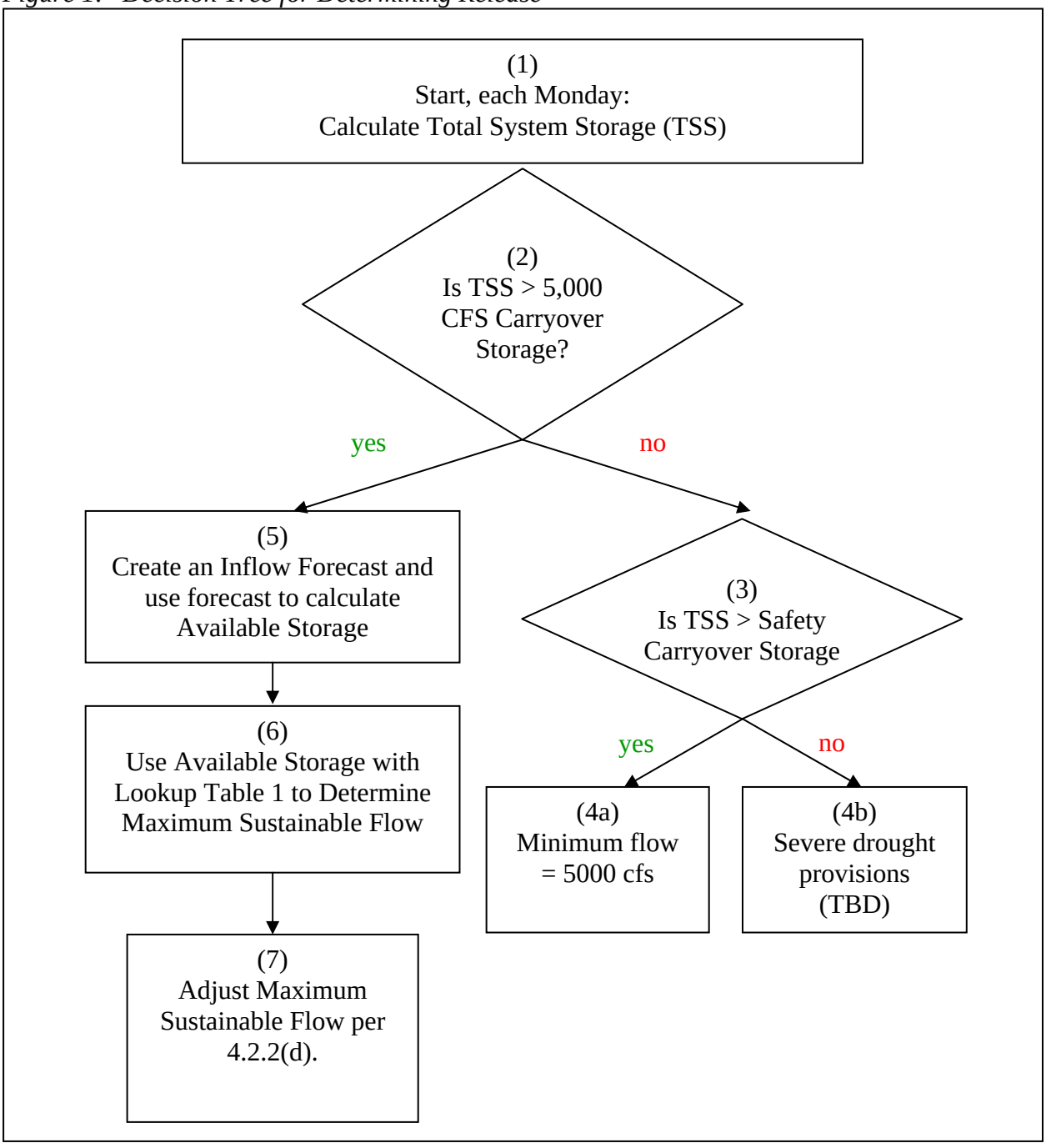
4.2 The Maximum Sustainable Release Rule (MSRR)

The basic concept of the proposed revision is to provide the Maximum Sustainable Release that can be supported by JWLD, up to 10,000 cfs. The Maximum Sustainable Release is calculated each week as a function of the total Available Storage using forecasting techniques established by USGS. A release is deemed to be "sustainable" if the storage is available to support it without comprising the long-term performance of the system, including ability of the system to refill by June 1 each year. Calculations necessary to implement the proposed alternative are easily made using a spreadsheet and real-time data maintained by USGS.

A decision tree is provided below (Figure 1) to show how to determine the Maximum Sustainable Flow on a weekly basis. The right side of the decision tree — dealing with "Carryover Storages" — is discussed in Section 4.2.1 below. The left side — calculation of the

Maximum Sustained Release when Total System Storage exceeds Carryover Storages — is discussed in Section 4.2.2.

Figure 1: Decision Tree for Determining Release



4.2.1 Carryover Storages

The primary goal of the MSRR is to provide the maximum sustainable flow at Woodruff as requested by RPM 3. Carryover Storages are storages that need to be preserved to meet critical needs over the long term. These storages are used to determine when flows must be

curtailed to meet such needs. Two critical needs are given top priority: the protection of public health and safety and protection of endangered species. The amount of "Carryover Storage" necessary to support each of these needs throughout a critical drought has been calculated and is shown in Figure 3.

a) Public Health and Safety

Losing the ability to provide drinking water and fire protection to the citizens of Alabama, Georgia, and Florida would be devastating to the region. Therefore the volume of water needed to protect public health and safety through a multi-year drought, called the Public Health and Safety Carryover Storage (or Safety Storage), should be maintained in storage at all times. In the MSRR, this volume was determined by running a simulation with 2030 demands and minimum flow requirements at Atlanta and Columbus only. The maximum drawdown in the four major reservoirs over the historic record is designated as the Public Health and Safety Storage — this is the volume of water that would have been needed to get through the worst drought on record.

b) 5,000 CFS Carryover Storage

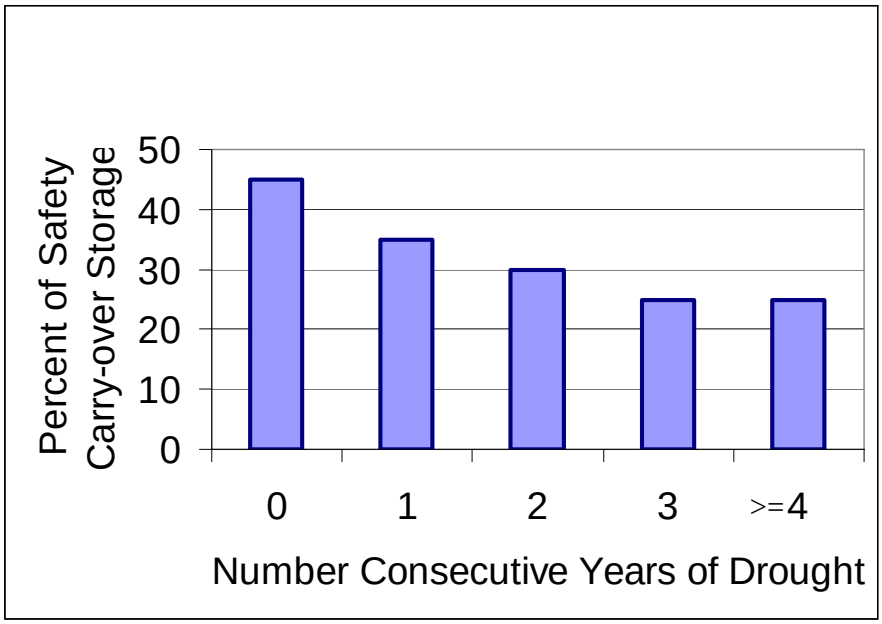
In addition to public health and safety, endangered species must be protected throughout a critical drought. Therefore the amount of storage needed to support threatened and endangered species must be preserved in system storage at all times. The storage set-aside to meet these needs is called the 5,000 CFS Carryover Storage.

In the MSRR, the 5,000 CFS Carryover Storage is set-aside to meet the 5,000 cfs minimum flow requirement and also to meet the ramping rates specified in the IOP. Larger minimum flows are supported when possible, but these are the minimum requirements. The amount of 5,000 CFS Carryover storage was determined using the same method as for the Public Health and Safety Carryover Storage: simulations were done with demands, minimum flow requirements at Atlanta and Columbus, and the releases at Woodruff listed above. The maximum drawdown in the four major reservoirs over the historic record is the volume of water that would have been needed to sustain the 5,000 cfs minimum flow and IOP ramping rates throughout the worst historical drought.

c) Margin of Safety

Because future droughts may be worse than the historical drought of record, a margin of safety is added to both Carryover Storages. The margin of safety decreases each year of an ongoing drought to balance the impacts of lower flows on the environment and water-use restrictions on public health and welfare against the risk that the drought will continue. The margins of safety used in the demonstration run are shown in Figure 2; these percentages are multiplied by the Public Health and Safety Carryover Storage to set-aside an additional volume of water. Although calculated as a percentage of the Public Health and Safety Carryover Storage, the Margin of Safety is divided evenly between the two Carryover Storages.

Figure 2: Margin of Safety



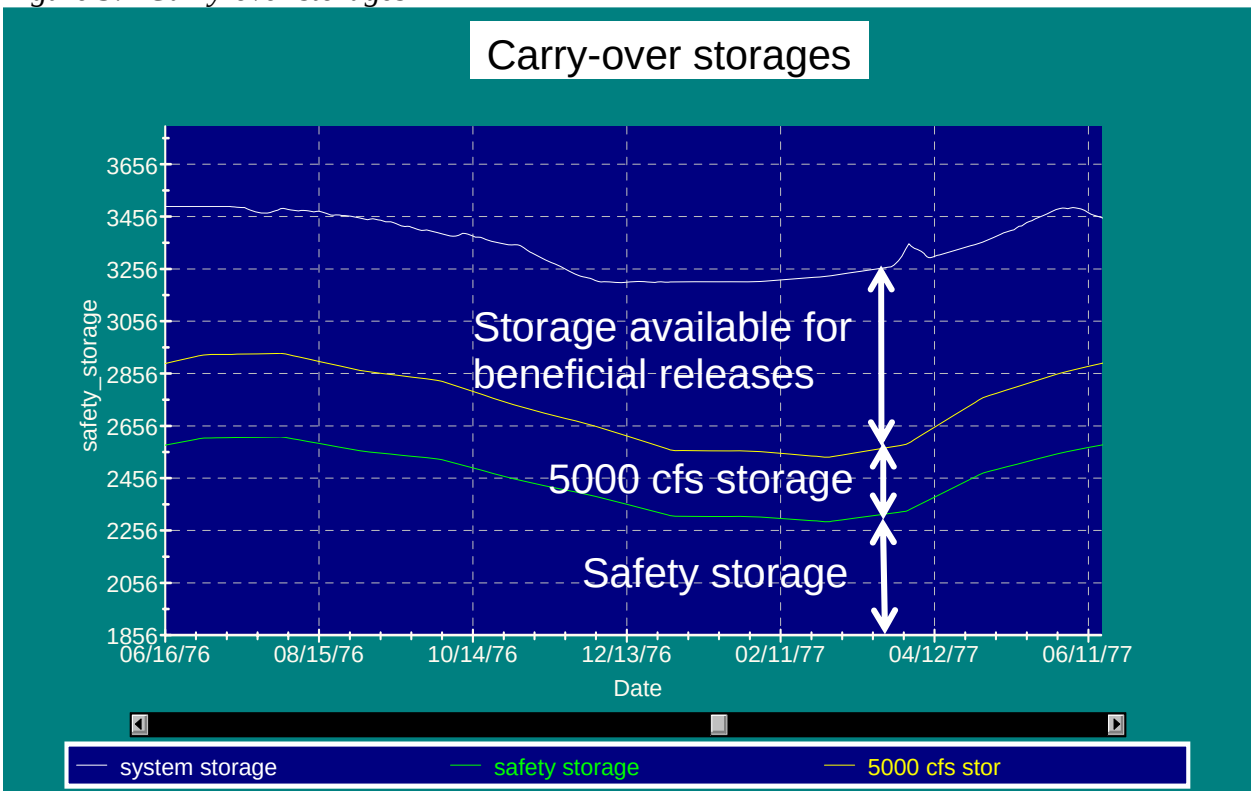
It is important to note that the MSRR manages storage in such a way that available storage will not reach or approach levels below those needed to maintain public health and safety during a repeat of any historical drought period. The provision of a margin of safety adds an additional measure of security, ensuring that the system can adapt to future droughts worse than those in the historical record. Further, it is important to understand that the performance of the MSRR will not be enhanced by reducing Carryover Storage or the Margin of Safety. The success of the MSRR is based on its strategy of allowing the reservoirs to refill early and often. Thus, providing a margin of safety would not conflict with achieving environmental objectives during a repeat of any historical drought. Also note that a similar margin of safety is provided for meeting critical instream flow needs below Woodruff Dam, as detailed below.

Figure 3 illustrates the Carryover Storages in relation to Total System Storage. The Carryover Storages vary seasonally following the drawdown pattern of the tops of conservation pools. A representative year, 1976, is shown in the figure; the seasonal pattern is the same in all other years. The margin of safety varies from year to year depending on the number of consecutive drought years. In 1976, there was no drought, so there is a 45% margin of safety added to the Carryover Storage. During prolonged droughts, this can drop to as low as 25%. The margin of safety was divided evenly between the Public Health and Safety Storage and the 5,000 CFS Carryover Storage. Therefore, the green line in Figure 3 shows the Public Health and Safety Carryover Storage — the maximum historical drawdown to meet public health and safety needs plus 22.5%. The distance between the yellow and green lines is the 5,000 CFS Carryover Storage—the maximum historical drawdown to support at least 5000 cfs at Woodruff and the ramping rates defined in the IOP plus 1/2 of the Margin of Safety.

The white line in Figure 3 shows the Total System Storage in 1976. System storage is defined as the sum of the storages in Lanier, West Point, and WF George. Whenever Total System Storage is less than the amount required for 5,000 CFS Carryover Storage, releases are curtailed unless necessary to meet the 5,000 cfs minimum and the IOP ramping rates. *This only*

happens once during the entire period of record in the MSRR, for about three months in 2000. If Total System Storage were ever to fall below the amount required for Safety Storage, extreme drought provisions would be triggered and the 5,000 cfs minimum might need to be relaxed by necessity. This *never* happens in the historical simulation of the MSRR. The system storage remains above the Carryover Storages in large part because releases to benefit protected species are made so as to be sustainable. The process used to determined beneficial releases is described in the next section.

Figure 3: Carry-over storages



d) Operations During Extreme Drought: Release Decisions Based on Carryover Storage Levels

As stated above, the Carryover Storages are established to indicate when releases must be curtailed to preserve the ability of the system to meet critical needs over the long term. If Total System Storage is less than Instream Flow Carryover Storage, releases are restricted to the amount necessary to meet the 5,000 cfs minimum flow and IOP ramp-down provisions. If Total System Storage is less than the Safety Carryover Storage, the MSRR does not specify any definite minimum flow.

The IOP does not specify what emergency measures would be taken if a more severe than historical drought were to occur, either. Thus, the only way to compare the MSRR and the IOP with regard to extreme droughts is to look at the storage levels likely to occur when operators realize that the potential for such a drought exists and begin to take emergency measures. The more storage available at that time, the more flexibility the operators will have to deal with the situation.

By setting aside Carryover Storages based on the most severe drought on record plus a sufficient margin of safety, the MSRR is designed to minimize or eliminate the likelihood that such provisions will ever be triggered. Minimum system storage under the MSRR is considerably higher than the minimum storage that would have occurred using the IOP. This indicates that the MSRR provides a considerably higher level of reliability in the face of extreme drought than does the IOP.

4.2.2 Determining the Maximum Sustainable Flow When Total System Storage Exceeds Carryover Storages

The steps used to determine the Maximum Sustainable Flow when Total System Storage exceeds the Carryover Storages are discussed below. The logic of the rule is to increase the minimum flow whenever (1) Total System Storage exceeds the Carryover Storages, and (2) sufficient water is available in storage to allow the reservoirs to refill by the following June 1; and (3) such releases can be made without compromising the ability of the system to meet critical needs. The calculation of available storage includes a conservative forecast of expected inflows (inflows expected to be exceeded 90% of the time) based on basin conditions. This rule provides a rational, sustainable basis for determining how much water to release in excess of the minimum requirements. Enhancement releases are determined such that system storage will refill each year with a high level of certainty.

a) Create an Inflow Forecast

The first step is to create an Inflow Forecast to provide expected amounts of inflows corresponding to different levels of probability. This information is used to determine the maximum flow that can be maintained at Woodruff while still allowing the system to refill each year with a high level of certainty.

While future rainfall cannot be accurately predicted, there are two sources of information to guide operational decision-making: historical statistics and forecasts of inflow. Forecasting methods make use of the correlation between current and future conditions: if inflows have been low, they tend to stay low, and vice versa. This is essentially because when conditions are dry, there is more evaporation and infiltration and hence less runoff, and vice versa.

Within about four month's time, the inflows forecast by conditional forecast methods converge to the inflows that would be forecast using historical statistics. In other words, although streamflow conditions are strongly autocorrelated from one month to another, the correlation weakens as the forecast period is lengthened, and the correlation is essentially zero by the time the forecast period is extended to four months. At this point, historical statistics provide the best available forecast.

There are a number of forecasting techniques, all of which give a shift in mean and variance based on antecedent inflows. A technique has been developed by Robert Hirsch of the USGS, and that program has been adapted for ease of use and integration with HECDSS by HydroLogics Inc. Documentation of this technique from the USGS is attached. The USGS technique is easy to implement. The adaptations made by Hydrologics do not affect the underlying methodology, and the forecast program can be made available to the USACE free of

charge. Alternatively, the USACE could obtain the original program from the USGS. In practice, running the forecast program requires that antecedent inflow data be kept current and formatted to suit the program. The data is already kept current and formatting can be easily automated. Running the forecast program takes less than one second.

Hydrologics has used the program to re-create the forecasts that would have been made each week in the hydrologic record. These "historical" forecasts were used to show how the MSRR would have performed in the past, using the forecasts. The results prove that the combination of the forecasting technique and the MSRR is effective given the existing accuracy and precision of the USGS forecasting technique. Producing and using forecasts in the manner incorporated in the MSRR is eminently practical. Such forecasts are currently being used operationally by a number of agencies, including the North Carolina Department of Natural Resources.

b) Calculate Available Storage — Storage in Excess of the Amount Necessary to Allow the System to Refill by June 1

The next step is to calculate "Available Storage" based on the Inflow Forecast at the 90% probability level (such that inflow has a 90% probability of exceeding the forecasted value). Available Storage is the amount of storage on hand in excess of the amount necessary to allow the system to refill by June 1.

Available Storage is calculated as the forecasted 90% inflow less (1) water supply (expected demand for all users above and including Whitesburg); (2) minimum flow requirements at Atlanta (number of days till June 1 times 750 cfs); (3) evaporation (average between now and June 1); and (4) void (volume in Lake Lanier between current storage and top of conservation pool on June 1[2]). The resulting volume — Available Storage — is roughly the amount of water that can be released from Lake Lanier while maintaining a 90% chance of refill by the following June 1.

c) Calculate the Maximum Sustainable Release

The Maximum Sustainable Release is determined as a function of Available Storage. This determination is made each Monday in the simulation. The Maximum Sustainable Release is given as a function of Available Storage in the lookup table provided in Table 1.

[2] For this calculation, Lake Lanier is used as a surrogate for system storage — it is assumed that the entire system will be full if Lake Lanier is full. Lake Lanier is a reasonable surrogate for the entire system because Lake Lanier takes much longer to refill than any of the other reservoirs.

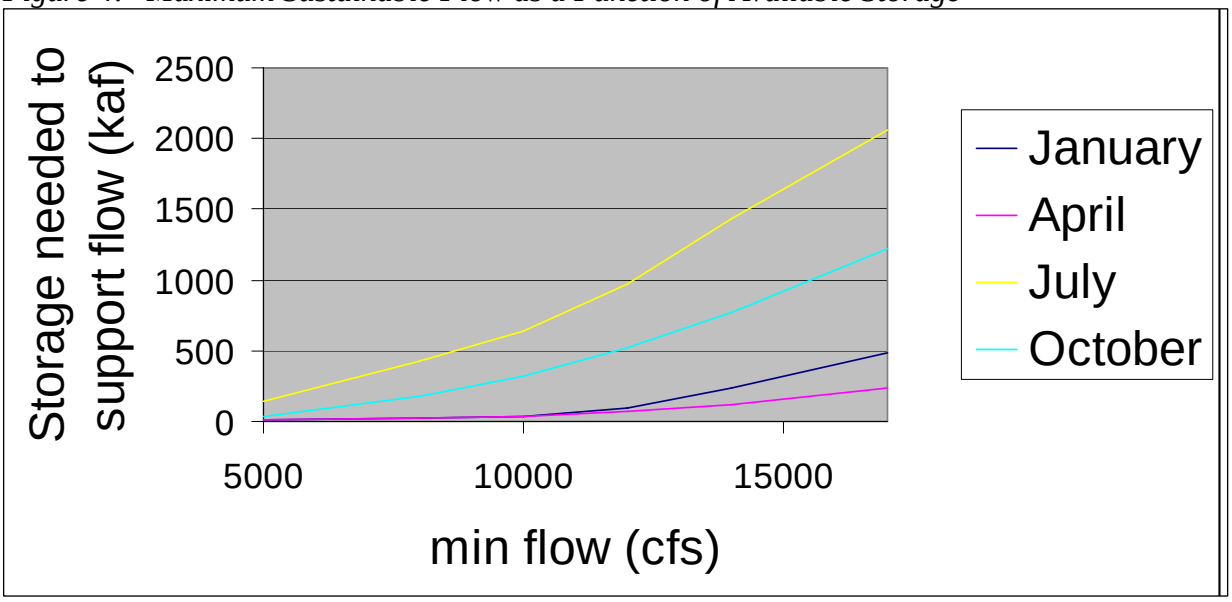
Table 1: Maximum Sustainable Release from Woodruff (cfs)

Available Storage (af)	1/1	2/1	3/1	4/1	5/1	6/1	7/1	8/1	9/1	10/1	11/1	12/1
0	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
7000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
14000	5000	6432	6544	6544	6546	5000	5000	5000	5000	5000	5000	5546
21000	5571	9700	9700	9704	9707	5000	5000	5000	5000	5000	5522	6155
28000	6243	10000	10000	10000	10000	5000	5000	5000	5000	5000	5720	6672
42000	9106	10000	10000	10000	10000	5000	5000	5000	5000	5088	6184	9238
49000	9753	10000	10000	10000	10000	5000	5000	5000	5000	5213	6391	10000
56000	10000	10000	10000	10000	10000	5000	5000	5000	5000	5313	8683	10000
63000	10000	10000	10000	10000	10000	5000	5000	5000	5000	5432	8922	10000
77000	10000	10000	10000	10000	10000	5000	5000	5000	5046	5853	9345	10000
84000	10000	10000	10000	10000	10000	5000	5000	5000	5302	5942	9369	10000
98000	10000	10000	10000	10000	10000	5000	5000	5000	5470	6171	10000	10000
105000	10000	10000	10000	10000	10000	5000	5000	5000	5554	6282	10000	10000
112000	10000	10000	10000	10000	10000	5000	5000	5000	5607	6597	10000	10000
126000	10000	10000	10000	10000	10000	5000	5000	5043	5985	6817	10000	10000
133000	10000	10000	10000	10000	10000	5000	5000	5128	6068	6924	10000	10000
140000	10000	10000	10000	10000	10000	5094	5000	5307	6118	6990	10000	10000
154000	10000	10000	10000	10000	10000	5359	5084	5476	6280	8988	10000	10000
161000	10000	10000	10000	10000	10000	5501	5148	5557	6360	9111	10000	10000
168000	10000	10000	10000	10000	10000	5315	5282	5616	6635	9175	10000	10000
182000	10000	10000	10000	10000	10000	5577	5409	5932	6795	9407	10000	10000
189000	10000	10000	10000	10000	10000	5717	5471	6009	6874	9519	10000	10000
196000	10000	10000	10000	10000	10000	5932	5517	6058	6920	9867	10000	10000
210000	10000	10000	10000	10000	10000	5777	5747	6203	8780	10000	10000	10000
217000	10000	10000	10000	10000	10000	5916	5807	6272	8874	10000	10000	10000
231000	10000	10000	10000	10000	10000	6286	5904	6592	9017	10000	10000	10000
238000	10000	10000	10000	10000	10000	6450	5960	6660	9109	10000	10000	10000
245000	10000	10000	10000	10000	10000	6097	6097	6725	9506	10000	10000	10000
259000	10000	10000	10000	10000	10000	6463	6245	8494	9633	10000	10000	10000
266000	10000	10000	10000	10000	10000	6623	6299	8569	9701	10000	10000	10000
273000	10000	10000	10000	10000	10000	6791	6352	8642	9769	10000	10000	10000
287000	10000	10000	10000	10000	10000	6625	6600	8733	10000	10000	10000	10000
294000	10000	10000	10000	10000	10000	6782	6651	8801	10000	10000	10000	10000
308000	10000	10000	10000	10000	10000	8655	6725	9251	10000	10000	10000	10000
315000	10000	10000	10000	10000	10000	8878	6773	9315	10000	10000	10000	10000
322000	10000	10000	10000	10000	10000	6927	6927	9377	10000	10000	10000	10000
336000	10000	10000	10000	10000	10000	8818	8498	9826	10000	10000	10000	10000
343000	10000	10000	10000	10000	10000	9034	8553	9875	10000	10000	10000	10000
357000	10000	10000	10000	10000	10000	9499	8660	9970	10000	10000	10000	10000
364000	10000	10000	10000	10000	10000	8966	8943	9960	10000	10000	10000	10000
378000	10000	10000	10000	10000	10000	9397	9045	10000	10000	10000	10000	10000
385000	10000	10000	10000	10000	10000	9624	9095	10000	10000	10000	10000	10000
399000	10000	10000	10000	10000	10000	9308	9308	10000	10000	10000	10000	10000
406000	10000	10000	10000	10000	10000	9521	9501	10000	10000	10000	10000	10000
420000	10000	10000	10000	10000	10000	10000	9547	10000	10000	10000	10000	10000

427000	10000	10000	10000	10000	10000	10000	9591	10000	10000	10000	10000	10000
430000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000

The flows in Table 1 were derived from a series of graphs similar to Figure 4. To determine the Maximum Sustainable Flow on July 1 from Figure 4, first determine the Available Storage. If Available Storage is 500 kaf, the Maximum Sustainable Flow is about 8500 cfs. This is the flow can be supported at Woodruff without compromising the ability of the reservoirs to refill by June 1. Note that the same amount of Available Storage in April could be used to support a much higher minimum flow.

Figure 4: Maximum Sustainable Flow as a Function of Available Storage



Curves similar to those shown in Figure 4 have been developed for each month of the year, as reflected in Table 1. These graphs were generated by calculating the difference between the desired flow and historical inflows each day to give the water needed from storage that day, if any. These daily values were then summed between present and June 1. To provide a high level of reliability, the 90th percentile of historic inflows were used, meaning that if all years in the historic record were ranked from wettest to driest, 10% of the years would be drier and 90% wetter than the inflows used in the analysis. 90th percentile inflows to the basin remain above 7000 cfs for much of the year, so the average of the driest three years was used in place of the 90th percentile below 7000 cfs and values were interpolated between these values and the 90th percentile at 9000 cfs.

In addition, when the value of Maximum Sustainable Flow obtained from the curves is greater than 7,000 cfs, it is adjusted upward by 20%. Trial and error has shown that the upwardly adjusted flows can be maintained without impact on other objectives. The boosted values are reflected in Table 1.

d) Adjust the Maximum Sustainable Flows

Finally, once the Maximum Sustainable Release is determined from Table 1, it is subject to three possible alterations developed by trial and error to enhance the performance of the operating rules: (1) a ramping rate restriction and (2) a limitation on maximum sustainable releases over 10,000 cfs. Again, all three of these alterations improved the performance of the MSRR on the performance measures shown in the previous section.

i *Ramping rate restriction.*

To avoid extreme jumps in the minimum flow requirement from week to week, a ramping rate restriction of 1,400 cfs / week is imposed. The daily change in releases from Woodruff, and thus impacts due to ramping on by endangered species in the Apalachicola, are controlled by the ramping rates used in the IOP.

ii *Limitation on Maximum Sustainable Releases Over 10,000 cfs.*

In the MSRR, flows above 10,000 cfs are not supported from storage. Imposing this limit resulted in significantly better flows for the mussels and caused little change in sturgeon spawning habitat or floodplain connectivity. Flows above 10,000 cfs are still common due to inflows from the Flint River and spill from the reservoirs — this is the reason the MSRR performs well on the sturgeon spawning performance measure.

4.2.3 Other Operational Criteria

a) Hydropower Releases

In the MSRR, releases equivalent to three hours of generation at capacity are made under the following conditions: (1) stages are above initial recreation impact level, (2) the day-ahead projected prices are above average, and (3) forecasted inflows for the year are above the 35th percentile. Otherwise, there is no provision for making hydropower releases, or even for reducing releases on weekends to increase the value of power generated during the week. In spite of this limited attention to hydropower, the MSRR produces slightly more power, and slightly more valuable power than does the IOP. In evaluating the value of hydropower, it is assumed that releases are made during peak hours whenever possible.

For this generation rule, the current stage at Lanier and forecasted inflows to Lanier were used to flag days when power releases should be made. For day-ahead projected prices the average daily day-ahead ERCOT prices from 2002-2005 were used; the first Mondays in January for each of these years were aligned to determine the average, and leap-day was accounted for.

b) Reservoir Balancing

The MSRR moves water from upstream reservoirs to downstream reservoirs to balance storage in zones, as does the IOP. The MSRR zones have been adjusted to provide a balance of recreation impact days between the three reservoirs. All three reservoirs are drawn down together insofar as possible to the level where initial recreational impacts begin to occur. Below

that level, the reservoirs are emptied by zones, from downstream to upstream. Details of the reservoir balancing scheme and its performance relative to the IOP are discussed below.

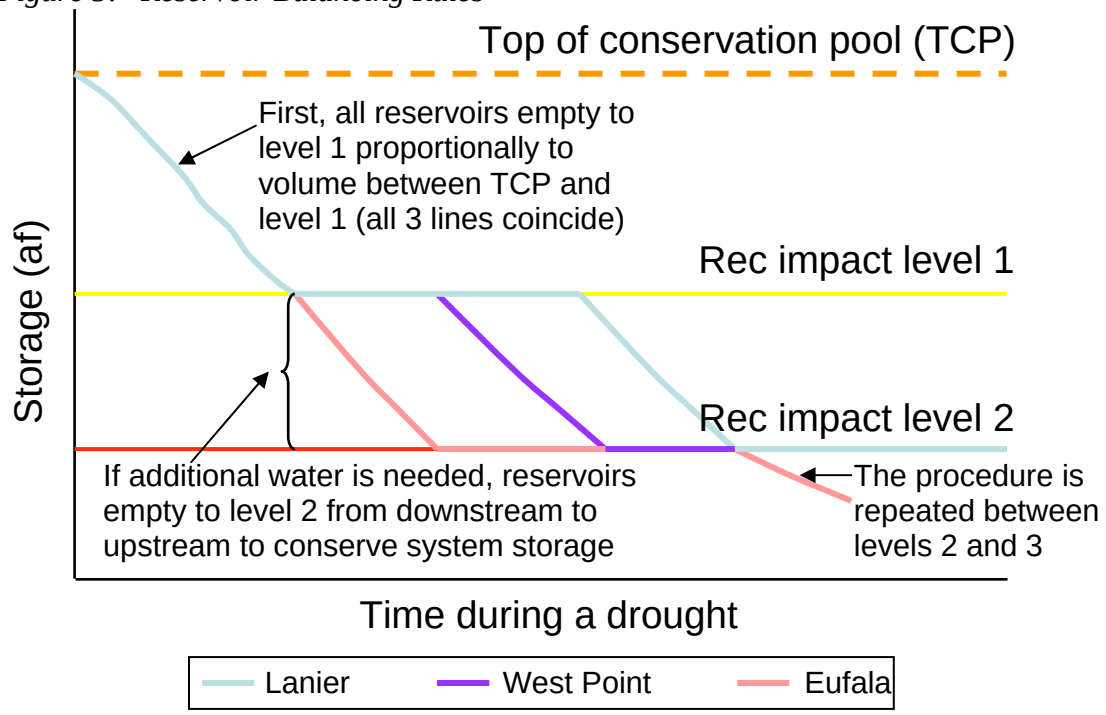
Recreation impact levels were taken from the USACE 1989 Draft Water Control Plan; the values are shown in Table 2. In the following discussion, initial recreation impact is referred to as level 1, recreation impact as level 2, and water restriction as level 3, as shown in columns A and B. Note that applying these impact levels at Eufala for reservoir balancing resulted in stages below historical, so the numbers were increased as shown in the table: Eufala was balanced according to the amended values (column F), while recreation impact was assed with the EIS values (column E).

Table 2: Corps Recreation Impact Levels

A	B	C	D	E	F
Recreation impact level	Terminology from EIS	Lanier (ft)	West Point (ft)	Eufala EIS (ft)	Eufala MSRR (ft)
Level 1	Initial impact	1066	632	187	187
Level 2	Impact	1063	628	185	186.5
Level 3	Water restriction	1060	627	184	185.5

When water is needed from storage, the Lanier, West Point, and Eufala stages are reduced together between their top of conservation pools and recreation Impact Level 1. Specifically, the percentage of the volume between Impact Level 1 and the top of conservation pool is kept the same for the three reservoirs. This is shown in Figure 5, which illustrates the reservoir balancing rules implemented in the MSRR. Note that the shape of these lines depends on the rate of storage emptied from the system. The recreation impact levels and top of conservation pool are in equivalent storages.

Figure 5: Reservoir Balancing Rules



Once the stages of the three reservoirs are at Impact Level 1, there is the real possibility that the system will not refill in the spring, so water is conserved upstream. Specifically, Lanier and West Point are kept at level 1, while Eufala's stage is reduced to Impact Level 2; then Lanier and Eufala are kept at levels 1 and 2 respectively as West Point is reduced to Impact Level 2; and finally Lanier is reduced to level 2, while West Point and Eufala stay at Impact Level 2 (see Figure 5). If more water is needed from storage, the procedure is repeated between recreation Impact Levels 2 and 3. In theory, the same procedure would be used between level 3 and dead storage, but the only time the reservoirs fall below level 3 in the MSRR period of record run is in the 2000 drought, and in this case, all three reservoirs empty below level 3 as they meet local flow requirements and consumptive demands.

One of the reasons reservoir levels do not drop further in the 2000 drought is that by preserving water upstream when the reservoirs fall below impact level 1, there is more system storage entering the drought (May 2000) in the MSRR that the IOP or historically. By preserving water upstream when necessary, all the reservoirs benefit in the following year, as evidenced by the dramatically better performance of the MSRR on the recreation performance measures.

In practice, the reservoir stages do not follow Figure 5 exactly. While this is the guiding principle, the reality is complicated by two issues: water cannot be moved from downstream to upstream and there are physical limitations on the rate at which water can be moved downstream. For example, water from Lanier must be used to meet all of the demands and instream flow requirements north of West Point. As a result, Lanier may be pulled down more rapidly to meet these needs, but the reservoirs are rebalanced when possible.

Recreation impact levels were not included in the EIS for Lake Seminole. In the MSRR, Seminole is kept at top of conservation pool until the stages of other three reservoirs reach level 1. Seminole is then brought down to bottom of conservation pool (76 feet) before Eufala is taken below level 1. Eufala drops below bottom of conservation pool in the 2000 drought only; in this case, the stage is kept above 75.5 feet at all times. Operations at Seminole can be further refined with appropriate recreation impact information.

The stages for top and bottom of conservation pool was taken from the IOP: the MSRR does not alter flood control rules.

4.3 Summary

The required releases from Woodruff are summarized in Table 3.

Table 3: Summary of Required Releases

Level of System Storage	**Minimum Release from Woodruff**
Total System Storage > full	100% of Basin Inflow
Total System Storage > Instream Flow Carryover Storage	Maximum Sustainable Release
System Storage > Public Health and Safety Carryover Storage	5000 cfs + IOP Ramping
System Storage < Public Health and Safety Carryover Storage	Severe Drought Provisions (TBD)

5. IMPLEMENTATION

5.1 Similarities and Differences Between MSRR and IOP / Concept #3

The MSRR is a refinement of Concept #3 in that both use a measure of available storage to determine whether flows higher than the 5,000 cfs minimum can be provided. The main difference between this plan and Concept #3 is (1) the use of a conditional forecasting technique to determine when flows *higher* than the "desired flow" of 6,500 cfs can be provided; and (2) the use of "available storage" to determine the *maximium* flow that can be sustained, instead of using "system composite storage" as an on-off "drought trigger" to toggle between "minimum flow" of 5,000 cfs and the "desired flow" of 6,500 cfs. This alternative also incorporates elements of concept #4, which was to increase the amount of basin inflow that can be stored when basin inflow exceeds 10,000 cfs. Under the MSRR, flows in excess of 10,000 cfs are stored to permit the reservoirs to refill.

Other provisions of the IOP (and/or "existing operations") are directly incorporated in the MSRR. These include:

1) Top of conservation pool rule curves and flood control operations,

2) Bottom of conservation pool assumptions,

3) Instream flow requirements upstream of Jim Woodruff dam,

4) Water supply requirements

5) Ramping rates

6) Minimum flow requirement of 5000 cfs at Jim Woodruff Dam

In addition, the MSRR is based on many concepts that are implemented in the IOP, although in a different form. These include the following:

1) In the IOP, release requirements at Jim Woodruff Dam are based on Basin Inflow and time of year. Concept #3 also includes consideration of system storage in determining releases. In the MSRR, releases below Woodruff are based on those factors, and on storage in the system as a whole and on forecasts. These changes are necessary to implement the requirement of RPM3 to base minimum releases on basin conditions.

2) Releases in both the IOP and the MSRR seek to maintain natural patterns of flows below Woodruff Dam. The IOP does this by specifying that the releases be a percentage of Basin Inflow. The MSRR achieves this objective more effectively by ensuring that the reservoirs fill early in most years. Once the reservoirs are full, they must pass 100% of Basin Inflow in order to maintain flood control storage. The result of this change in implementation strategy is better performance for all the biological performance measures used in the BiOP. The change in strategy is an implementation of the RPM3 directive to "store more water than allowed under the IOP during certain times of the year to insure minimum water availability later." The water stored by filling the reservoirs early is used to establish appropriate sustainable minimum flow (which ca be any value between 5000 and 1000 cfs). In most years that flow is substantially in excess of 5,000 cfs, per the directives in RPM3.

3) Both the IOP and the MSRR contain provisions for maintaining hydropower generation. The IOP requirements provide for setting a number of hours of weekday generation at individual reservoirs based on the storage in each reservoir. The MSRR bases this requirement for all reservoirs on a variety of conditions, including storage in Lake Lanier, forecast inflows, and historical day-ahead energy prices. All of this information should be readily available to operators in real time. The reason this is done is, again, to "store more water than allowed under the IOP during certain times of the year to insure minimum water availability later." The result of implementing this strategy is improved biological performance, slightly higher overall power generation, and slightly higher value of power generated. The changes in power benefits are not significant in our opinion.

4) Both the IOP and the MSRR contain provisions for balancing storage among reservoirs. In the MSRR this is designed to balance two objectives: (a) maintain the highest level of system storage over the long run, and (b) equalize the number of days of recreation impacts among the reservoir pools.

The balancing strategy employed by the MSRR effectively equalizes recreational impacts among the lakes without significantly affecting water supply reliability or environmental or any other purposes. Coupled with the strategy of storing water to ensure higher minimum flows, the balancing strategy results in a wholesale reduction in recreational impacts compared to the IOP and Concept #3.

5.2 Ease of Implementing the MSRR

The MSRR is an extremely practical operating rule. All the data needed to evaluate releases each day are available, the forecast technique is available, uses only up to date flow data, which is also available, and takes very, very little time and almost no training to run. Historical day-ahead energy prices are also available. The calculations necessary are easily implemented in a spreadsheet. We see no practical impediments to expeditiously implementing the MSRR.

That said, we recognize that USACE will need to validate the results presented below before implementing MSRR as RPM3. ARC and Hydrologics will make available to USACE any information, data or other resources necessary to validate the rule. Copies of the input and output files are attached.

Moreover, although the MSRR is superior in performance to the IOP and Concept #3, we are certain that operating rules superior to the MSRR can be developed. We stand ready to work with the USACE towards the development of better operating policies. However, we will firmly oppose the implementation of operating policies that are clearly inferior to the MSRR.

6. EVALUATION OF PROPOSED ALTERNATIVES FOR RPM3 BASED ON SPECIFIC OPERATIONAL OBJECTIVES

As is shown in greater detail below, the MSRR significantly out-performs the IOP on many objectives and does not perform significantly less well on any of the others. This alternative provides superior protection to threatened species while, at the same time, keeping significantly more water in storage and thus benefiting other project purposes. The proposed alternative would not have any adverse impact on flood plain connectivity, hydropower generation, flood control, or, to our knowledge, any other operating objective.

The parameters of an operating rule (e.g. the exact values in lookup tables relating available storage to releases, or the exact levels (rule curves) used for balancing storage among reservoirs) are derived by trial and error using simulation models (i.e. the parameters of the rule are “tuned” to achieve superior performance). This was done, at least to some degree, in developing the IOP. Lack of time has prevented us from extensive tuning of the parameters of the MSRR. Therefore, we are certain that the rule presented below can be tuned for even better performance. In addition, it is likely possible to invent alternative forms for operating rules. Such rules could be superior to the MSRR. We urge the USACE to work with stakeholders to develop better forms of operating rules, and we stand ready to assist.

The following sections compare the performance of the proposed implementation of the MSRR with historical operations and operations under the IOP.

6.1 Protection and Enhancement of Threatened and Endangered Species

The conclusions in the Biological Opinion are based on the "biologically relevant" characteristics of the flow regime for each species. USFWS developed graphs developed to plot these characteristics for the "baseline" (historical) and "run-of-river" scenarios against the IOP. USFWS then used following chart to determine whether the IOP would have an "adverse" or "beneficial" effect on the species.

Figure 6 (BiOp Figure 4.2.A): Evaluation of Effects

Biologically Relevant Flow Regime Characteristic

	Adverse ← Condition Gradient → Beneficial			Interpretation of IOP Alteration
1	Baseline	IOP	RoR	Beneficial, but not attributable to the IOP
2	Baseline	RoR	IOP	Beneficial
3	IOP	Baseline	RoR	Adverse
4	IOP	RoR	Baseline	Adverse
5	RoR	Baseline	IOP	Beneficial
6	RoR	IOP	Baseline	Adverse, but not attributable to the IOP

The same graphs, and the same chart, should be utilized to evaluate any proposed revision to implement RPM3. The actual graphs utilized by USFWS in the Biological Opinion are reproduced in Section 4, except that one line has been added to each graph to represent the Corps' "Concept #3" and another has been added to represent the revision proposed by ARC (the "Maximum Sustainable Release Rule").

Based on these performance measures, the proposed alternative out-performs the IOP and Concept #3 in the protection and enhancement of habitat for threatened and endangered species. The proposed alternative also performs better than or at least equal to the "baseline" and "run-of-river" alternatives for every performance measure evaluated by USFWS in the Biological Opinion.

6.2 Mussel Species

Figure 7 (BiOp Figure 4.2.2.A): Flow Frequency at the Chattahoochee Gage

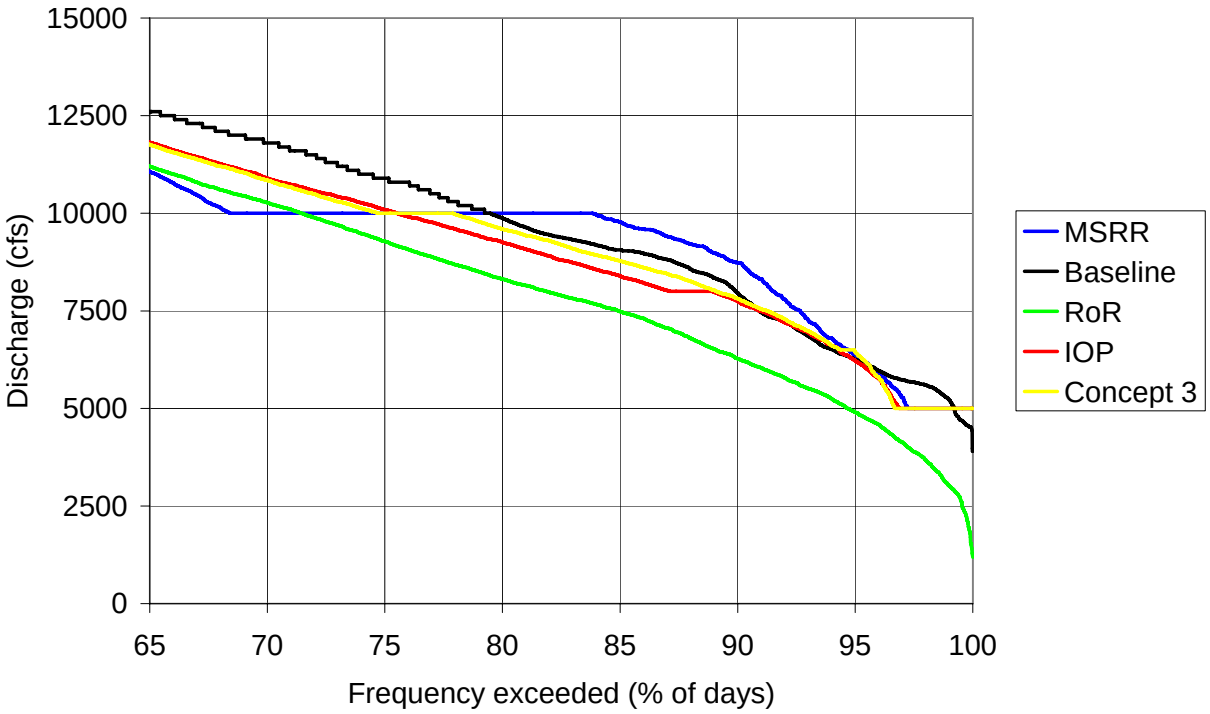


Figure 7 (BiOp Figure 4.2.2.A) shows the flow frequency at the Chatahoochee gage. Higher values are better According to the BiOp, fat threeridge mussels may occasionally be affected by flows below 10,000 cfs. The graph shows the distribution of such flows for each of the cases. The MSRR has significantly lower frequencies of flows from 10,000 cfs to approximately 6000 cfs, and approximately the same frequency of flows lower than 6000 cfs compared to the IOP and Concept 3. Therefore the MSRR is more desirable in terms of this performance measure.

Figure 8 (BiOp Figure 4.2.5.A): Inter-Annual Frequency of Discharge Events

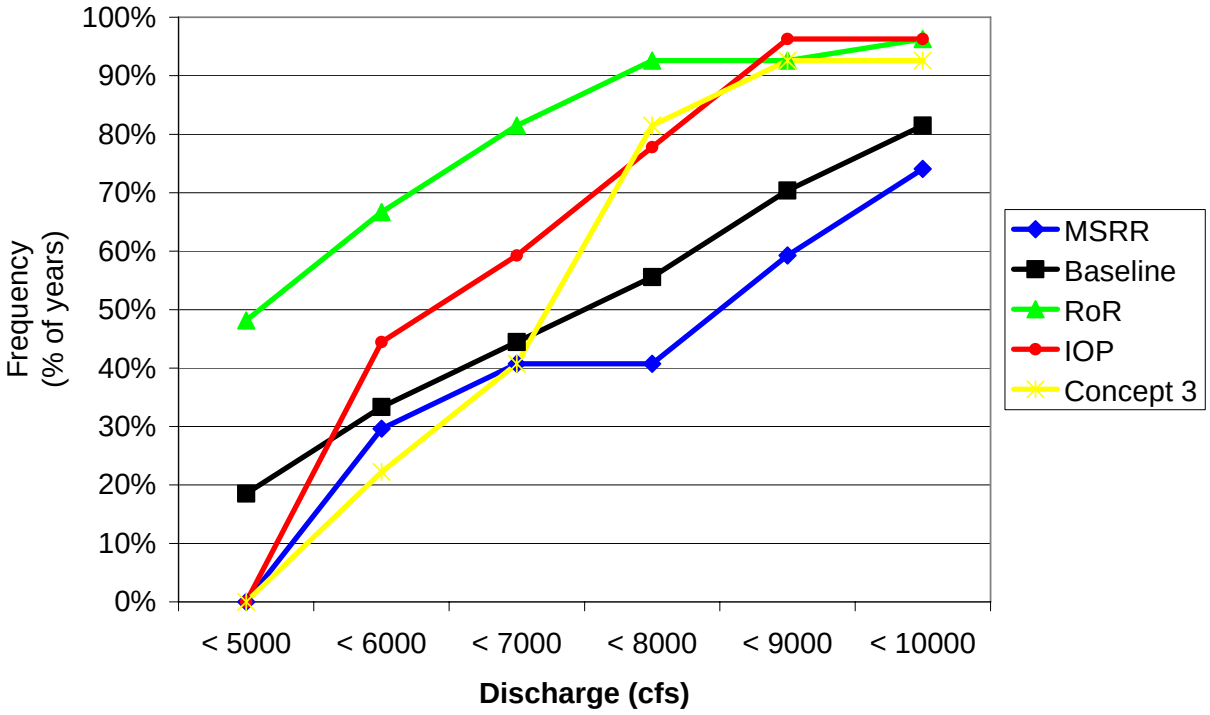


Figure 8 (BiOp Figure 4.2.5.A) shows the percent of years with flows below thresholds from 5,000 to 10,000 cfs in 1,000 cfs increments. Lower numbers are better. With the minor exception of Concept 3 at flows of 6,000 cfs, the MSRR performance is superior.

Figure 9 (BiOp Figure 4.2.5.B): Number of Low-Flow Days in the Worst Year

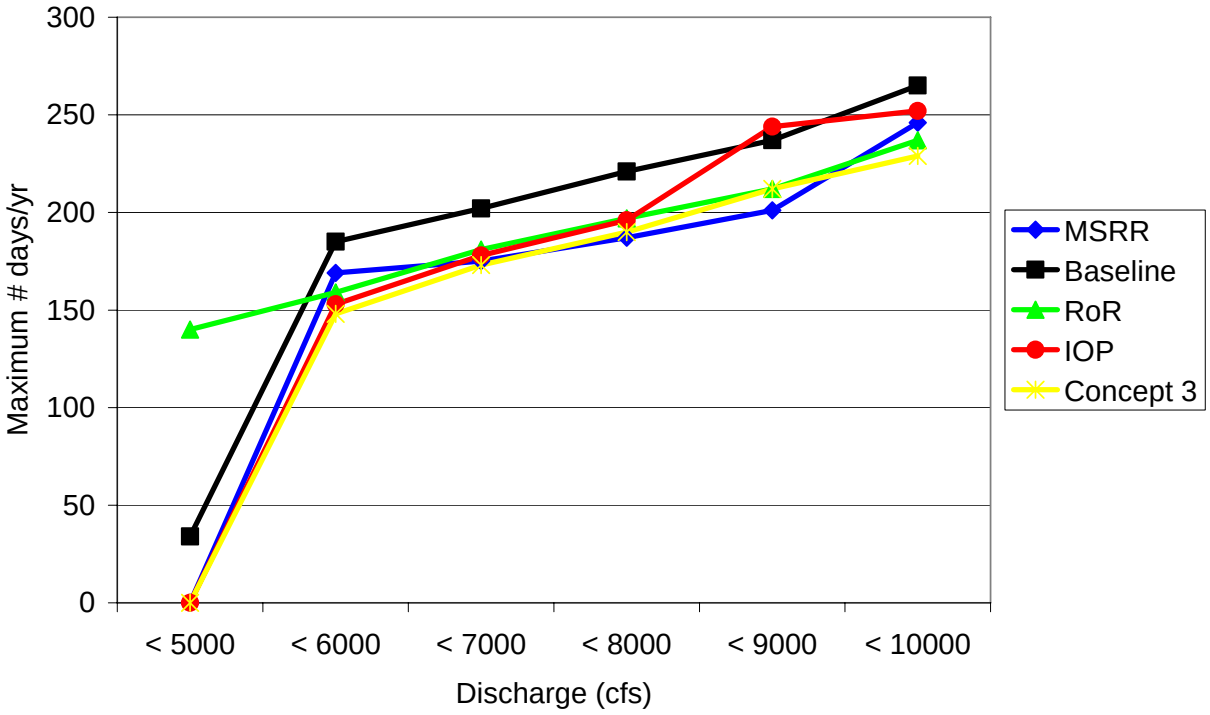


Figure 9 (BiOp Figure 4.2.5.B) shows the number of low flow days in the worst year to the record for the same thresholds as the previous figure. Fewer days are better. The performance of the MSRR is not significantly different in this performance measure than either of the other operating rules.

Figure 10 (BiOp Figure 4.2.5.C): Number of Consecutive Low-flow Days in Worst Year

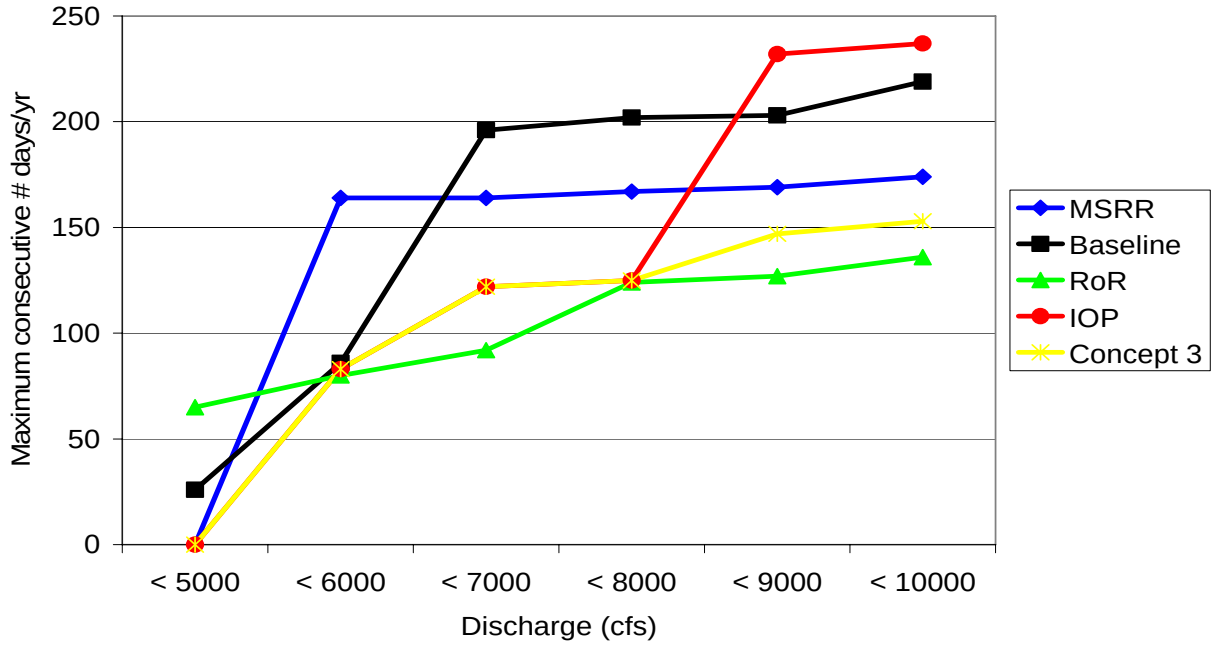


Figure 10 (BiOp Figure 4.2.5.C) shows the number of consecutive days of low flow in the worst year. Lower numbers are better. While the MSRR does not perform as well as the IOP or Concept 3 on this measure, the difference is not significant. This is especially true because the total number of days in the year is approximately the same, and mussels are impacted primarily when the flows fall. Arguably, for the same number of days of low flow, it is better for the mussels if the flows fall only once as opposed to several times. More days of consecutive low flow imply fewer rises. This is beneficial because those rises could induce mussels that have survived by moving to lower elevation habitats to move back to higher elevation habitats where they would again be vulnerable if flows fell again. In other words, at extreme low flows, it more important to provide stable flows than it is to provide higher flows that can be sustained for only a short period of time.

Figure 11 (BiOp Figure 4.2.5.D): Number of Low-flow Days in Median Year.

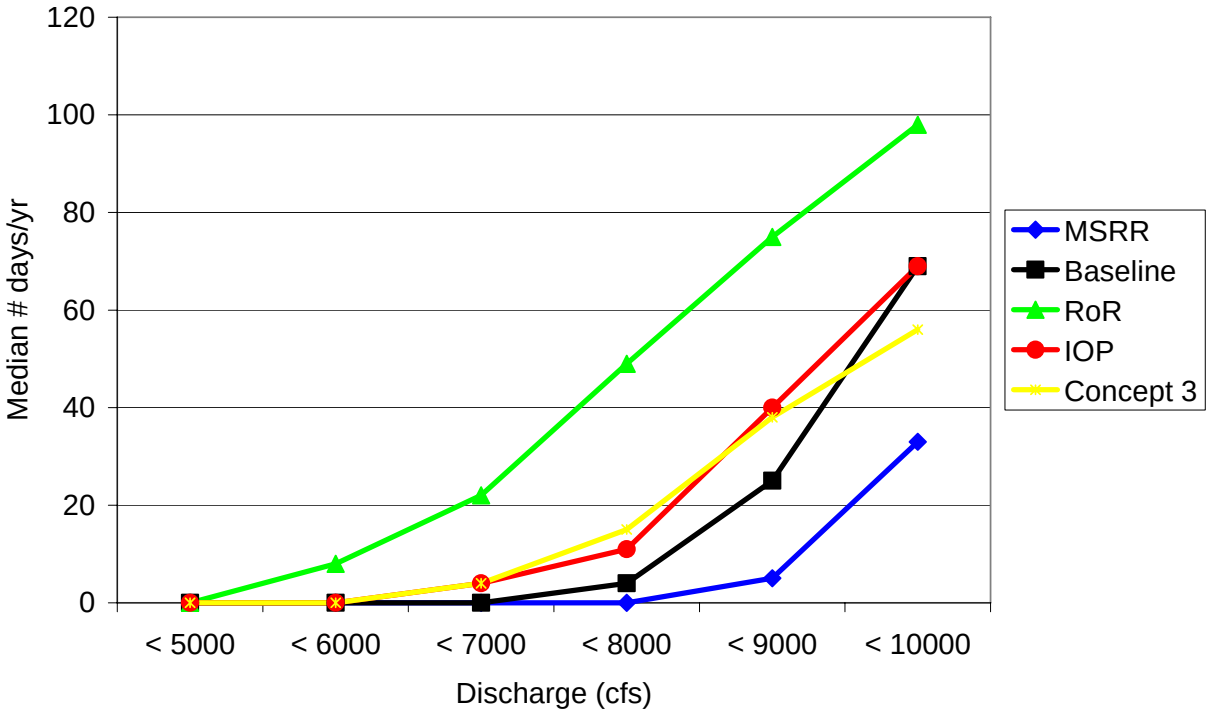


Figure 11 (BiOp Figure 4.2.5.D) shows the median number of days of flow below thresholds in a given year. Lower is better. The MSRR performance with regard to this criteria is clearly and substantially superior for mussels. The figure reflects the fact that more than half of the years have no days with less than 8000 cfs under the MSRR. The corresponding flow for the IOP and Concept 3 is 6000 cfs. Note that the MSRR is the only operating rule that outperforms historical flows for this performance measure.

Figure 12: Frequency of Sustained Low Flows 1975-2001

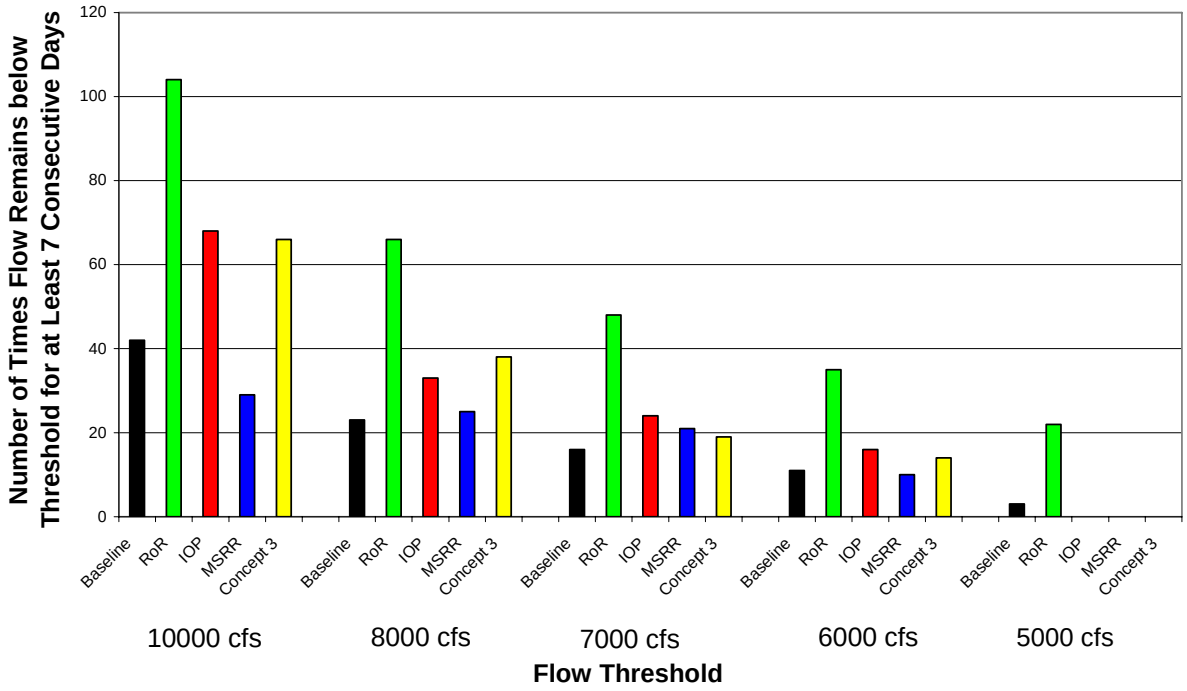


Figure 12 is not contained in the BiOp, but clearly shows the superior of performance of the MSRR with regard to benefits to endangered mussels. It shows the number of times in the simulated record that flows fall below thresholds for at least seven days. This is important because mussels can survive short periods of dewatering. The MSRR clearly outperforms the IOP and Concept 3 at the 10,000 8.000 and 6,000 cfs thresholds, and is equivalent to both rules at the 7,000 cfs threshold.

Figure 13: (BiOp Figure 4.2.4.A): Max Number of Consecutive Days per Year of Flow Less than 16,000 cfs

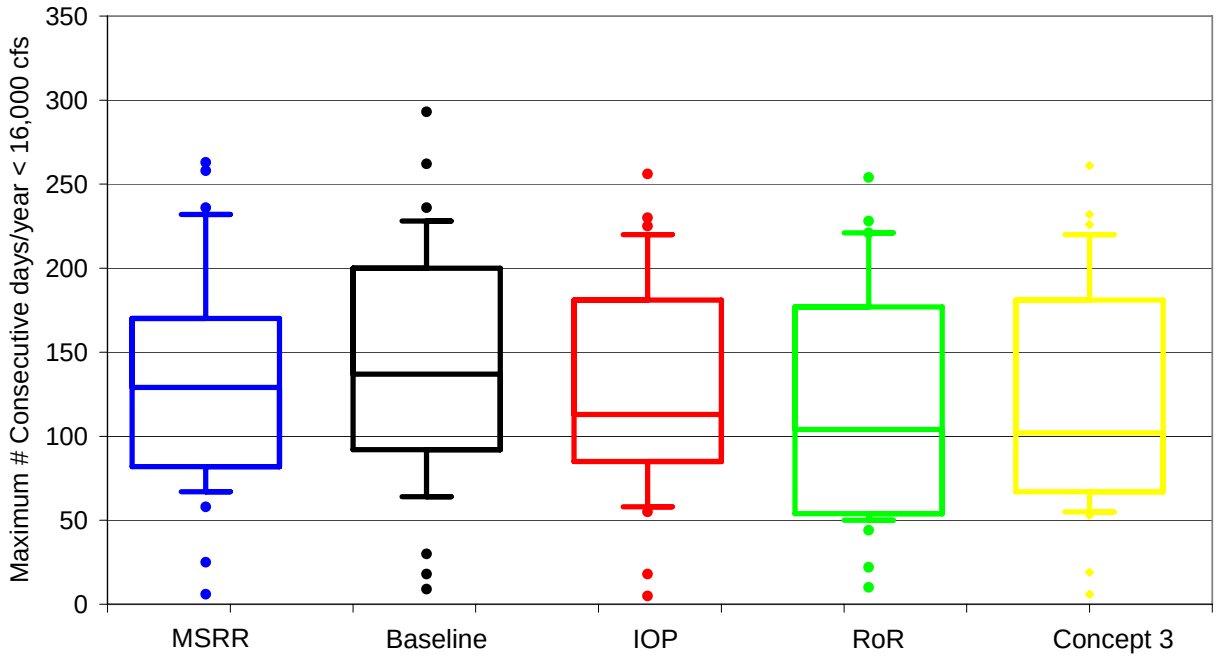


Figure 13 (BiOp Figure 4.2.4.A) shows the distribution of the number of days per year below 16,000 cfs for all cases. It is difficult to distinguish the performance of the alternatives based on this performance measure.

The mussels are also affected by the daily change in stages, which is why ramping rates on the reduction of flows at Woodruff is part of the IOP. The next two performance measures are designed to evaluate the rate of change of stage experienced by the mussels. The first of these, Figure 14 (BiOp Figure 4.2.5.F), shows the rate of stage change for flows under 10,000 cfs only. Based on the IOP ramping rates, all days should fall under the first two categories: rising or stable or <= 0.25 ft/day. The MSRR respects the ramping rate restrictions at these low flows much better than the IOP or Concept 3; however, this may be because OASIS is able to enforce the ramping rates more closely than HEC 5 rather than an actual difference in the operating policies.

This difference in the modeling tools also affects the next performance measure, Figure 15 (BiOp Figure 4.2.5.E). Given these differences it is difficult to evaluate these performance measures. They are included for completeness, nonetheless.

Figure 14 (BiOp Figure 4.2.5.F): Frequency of Daily Stage Changes When Releases from Woodruff are Less than 10,000 cfs

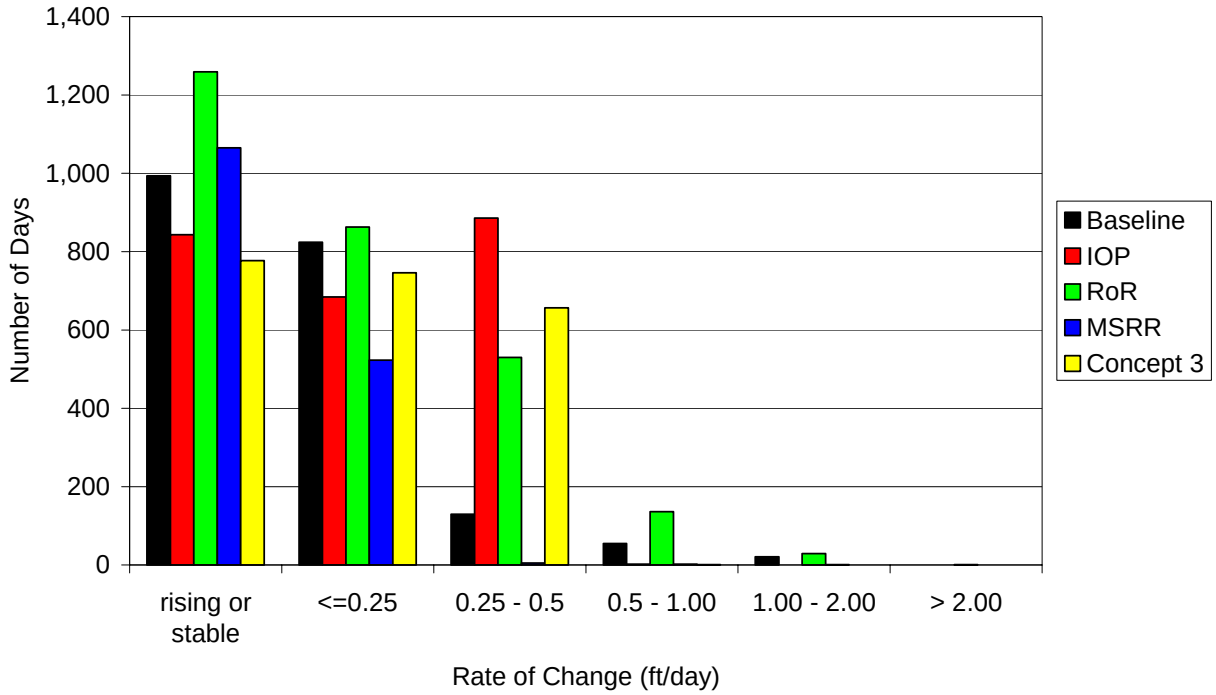
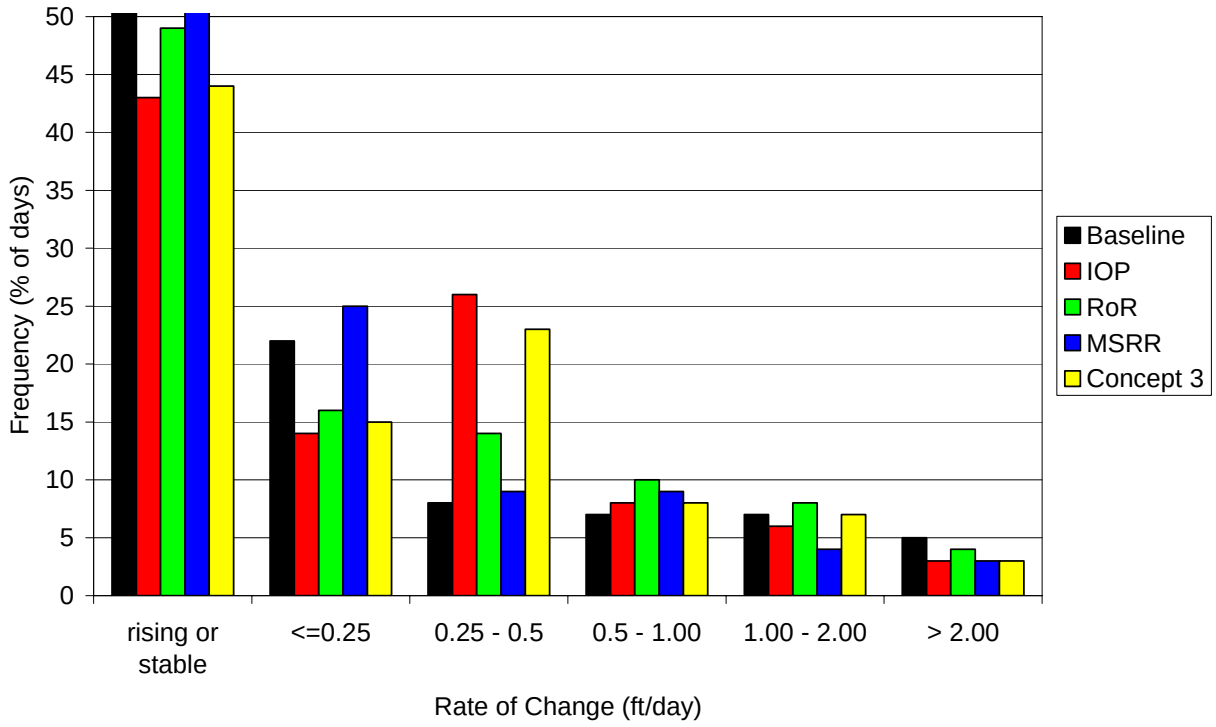


Figure 15 (BiOp Figure 4.2.5.E): Frequency of Daily Stage Changes



Floodplain connectivity is important for the lifecycle of the host fish that support the mussel species. The next two performance measures, Figures 10 and 11, quantify the number of floodplain acres connected to the main channel during growing season. Note that the relationship between acres of connected floodplain and flow was estimated from BiOp Figure 3.3.2.B, so the lines do not match those in the BiOp figures exactly.

Figure 16 (BiOp Figure 4.2.6.A) shows the percent of days in which amounts of habitat area are connected. Most of the runs follow the same trend, with the IOP higher for some habitat areas, lower for others.

Figure 16 (BiOp Figure 4.2.6.A): Frequency of Floodplain Connectivity to the Main Channel During Growing Season

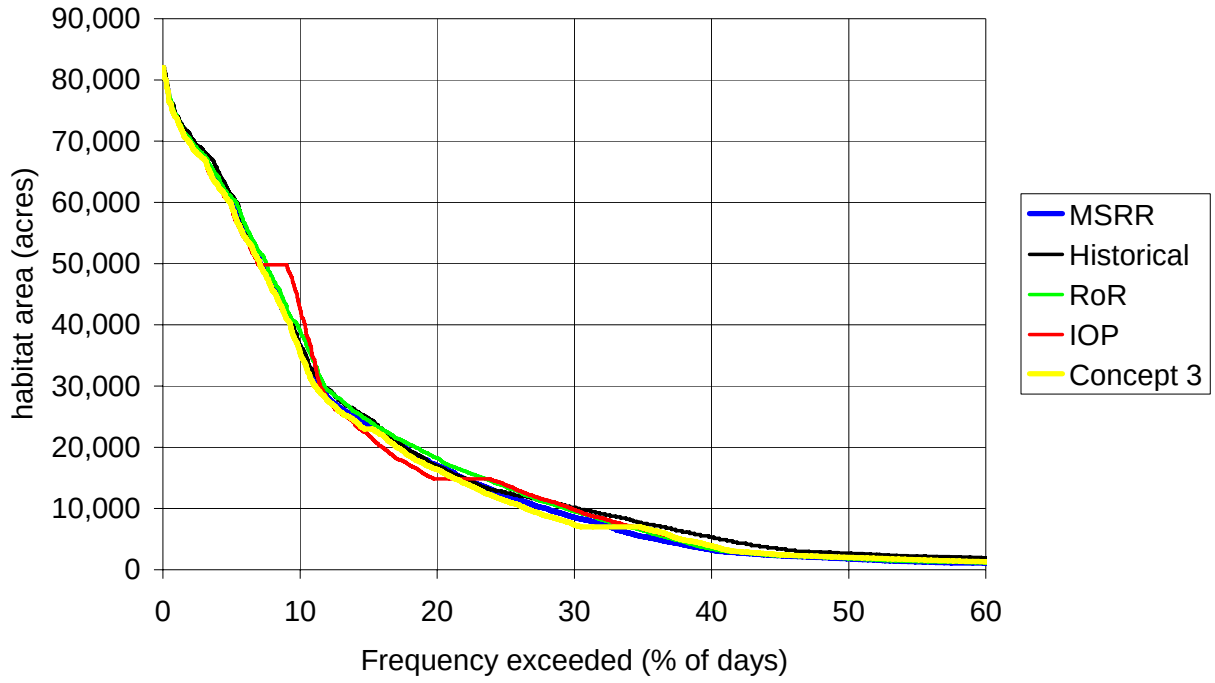
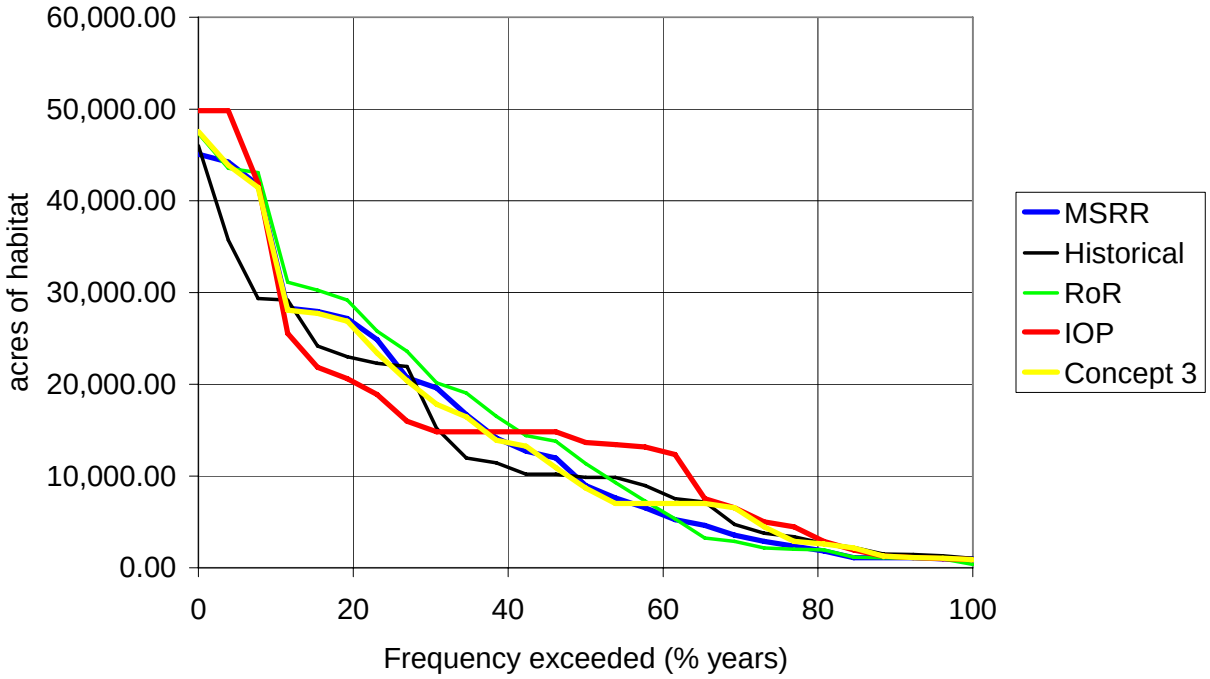


Figure 17 (BiOp Figure 4.2.6.B), the next performance measure, looks at the amount of habitat area connected for at least 30 days each year. The IOP is higher for some ranges, the MSRR for others. In general, the runs are comparable and do not appear to be inferior to historical. Note that storing more water in the spring under Concept 3 shifted the IOP trace closer to that of the MSRR. The MSRR more closely mimics run-of-river (ROR) than does the IOP. This may be desirable.

Figure 17 (BiOp Figure 4.2.6.B): Max Floodplain Habitat Connected to the Main Channel for at least 30 Days During Growing Season

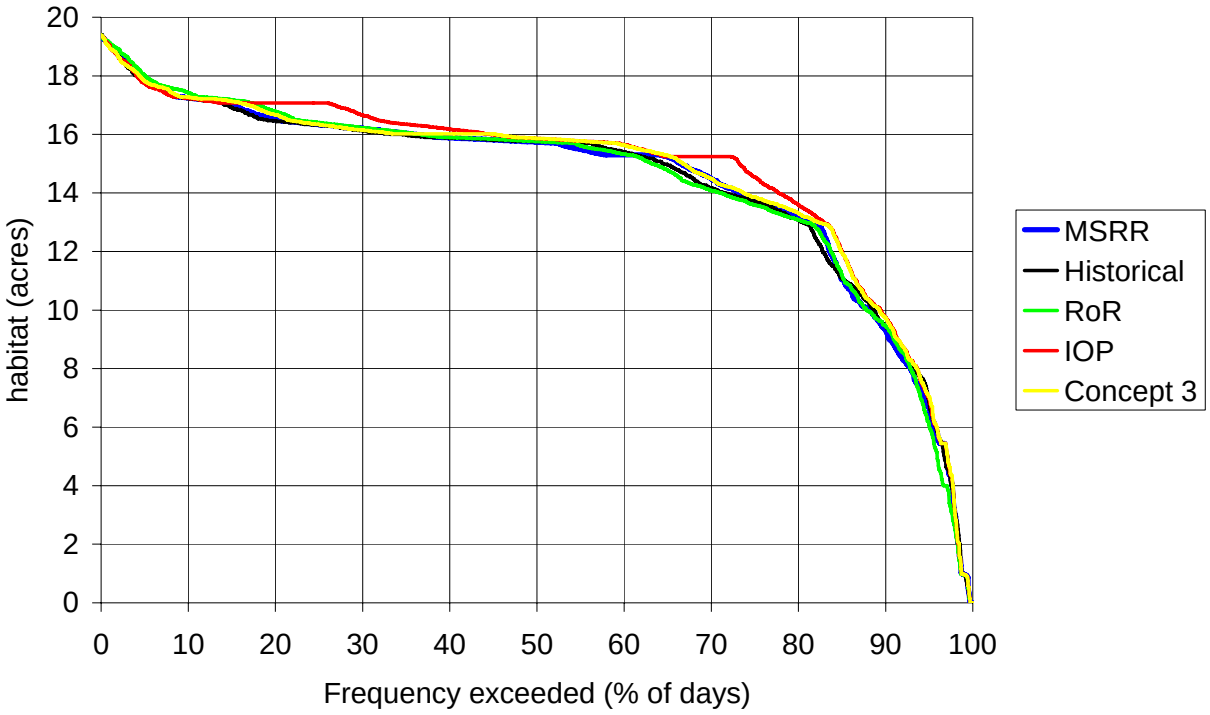


6.2.1 Gulf Sturgeon

As demonstrated in the previous section, the MSRR is clearly superior for the mussels overall. Based on the gulf sturgeon habitat measures from the BiOp, the MSRR is no worse for the sturgeon. We do recommend that these performance measures be refined for the reasons discussed below.

The first performance measure, Figure 18 (BiOp Figure 4.2.3.A), shows the frequency of days that different amounts of habitat are available during spawning season. The traces are not significantly different with the exception of the IOP, which provides spawning habitat around 15 acres and 17 acres more frequently than the other scenarios. Note that the increase in stored water in the spring under Concept 3 removes these features of the IOP trace, and Concept 3 follows the other traces more closely. The differences are small and do not appear to be significant.

Figure 18 (BiOp Figure 4.2.3.A): Frequency of Spawning Habitat Availability



The next performance measure, Figure 19 (BiOp Figure 4.2.3.B), shows the maximum amount of habitat sustained for at least 30 days during spawning season each year. The IOP performs somewhat better than the other traces on this measure. The increase in sustained habitat, however, is at most about 1.5 acres, which is not likely to significantly affect such a small population of spawning fish. Furthermore, the changes planned to the IOP by the USACE illustrated by Concept 3 reduce the advantage of the IOP on this measure. The MSRR provides more sustained habitat than the Baseline or RoR, signifying no impact to the sturgeon based on the BiOp criteria. Finally, the performance on this particular measure is greatly influenced by the bathymetry at RM 99.5, the location at which very few eggs have been collected compared to RM 105.

The relationship between flow and sturgeon habitat is shown in Figure 20 (BiOp Figure 3.6.1.4.C). Note that at flows greater than 50,000 cfs, the available habitat decreases down to zero at 150,000 cfs. In addition, habitat at RM 99.5 decreases dramatically at 23,000 cfs. Therefore, high flows do not necessarily correspond to higher availability of spawning habitat. Further, the decrease in habitat at RM 99.5 at flows above 23,000 cfs causes a dip in total habitat below 14 acres between 29,000 and 34,000 cfs. Avoiding flows in this particular range can have a significant impact on the sustained habitat performance measure. In 1979, for example, flows at the Chattahoochee gage fall in the range for the MSRR on May 3, causing the habitat to fall from about 15 to 13 acres. Flows in the IOP fall between May 6 and 10 as well, but they skip the habitat dip, dropping from 37,000 to 24,000 cfs in a single day. The flows and corresponding habitat are shown in Figure 19 (BiOp Figure 4.2.3.B). Since these days in May fall within the 30-day maximum sustained habitat time frame, the value for the MSRR is about 13 acres for this

year, while the value for the IOP is about 15 acres. This reduction in sustained habitat for the MSRR happens again in 1980.

Figure 19 (BiOp Figure 4.2.3.B): Max Habitat Sustained for At Least 30 Days During Spawning

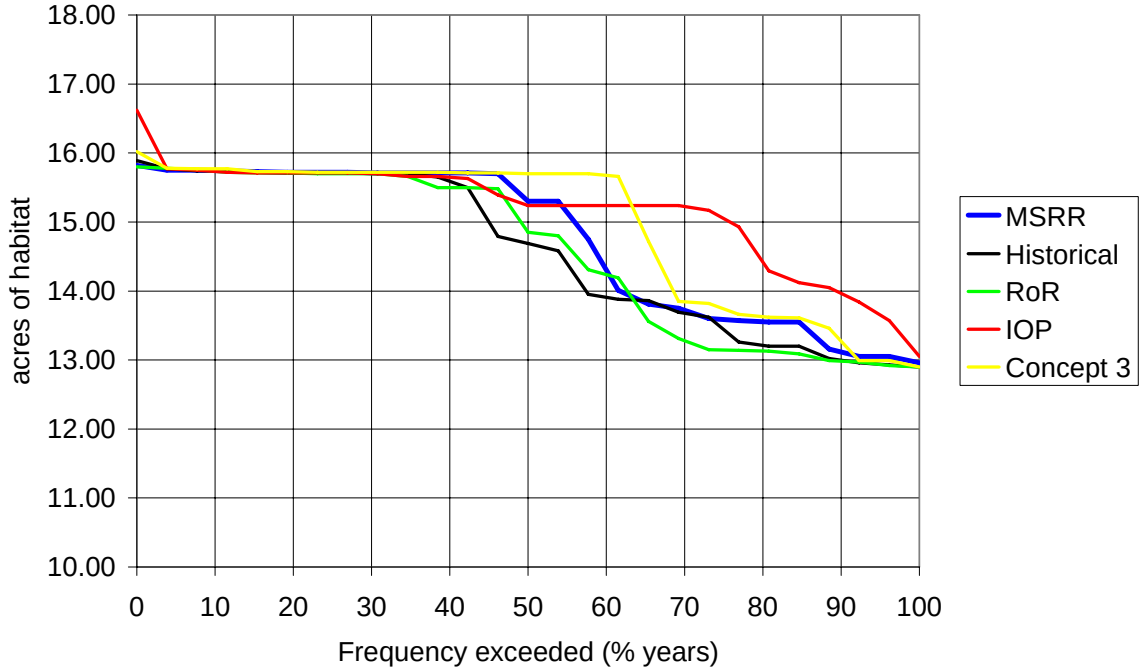


Figure 20 (BiOp Figure 3.6.1.4.C): Area of Gulf Sturgeon Spawning Habitat

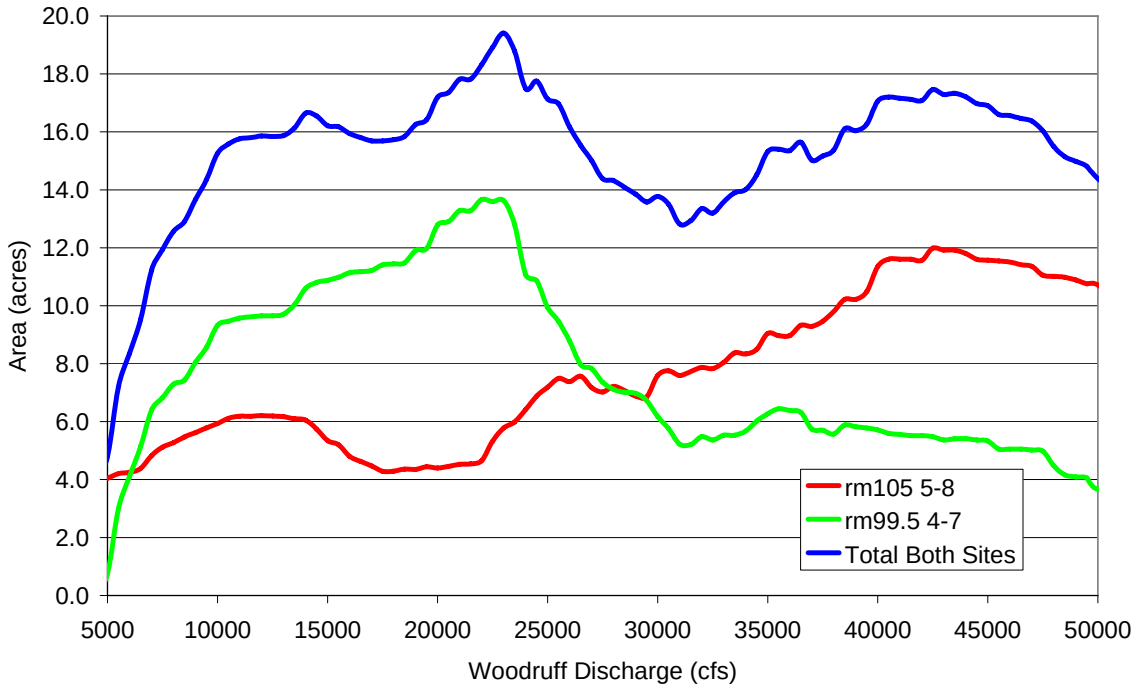
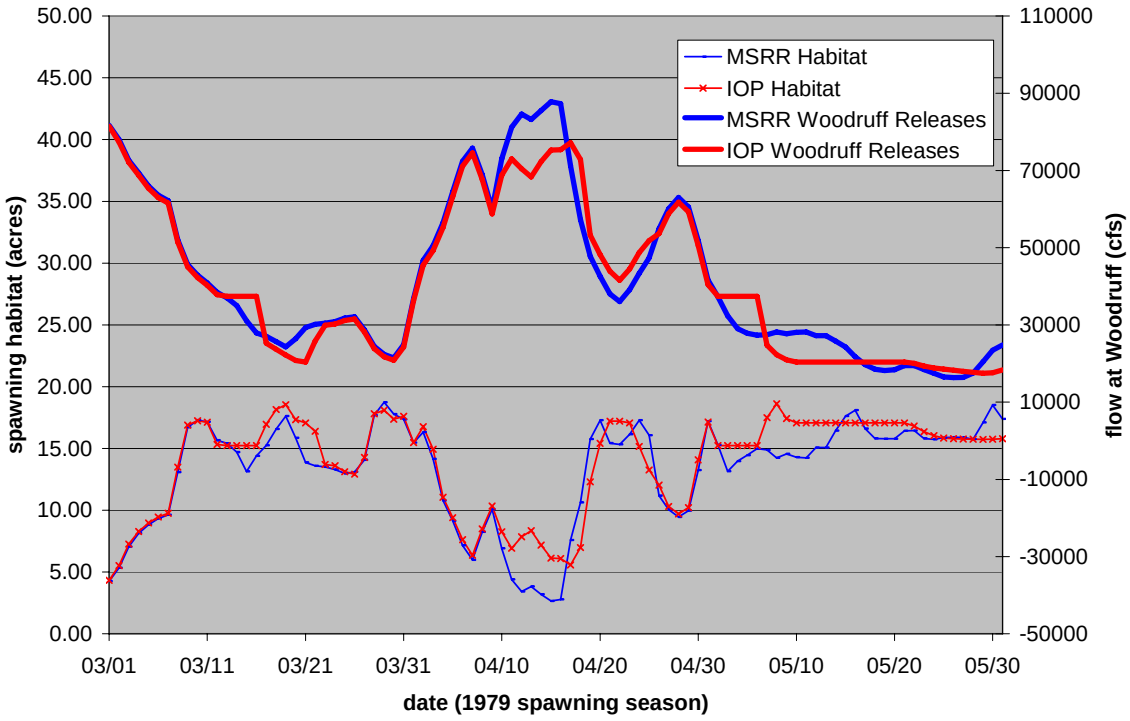


Figure 21 Spawning Habitat and Woodruff Releases in 1979



The MSRR could be tuned to avoid the problematic range of flows. We have not yet done so, however, for two reasons. First, the dip in habitat may or may not reflect an actual decline in usable habitat. Based on the "range of spawning depths observed" after the removal of the outliers, there will be some amount of habitat loss as flows increase simply as a matter of channel geometry. This is because at some point under increased flows, depths will increase to greater than 18.0 feet before other areas of the rock shoal are inundated with at least 8.5 feet of water. While the range of depths in the BiOp may be optimal based on this depth range rule, it is obvious from the 2005 and 2006 data that sturgeon will spawn at depths outside of this range. Habitat may not be lost as water depth increases in the main channel in response to flows that result in channel depths greater than 18 ft with shelf depths less than 8.5 ft. This casts doubt on differences in apparent available habitat among various management scenarios at intermediate flows.

In addition, the MSRR currently performs as well or better than the IOP at RM 105, the more important of the two spawning sites, at seen in Figures 18 and 19. Figure 18 shows that the MSRR has more days that fall below habitat in the 8 to 10 acre range, but less days that fall below habitat in the 4 to 6 acre range. Figure 19 shows that the MSRR supports more sustained habitat than does the IOP in the range of 5 to 7.5 acres, and equally as much as the IOP for all other values of habitat. We believe that the sustained habitat measure is the more critical of these two and so conclude that the performance of the MSRR with regard to sturgeon habitat is at least as good if not better than the performance of the IOP. The same holds true for the comparison of the MSRR and Concept #3. The performance of the MSRR is clearly no worse than the baseline or RoR, as well.

Figure 22 (BiOp Figure 4.2.3.A): Frequency of Spawning Habitat Availability at RM 105

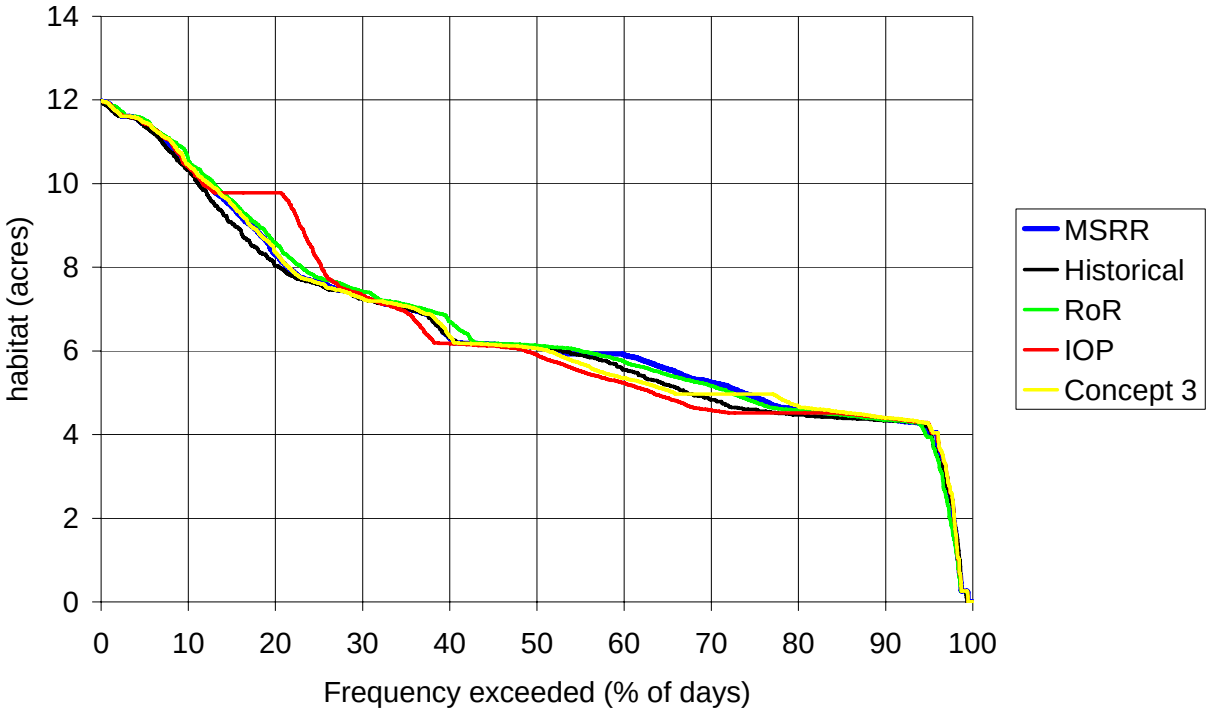
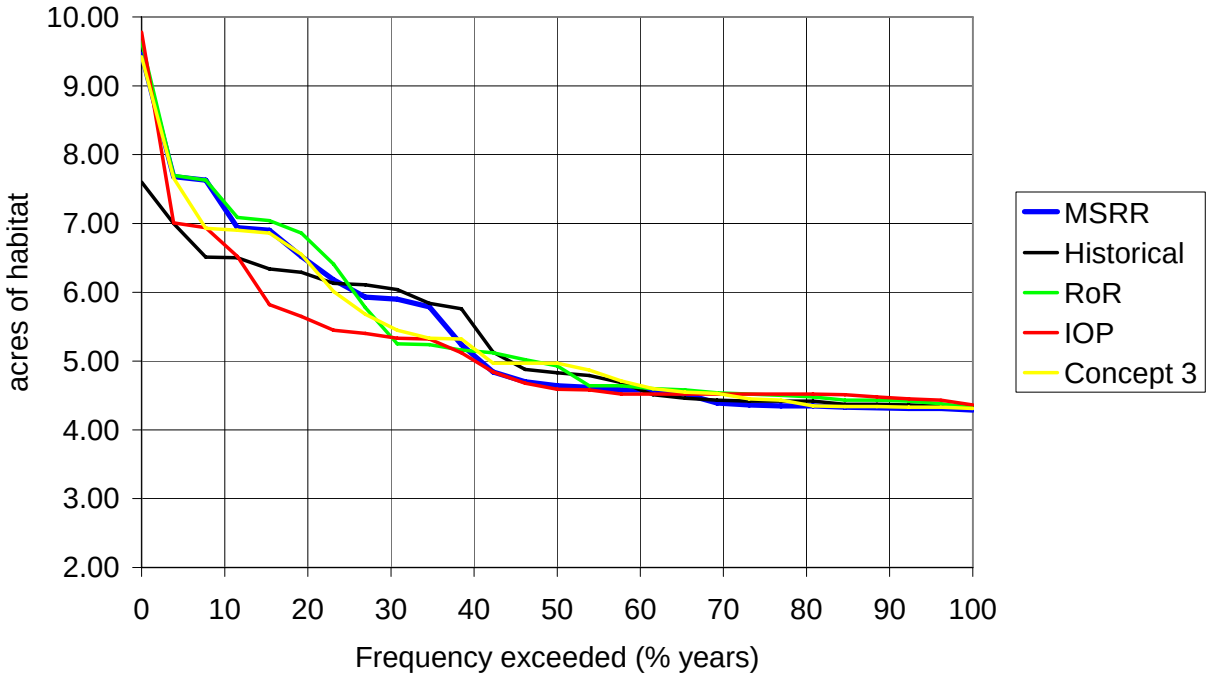


Figure 23 (BiOp 4.2.3.B): Max Habitat Sustained for At Least 30 Days During Spawning Season at RM 105



6.3 Other Operational Objectives

6.3.1 System Storage

Figure 24: System Storage 1940-2001

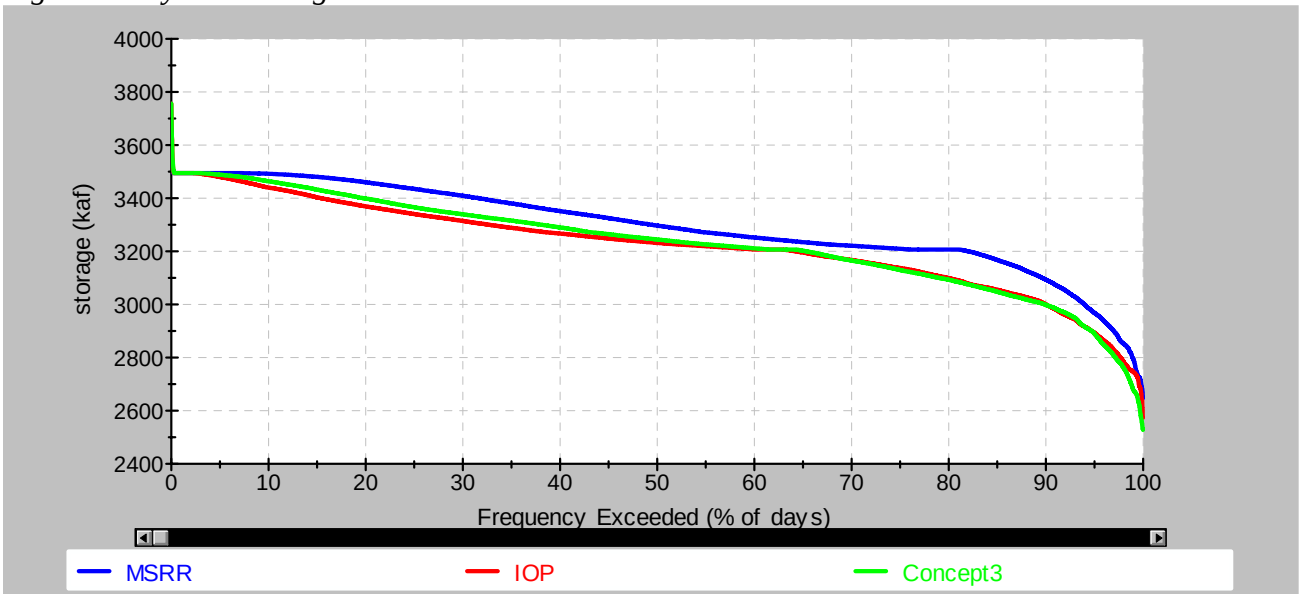


Figure 24 shows the cumulative distribution of system storage for all three operating rules. The graph indicates MSRR produces consistently higher values of storage under almost all operating conditions. This strongly suggests that the system will be better able to respond to drought events more extreme than historical droughts if operated using the MSRR.

6.3.2 Recreation Impacts

Figures 25, 26 and 27 show the benefits of implementing the MSRR relative to recreation impacts. Higher lines are better. The graph for Lanier (Figure 25) shows a wholesale reduction in impacts measured in recreation days at all impact levels.

The graph for West Point (Figure 26) is somewhat more complicated because operations for flood control lower the top of conservation pool, and thus reservoir storage, to the level 2 impact stage every year. The dotted orange line shows the recreational impact of maintaining the reservoir at the top of the seasonally-varying conservation pool at all times, with no other other lowering of the reservoir stage. The impact of operations for all other purposes is the difference between the orange line and the line corresponding to each operating rule. Again, the MSRR is substantially superior to either of the operating rules with regard to this performance measure for all levels of recreational impact.

The graph for Lake Eufala (W. F. George, Figure 27) shows that the MSRR produces more days of initial recreational impact at Eufala than the other two rules. The reservoir balancing scheme in the MSRR makes this happen because it tries to balance impacts among the three reservoirs while minimizing the total impact. The small additional drawdown in Lake Eufala allows that lake to capture water that would otherwise be spilled without significant

benefit to other operating objectives. The drawdown contributes significantly to the achievement of all other operating objectives by preserving system storage upstream. The additional drawdown is quite equitable, as shown in Figure 29-31, and is substantially superior to historical conditions. The same is true for Lake Seminole (Woodruff), as shown in Figure 28. We have no estimates of recreational impact levels for Lake Seminole.

Figures 25, 26 and 27 summarize the recreational impacts for Lake Lanier, West Point Lake and Lake Eufala at each of the impact levels. The overall recreational impacts of the MSRR are clearly less than those of the other two rules, and more equitably apportioned between the lakes.

Figure 25: Frequency of Stages at Lake Lanier

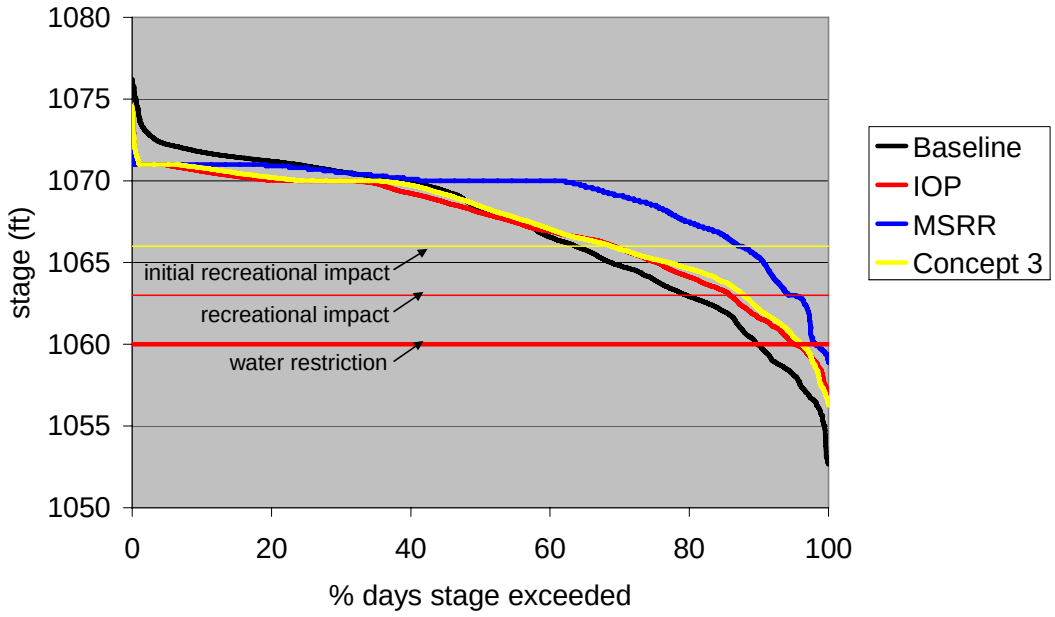
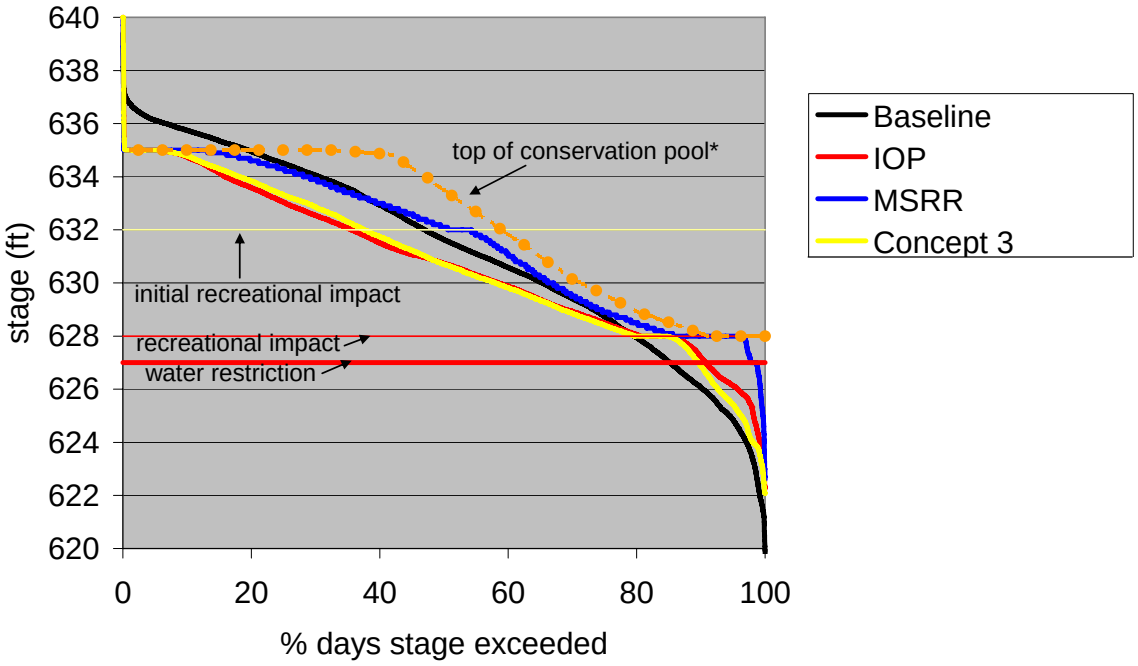


Figure 26: Frequency of Stages at West Point



**This line indicates reservoir levels when West Point is kept at the top of the seasonally-varying conservation pool every day.*

Figure 27: Frequency of Stages at Walter F. George

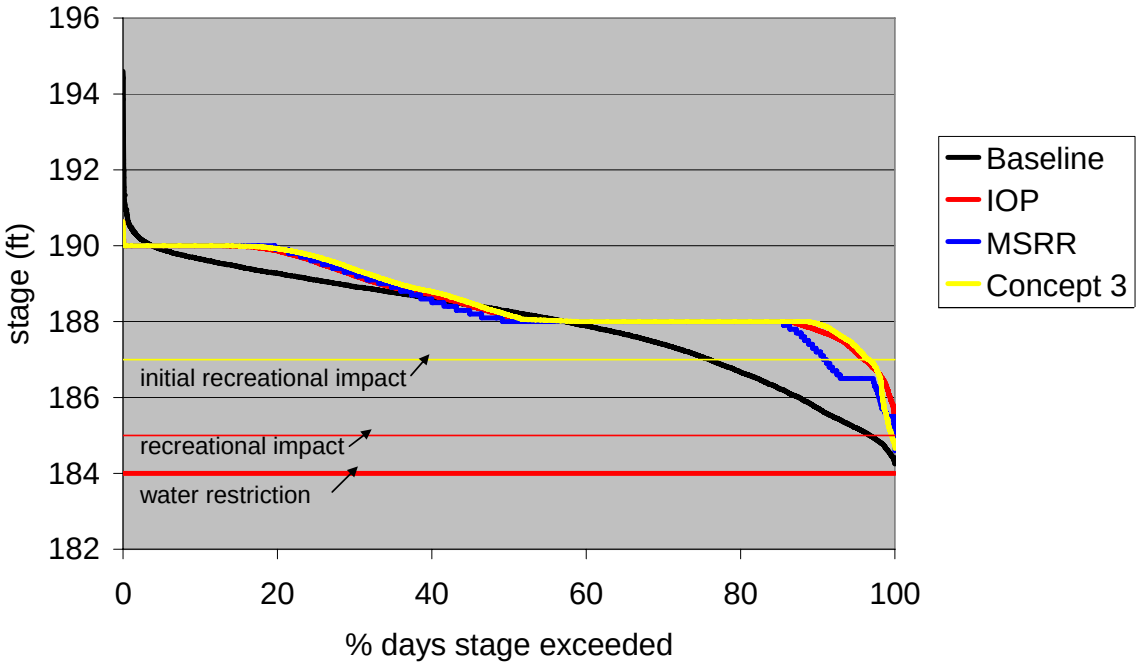


Figure 28: Frequency of Stages as Woodruff

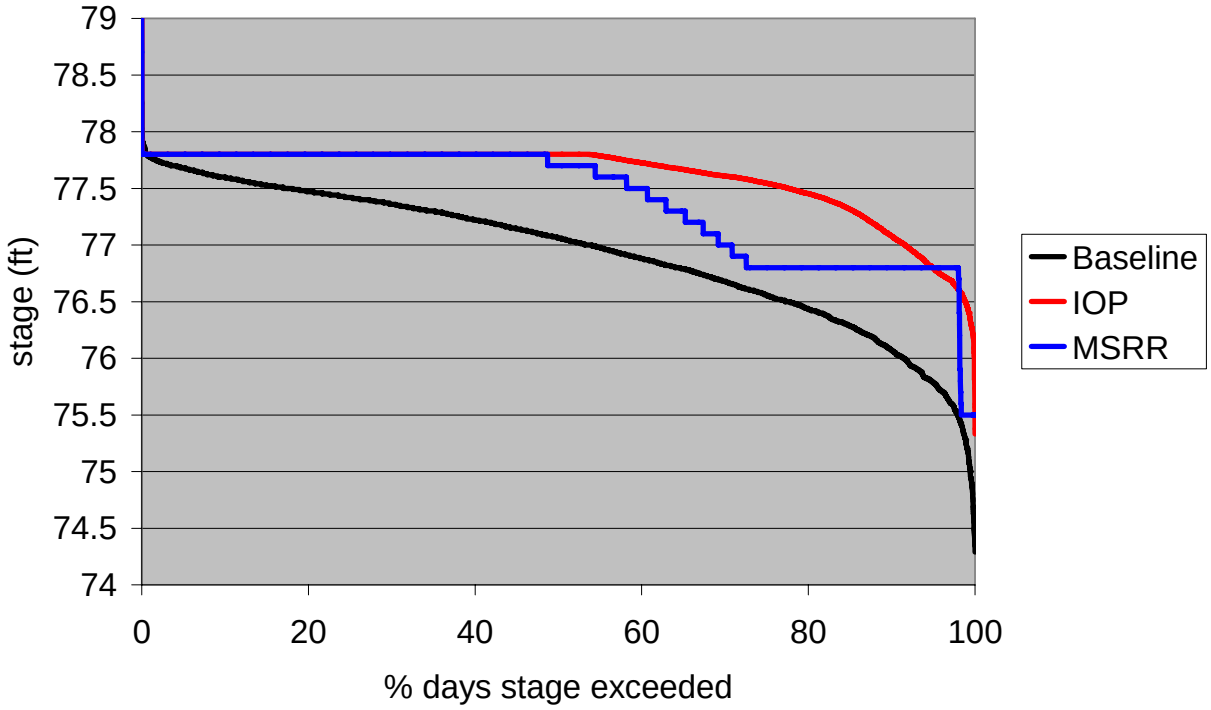


Figure 29: Recreation Impact (1975-2001) - Impact Level 1 (Initial Impact)

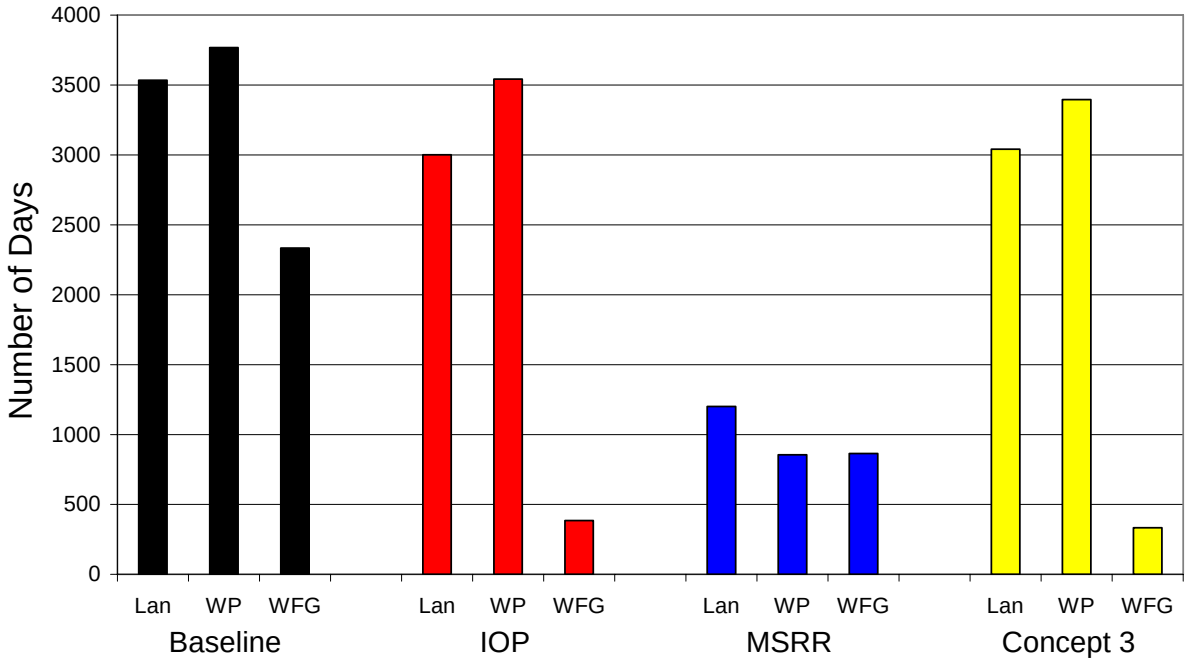


Figure 30: Recreation Impact (1975-2001 - Impact Level 2 (Recreation Impact)

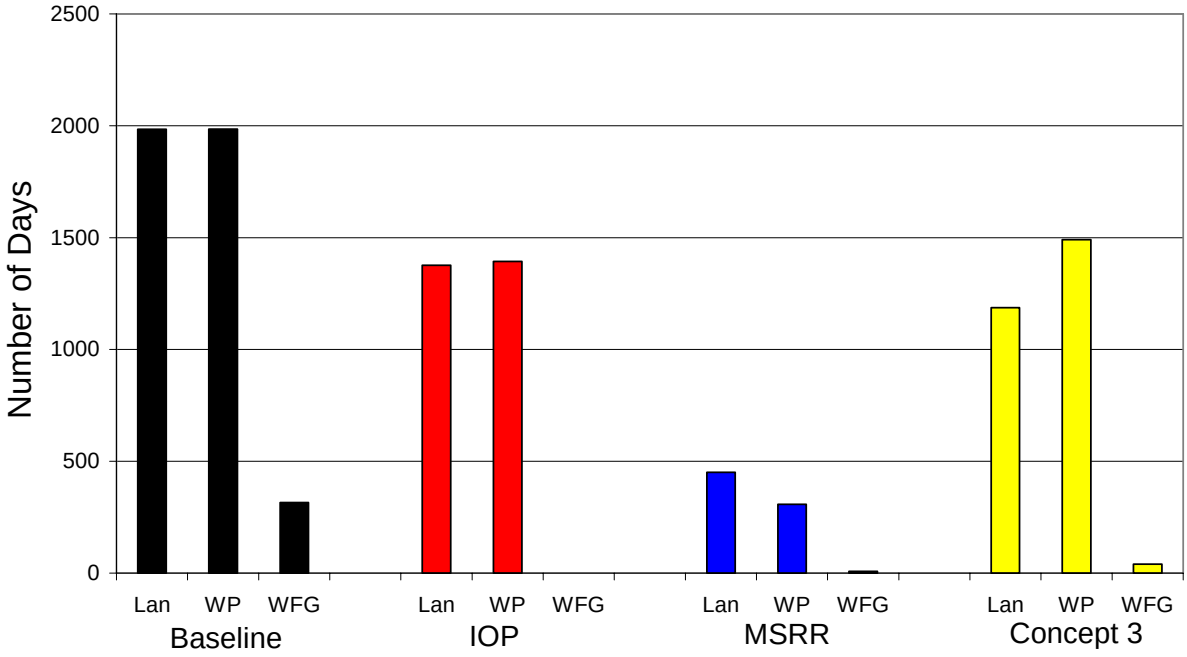
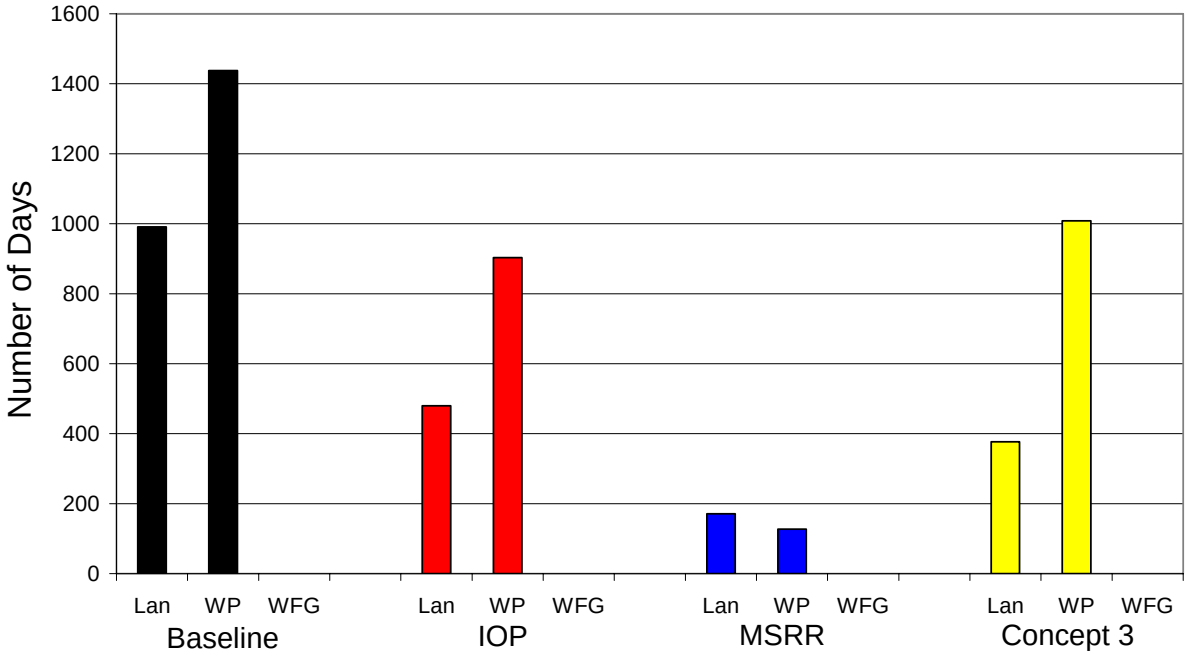


Figure 31: Recreation Impact (1975-2001) - Impact Level 3 (Water Restriction)



6.3.3 Hydropower

Figure 28 shows monthly hydropower generation for the IOP and for the MSRR, and the standard deviation for each month. The difference in total generation is insignificant, although the monthly distribution shows minor differences.

Figure 32: Average Monthly Energy Generated (1940-2001)

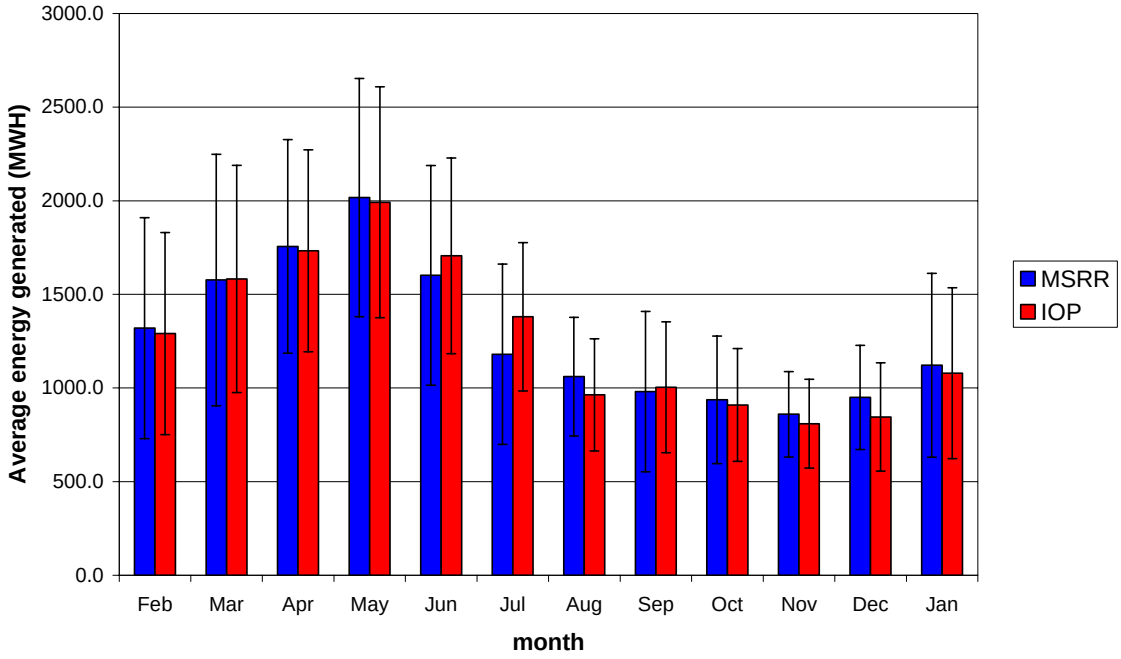
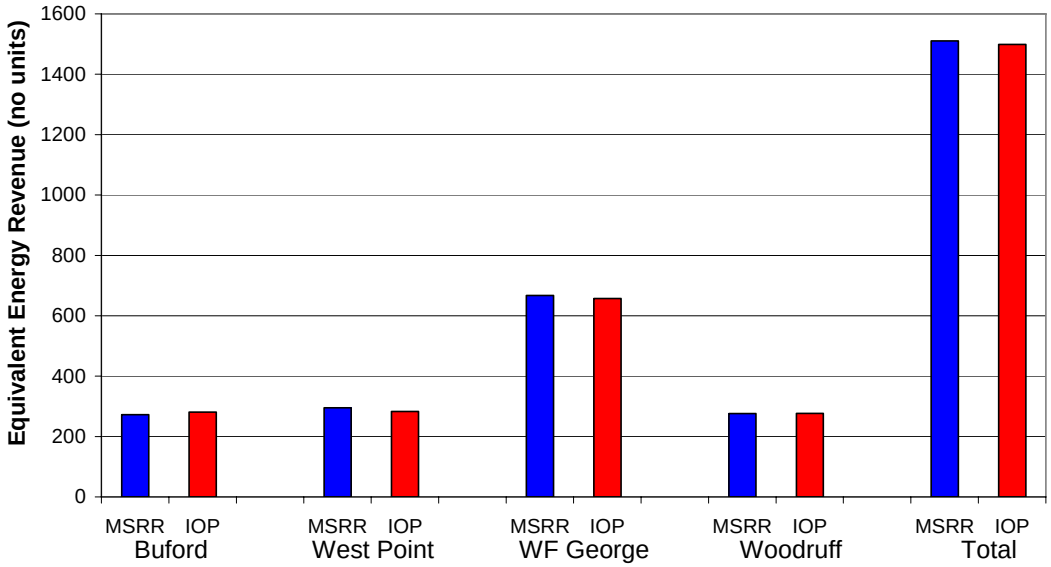


Figure 29 shows an estimate of the value of the power produced. This value is estimated using the average of 2001-2005 day-ahead peak power generation prices from the ERCOT hub. An individual price was generated for each day in the calendar year. The power generation for the day is divided by the generating capacity of the powerhouse for the day to give the number of hours of generation. At Buford, the capacity is a function of elevation, and at the other powerhouses it is constant. This is the same as the method used in HEC5. The first 3 hours of generation are priced at peak price levels, and the remaining hours at 1/3 of peak price levels to estimate the value of power generated for the day. We believe this is a reasonable first order estimate of value. The MSRR produces an insignificantly higher value for power produced even though it has minimal provisions for optimizing power generation.

It is important to note that the MSRR generates energy only when prices are high rather than everyday. As seen above, this not only increases the value of power generated, it also produces better biological performance.

Figure 33: Average Equivalent Energy Revenue



6.3.4 Flood Control

The proposed alternative does not include any requirements concerning flood control operations beyond those associated with the seasonal curve for specifying the top of conservation pool in each reservoir. Top of conservation rule assumptions are unchanged from current levels. Therefore, implementing the proposed alternative will not impact flood control performance.

7. CONCLUSION

The Maximum Sustainable Release Rule ("MSRR") is proposed as a revision to the IOP for the implementation of RPM3:

- The MSRR responds to RMP3 by increasing minimum flows below Woodruff to the maximum sustainable flow whenever basin conditions permit.

- The MSRR ensures that such releases will not compromise the ability of the system to meet critical needs over the long-term.

- The MSRR performs better in terms of many operating objectives, including but not limited to those relating to the protection of threatened and endangered species. MSRR does not perform significantly worse in terms of any operating objective.

- The MSRR provides improved ability to cope with droughts worse than the drought of record with regard to maintaining environmental flows and maintaining public health and safety.

- The MSRR is a practical rule that is easily implemented.

- We appreciate the Corps' consideration of this approach and will make available to any information, data or other resources necessary to validate the rule. We also stand ready to assist the Corps in any way possible.

E-10 Southeastern Power Administration (SEPA) letter to CESAM dated 10 January 2007, providing comments on the IOP and RPM3

Department of Energy
Southeastern Power Administration
1166 Athens Tech Road
Elberton, Georgia 30635-6711

January 10, 2007

Mobile District, USACE
ATTN: Joanne Brandt
NEPA Compliance Manager
Inland Environmental Team
P.O. Box 2288
Mobile, AL 36628-0001

Dear Ms. Brandt:

Southeastern Power Administration (Southeastern) would like to take this opportunity to provide comments on the Mobile District's low flow regime concept which is being developed in accordance with provisions of the U.S. Fish and Wildlife Service's Biological Opinion on the District's Interim Operations Plan (IOP) for the Jim Woodruff Project.

Southeastern reiterates the comments and concerns that we have previously expressed regarding the IOP. The plan fundamentally alters basin operation in a manner which is not conducive to the production of a dependable hydropower resource. Operating according to the plan's flow regimes will impact project storage during the critical springtime filling months and could result in lower upstream summer pool elevations as well as reductions in the quantity of generation available during the high electrical demand summer period. Lower upstream elevations and reductions in generation could occur irrespective of the system's actual hydrological drought status. In addition, when compared to the 1989 Water Control Manual, the plan imposes a reduction in the hours-use by zone which is not representative of the hydropower requirement. These altered river operations to accommodate the listed species could have significant negative impacts to Southeastern both in terms of contractual deficiencies and replacement energy purchases.

Low flow conditions are the most critical of all conditions encountered on a river system for the hydropower purpose. The suggested modifications to the IOP of increasing releases during low flow periods will result in a more rapid depletion of system storage. During these periods, the preservation of storage is typically the objective of river basin operation. In recent drought events there has been a close spirit of cooperation among the District, Southeastern, and the customers (Drought Busters) in developing strategies to preserve the water resource in the river basin at the onset of a drought, while continuing to maximize hydropower benefits. These actions have been taken at a considerable expense to the customers. Increasing the discharges during periods of low inflows would conflict with this

strategy by utilizing the resource which has been preserved and undermining the positive effects to the river basin that have been achieved as a result of the customers' expenditures. Without the expectation of future benefits resulting from their expenditures, the customers could cease their cooperative efforts.

Southeastern hopes that the District will continue its efforts in the development and refinement of a river basin plan which will satisfy the District's endangered species obligations while minimizing impacts to authorized project purposes. In addition, Southeastern would welcome an analysis by the District, which determines the impacts of operating under the IOP on authorized project purposes and explores methods of compensating purposes for lost benefits.

Southeastern appreciates the Mobile District's efforts on this issue and looks forward to continuing to work with the District on this and other important basin issues.

Sincerely,

Kenneth E. Legg
Assistant Administrator for
Power Resources

E-11 FDEP letter to CESAM dated 16 January 2007, providing comments and an alternative RPM3 concept

Florida Department of Environmental Protection
Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary - Designee

January 16, 2007

Ms. Gail Carmody
Supervisor
United States Fish and Wildlife Service
1601 Balboa Ave
Panama City, Florida 32405-3721

Colonel Peter F. Taylor, Jr.
Department of the Army
Mobile District, Corps of Engineers
Attention: CESAM-DE
Post Office Box 2288
Mobile, Alabama 36628-0001

RE: Comments on Reasonable and Prudent Measure No. 3 (Drought Provisions)

Dear Ms. Carmody and Colonel Taylor:

The U.S. Fish and Wildlife Service ("FWS" or the "Service") issued its *Biological and Conference Report on the U.S. Army Corps of Engineers, Mobile District, Interim Operating Plan for Jim Woodruff Dam and the Associated Releases to the Apalachicola River* ("BiOp") on September 5, 2006. The BiOp provided the U.S. Army Corps of Engineers ("Corps") an incidental take statement for the taking of mussels in the Apalachicola River. BiOp at 140-147. Among the reasonable and prudent measures ("RPM") contained in the incidental take statement is "RPM 3 Drought Provisions." The question presented by RPM 3 is whether, and under what conditions, the Corps can provide a higher flow floor than 5,000 cubic feet per second ("cfs") in the Apalachicola River. Our analysis indicates that the Corps unquestionably can provide higher flow floors ranging from at least 5,700 cfs in the driest years up to at least 6,300 cfs under normal conditions.

To be clear, Florida remains dissatisfied with many facets of the IOP and has challenged the BiOp in the U.S. District Court for the Northern District of Florida. *State of Florida v. U.S. Fish & Wildlife Serv.*, 4:06 CV 410 RH-WCS 9 (N.D. Fl.). The following comments are not intended to condone or validate the IOP or the BiOp, but are offered simply to answer the narrow question presented by RPM 3 in accordance with the invitation

extended by your agencies. Florida's analysis assumes continuation of the IOP in its current form solely for the limited purpose of demonstrating the Corps' ability to raise the flow floor under the IOP. The results of our analysis and methodologies employed are set forth in detail below. Neither our analysis, nor our conclusions, constitute a "Florida proposal" of any kind. Rather, they reflect a simple demonstration of the Corps' capability to augment flows for the mussel species and habitats of concern within the limited context of RPM 3.

I. Background

RPM 3 requires the Corps to "[d]evelop modifications to the IOP that provide a higher minimum flow to the Apalachicola River when reservoir storage and hydrologic conditions permit." BiOp at 142. The BiOp explains that "available data indicates that higher minimum flows are supportable during normal and wet hydrologic periods, and during dry periods when the reservoirs are relatively full." *Id.* Measures like RPM 3 are implemented through compliance with mandatory "terms and conditions." 16 U.S.C. § 1536(b)(4)(iv); 50 C.F.R. § 402.14(i)(1)(iii). The Corps' incidental take statement contains among its terms and conditions a requirement that the Corps "with Service concurrence, shall initiate by January 30, 2007, IOP drought provisions that identify the reservoir, climatic, hydrologic, and/or listed species conditions that would allow supporting a higher minimum flow in the Apalachicola River, and that identify recommended water management measures to be implemented when conditions reach the identified drought trigger point(s)." BiOp at 144. The Corps must implement the RPMs and terms and conditions enumerated in the incidental take statement to maintain authority to take mussels in the Apalachicola River. *See, e.g.*, 16 U.S.C. § 1536(b)(4)(ii); 16 U.S.C. § 1536(o)(2); 50 C.F.R. § 402.14(i)(1)(ii). Thus, it is not a question of whether the Corps must comply with RPM 3, but how.

Florida extended an invitation on December 8, 2006 to Corps and FWS personnel to meet with Florida's modeling team and discuss the opportunity presented by RPM 3. By electronic mail dated December 18, 2006 from Brian Zettle of the Corps, your agencies regrettably declined Florida's invitation. You, nevertheless, indicated that you would accept any information on the subject that Florida desired to submit. The Service, moreover, has explained it will consider relevant information at any time.[1] Please consider these comments Florida's response to these invitations.

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[1] *See Interagency Cooperation – Endangered Species Act of 1973, as Amended, Final Rule*, 51 Fed. Reg. 19,926, 19,950 (June 3, 1986) ("We [FWS] believe that information could become available at any

II. Observations About Concepts Presented at the December 13, 2006 Workshop.

Your agencies held a workshop concerning RPM 3 in Columbus, Georgia on December 13, 2006. Florida was not able to actively participate in the workshop, but did attend and review the Corps' (and others') presentations. Florida makes the following observations about the Corps' effort to comply with RPM 3 as described at the Columbus workshop.

The IOP allocates Basin Inflow among consumptive uses, storage and instream flows (mussels, sturgeon, etc). All upstream consumptive demands are implicitly met without restriction.[2] The remainder is then distributed between storage and release. Contrary to the import of RPM 3, the Corps' presentation makes clear that the Corps intends to retain 5,000 cfs as the flow floor and allocate even more Basin Inflow during the spring to storage. The Corps then specifies that a flow of 6,500 cfs could be maintained until composite reservoir storage reaches the top of Zone 3. Thereafter, until composite storage is refilled to Zone 1, the flow would be kept at 5,000 cfs. This approach does not satisfy the goal of RPM 3, which is to provide more – not less – water to the Apalachicola River.

The Corps' suggestions for RPM 3 reflect much modeling, but very little hydrologic analysis. There are four fundamental problems with the Corps' suggestions: 1) They are based entirely on conditions that have already occurred or very near term (7-day) projections; thus they all are reactive rather than proactive; 2) they make no distinction between wet and dry seasons; 3) they never allow for drafting of storage for the benefit of mussels, except at 5,000 cfs; and 4) they are based on the premise that 5,000 cfs results in an acceptable flow level, which, again, contravenes RPM 3.

Finally, it appears the Corps is placing considerable weight on the droughts of 1981, 2000 and shorter duration dry conditions experienced in 2006. In any analysis of RPM 3 alternatives, it must be recognized that both the 2000 and 2006 adverse hydrologic conditions were significantly, and unnecessarily, exacerbated by the Corps. In late April and early May of 2000 the Corps conducted a navigation window. Approximately 200,000 acre-feet of water was released for that purpose, equivalent to

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time during the consultation, and such information should be submitted to the Service for its consideration.").

[2] As a consequence, the Apalachicola River unfairly bears the full burden of decreased Basin Inflow attributable to increasing Georgia demands. Georgia's demands cannot be allowed to grow unchecked without account for the impact of that growth on downstream interests.

an average continuous release of at least 7,200 cfs for the two week period. In 2006, due to a gage error that persisted for almost 2 months, the Corps unknowingly released 76,000 acre-feet of storage from Lake Lanier over and above intended amounts. This was equivalent to a continuous average release of 650 cfs over the 59 day period and occurred during the dry season.

In short, the level of Lake Lanier dropped much further than it should have in both 2000 and 2006. In each case, through modified operations and increased diligence, reservoir levels throughout the ACF Basin could have been much higher, and more water could have been made available downstream. Indeed, the Corps has publicly committed to discontinue its use of navigation windows.[3] Thus, when predicting future reservoir elevations that might result from implementing RPM 3, it should be assumed that the Corps will not repeat its errors of the past, and that more water will be available to meet downstream flow requirements.

III. Higher Flows Need Not Be Provided at the Gulf Sturgeon's Expense

At the December 13, 2006 workshop, one or more presentations made by the Corps and Georgia involved conserving additional water during the spring riverine fish spawn with the apparent intent of making that increment of stored water available later during the year in furtherance of augmented mussel-related flows.[4] The problem with this approach is twofold: First, there is no basis in the BiOp from which to conclude that the Gulf sturgeon can tolerate even less water than is provided under the IOP during the spawn. Second, the approach entirely ignores the fact that reduced floodplain inundation during the spring will compromise the health and productivity of fish species that act as reproductive hosts for the mussels, themselves.

A. The Current Proposals are Bad for the Gulf Sturgeon

Georgia and the Atlanta Regional Commission (ARC) have proposed to further reduce Apalachicola River flow during Gulf sturgeon spawning. Georgia's and ARC's recommendations were based on an assumption that adequate sturgeon spawning habitat would be provided at a flow of 10,000 cfs when total inundated acres of river

[3] Letter dated March 7, 2006 from Col. Taylor to Gail Carmody (initiating ESA Section 7 consultation) at 5-7.

[4] It did not go unnoticed that Georgia's proposal, notably, stopped at the point of storing additional water during the spring, but never actually explained how – or if – the additional storage would be used for the benefit of the mussels.

bottom were combined for the two documented spawning sites. Figures 3.6.1.4.C and 3.6.1.4.D of the BiOp were referenced to validate the recommendation. Using the combined two-site (RM 99 + RM 105) acreage inundation, as Georgia and ARC propose, does not recognize the spawning substrate requirements for successful Gulf sturgeon reproduction.

Gulf sturgeon research and literature demonstrates that rough limestone bottom is essential for successful sturgeon spawning, egg development, and larval survival. The arguments presented by Georgia and ARC make the erroneous assumption that smooth consolidated clay bottom provides suitable habitat for successful spawning and early development of Gulf sturgeon. Sturgeon eggs have been collected one time at river mile (RM) 99 where clay bottom exists, but no evidence is available to demonstrate that clay bottom supports successful egg development and larval survival. The occurrence of eggs at RM 99 may or may not have biological importance. The rough limestone spawning site at RPM 105 appears to be the primary sturgeon spawning location on the Apalachicola River and provides a range of flow velocities suitable for sturgeon spawning and egg attachment over a wide range of river flows. Simply put, RM 99 is not the habitat equivalent of the rough limestone spawning site at RM 105 where egg collection success was 10 times greater than that of RM 99 in 2006. The one time collection of nine eggs at RM 99 cannot reasonably justify a three-fold reduction in Apalachicola River flow during the spring spawning season.

The Service previously explained the importance of preserving essential Gulf sturgeon habitat components, stating "spawning habitats should receive maximum protection from disturbance[,]" and that, more specifically, "protection of spawning habitats of the Apalachicola River would include the upper 20 km (12.4 mi) of the river and its surrounding basin components."[5] This area later was designated as part of critical habitat "Unit 6."[6] Current proposals that take yet more water from these areas during the spawn cannot be justified biologically.

B. The Current Proposals are Bad for the Mussels

The Apalachicola River mussels rely entirely on host fish for reproduction. The importance of the host-fish connection is documented in the BiOp. *See, e.g.*, BiOp § 2.2.3.3. (Reproduction); *id.* § 3.3.3. (Seasonality) ("The habits of many fish species, some

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[5] U.S. Fish and Wildlife Service, *Gulf Sturgeon Recovery/Management Plan* (1995) at 51.
[6] 68 Fed. Reg. at 13,393.

of which may serve as hosts for the listed species, are seasonal and flow dependent (Angermeir 1987; Schlosser 1985). We discussed the importance of floodplain inundation as spawning and rearing habitat for fishes in the previous section."); *id.* § 3.6.2.3 (Permanently Flowing Water) ("This constituent element is also necessary for host fishes that spawn in the floodplain. According to Light et al. (1998; 2006) and analyses presented in this Biological Opinion (see section 3.3 Flow Regime Alterations), the frequency and duration of main channel-floodplain disconnections has increased over time, and these disconnections are exacerbated by low flows associated with droughts and controlled water releases (Walsh et al. 2006)."); *id.* § 3.6.2.5 (Fish Hosts) ("Although the three mussels are not generally found in floodplain habitats, their host fish species are likely to use floodplain habitats, and, as previously mentioned, mussel population viability is likely dependent on fish host population density.").

More than 80% of the freshwater and anadromous fish species found in the River spend a portion of their life cycle in the floodplain.[7] The area of available fish and wildlife habitat, however, has been reduced dramatically over the previous five decades.[8] For example, the United States Geological Survey ("USGS") has concluded it now takes over 10,000 cfs more water in the upper River to inundate the same amount of habitat available in the pre-dam era at a flow of 15,000 cfs.[9] In addition, there has been a decrease in the duration of floodplain inundation, particularly at lower discharges. "As a consequence of this decreased inundation, the quantity and quality of floodplain habitats for fish, mussels, and other aquatic organisms has declined, and wetland forests of the floodplain are changing in response to drier conditions."[10]

Taking additional water from these key floodplain habitats during the spring will not only further imperil the Gulf sturgeon, but will also compromise the spawn of multiple fish species, many of which play host to threatened and endangered mussels.

IV. A Better Approach is Available

Rather than accepting a 5,000 cfs flow floor, as the Corps continues to do, Florida's goal was to specify conditions under which flows at Chattahoochee could be maintained at

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[7] U.S. Geological Survey, *Water-Level Decline from 1954 to 2004 in the Apalachicola River, Florida, and Effects on Floodplain Habitats* (Aug. 2006) at 1.
[8] USGS 2006 at 1.
[9] USGS 2006 at 22.
[10] USGS 2006 at 1.

not less than 6,300 cfs.[11] Florida also set out to better identify what flows could be provided if 6,300 cfs could not be attained due to perceived limitations on storage. Our desire was to develop an objective set of predictive conditions that could be used to implement an appropriate flow floor. There are many perturbations of the following framework. The important elements, however, are to: 1) Maximize refilling of Lake Lanier in the less biologically significant months of December, January and February, 2) draft from storage as needed to meet revised (i.e., higher) flow floors, and 3) rely on the volume of Basin Inflow in the January – March timeframe to determine the appropriate flow floor for the year.

A. Early Year Basin Inflow Can Be a Key Predictive Tool

It is critical to anticipate accurately whether dry conditions will persist throughout a given year when rainfall or Basin Inflow is below normal in the January - March period. We examined the reliability of using flows in January - March as a predictor for the remainder of the year.[12]

The monthly distribution of inflow in the Chattahoochee Basin and at Seminole is very homogeneous. On average over the entire basin and at each of the reservoirs, approximately 50% of the total Basin Inflow is received from January through April. At Lanier, West Point, Walter F. George and Seminole, the local inflows during January to April are 48%, 52%, 59% and 50% of the total yearly inflow, respectively.. Roughly 36% to 46% of the total is received in January to March. **Figure 1** illustrates the cumulative monthly inflow at each of the four federal reservoirs. These distributions are very similar, indicating that average inflows at one location correlate very well with inflows at other locations. Inflows are also spatially similar under low flow conditions.

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[11] Florida has explained the biological relevance of the 6,300 cfs flow numerous times, *see, e.g.*, Letter dated August 18, 2006 from Secretary Castille to Gail Carmody (comments on the BiOp), and will not reiterate that discussion here. Florida notes, however that some have incorrectly intimated that such a flow is relevant only to Swift Slough. The benefits afforded Swift Slough at this flow accrue in many other areas, including the mainstem channel margins from NM 43 to NM 44, Hog Slough, Moccasin Slough, and the unnamed Brushy Creek Feeders. Each contains significant mussel resources or habitat, and all of these areas were unnecessarily impacted in 2006 due to dewatering or elevated water temperatures in the shallows.

[12] Another predictive measure of near-term drought should be added separate from the January - March inflow. NOAA makes 3-month and 6-month projections that are fairly accurate. Based on a cursory review, it appears the accuracy of these projections for drought is on the order of 60-70%.

At the December 13 workshop, the Corps distributed graphs showing the inflow to each federal reservoir for the 1981 and 2000 droughts. **Figures 2a and 2b** illustrates the distribution of inflows for these years at each of the federal reservoirs. Under average and low flow conditions, there is a strong spatial correspondence between flows in different parts of the basin. We can expect, therefore, that conditions in one part of the basin will be reflected in the remaining areas of the basin.

Florida also analyzed the temporal variation in flow to determine if conditions early in the year (January to March) were a reliable predictor of conditions for the remainder of the year. **Figure 3** illustrates the quarterly observed flows at the Chattahoochee gage for the period 1939 to 2005 expressed as the ratio to the quarterly average flow. For example, if the observed value is identical to the average, the ratio will be exactly 1 (i.e., the observed flow is 100% of the average). Values less than 1 are instances in which below average flow was observed. Values greater than 1 are instances in which the observed flow is greater than the long-term average.

No drought years occurred if the flow at the Chattahoochee gage was 90% or above of the 67 year mean in January – March period. Of the 67 year period of record, 39 years (58%) had January - March flows of at least 90% of the average **(Figure 4)**. None of these is considered a dry or drought year. Even in these years, however, there is a very high probability (80%) that flow at the Chattahoochee gage will be less than average in at least one quarter. This simply means that below normal flows will occur for a short period in most all years (e.g., 2006). These short duration events should be expected and should not lead to curtailment of reservoir releases if the January - March flows were strong and near term climate predictions do not indicate persistent dry conditions over the next 3 to 6 months. Since these short-duration events will occur most every year, it follows that water should be stored at least during the January - February period to provide augmentation when the almost inevitable dry period occurs later in the year. Since this is the wet season, storage during this period should have little relative impact on flows at the Chattahoochee gage.

In contrast, if the January – March flow is only 55% of normal or less, then there is a very high probability that severe drought and low flow conditions will occur during the dry season. This condition occurred in 10 of the 67 years (**Figure 5**). All the most severe droughts of record occurred in years in which the January - March flows were 37% to 55% of normal (Figure 4). This condition occurred in 1981, 1999, 2000 and 2002 without

exception. Earlier in the record, this condition also occurred in 1941, 1951, 1955 and 1956. Similarly, these were all drought years.[13]

Of the remaining 18 years in which the January - March flow at Chattahoochee was between 55% and 90% of normal, 12 were years that were not persistently dry (**Figure 6**), and in which there were no operational problems, abnormally low reservoir levels or low flows at the state line. The remaining 6 years include 1950 and 1954 (pre-reservoirs), 1968, 1986, 1988, 2001 and 2004. These were dry years, but did not result either in severe low flows for an extended period of time or low levels at Lanier.

From the above it is evident that flow in the January - March period can be used with reasonable accuracy to anticipate conditions for the remainder of the year. In sum:

- If flow at the Chattahoochee gage from January - March is 90% of average or greater, there is essentially a zero probability that the year will be a drought year.

- If flow at the Chattahoochee gage from January - March is 56% to 89% of the average, there is a 33% chance that persistently dry conditions (i.e., less than 90% of average at Chattahoochee) will continue for the remainder of the year.

- If flow at the Chattahoochee gage from January - March is 55% of average or less, there is a high probability that drought conditions have already started and will continue for the remainder of the year. There is also a high probability that conditions will be severe and that flows and reservoir levels will be impacted.

If the Corps is to implement successfully RPM 3, it must fundamentally change its operational penchant for assuming worst-case future hydrology scenarios when Basin Inflow merely is reduced in the short-term. Simply put, as dry conditions develop, the Corps invariably assumes that an extraordinary drought will develop for the remainder

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[13] As with any such analysis, the results are not exactly as predicted. There were two "drought" years which did not have a severely dry first quarter. These are 1954 and 1986. Neither of these was any more severe than dry years such as 1988. There were also two years in which the January - March flows were at or below 55% of normal but the year was not a severe drought year. These are 1957 and 1989 both of which were dry years but not severe drought years.

of the year. In 2006, for example, as low Basin Inflow began to be observed, the Corps responded by curtailing releases as if a 2000 drought scenario were in place. The January - March flows for 2006, however, were 75% of normal, and hydrologic conditions during 2006 never approached those experienced in 2000. Curtailing releases and reducing flows at Chattahoochee based solely on such faulty assumptions will always result in a higher level of mussel mortality than is necessary and empirically is unjustified.

B. Municipal and Industrial Intakes at Lake Lanier May be Protected

The Corps operates Lake Lanier during dry periods principally to protect water supply. *See, e.g.*, 1989 Draft Water Control Plan at A-2. Setting aside, for the moment, what Florida perceives as the illegality of that decision, Florida understands that the M&I water supply intakes of various entities who withdraw water from Lake Lanier are located at approximately elevation 1,045'. *Final Environmental Impact Statement for the Operation and Maintenance of Lake Lanier* (2003) at 2-39 ("Below 1,045 feet pumps must be operated at lower capacity to prevent a whirlpool effect, which could damage pumping equipment.") Solely for the limited demonstration contained herein, and without accepting its legitimacy, a minimum elevation of 1,048' is assumed to be acceptable.[14]

Lake Lanier is the most important of the federal reservoirs for augmentation purposes, since it represents approximately two-thirds of the total basin storage. Therefore, Florida examined whether sufficient storage has traditionally been available to augment flows at Chattahoochee when needed. The average elevation of Lake Lanier was computed on a quarterly basis for the period 1960 to 2006 (1960 was the first year that Lanier was at full pool for an entire quarter). **Figure 7** illustrates the quarterly elevations for each year. There are 10 years in which the quarterly average elevation of Lake Lanier was 1,060' or less. Interestingly, only 4 of the 10 years were drought years. These are 1981, 1986, 1988 and 2000. The remaining years in which the Lake Lanier elevation was 1,060' or less were not drought years, suggesting some non-drought-related operational decision was made that reduced the lake elevation. In droughts of the magnitude of the year 2000, the level of Lake Lanier will drop below 1,060', but it has never approached a critical level of 1,048'.

C. A Hypothetical RPM 3 in Practice.

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[14] For our purposes, consistent with the Corps' historical practice, the minimum level at West Point and Walter F. George is the bottom of those reservoirs' respective conservation pools.

Based on the foregoing, Florida believes that the following predictive measure could be used by the Corps to implement RPM 3, while protecting a Lake Lanier elevation of 1,048':

1. In January and February, preferentially store water in Lake Lanier. Allocate Basin Inflow above Buford between storage and minimum required releases (+/- 850 cfs). Refill to the top of the conservation pool (1,071). Retain the release schedule from the IOP for Basin Inflow below Buford.

2. In March, draft storage as necessary to support a flow floor of 6,300 cfs at Chattahoochee (which never has occurred in the entire period of record). At higher Basin Inflow operate as provided in the IOP.

3. On April 1, 2006, check aggregate January – March Chattahoochee flow and set the mussel-related flow floor for the year as noted in Table A below. At higher Basin Inflow operate as provided in the IOP.

Table A: Possible Alternative Flow Floors

January – March Flows as a percentage of long-term avg.	Applicable flow floor at the Chattahoochee Gage
90% or greater	6,300 cfs
56% - 89%	6,000 cfs
55% or less	5,700 cfs

D. Model Results

Florida has modeled the scenario just described against the 1981 and 2000 droughts, as well as the full range of historic flows. The release rules and new floors at the Chattahoochee gage described above were used to simulate the period from 1939 – 2002. Demands were set at levels recently provided by Georgia for municipal and industrial use and agricultural withdrawals.[15] The IOP releases were used at higher

[15] Because these amounts were provided to Florida in the context of the ongoing mediation in State *of Alabama v. United States Army Corps of Engineers*, CV-90-H-01331-E (N.D. Ala.), they are

levels of Basin Inflow. Inflow to Lake Lanier in excess of 850 cfs in January and February was retained in storage. This curtails hydropower releases and production except when Lanier is at 1,071'. For modeling purposes only, the minimum level of Lanier was set at an elevation of 1,048'. The levels of West Point Lake and Lake W.F. George were allowed to reach the bottom of the conservation pool without restriction.

With the above operating rules and demands, the minimum daily flow at the Chattahoochee gage is at least 5,700 cfs on all days (100%). Most of these occurrences were in the simulated equivalent of 1941, 1955, 1981, 1986, 1999 and 2000. These are all years in which the January – March Chattahoochee flow was at or below 55% of normal. Therefore, even during the critical periods, a minimum of 5,700 cfs can be maintained at Chattahoochee. Moreover, a daily Chattahoochee flow of 6,300 cfs occurred 95% of the time.

The simulated minimum Lanier elevation is 1,050.49'. Notably, Lake Lanier is at or above 1,051' in all but 10 days out of the 63 year period and at or above 1,052 for all but 84 days. At higher Basin Inflow values, the flow at the Chattahoochee gage is at or above the minimum values listed in the IOP. All Georgia demands are met. There is some impact on flood storage in Lake Lanier resulting from the preferential refilling in January and February. The minimum daily elevation of Lake Lanier occurred in the simulated equivalent of 2000. The minimum daily simulated elevations for 1981, 1986, and 1999 are 1,058.12, 1,058.82 and 1,062.87, respectively.

Figures 8 and 9 illustrate the simulated daily flows at the Chattahoochee gage and the elevation of Lake Lanier. These are expressed as simple probabilities.

E. Lessons from 2006

As noted above, January - March Chattahoochee flows for 2006 were 75% of normal. Thus, under the terms described above, a flow floor of 6,000 cfs would have been provided at all times. The ease with which this could have been accomplished is demonstrated by a brief reflection on actual conditions experienced in 2006, a year in which a flow floor of 6,300 cfs was easily achievable.

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not disclosed here. These demands represent current upstream consumptive uses, *i.e.*, reductions in Basin Inflow. To the extent Georgia's demands increase, the projections set forth herein may be affected. However, Florida cannot be compelled to bear the burden of additional reductions in Basin Inflow.

During 2006 there were a total of 62 days in which flow at the Chattahoochee gage was less than 6,300 cfs. Augmenting downstream flows to increase all 62 days to 6,300 cfs would have required 98,241 acre-feet of water. Assuming that 100% of this total was drafted from Lake Lanier, with a starting elevation of 1,065', the required augmentation releases would have caused a decline of approximately 2.8' in the elevation of Lake Lanier. The lowest elevation of Lake Lanier this past summer was approximately 1,061'. Even with augmentation releases to support 6,300 cfs at Chattahoochee, Lanier would have declined only to 1,058'.

Finally, recall that the Corps lost approximately 2.5' in Lanier as a result of its gage error last year. If the Corps had not over-released during that time, but instead supported the 6,300 cfs in July and August, the Lanier elevation would be at approximately the same elevation it is today, or 1,063'. As a practical matter, therefore, reservoirs would not have been impacted at all by augmentation flows during 2006. On the other hand, literally thousands of threatened and endangered mussels likely would have survived, had the Corps been willing to accept modest, temporary declines at Lake Lanier.

IV. Conclusions

The Corps previously committed to maintain a hydrologic connection between the main channel of the River and key mussel habitats like Swift Slough.[16] Although that connection may have been available previously at a flow of 5,000 cfs, such flow simply no longer suffices to maintain the critical connections that are necessary to minimize mussel mortality.[17] Nevertheless, the foregoing demonstrates that the Corps can provide a higher flow floor in the Apalachicola River. In the majority of years, the Corps can provide at least 6,300 cfs, and at least 5,700 cfs even under the most dire circumstances, with proper operational forethought. This can be accomplished even within the context of the IOP and without compromising M&I water supplies at Lake Lanier.

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[16] U.S. Fish and Wildlife Service, *Recovery Plan for Endangered Fat Threeridge, Shinyrayed Pocketbook, Gulf Moccasinshell, Oval Pigtoe and Threatened Chipola Slabshell, and Purple Bankclimber* (2003) at 88 (discussing Corps' assurance that 5,000 cfs would maintain a connection between the River and Swift Slough).

[17] *See* Letter dated July 13, 2006 from Marian Berndt to Jerry Zietwitz (Attachment A – *Apalachicola River discharges needed to maintain flowing conditions in Swift Slough*).

It is incumbent on FWS to ensure that the Corps' incidental take statement includes measures "necessary or appropriate to minimize" the impact of take, 16 U.S.C. § 1536(b)(4)(C)(ii) (emphasis supplied). Had the Corps been utilizing a realistic, predictive approach to water management in 2006, a floor of at least 6,000 cfs could have been maintained in the Apalachicola River at all times. Observed mussel mortality, which was 2 – 4 times the natural rate in 2006,[18] would have been dramatically reduced. The ESA requires no less.

Florida appreciates the opportunity to provide this information and looks forward to seeing its incorporation into your decision. Should either of your agencies have any questions about this analysis or Florida's conclusions, do not hesitate to contact me.

Sincerely,

Michael W. Sole
Secretary-Designee

MWS/tw

[18] BiOp at 78-79.

Figure 1-- Average Cumulative Percent Inflow (approximate)

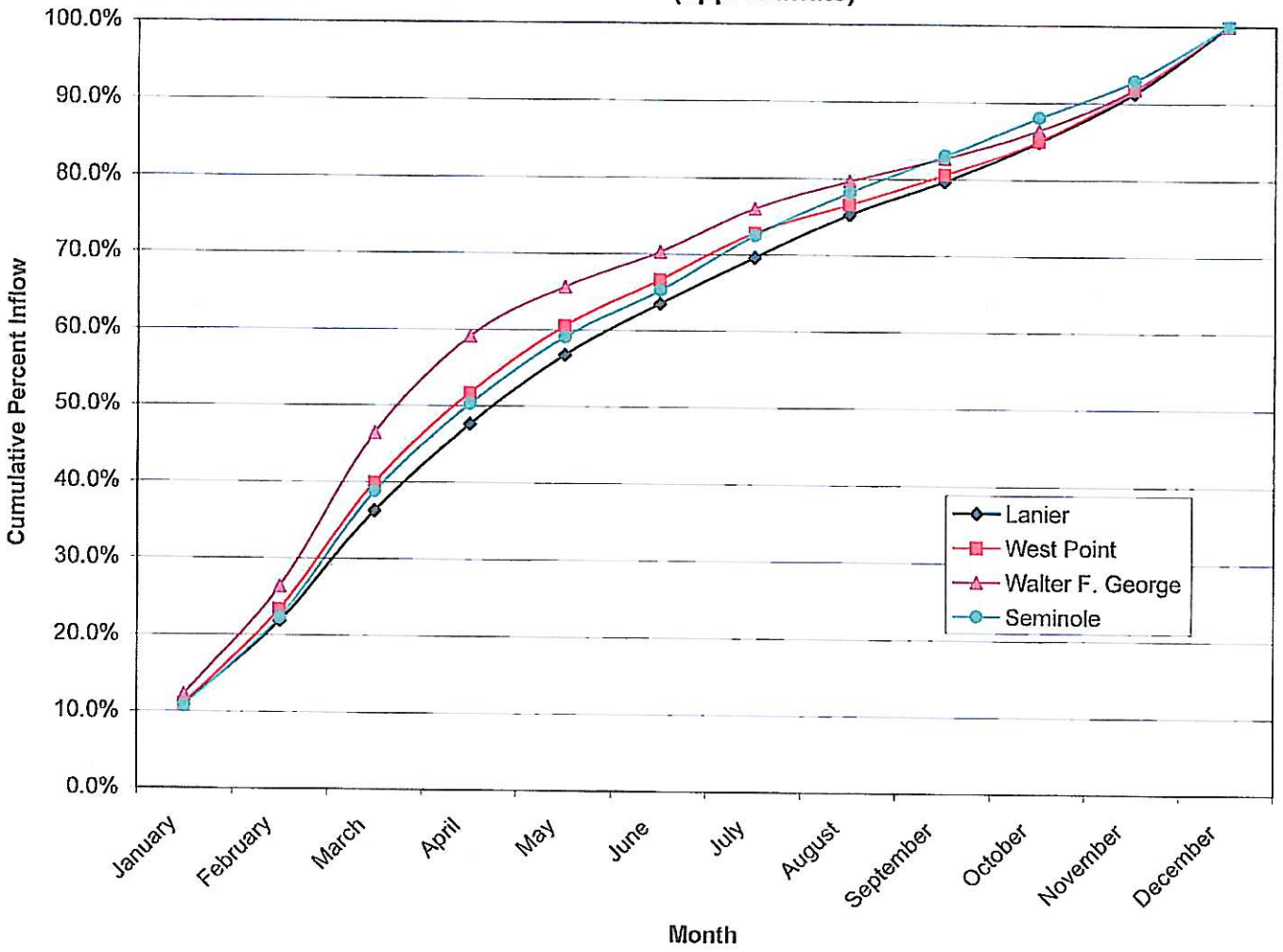


Figure 2a -- Monthly Inflow to Federal Reservoirs in 2000

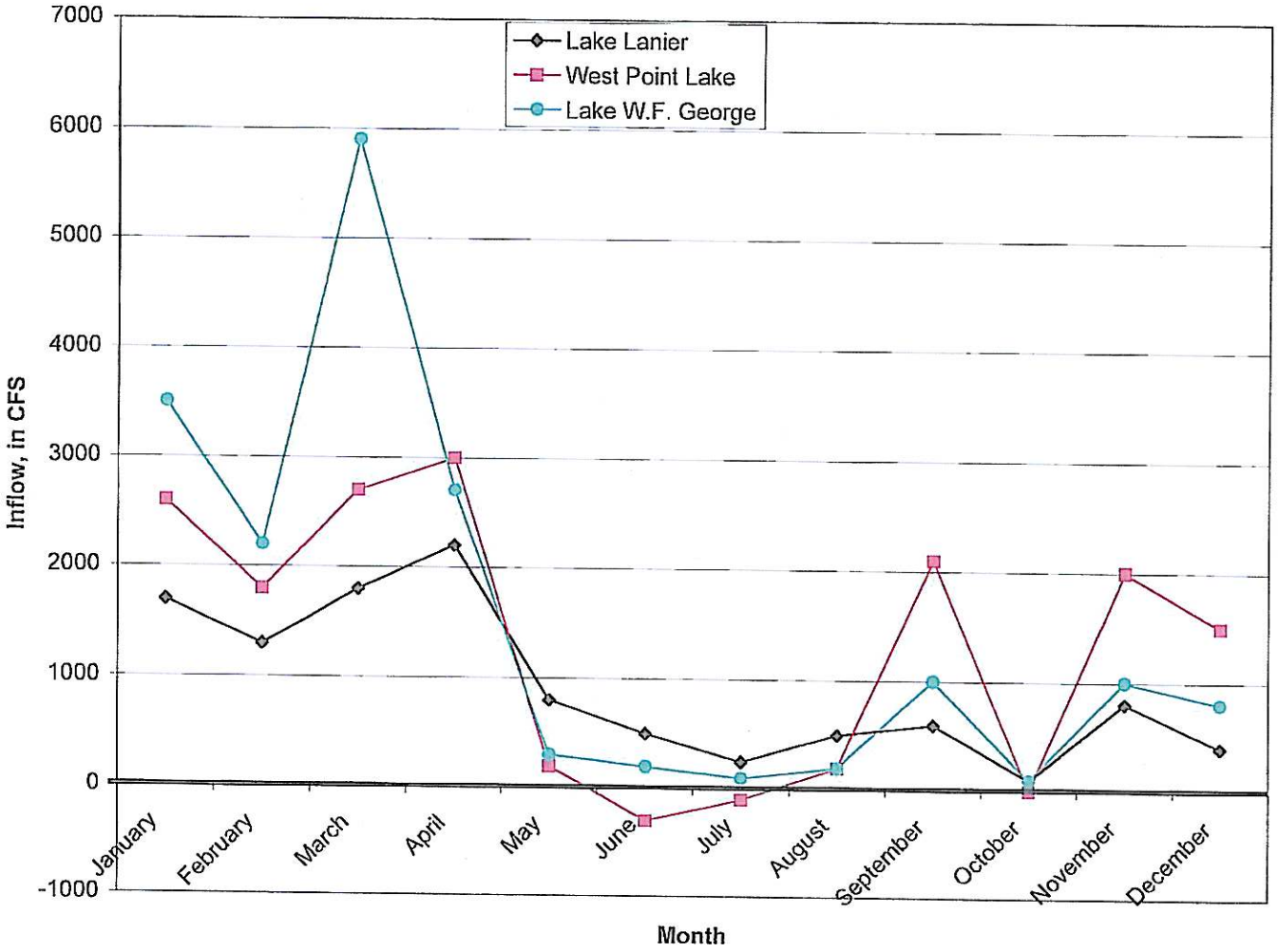


Figure 2b--Monthly Inflow to Federal Reservoirs in 1981

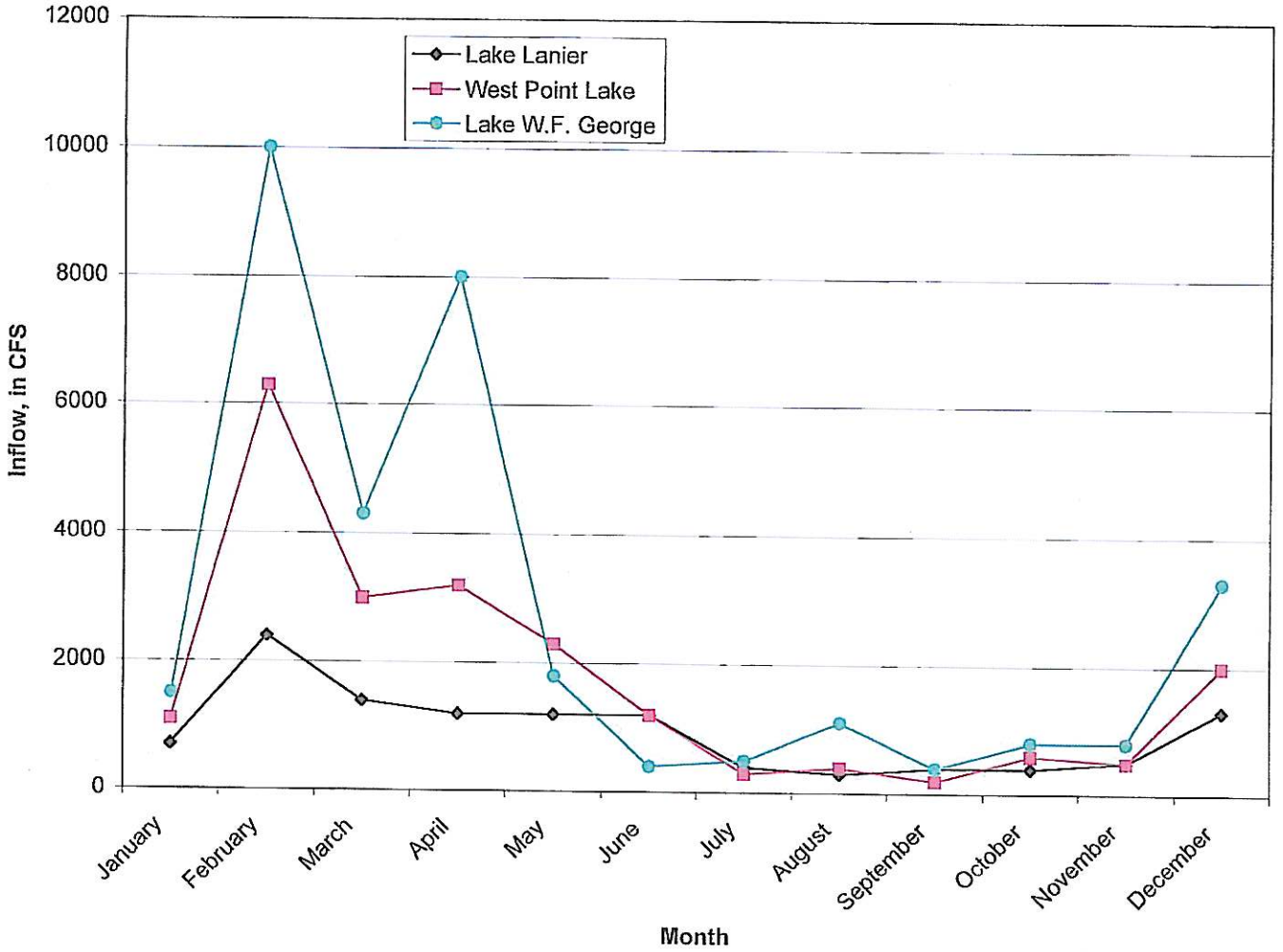


Figure 3--Quarterly Flow at the Chattahoochee Gage by Year for 1939-2006

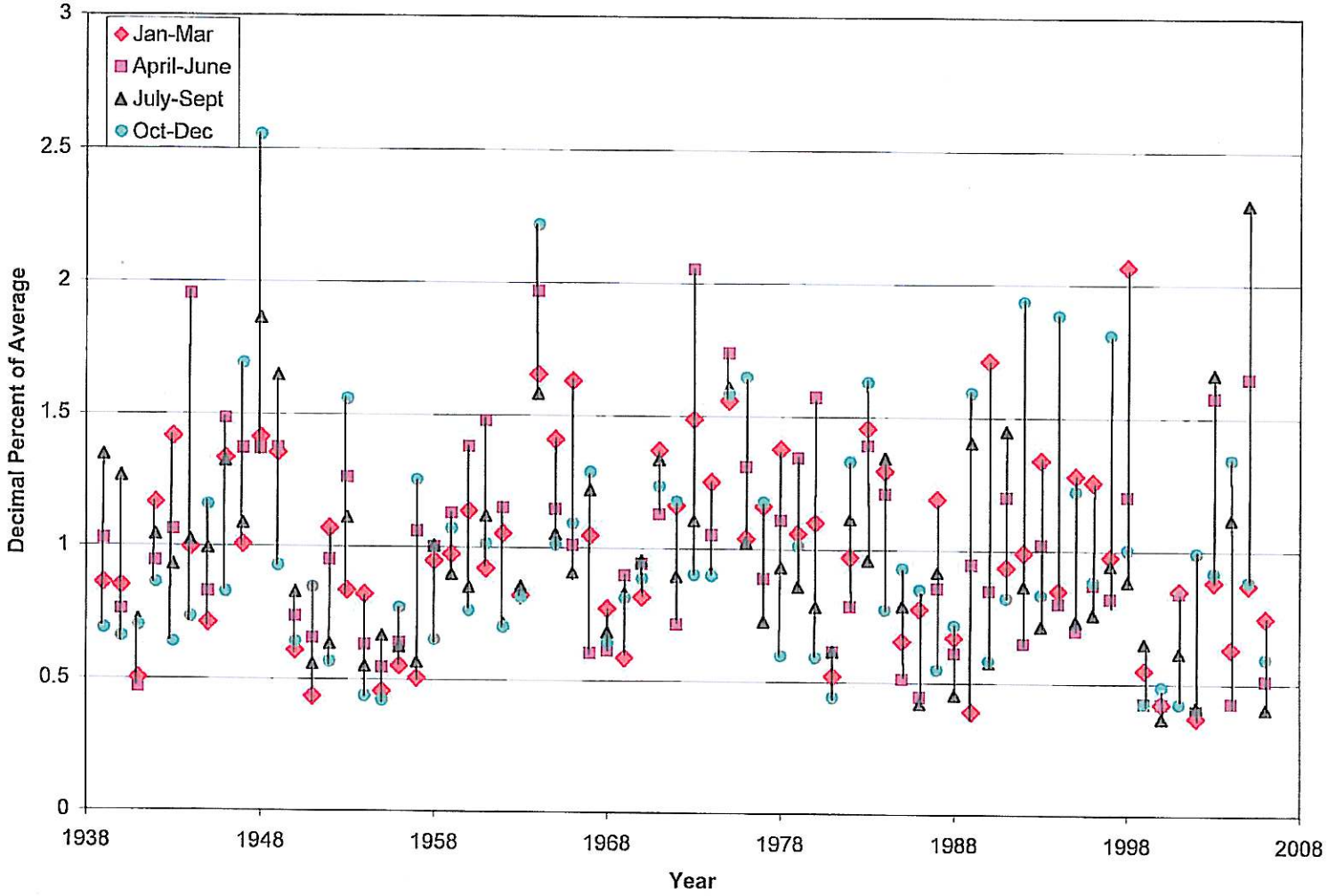


Figure 4-- Quarterly Flow at the Chattahoochee Gage by Year for 1939-2005
(Years when Jan-Mar flow is equal to or greater than 90% of average)

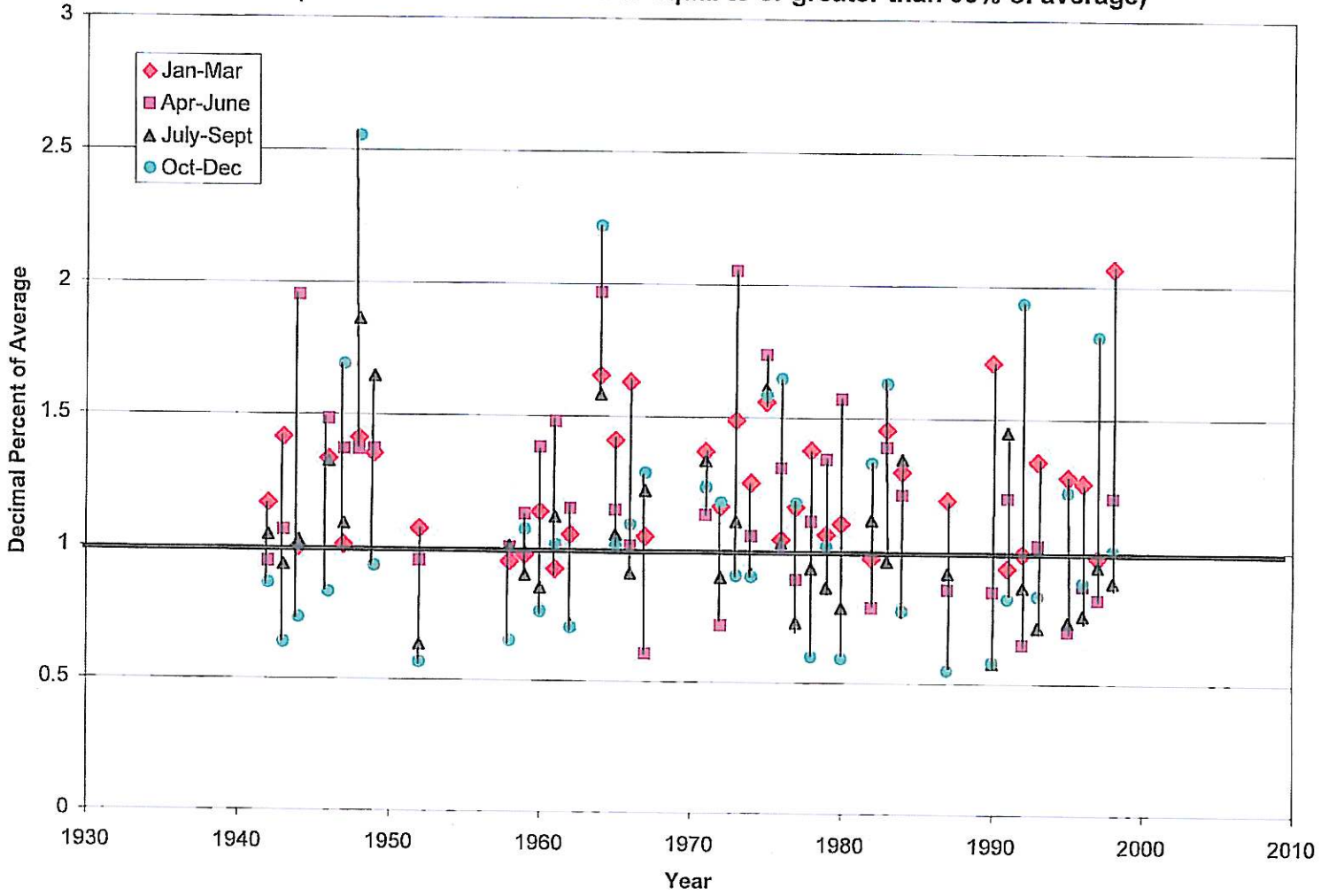


Figure 5--Quarterly Flow at the Chattahoochee Gage by Year for 1939-2005
(Years when Jan-March flow is 55% of Average or less)

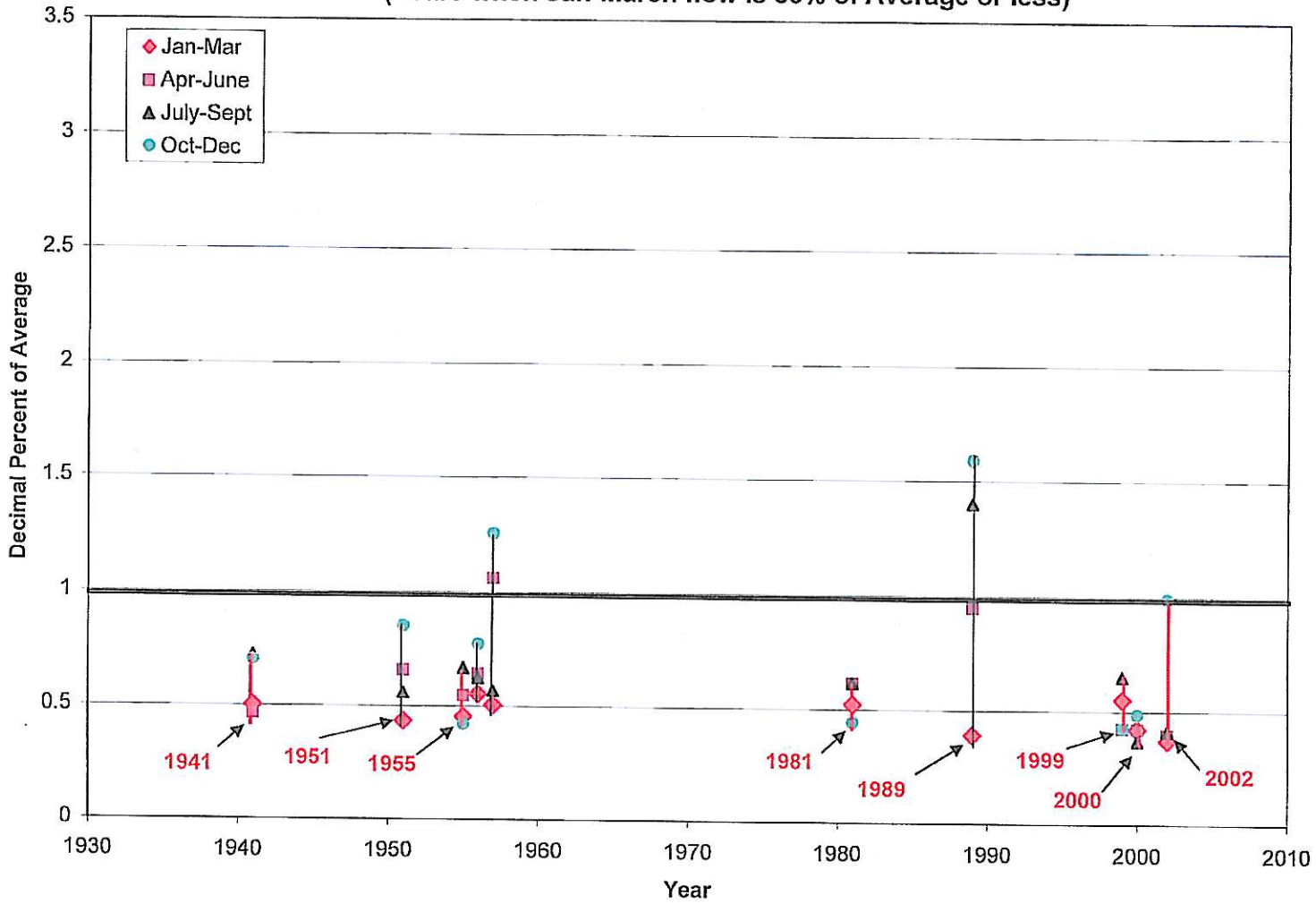


Figure 6--Quarterly Flow at the Chattahoochee Gage by Year for 1939-2005
Years when Jan-March Flow is 55% to 90% of average

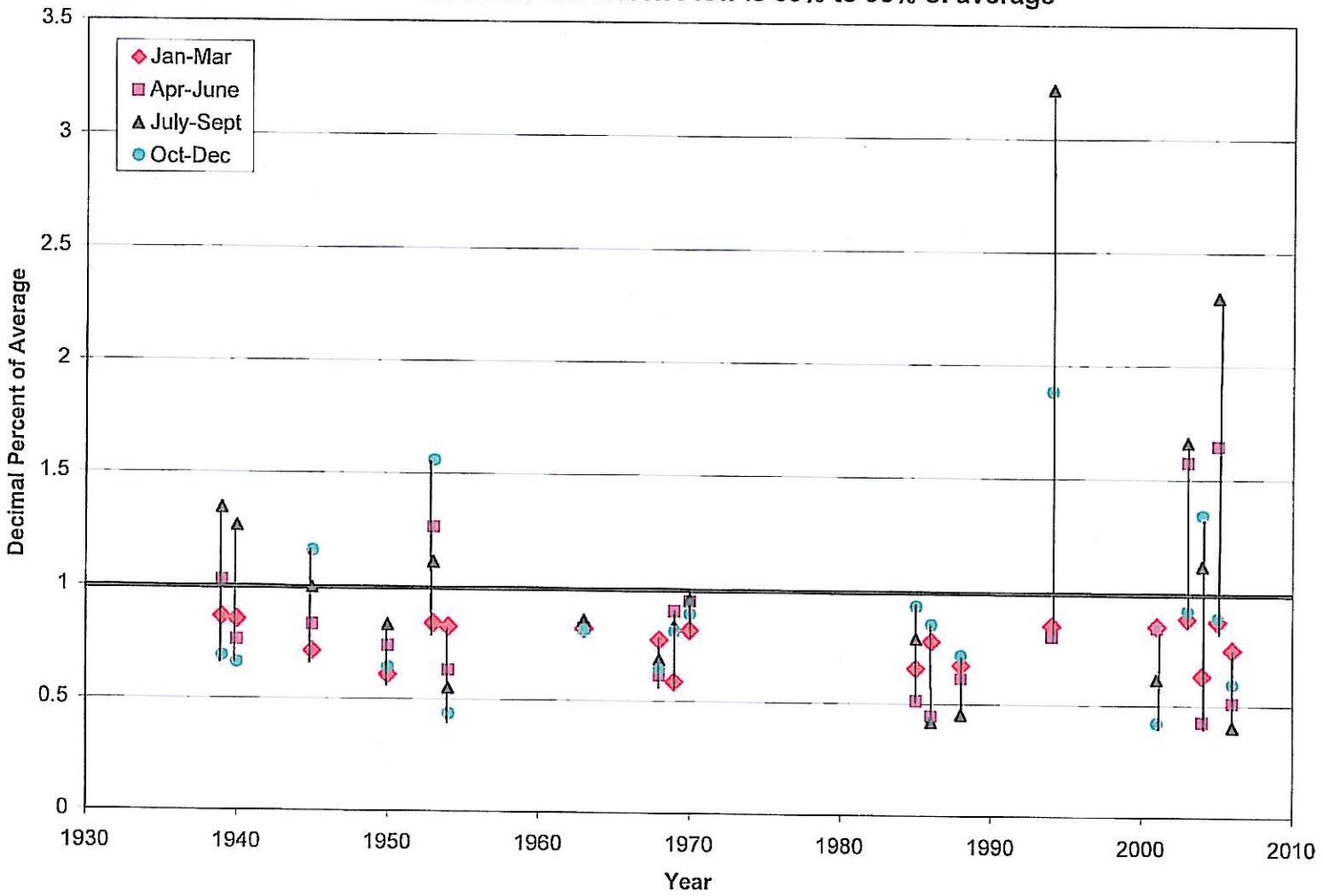


Figure 7--Quarterly Mean Elevations of Lake Lanier, 1960-2006

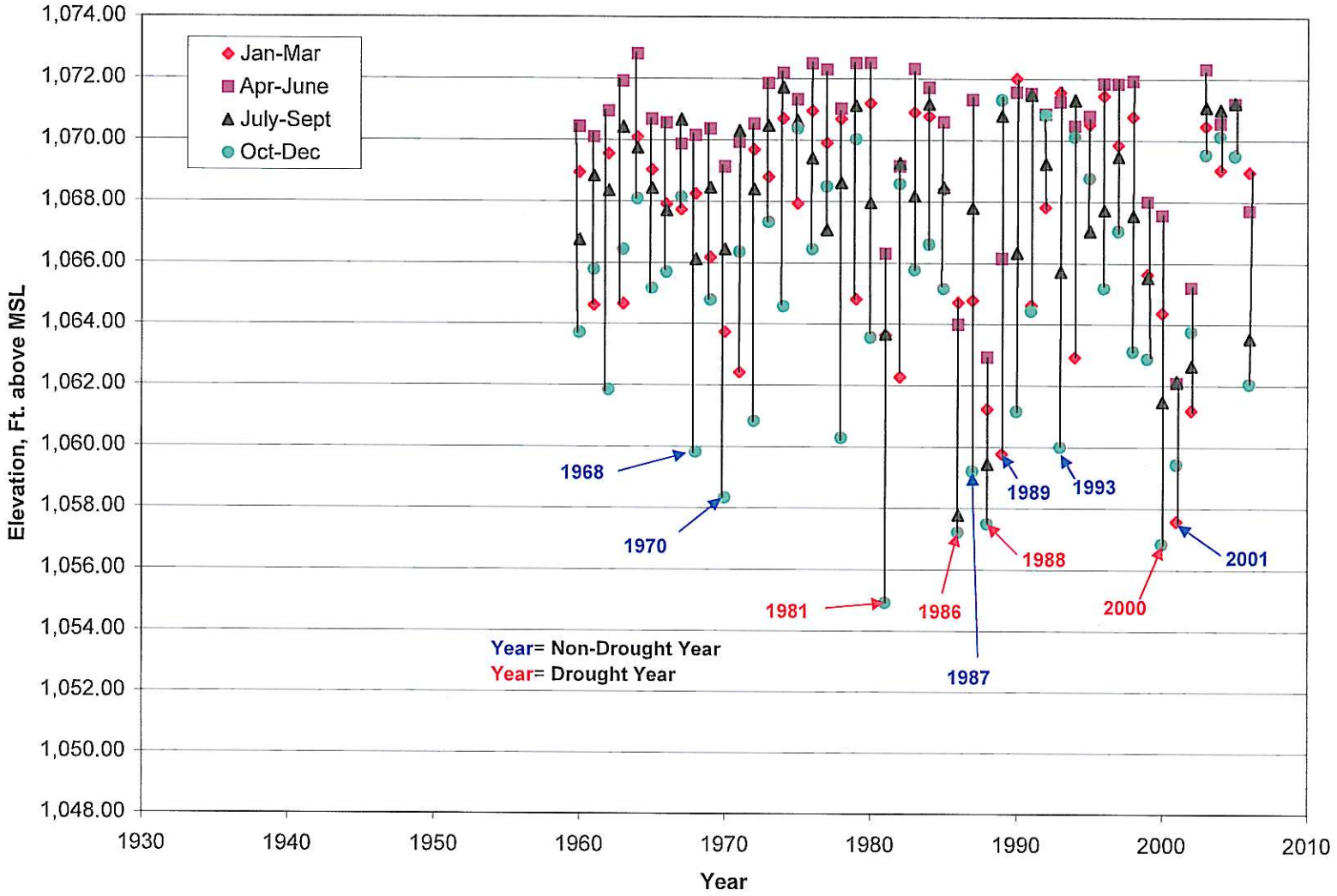


Figure 8--Simulated Daily Flows at the Chattahoochee Gage

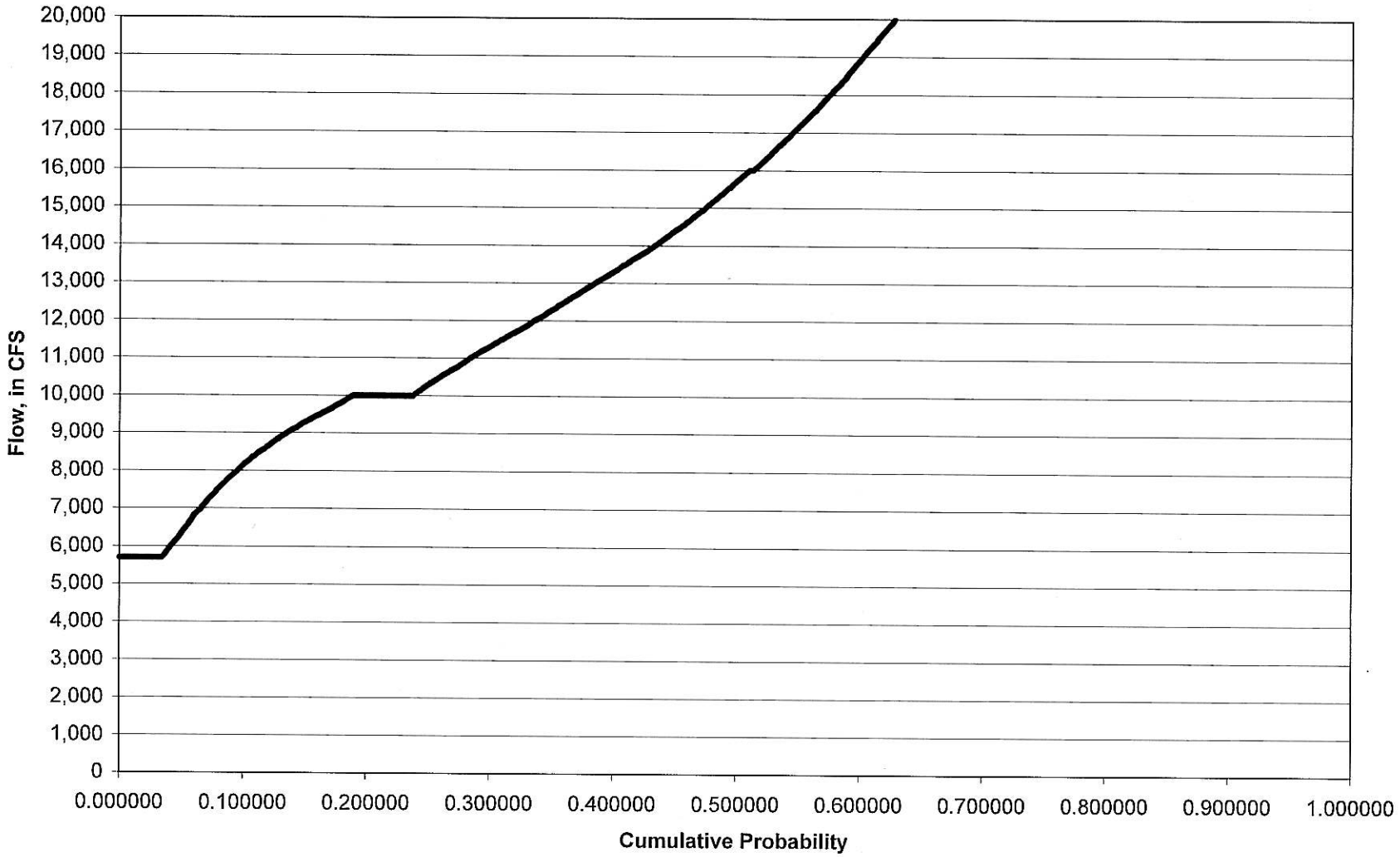
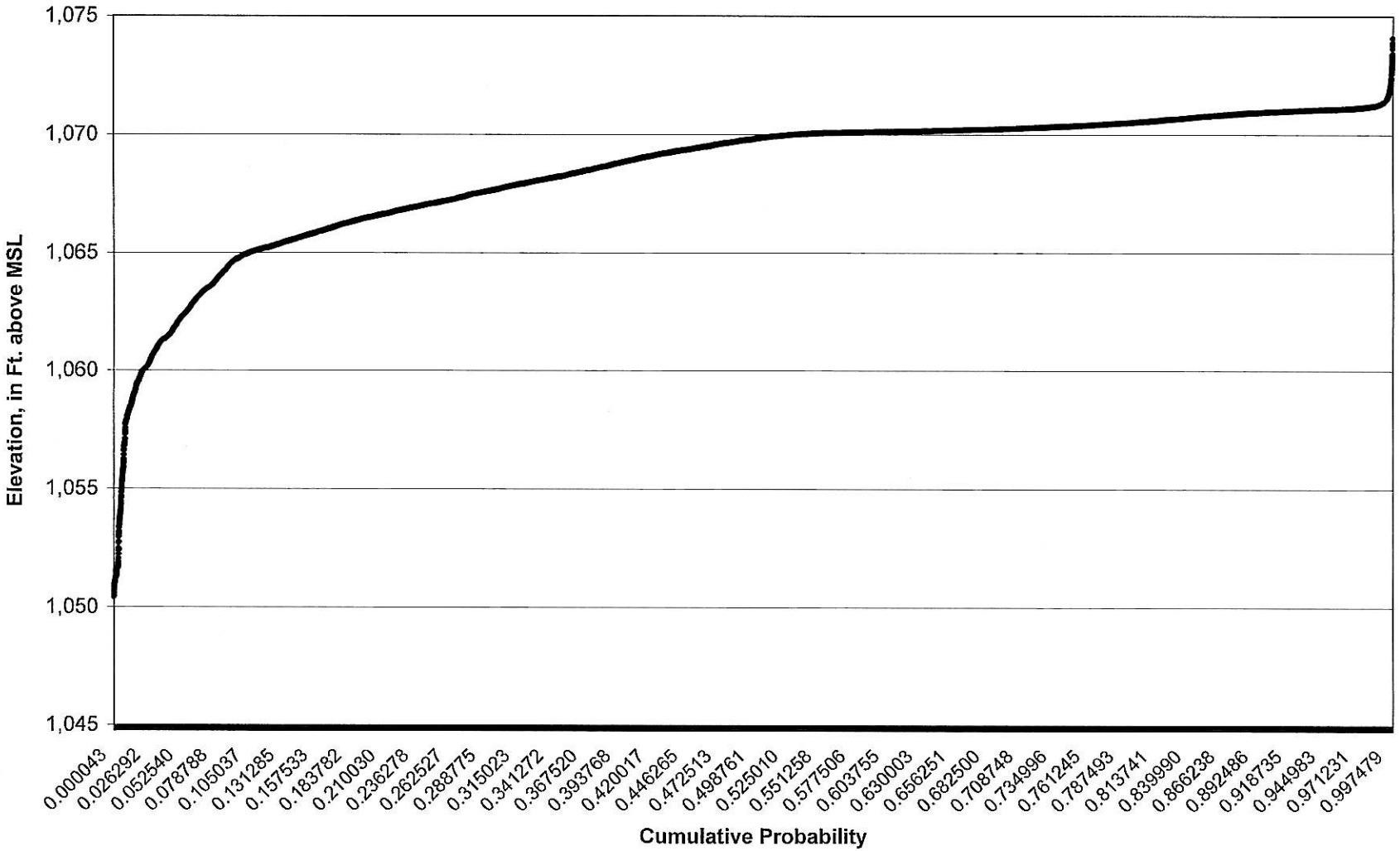


Figure 9--Simulated Elevation of Lake Lanier



E-12 FDEP letter to CESAM dated 29 January 2007, providing comments on the GA-EPD and ARC alternative RPM3 concepts

Florida Department of Environmental Protection
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Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

January 29, 2007

Ms. Gail Carmody
Supervisor
United States Fish and Wildlife Service
1601 Balboa Avenue
Panama City, Florida 32405-3721

RE: Response to Georgia and ARC *et al.*'s Comments on Reasonable and Prudent Measure No. 3 (Drought Provisions)

Dear Ms. Carmody:

Florida has reviewed comments offered by the State of Georgia and the Atlanta Regional Commission *et al.* ("ARC") regarding implementation of "Reasonable and Prudent Measure (RPM) 3" set forth in the Fish and Wildlife Service's ("Service") *Biological and Conference Report on the U.S. Army Corps of Engineers, Mobile District, Interim Operating Plan for Jim Woodruff Dam and the Associated Releases to the Apalachicola River* ("BiOp") (September 5, 2006). Neither proposal reflects an appreciation of the capacity of upstream reservoirs to augment Apalachicola River flows over and above the 5,000 cubic foot per second ("cfs") floor identified in the Corps of Engineers' ("Corps") Interim Operations Plan. These comments are intended to illuminate the fundamental problems with Georgia's and ARC's proposals and, again, highlight the Corps' ability to provide additional water to the River. This can be accomplished without adversely impacting flows needed to support Gulf sturgeon and host-fish spawning activities, provided all interests share the adversity presented by extraordinary drought.

1. Problems with the Georgia Entities' Proposals

(a) Georgia's Proposal

Georgia's proposal, in short, involves storing additional water during the spring riverine fish spawn with the professed intent of making that increment of stored water available later during the year. Of course, Georgia's proposal stops at the point of storing additional water, and never actually explains how – or if – the additional

storage would be used for the benefit of mussels. In other words, Georgia's proposal fails entirely to address the point of RPM 3 - *minimization* of the impact of take on the mussels by increasing flows to members of that species. 16 U.S.C. § 1536(b)(4)(C)(ii).

In reality, the Georgia proposal eliminates any benefit the Apalachicola River species might receive from the Interim Operations Plan as currently written.[1] Specifically, under the Georgia proposal, the Corps would store 100% of all Basin Inflow above 10,000 cfs any time the upstream reservoirs (principally Lake Lanier) were not full - even in the middle of the spring spawning season. If the reservoirs actually filled, then the Apalachicola River would receive the "spill water" that could no longer be contained due to limits on storage capacity. In short, whereas the River currently receives 100% of Basin Inflow during the spring spawn whenever flow is below 20,400 cfs, under the Georgia proposal the River would receive *nothing* over 10,000 cfs *unless and until* the reservoirs were overflowing.

Florida, in its initial comment on RPM 3, explained the conceptual problem with storing more water in the spring than the Interim Operations Plan already allows. There is simply no basis in the BiOp from which to conclude that the Gulf sturgeon can tolerate less water than is provided currently during the spawn. Georgia criticizes the Service for utilizing data collected in 2005 to justify the "higher-end" flows called for in the BiOp (*e.g.*, 20,400 - 37,400 and above) because they are allegedly based on one year's data. Georgia then, justifies its call for reduced spring flows entirely on the back of a one time collection of nine Gulf sturgeon eggs at RM 99 in 2006.[2] As Florida previously stated, that collection data cannot reasonably justify a three-fold reduction in Apalachicola River flow during the spring spawning season. To the extent there is biological uncertainty surrounding the minimum flow requirements of the Gulf sturgeon, the Service must "give the benefit of the doubt to the species." *Ctr. for Biological Diversity v. Bureau of Land Management*, 422 F.Supp.2d 1115, 1127-28 (N.D. Cal. 2006) *quoting Conner v. Burford*, 848 F.2d 1441, 1454 (9th Cir. 1988) (*quoting* H.R. Conf. Rep. No. 96-697, 1st Sess. 12, *reprinted in* 1979 U.S.C.C.A.N. 2572, 2576); 51 Fed. Reg. at 19,952 *citing* H.R. Conf. Rep. No. 697 at 12 ("In formulating its biological opinion, the Service must provide the 'benefit of the doubt' to the species concerned.")

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[1] It is, of course, no secret that Georgia actively is attempting to invalidate the Interim Operations Plan in at least one judicial forum. *See Georgia v. Army Corps of Engineers*, 1:06-cv-01473-CAP (N.D. Ga.).

[2] Georgia relies heavily on Figures 3.6.1.4.C and 3.6.1.4.D of the BiOp to validate its recommendation. However, the quality of habitat at RM 105 and 99 are not comparable. Simply put, RM 99 is not the habitat equivalent of the rough limestone spawning site at RM 105 where egg collection success was 10 times greater than that of RM 99 in 2006.

Any such approach, moreover, entirely ignores the fact that reduced floodplain inundation during the spring will compromise the health and productivity of fish species that act as reproductive hosts for the mussels. The Apalachicola River mussels rely entirely on those fish for reproduction, and the importance of the host-fish connection is well documented in the BiOp. *See, e.g.*, BiOp § 2.2.3.3. (Reproduction); *id.* § 3.3.3. (Seasonality); *id.* § 3.6.2.3 (Permanently Flowing Water); *id.* § 3.6.2.5 (Fish Hosts). Taking additional water from key floodplain habitats during the spring will not only further imperil the Gulf sturgeon, but will also compromise the spawn of multiple fish species, many of which play host to threatened and endangered mussels.

Georgia's proposal contains no discussion whatsoever of these critical issues. It should be rejected as counterproductive to the spirit and intent of RPM 3.

(b) ARC's Plan

ARC's plan suffers the same fundamental flaw inherent in Georgia's. At base, it directs its energy to ensuring that the Corps keeps "significantly more water in storage" so that upstream reservoirs are full on June 1, each year. ARC Plan at 1, 8. This too is done under the auspices of ensuring that water will be available in a "5,000 cfs Carryover Storage" pool. *Id.* at 8. ARC's so-called "Maximum Sustainable Release Rule" or MSRR would set a target flow of 10,000 cfs and a base flow of 5,000 cfs. *Id.* at 9. The MSRR would "restrict[] releases to 5,000 cfs whenever there is not enough water in the system to sustain [higher] flow over a repeat of the worst historical drought and still have a margin of safety." *Id.* Like so many flawed Corps operations, it sets operational parameters based on worst-case scenarios rather than realistic projections.

ARC's proposal, like Georgia's accepts 5,000 cfs as a proper minimum flow and attempts to maximize storage in the critical spring months so that a "sustainable flow" above 5,000 cfs might be maintained on occasion. While ARC is unclear about what it views as "sustainable" from a downstream flow standpoint, some insight can be gleaned between the lines. First, it is clear ARC's overriding goal is to protect at all times the 2030 water supply demands of the Atlanta metropolitan area. ARC Plan at 11. Second, this block of dedicated water would be insulated, in part, by a "margin of safety" designed to protect against an unprecedented hypothetical drought scenario. *Id.* at 12, 13 and Figure 3. Third, the needs of the Apalachicola River species come after

Atlanta's 2030 demands are fully satisfied. This, without any apparent consideration of conservation potential that might reduce that strain on the reservoir system.[3]

Finally, and perhaps most telling is ARC's analysis of the impact its plan might have on Lake Lanier. ARC Plan at 40, Figure 25 Frequency of Stages at Lake Lanier. It is clear from this Figure ARC views any scenario that reduces the elevation of Lake Lanier to less than 1059' as one that must be avoided. ARC's analysis concludes that *even in the worst case scenario*, Lake Lanier would remain at or above this elevation. Such a floor has no foundation in law, is well over the historic low elevation of 1053' and is 11' above municipal and industrial supply intakes. Clearly, ARC's fundamental objective is to elevate recreational and municipal and industrial uses above the needs of the Apalachicola River species. But, ARC has it backwards. In *Tennessee Valley Authority v. Hill*, 437 U.S. 153, 194 (1978), the Supreme Court emphatically explained that "Congress has spoken in the plainest of words, making it abundantly clear that the balance has been struck in favor of affording endangered species the highest of priorities ... ."

Setting aside for the moment these fundamental problems, even ARC concedes that mussels will be exposed for more consecutive days at the lowest flows of 5,000 cfs (or less)[4] than under the existing Interim Operations Plan. *Id.* at 28, Figure 10. ARC justifies this on the basis that "it is better for the mussels if the flows fall only once as opposed to several times." *Id.* This unsupported finding is contradicted by ARC's analysis of the frequency of sustained low flows, wherein it argues that "mussels can survive short periods of dewatering." *Id.* at 30. ARC cannot seriously contend that it is good for mussels to experience long duration flow events and yet acknowledge that mussels can survive out of water for only a short time. Such cursory biological analyses hardly constitute the "best scientific and commercial data available." *Nat'l Wildlife Fed'n v. Norton*, 332 F.Supp. 2d 170, 175. (D.D.C. 2004); *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1336 (9th Cir.1992).

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[3] Florida already explained the potential for conserved water to accommodate the 2030 demands of metro-Atlanta. *See* Pacific Institute for Studies in Development, Environment and Security, *A Review of Water Conservation Planning for the Atlanta, Georgia Region* (prepared for Florida DEP) (August 2006).

[4] Notably, under ARC's plan, even this modest flow apparently would not be sustained in some undefined period of "severe drought." The true bottom flow is apparently "to be determined" at a later date. Proposal at 10, Figure 1. It is impossible to reconcile this approach with the Service's obligation to minimize the impact of take on the mussels.

2. The Corps Can Provide More Water to the Apalachicola River

As Florida already has explained, there is no need to accept the 5,000 cfs flow floor identified in the Interim Operations Plan. By maximizing reservoir refill in the less biologically significant months of December, January and February, and relying on the volume of Basin Inflow in the January - March timeframe as a predictor of likely hydrologic conditions, the Corps can easily sustain 5,700 cfs in the worst case scenario and 6,300 cfs 95% of the time. *See generally*, Florida's Comments on Reasonable and Prudent Measure No. 3 (Drought Provisions) (January 16, 2007). While the simulated minimum Lanier elevation is 1,050.49' under Florida's proposal, that level remains 2.5' above intakes of concern, and Lake Lanier is *at or above 1,051' in all but 10 days* of the 63-year period.

3. Conclusion

In the end, Georgia's and ARC's proposals undercut what little benefit the Interim Operations Plan affords the River and elevate the functions served by reservoir storage (*e.g.*, recreation and municipal and industrial use) over and above the needs of the Apalachicola River species. They simply perpetuate the kind of worst-case planning that has resulted for years in unnecessary (and mitigated) destruction of mussel populations in the Apalachicola River. Again, 2006 provides the best example of the problem: The Corps refused to release more than 5,000 cfs, except under Florida's court order, and thousands of mussels died unnecessarily as a result. Yet even with augmentation releases to support 6,300 cfs at Chattahoochee, Lake Lanier would have declined only to elevation 1,058'. Continuation of such poor operational choices will not minimize the impact of take on the mussel species, and it is incumbent on the Service to demand more.

Florida appreciates the opportunity to provide this review. Should you have any questions about this analysis or Florida's conclusions, do not hesitate to contact me.

Sincerely,

Michael W. Sole
Secretary

E-13 CESAM letter to USFWS dated 30 January 2007, requesting extension of RPM3 implementation date from 30 January 2007 to 28 February 2007

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

REPLY TO
ATTENTION OF

January 30, 2007

Inland Environment Team
Planning Environmental Division

Ms. Gail Carmody
Ecological Services
U.S. Fish and Wildlife Service
1601 Balboa Avenue
Panama City, Florida 32405-3721

Dear Ms. Carmody:

This letter concerns the execution of Reasonable and Prudent Measure 3 (RPM3) of the *Biological Opinion and Conference Report on the U.S. Army Corps of Engineers, Mobile District, Interim Operating Plan for Jim Woodruff Dam and the Associated Releases to the Apalachicola River* dated September 5, 2006. RPM3 requires the Mobile District to "Develop modifications to the Interim Operating Plan (IOP) that provide a higher minimum flow to the Apalachicola River when reservoir storage and hydrologic conditions permit." The specific terms and conditions for RPM3 require that:

a. the Mobile District, with the U.S. Fish and Wildlife Service (USFWS) concurrence, initiate IOP drought provisions that identify the reservoir, climatic, hydrologic, and/or listed species conditions that would allow supporting a higher minimum flow in the Apalachicola River, and that identify recommended water management measures to be implemented when conditions reach the identified drought trigger point(s), by January 30, 2007; and

b. if modifications to the IOP parameters for the months of March through May are adopted as part of the drought provisions, the Mobile District shall assess potential affects to Gulf sturgeon spawning and floodplain inundation. The Mobile District shall provide the models and a biological assessment of the effects of the drought provisions on listed species at least 135 days in advance of implementing the drought provisions in order to reinitiate this consultation relative to any proposed changes in the IOP.

The purpose of RPM3 was to formulate IOP drought provisions that would increase the habitat available to listed species by increasing the minimum flow supported with releases from reservoir storage during most, but not necessarily all, low-flow periods. The drought provision would identify the conditions during extended dry or drought periods when sustaining a higher flow was not prudent, and when a lower flow would be released. Periods of low basin inflow (less than 10,000 cfs) typically occur during the summer and fall. The earliest possible benefit of RPM3 would be realized during the next period of low basin inflow, most likely occurring in the summer of 2007. Therefore, the USFWS and the Mobile District agreed in RPM3 upon adopting drought provisions by January 30, 2007, well before the next likely need for the measure.

Based on modeling completed to date and experience in operating the system, the Mobile District believes that ensuring a minimum flow greater than 5,000 cfs is feasible in most years by storing more water in the reservoirs during the normal refill period than is currently allowed under the IOP, specifically increasing storage to some degree during the months of March through May while still providing protection for sturgeon spawning habitat areas. Based on recommendations developed during consultation discussions with the USFWS, the Mobile District has examined variations upon the IOP that sustain various minimum flows greater than 5,000 cfs in most years consistent with the Water Control Plan, which would be of benefit to the listed mussel species, with minimal effect to Gulf sturgeon spawning habitat during the Spring spawning months. A specific concept for a drought provision was developed in consultation with the USFWS (Concept 3) and was presented to the States of Alabama, Florida, and Georgia and interested stakeholders at a workshop held on December 13, 2007. However, upon completion of the evaluation of the effects of the Concept 3 plan on the criterion used in the Biological Opinion (BO) analyses, a potential tradeoff of adverse effects to floodplain spawning habitat relative to that provided by the IOP and baseline conditions was identified. Therefore, USFWS could not reach a determination that the proposed drought provision would result in a "not likely to adversely affect" determination for habitat for host fish for mussels. As a result, formal Section 7 consultation with the USFWS would be required for further consideration of the Concept 3 drought provision. However, it appears that additional adjustments to the proposed drought provision (e.g., adjustments of the proposed lower threshold for March – May) could be made that may remove this potential for adverse effect to host fish for listed mussel species. These possible adjustments have been discussed with USFWS and it is agreed that they should be further investigated. The Mobile District believes that additional adjustments to the drought provision conceptual plan will yield a set of parameters for a drought provision that achieves the desired beneficial effect of higher minimum flows while avoiding adverse effects on floodplain inundation or other evaluation criteria presented in the BO. The Mobile District intends to complete the evaluations and propose a drought provision that can be implemented before the initiation of Gulf sturgeon spawning operations under the IOP this Spring (March – May). As discussed with Jerry Ziewitz of your staff, it was agreed that the additional analysis for a proposal that can be implemented this spring is preferred. Therefore, we hereby request an extension of the due date for implementation of the RPM3 drought provision from January 30, 2007 to February 28, 2007. This would allow for implementation of the drought provision prior to the initiation of sturgeon spawning operations on March 1.

During the December drought provision workshop, the Mobile District requested comments and recommendations regarding the implementation of RPM3. Several comments regarding the Concept 3 proposal, and alternative concepts for a drought provision, were received. The Mobile District and USFWS are currently reviewing these comments to determine whether elements of the suggestions and concepts presented could provide some benefits in developing a drought provision. However, many of the suggestions and comments received would require more extensive analysis and would require significant changes to the current Water Control Plans. Therefore, the Mobile District and the USFWS agreed to focus efforts to

develop a drought provision that met the intent of RPM3, and could potentially be implemented prior to the 2007 sturgeon spawning season. The Mobile District and USFWS will continue to review certain elements of the stakeholder proposals to determine if they would provide for additional benefits, and if any additional changes to the IOP or RPM3 should be submitted for future consideration consistent with the adaptive management provision (RPM1) of the BO.

The Mobile District is completing the modeling and evaluation of a promising drought provision proposal which appears to avoid or minimize the tradeoff of mussel benefits for floodplain inundation effects. This evaluation will use the same statistical analyses and effects analysis as prepared by the USFWS in the BO.

The Mobile District does not believe that delaying compliance with RPM3 will result in any adverse effects on listed species since the possible need to supplement basin inflow with releases from storage is unlikely in the next two to three months. This assumption is supported by (1) the reservoirs in the lower portion of the ACF basin (Walter F George and West Point) are currently above the rule curve elevations, Lake Lanier is currently near average elevation for this time of year, and the drought monitor no longer projects abnormally dry or drought conditions; (2) it is unlikely that basin inflows occurring over the next four weeks would result in different operations if drought provision measures were in place; and (3) due to the relatively short duration of the requested extension, it is unlikely that a significant difference in benefits would have been realized if the January 30, 2007, date were met.

We request your concurrence with our request for an extension of the RPM3 drought provision due date to February 28, 2007. Should you have any questions, comments, or recommendations, please contact Ms. Joanne Brandt at (251) 690-3260 or Mr. Brian Zettle at (251) 690-2115.

Sincerely,

Roger A Burke

for Curtis M. Flakes
Chief, Planning and Environmental
Division

E-14 CESAM letter to USFWS dated 31 January 2007, submitting fiscal year 2006 Annual Report in accordance with RPM1

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

REPLY TO
ATTENTION OF

January 31, 2007

Inland Environment Team
Planning and Environmental Division

Ms. Gail Carmody
Field Supervisor
U.S. Fish and Wildlife Service
1601 Balboa Avenue
Panama City, Florida 32405-3721

Dear Ms. Carmody:

On September 5, 2006, the U.S. Army Corps of Engineers, Mobile District received a Biological Opinion (BO) from the U.S. Fish and Wildlife Service (USFWS) regarding the impacts of our Interim Operations Plan and associated releases from the Jim Woodruff Dam to the Apalachicola River. The BO includes five Reasonable and Prudent Measures (RPMs) and terms and conditions for implementing the RPMs. In accordance with RPM1, we are hereby submitting the first Annual Report for fiscal year 2006, which summarizes the status of compliance with the terms and conditions of the BO. Although the BO only requires a status of efforts to comply with the terms and conditions for the previous fiscal year (through September 30, 2006), we are also including a summary of efforts undertaken by the Mobile District since October 1, 2006.

Please note that we have, by separate letter, requested an extension of the due date for implementation of the drought provision required under RPM3 until February 28, 2007. A concept for the drought provision was presented to the USFWS in December 2006 (Concept 3). A workshop on the proposed Concept 3 drought provision was held with the USFWS, the States of Alabama, Florida, and Georgia as well as other interested stakeholders on December 13, 2006. However, once the evaluations of the effects of Concept 3 were completed using analyses similar to that completed for the BO, a potential tradeoff of benefits to mussels (higher sustained flows during low flow conditions) for adverse effects to host fish for mussels (due to reduced floodplain inundation) was identified. In consultation with your staff, it was agreed that additional adjustments to the proposed drought provision should be investigated to see if this tradeoff of effects can be avoided or minimized. We believe an alternative conceptual plan for a drought provision can be identified, and our evaluation of the effects of the adjusted conceptual plan completed, such that an RPM3 drought provision can be implemented before the initiation of the spring spawning operations on March 1, 2007.

The BO also recognizes that certain studies and other outreach programs in the RPMs and conservation measures are subject to the availability of funds by Congress. The Mobile District agreed to exercise its best efforts to secure funding for those activities. In the event the necessary funding is not obtained to accomplish the RPM activities by the dates established, the

Mobile District would reinitiate consultation with the USFWS. The Mobile District is currently operating under Continuing Resolution Authority (CRA) funding constraints, which are anticipated to continue well into the year. The CRA funding constraints have delayed the initiation of the Apalachicola River sedimentation/morphology panel evaluations required by RPM4, and the development of a monitoring plan to determine the abundance and distribution of listed mussels required by RPM5. In accordance with the BO, both of these activities are to be completed by March 30, 2007. Due to current funding constraints, we will not be able to meet that due date for these activities. However, the Mobile District has been aggressively pursuing other possible funding sources and expects to have funding in place later this spring to initiate efforts required by RPM4 and RPM5. Therefore, it is hereby requested that the due date for these RPM4 and RPM5 requirements be extended until August 30, 2007. This schedule would provide for consideration of the panel report and the proposed monitoring plan at the next semi-annual meeting with USFWS scheduled for August 2007.

If you have any questions regarding the enclosed annual report or wish to discuss our request for an extension of the due dates for RPM3, RPM4, or RPM 5, please contact Ms. Joanne Brandt, Compliance Manager, by telephone at 251-690-3260, or by email at: joanne.u.brandt@sam.usace.army.mil.

Sincerely,

for Curtis M. Flakes, Chief
Planning and Environmental
Division

Enclosure

Jim Woodruff Dam Interim Operations Plan Biological Opinion
Annual Report
31 January 2007

On 7 March 2006, the U.S. Army Corps of Engineers, Mobile District, submitted a request to initiate formal consultation pursuant to Section 7 of the Endangered Species Act (ESA) regarding the impact of releases from the Jim Woodruff dam to the Apalachicola River on Federally listed endangered or threatened species and critical habitat for those species. Operations regarding releases to the Apalachicola River were described in an Interim Operations Plan (IOP) for Jim Woodruff Dam, since consultation on the overall project operations for the Apalachicola, Chattahoochee,Flint Rivers (ACF) system would be deferred until future efforts to update the water control plans and basin manual for the system. Species of concern include the threatened Gulf sturgeon (*Acipenser oxyrinchus desotoi*) and critical habitat for the Gulf sturgeon; the endangered fat threeridge mussel (*Amblema neislerii*); the threatened purple bankclimber mussel (*Elliptoideus sloatianus*); and the Chipola slabshell mussel (*Eliptio chipolaensis*). A final Biological Opinion (BO) for the Jim Woodruff Dam IOP was issued by the U.S. Fish and Wildlife Service, Panama City Field Office on 5 September 2006. By issuance of the final BO, USFWS authorized a specific amount of incidental take of mussels associated with water management operations under the IOP, in the form of a surrogate measure of potential take. The surrogate measure in the Incidental Taking Statement is represented by the number of days releases from Jim Woodruff Dam, as measured on the Apalachicola River at the U.S. Geological Survey (USGS) Chattahoochee, FL river gage, are less than the daily basin inflow, when the daily basin inflow is between 8,000 cfs and 10,000 cfs. This determination of potential for take is based on the findings in the BO that the IOP operations may result in an increase in the number of days, when flows are between 8,000 cfs and 10,000 cfs, that releases under the IOP would be less than daily basin inflow due to managing releases using a 7-day average of the basin inflow. An authorized 39 days per calendar year of "potential take days" was included in the BO. The BO also included five reasonable and prudent measures (RPMs) for limiting the amount of incidental take associated with water management operations and at Jim Woodruff Dam. For each of the five RPMs, the BO also included specific terms and conditions which must be met in order to assure compliance with the RPMs.

This annual report summarizes efforts that have been taken and the status of compliance with the terms and conditions since issuance of the BO on 5 September 2006. Although the BO only requires a summary of actions through the previous fiscal year, a number of activities have been accomplished since 1 October 2006 (beginning of FY 2007) and will also be summarized in this report.

STATUS OF COMPLIANCE WITH TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the Mobile District must comply with the following terms and conditions, which implement the reasonable and prudent measures described in the BO. These terms and conditions are mandatory. However, the studies

and other outreach programs in the RPMs and conservation measures are subject to the availability of funds by Congress. The Corps will exercise its best efforts to secure funding for those activities. In the event the necessary funding is not obtained to accomplish the RPM activities by the dates established in the BO, the Mobile District will reinitiate consultation with USFWS as necessary.

Adaptive management (RPM1). Identify ways to minimize harm as new information is collected.

Rationale. Additional information will be collected about the listed species and their habitats in the action area, water use upstream, and climatic conditions. This information needs to be evaluated to determine if actions to avoid and minimize take associated with the Corps' water management operations are effective or could be improved.

a. The Corps shall organize semi-annual meetings with the Service to review implementation of the IOP and new data, identify information needs, scope methods to address those needs, including, but not limited to, evaluations and monitoring specified in this Incidental Take Statement, review results, formulate actions that minimize take of listed species, and monitor the effectiveness of those actions.

STATUS: In discussions with USFWS, it was recommended that a semi-annual meeting be held in the early fall of each year (preferably in August); and in the late winter or early spring prior to initiation of fish spawn activities (preferably in February). Since the BO was issued in September 2006, the first semi-annual meeting was held at the USFWS Panama City Field Office on 26 October 2006. A copy of the Memorandum for Record of this meeting is enclosed (**Enclosure 1**). At this meeting, the Corps and USFWS discussed current water management operations in support of the listed species, a draft plan and schedule for implementing the RPMs and terms and conditions, and confirmed the monitoring plans being implemented to track potential taking days. The next semi-annual meeting will be scheduled for late February or early March 2007.

b. The Corps shall assume responsibility for the studies and actions that both agencies agree are reasonable and necessary to minimize take resulting from the Corps' water management actions.

STATUS: Suggestions for conduct of studies and actions described in the BO were discussed at the semi-annual/planning meeting on 26 October. The Corps accepts responsibility for those reasonable and necessary actions, subject to authority and funding limitations. Due to budget constraints (the Corps has been operating under limited Continuing Resolution Act funding since the beginning of Fiscal Year 2007, and these funding limitations are anticipated to continue for several more months into 2007), implementation of some of the activities requiring additional studies or procurement of other services may be delayed or deferred until funding is available. However, all the actions related to project operations and that can be accomplished within current funding levels are being implemented. In the meantime, other sources of funding are being

sought to assist in implementing the other required studies as soon as possible. Incremental funding is expected to be available in Spring 2007.

c. The Corps shall evaluate refinements to predictive tools.

STATUS: The Mobile District is actively pursuing two actions that will assist in the use of predictive modeling tools. These include the extension of the unimpaired flow dataset for the Apalachicola-Chattahoochee-Flint River (ACF) basin from 2001 through 2004. In the event additional demand data can be obtained from the States of Alabama, Florida and Georgia, attempts will be made to further extend the unimpaired flow dataset through 2005. The other action being pursued is to update the predictive hydrological model from HEC-5 to HEC-ResSim. The ResSim model will be more flexible, and can be programmed to run model simulations with if/then/else statements. This conversion should be completed by early in 2007 for the existing operations conditions, with the IOP as reflected in the BiOp integrated into the existing operations. It is anticipated that the ResSim model and the extended unimpaired flow data set would be used as a base for analyses incorporated into the Environmental Impact Statement (EIS) for proposed Interim Water Storage Contracts at Lake Lanier, and any future EIS to address updates or revisions to the existing water control plans.

The Mobile District is also investigating the use of the Apalachicola Bay 3-D Hydrodynamic model in the evaluations programmed for the EIS for the proposed Lake Lanier Interim Storage Contracts. This model can provide predictive measures for both circulation and salinity within the bay, and could therefore provide a measure of changes in salinity in sturgeon feeding areas due to potential changes in flow into the bay. If the Interim Storage Contracts at Lake Lanier would result in substantive changes in IOP operations and potential changes in freshwater flows, this model could assist in the required Section 7 consultation regarding potential modifications to sturgeon habitat in Apalachicola Bay and the estuarine channel areas.

USFWS recommends additional flow/velocity studies be conducted at the sturgeon spawning areas immediately below Jim Woodruff Dam in order to build the information based used in future consultations. The Mobile District has flow/velocity meters on hand that could be used to measure velocities at particular sites and depths, as determined necessary. The Mobile District is currently planning to work with the U.S. Geological Survey to prepare an updated flow/stage rating table relating to releases from the dam later this spring. Additional flow/velocity data may be able to be collected during the flow rating study, and this information could then be used to assist in future consultations regarding project operations.

d. The Corps shall provide an annual report to the Service on or before January 31 each year documenting compliance with the terms and conditions of this Incidental Take Statement during the previous federal fiscal year, any conservation measures implemented for listed species in the action area; and recommendations for actions in the coming year to minimize take of listed species.

STATUS: This report represents compliance with this term and condition. This report includes a status of compliance with the terms and conditions of the BO, and lists those RPM actions programmed for implementation in FY 2007 and 2008. In addition, several efforts have been accomplished over the past few months to accomplish the conservation measure recommendation for additional public outreach methods to inform the public regarding project operations and management efforts in support of endangered and threatened species. These efforts include a special display on the limitations of reservoir storage projects within the ACF basin that was provided and staffed during the five public scoping meetings in November and December 2006 on the Lake Lanier Interim Storage Contracts EIS; and the Drought Provision Workshop held in Columbus, Georgia on 13 December 2006 with representatives from the States of Alabama, Florida and Georgia and various interested stakeholders.

RPM2. Adjust June to February Lower Threshold to 10,000 cfs. Replace the proposed 8,000 cfs threshold in the IOP with a threshold of 10,000 cfs.

Rationale. Mussels may be in vulnerable areas where take may occur when flows are less than 10,000 cfs. Not increasing reservoir storage when basin inflow is 10,000 cfs or less from June to February will avoid and minimize the potential for take in the zone of 8,000 to 10,000 cfs.

a. The Corps shall immediately release the 7-day moving average basin inflow, but not less than 5,000 cfs, when the 7-day moving average basin inflow is less than 10,000 cfs for the months of June to February, and shall incorporate this revision into the IOP table of minimum discharges.

STATUS: The Mobile District implemented the requirements of RPM2 immediately upon issuance of the BO. Whenever the 7-day basin inflow is less than 10,000 cfs, at least basin inflow but not less than 5,000 cfs will be released. A copy of the revised IOP table was provided to USFWS by letter dated 7 September 2006 (**Enclosure 2**) and has been posted on the Mobile District website: http://www.sam.usace.army.mil/ACF.htm. A copy of this letter is also enclosed with this report. Below is a copy of the updated IOP table as required by the final BO.

U.S Army Corps of Engineers, Mobile District
Interim Operations Plan at Jim Woodruff Dam
and Releases to the Apalachicola River
In Support of Listed Mussels and Gulf Sturgeon

Minimum Releases

Months	Basin Inflow (BI) (cfs)*	Releases from JWLD (cfs)
March - May	>= 37,400	not less than 37,400
	>= 20,400 and < 37,400	>= 70% BI; not less than 20,400
	< 20,400	>= BI; not less than 5,000
June - February	>= 23,000	not less than 16,000
	>=10,000 and < 23,000	>= 70% BI; not less than 10,000
	< 10,000	>= BI; not less than 5,000

*The running 7-day average daily inflow to the Corps' ACF reservoir projects, excluding releases from project storage.

Down Ramping Rates

Release Range	Maximum Fall Rate (ft/day), measured at Chattahoochee gage
Flows greater than 30,000 cfs*	No ramping restriction**
Flows greater than 20,000 cfs but <= 30,000*	1.0 to 2.0 ft/day
Exceeds Powerhouse Capacity (~16,000 cfs) but <= 20,000 cfs*	0.5 to 1.0 ft/day
Within Powerhouse Capacity and > 8,000 cfs*	0.25 to 0.5 ft/day
Within Powerhouse Capacity and <=8,000 cfs*	0.25 ft/day or less

*Consistent with safety requirements, flood control purposes, equipment cabability.
**For flows greater than 30,000 cfs, it is not reasonable or prudent to attempt to control down ramping rate, and no ramping rate is required.

RPM3. Drought provisions. Develop modifications to the IOP that provide a higher minimum flow to the Apalachicola River when reservoir storage and hydrologic conditions permit.

Rationale. Take of listed species due to the IOP may occur when the Corps is using a portion of basin inflow to increase ACF reservoir storage. The Corps can minimize mussel mortality due to low-flow conditions by supporting a higher minimum flow when total reservoir storage and/or hydrologic conditions permit. As proposed, the IOP uses reservoir storage to support a 5,000 cfs minimum flow. The available data indicates that higher minimum flows are supportable during normal and wet hydrologic periods, and during dry periods when the reservoirs are relatively full. Conversely, during extended drier than normal conditions, it may be prudent to store more water than allowed under the IOP during certain times of the year to insure minimum water availability later.

Possible components and triggers of the drought plan could be, but are not limited to: Corps reservoir action zones, cumulative reservoir storage remaining, total basin inflows, indictors of fish spawn, climatic condition indices, and flow levels at gages downstream of the Chattahoochee gage, such as the gage at Wewahitchka.

a. The Corps, with Service concurrence, shall initiate by January 30, 2007, IOP drought provisions that identify the reservoir, climatic, hydrologic, and/or listed species conditions that would allow supporting a higher minimum flow in the Apalachicola River, and that identify recommended water management measures to be implemented when conditions reach the identified drought trigger point(s).

b. If modifications to the IOP parameters for the months of March through May are adopted as part of the drought provisions, the Corps shall assess potential effects to Gulf sturgeon spawning and floodplain inundation. The Corps shall provide the models and a biological assessment of the effects of the drought provisions on listed species at least 135 days in advance of implementing the drought provisions in order to reinitiate this consultation relative to any proposed changes in the IOP.

STATUS: During the 26 October 2006 semi-annual/planning meeting, USFWS suggested that the Mobile District investigate whether a higher minimum flow than the 5,000 cfs specified in the IOP could be sustained year-round if there were opportunities to provide for additional storage during the spring spawning months (March – May) to support future augmentation releases for the higher minimum flows. The higher minimum flow identified for further consideration under the RPM3 drought provision were based on the flow conditions necessary to provide "flow-through" conditions at swift Slough and adequate depths at the impacted "hooks and bays"; as well as operational constraints while making releases through the powerhouse turbines during low flow conditions. Three scenarios were identified for further modeling and evaluations initially: alternative minimum flows of 5,800 cfs, 6,500 cfs and 7,000 cfs. In order to provide for additional storage during the March-May timeframe, it was agreed to consider lowering the upper threshold to 25,000 cfs (below which at least 70 percent of basin inflows would be released and up to 30 percent could be stored); and lowering the lower threshold to 16,000 cfs (below which 100 percent of the basin inflows would be released). The three scenarios modeled are shown in the table below:

		Basin Inflow (cfs)	Release
Mar-May	High	≥ 25,000	not less than 25,000
	Mid	≥ 16,000 and <25,000	≥ 70% BI, not less than 16,000
	Low	<16,000	≥ BI, not less than 5,800 (Scenario 1) 6,500 (Scenario 2) 7,000 (Scenario 3)

Jun-Feb	High	≥ 23,000	not less than 16,000
	Mid	≥ 10,000 and < 23,000	≥ 70% BI, not less than 10,000
	Low	< 10,000	≥ BI, not less than 5,800 (Scenario 1) 6,500 (Scenario 2) 7,000 (Scenario 3)

The Mobile District agreed to model these three scenarios as a screening tool to see if the system could support the higher minimum flows and/or if these adjustments would provide any meaningful benefits in providing higher support flows for mussels. The Mobile District agreed to provide feedback on the model results to USFWS in November, and then meet again on 6 December 2006 to discuss any additional adjustments or concepts for a drought provision that could be implemented by 30 January 2007.

The Mobile District provided modeling results to USFWS on 1 November 2006 for the above three scenarios (based on composite storage within the basin), which indicated that there would be shortages for each of the three scenarios, although the shortage for the 5,800 cfs scenario would be small. This indicated that a sustained minimum flow close to 5,800 cfs might be sustainable, but that a drought "trigger" would likely be required for this or higher minimum flow scenarios to indicate when the lower 5,000 cfs minimum flow would be prudent during sustained low flow or drought conditions. It was agreed the Mobile District would attempt to define a drought trigger, and that the results of further considerations and modeling would be presented at the 6 December meeting.

On 1 November 2006, the Florida Department of Environmental Protection (FDEP) requested a status of Corps efforts to develop the RPM3 drought provision and a meeting with their modelers regarding any proposed provision (**Enclosure 3**). By letter from Mobile District dated 6 November 2006 (**Enclosure 4**), the FDEP was informed that preliminary discussion and modeling had begun in consultation with USFWS, and that both agencies had agreed the first step was to investigate whether possible reductions in spring releases would provide sufficient composite storage to allow sustained higher releases in the summer months during drought conditions. It was noted that additional modeling would be conducted prior to an early December meeting with USFWS. Also under consideration was a possible workshop with ACF basin stakeholders, to be held before the end of the year, during which preliminary modeling results and suggested drought provisions could be discussed. It was also noted that the Mobile District intended to identify proposed components of a drought provision by the end of January, as required by the terms of RPM3; and that revisions to the spring release schedule or other elements of the IOP may require completion of additional Section 7 consultation prior to implementation under the IOP.

During November, the Mobile District was also approached by the Atlanta Regional Commission (ARC), regarding their suggestions for a drought provision or other modification to the IOP.

On 27 November 2006, an announcement was sent to the States of Alabama, Florida and Georgia, Federal agencies and other stakeholders regarding a Drought Provision Workshop to be held on 13 December 2006, in Columbus, Georgia (**Enclosure 5**).

During the Drought Provision Workshop, the Corps presented several concepts that had been considered (Concepts 1 through 4), with Concept 3 selected as the drought provision plan to be carried forward for further consideration. Concept 3 is comprised of operating in conformance with a modification of the IOP to lower the upper and lower flow thresholds for the March – May spawning period to 25,000 cfs and 16,000 cfs, respectively, as shown in the below table. Under normal to wet flow conditions, a higher minimum release of 6,500 cfs would be maintained. However, during sustained dry or drought conditions, a more conservative drought management operation would "trigger" the reversion to the lower minimum release of 5,000 cfs. The drought trigger would be determined by computing the Composite Storage** within the storage reservoirs within the basin. Whenever the Composite Storage falls below the bottom of Zone 2 into Zone 3, the drought trigger would dictate a minimum release of 5,000 cfs. The drought provision would maintain a minimum release of 5,000 cfs until conditions improve such that the Composite Storage reaches a level above the top of Zone 2 (i.e., within Zone 1). At this time, the drought provision would be suspended, and the higher minimum release of 6,500 cfs would be maintained.

		Basin Inflow (cfs)	Release
Mar-May	High	$\geq$ 25,000	not less than 25,000
	Mid	$\geq$ 16,000 and <25,000	$\geq$ 70% BI, not less than 16,000
	Low	<16,000	$\geq$ BI, not less than 6,500*
Jun-Feb	High	$\geq$ 23,000	not less than 16,000
	Mid	$\geq$ 10,000 and < 23,000	$\geq$ 70% BI, not less than 10,000
	Low	< 10,000	$\geq$ BI, not less than 6,500*

*Drought Provision: When Composite Storage is within Zones 1 and 2, then the higher minimum Release of 6,500 cfs would be maintained. When Composite Storage falls below the top of Zone 3, then Release will be reduced to the 5,000 cfs minimum; when Composite Storage is restored to above the top of Zone 2 (i.e., within Zone 1), then the higher minimum Release of at least 6,500 cfs would again be maintained.

**Composite Storage is the combined storage of Lake Sidney Lanier, West Point Lake and Walter F. George Lake.

Preliminary modeling results for Concept 3 were presented by the Mobile District at the 13 December workshop. Other stakeholders making presentations regarding suggestions for a drought provision, or information to be considered in development of a drought provision, included the State of Georgia Environmental Protection Division (GA-EPD) and ARC. A copy of the workshop memorandum of record is enclosed (**Enclosure 6**).

The memorandum for record of the workshop was provided to all workshop participants on 15 December 2006, and copies of all presentations, modeling assumptions, and the memorandum of the workshop have been posted on the Mobile District website at:

http://www.sam.usace.army.mil/ACF.htm

Participants in the workshop were requested to submit any additional comments on the proposed drought provision or suggestions for alternatives not later than 10 January 2007 so they may be considered prior to submittal of a drought provision on 31 January 2006.

Additional comments on the proposed drought provision were received from Gwinnett County, Georgia by letter dated 5 January 2007; from the GA-EPD by letter dated 9 January 2007; from the ARC by proposal submitted on 10 January 2007; from the Southeastern Power Administration (SEPA) by letter dated 10 January 2007; and from the FDEP by letter dated 16 January 2007. FDEP provided additional comments on the ARC and Georgia proposed concepts by letter dated 29 January 2007. Copies of this correspondence are enclosed (**Enclosures 7 – 12**) and are also posted on the Corps webpage. The Mobile District and USFWS are currently reviewing these comments to determine whether elements of the suggestions and concepts presented could provide some benefits in developing a drought provision. However, this evaluation cannot be completed by the due date of 30 January 2007 specified in the BO.

On 26 January 2007, the Mobile District completed the modeling and evaluation of the Concept 3 drought provision proposal using the same statistical analyses and effects analysis as prepared by the USFWS in the BO. In reviewing these results, it was determined that the Concept 3 plan would provide the desired beneficial effects on low flow conditions, providing for fewer years when flows were between 5,000 cfs and 7,000 cfs, higher sustained flows for mussels more of the time than the IOP during low flow conditions between 8,000 cfs and 10,000 cfs. However, it was determined in consultation with USFWS that the proposed reduction in spring releases provided lower frequencies and shorter durations of floodplain inundation for certain flow conditions which may produce adverse effects on host fish for mussels. Therefore, USFWS could not reach a determination that the proposed drought provision would result in a "not likely to adversely affect" determination for habitat for host fish for mussels. As a result, formal Section 7 consultation with the USFWS would be required for further consideration of the Concept 3 drought provision. However, it appears that additional adjustments to the proposed drought provision could be made that may remove this potential for adverse effect. These possible adjustments have been discussed with USFWS and it is agreed that they should be further investigated. Additional modeling and evaluation of the effects of possible adjustments to the Concept 3 drought provision are currently underway, but cannot be completed by 30 January 2007. However, it is anticipated that a drought provision can be identified, modeled, evaluated and implemented prior to the upcoming sturgeon spawning period which begins 1 March 2007.

Based on the new information that has been developed during the informal consultation discussions related to development of the drought provision, USFWS has agreed that it is

appropriate to continue efforts to identify an acceptable drought provision that can be implemented for this spring season. The Mobile District has requested an extension until 28 February 2007 in order to complete the necessary modeling and evaluations of the proposed adjustments to the proposed RPM3 drought provision. A copy of the request for the extension (letter dated 30 January 2007) is enclosed (**Enclosure 13**).

Additional comments and suggested alternative concepts for an RPM3 drought provision submitted by others will continue to be carefully reviewed and evaluated. However, it is unlikely that this careful review would be completed in time to formulate a revised drought provision that could be implemented by 1 March 2007. In addition, many of the suggestions would require a modification to the current ACF water control plans and cannot be considered at this time. We will continue our review, and if elements of the concepts appear to offer benefits to the current IOP or RPM3 drought provision, we may propose future adaptations or adjustments to the IOP or drought provision, consistent with the provision for adaptive management specified in RPM1. However, any proposal that produces adverse effects when considering the evaluation criteria used in the BO would likely require the re-initiation of formal consultation under Section 7 of the ESA. Formal Section 7 consultation would likely require a minimum of 135 days to complete.

RPM4. Sediment dynamics and channel morphology evaluation. Improve our understanding of the channel morphology and the dynamic nature of the Apalachicola River.

Rationale. The dynamic conditions of the Apalachicola need to be evaluated to monitor the zone at which take may occur and to identify alternatives to minimize effects to listed mussels in vulnerable locations. Both sediment transport and channel morphology need to be considered to provide a basis for predicting changes in morphology that may affect the relative vulnerability of mussels to take due to the IOP. The amount of mussel habitat and thus IOP-related take depends on channel morphology. This evaluation will inform alternatives that may be considered under RPM1 and RPM3.

a. In coordination with the Service, and other experts jointly identified, the Corps shall evaluate before March 30, 2007, the current status of sediment transport and channel stability in the Apalachicola River as it relates to the distribution of listed mussels and their vulnerability to low-flow conditions. The goals of the evaluation are to identify: 1) feasible water and/or habitat management actions that would minimize listed mussel mortality; 2) current patterns and trends in morphological changes; and 3) additional information needed, if any, to predict morphological changes that may affect the listed mussels. This evaluation shall be based on available information and tools and best professional judgment.

STATUS: The Mobile District draft plan presented to USFWS on 26 October 2006 recommended that a panel of experts be selected, with the first meeting scheduled in November 2006, and second meeting in February 2007 with a report due in March 2007. However, due to budget constraints (the Corps is currently operating under Continuing Resolution Authority (CRA) funding) and the time required to procure expert services, it was jointly agreed to defer a panel meeting until January 2007. Possible sources of

expert services were discussed including: the U.S. Army Corps Engineer Research and Development Center (ERDC) in Vicksburg, MS, possible 3rd party private consultant that reviewed the previous Simon and Li report on the Apalachicola River; a potomologist from St. Louis District or other similar expertise from Missouri River or other Corps Districts; or those involved in the Lidstone and Anderson report on the ACF. It was recommended that the Mobile District provide an expert from ERDC and/or a private consulting geomorphologist or Corps potomologist. USFWS also recommended inclusion of the USGS geomorphologist from Denver, CO (Kirk Vincent) that worked with USGS on the recent study on declining river levels on the Apalachicola River. The Mobile District would fund services for the ERDC, other Corps, and/or private consultant; and USFWS would fund the services of USGS (another DOI agency).

Additional funding constraints could delay initiation or completion of this action. It was agreed to revisit the funding situation in January, and the need for further consultation with USFWS regarding the due date would be determined. The Corps is continuing to operate under CRA funding constraints, which are anticipated to continue well into the year. However, the Corps has been aggressively pursuing other possible funding sources and expects to have funding in place later this spring to initiate efforts required by RPM4. Therefore, it is requested that the due date for this RPM4 requirement be extended until 30 August 2007. This schedule would provide for consideration of the panel report at the semi-annual meeting with USFWS in August 2007.

RPM5. Monitoring. Monitor the level of take associated with the IOP and evaluate ways to minimize take by studying the distribution and abundance of the listed mussels in the action area.

Rationale. Take needs to be monitored monthly to insure that the level of take identified in the biological opinion is not exceeded. As natural conditions change, the populations of the species need to be assessed and the amount of take evaluated relative to any new information. Since this is an interim plan and there will be additional consultations on the overall operations of the ACF project for flood control, water supply contracts, hydropower, and navigation, the monitoring information is needed to prepare the biological assessments for these future consultations.

a. The Corps shall monitor the number of days that releases from Woodruff Dam (daily average discharge at the Chattahoochee gage) are less than the daily basin inflow when daily basin inflow is less than 10,000 cfs but greater or equal to 8,000 cfs. If the total number of days of releases in this range in a calendar year is projected to exceed the total number of days of daily basin inflow in this range by more than 39, the Corps shall reinitiate consultation immediately.

STATUS: During the 26 October 2006 semi-annual/planning meeting, the Mobile District demonstrated to USFWS the spreadsheets used to track basin inflows and releases and to track the number days when the daily average discharge from Jim Woodruff Dam is less than the daily basin inflow while the daily inflow is between 8,000 cfs and 10,000 cfs. These conditions were tracked from 1 January 2006 through 31 December 2006. There were 23 days during calendar year 2006 when daily average

release was less than the daily basin inflow. Information regarding daily average inflow, 7-day average inflow and daily releases are regularly posted on the Mobile District Water Management website: http://water.sam.usace.army.mil/

Below is a listing of the potential taking days (dates when the daily release from Jim Woodruff Dam was less than the daily basin inflow).

	1-Day* Discharge	1-Day Inflow	16 Days prior to Sep 5
9/19/2006	7457	9334	1
9/25/2006	7585	8480	1
10/20/2006	7068	9105	1
10/24/2006	5849	8565	1
10/31/2006	6573	8091	1
11/11/2006	7142	8907	1
11/13/2006	7513	8578	1
			23

* As measured at the Chattahoochee Gage

b. In coordination with the Service, the Corps shall develop on or before March 30, 2007, a feasible plan to monitor listed mussels in the action area. The goals are to:
1) periodically estimate total abundance of listed mussels in the action area; and
2) determine the fraction of the population that is located in habitats that are vulnerable to low-flow impacts.

STATUS: During the 26 October 2006 semi-annual/planning meeting with USFWS, the Corps presented a conceptual plan for a recon level study, comprised of a mussel biologist and a river hydraulic scientist to review aerial photography and/or field inspections on the river to observe potential habitat and river hydraulic conditions. The purpose would be to identify those areas with potential habitat and those areas with stable or unstable river conditions. The recon level study would assist in development of a survey/sampling design for a mussel monitoring plan. This effort could potentially be integrated with the sediment/morphology panel review. However, this effort is currently delayed due to funding constraints (CRA funding limitations). It was agreed to revisit the funding situation in January, and the need for further consultation with USFWS regarding the due date would be determined. As noted above, the Corps expects to have funding in place later this spring to initiate efforts required by RPM5. Therefore, it is requested that the due date for this RPM5 requirement be extended until 30 August 2007. This schedule would provide for consideration of the mussel monitoring plan at the semi-annual meeting with USFWS in August 2007.

c. The Corps shall implement the studies outlined above as soon as is practicable.

STATUS: No funds for studies recommended by the sediment/morphology panel or to implement the mussel monitoring plan are available in FY 2007. However, funds have been requested for inclusion in the President's budget for FY 2008, and current plans are to initiate the mussel monitoring plan and studies or actions recommended by the sedimentation/morphological panel in FY 2008, as appropriate within funding and authority limitations.

d. The Corps shall include monitoring results in the annual report provided to the Service under Condition 1.c.

STATUS: Monitoring of the amount of take, consistent with RPM5, are reported in this report. Once the recommended additional monitoring and studies are funded and completed, the results will be included in the annual report as appropriate.

RAMPING RATES

The BO requires specific ramping rates for reducing the discharge, based on current discharge values as shown in Table 1.3.A of the BO, which is reproduced below. Since the BO was issued on 5 September 2006, all ramping rates have been met, as measured by the USGS Chattahoochee, FL river gage.

Table 1.3.A. IOP maximum fall rate for discharge from Woodruff Dam by release range.

Release Range (cfs)	Maximum Fall Rate (ft/day)[a]
≥ 30,000	Fall rate is not limited.
≥ 20,000 and < 30,000	1.0 to 2.0
> 16,000 and < 20,000	0.5 to 1.0
> 8,000 and ≤ 16,000	0.25 to 0.5
≤ 8,000	0.25 or less

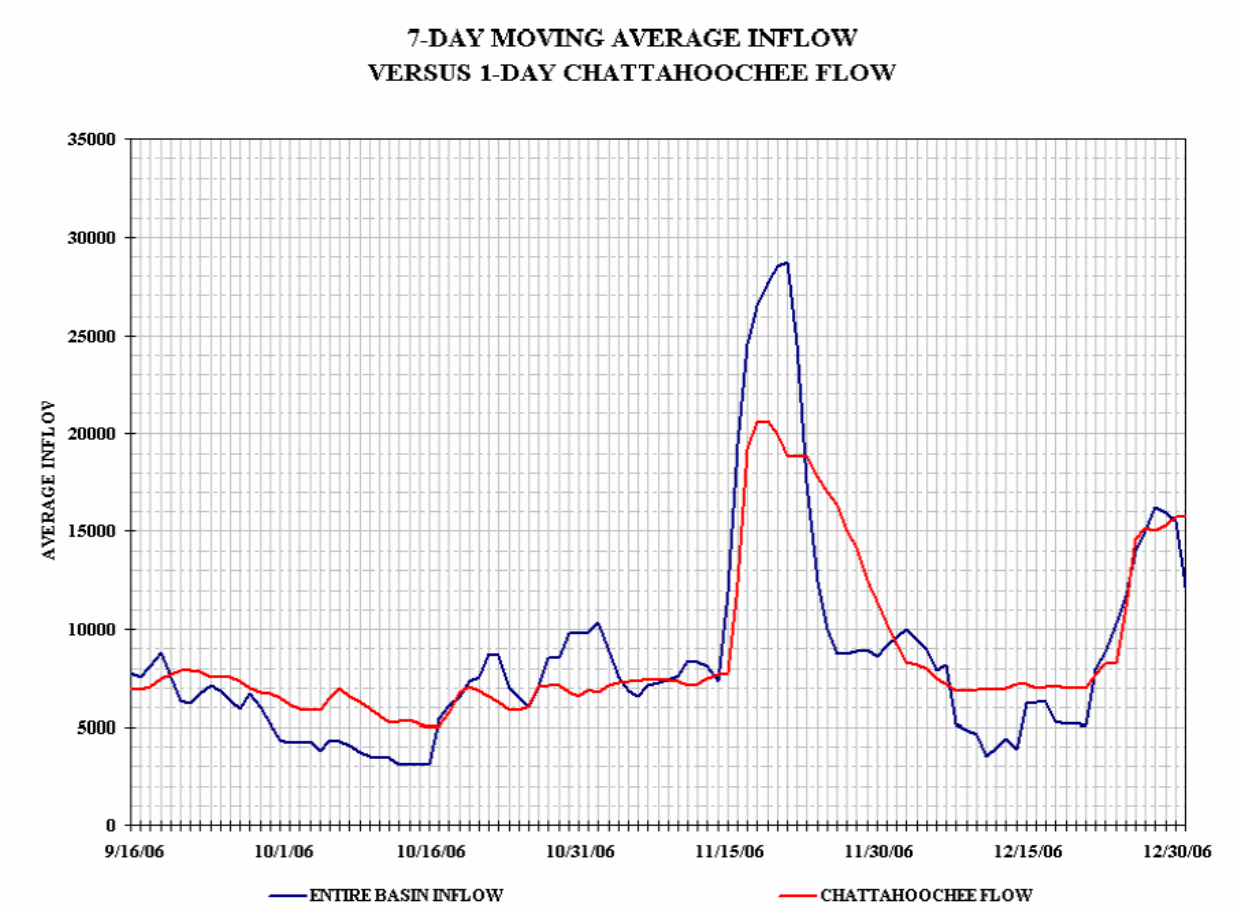
[a] Consistent with safety requirements, flood control purposes, and equipment capabilities, the IOP indicates that the Corps will attempt to limit fall rates to the lower value specified for each release range.

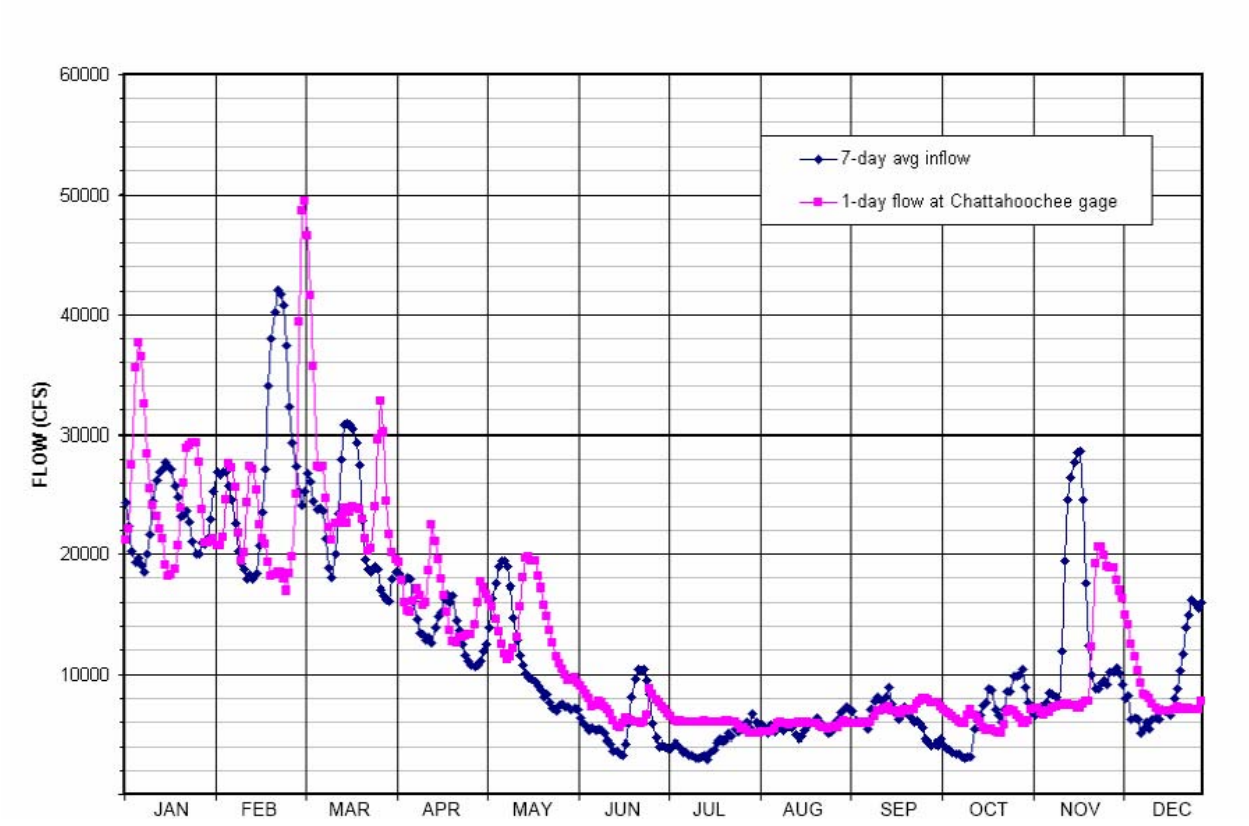
VOLUMETRIC BALANCING OF RELEASES

The BO also allows a volumetric balancing of releases in cases where following the ramping rates specified in the BO causes a release greater than that required to meet the above the calculated 7-day average basin inflow. During rain events, the required ramping rates are often more gradual than the decline in basin inflows, and potential over-releases and additional drain on reservoir storage could occur, especially when trying to match releases to the computed 7-day average basin inflow. In order to avoid over-releases and conserve storage, the volume of releases can be balanced during and following rain events. Releases after the rainfall events are adjusted to account for any computed under-release or over-release, to assure that releases are balanced to meet the computed volume of basin inflow over time. The volumetric balancing computations do not include releases for flood control or other special releases not required by the IOP, but primarily account for possible over-releases that occur due to the ramping rate restrictions.

From 5 September – 31 December 2006, in addition to the flows released for flood control and other special releases, 104.6% of the basin inflow was released.

Below is a hydrograph showing the 7-day average inflows and the 1-day average release from Jim Woodruff Dam, as measured at the USGS Chattahoochee, FL river gage during the September – December 2006 timeframe (following issuance of the final BO). Also below is a similar hydrograph showing the 7-day average basin inflow and the 1-day average releases for the entire year 2006. Additional information is posted regularly on the Mobile District Water Management website: http://water.sam.usace.army.mil/.


7-DAY MOVING AVERAGE INFLOW
VERSUS 1-DAY CHATTAHOOCHEE FLOW
AVERAGE INFLOW
35000
30000
25000
20000
15000
10000
5000
0
9/16/06
10/1/06
10/16/06
10/31/06
11/15/06
11/30/06
12/15/06
12/30/06
ENTIRE BASIN INFLOW
CHATTAHOOCHEE FLOW



(NOTE: Mobile District began operations under the originally submitted IOP in March 2006; under the revised IOP in June 2006; under a court-mandated operation from 21 June – 24 July 2006; reverted to the revised IOP on 24 July 2006; and initiated operations under the final IOP approved in the BO on 5 September 2006.)

E-15 USFWS letter to CESAM dated 2 February 2007, granting extension of RPM3 implementation date

United States Department of the Interior

IN REPLY REFER TO:

FISH AND WILDLIFE SERVICE
Field Office
1601 Balboa Avenue
Panama City, FL 32405-3721

(850) 769-0552
fax 763-2177

February 2, 2007

Curtis Flakes
Inland Environment Team
Planning Environmental Division
Mobile District, Corps of Engineers
P.O. Box 2288
Mobile, Alabama 36628-0001

Dear Mr. Flakes:

The Service has received your letter dated January 30, 2007, requesting a time extension for complying with the terms and conditions for Reasonable and Prudent Measure No. 3 (RPM3) of our Biological Opinion dated September 5, 2006, which addressed the Interim Operating Plan (IOP) for Jim Woodruff Dam. The purpose of RPM3 is to develop modifications to the IOP that provide a higher minimum flow to the Apalachicola River when reservoir storage and hydrologic conditions permit.

We agree that continuing to consult on an IOP modifications proposal until February 28, 2007, is warranted. We concur that delaying compliance with RPM3 will not result in an adverse effect on listed species. We look forward to receiving your proposal for RPM3 and your biological assessment of its effects.

Sincerely yours,

Gail A. Carmody

Gail A. Carmody
Field Supervisor

E-16 CESAM letter to USFWS dated 16 February 2007, submitting Concept 5 proposal and Biological Assessment (BA)

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

REPLY TO
ATTENTION OF

February 16, 2007

Inland Environment Team
Planning & Environmental Division

Ms. Gail Carmody
Ecological Services
U.S. Fish and Wildlife Service
1601 Balboa Avenue
Panama City, Florida 32405-3721

Dear Ms. Carmody:

On September 5, 2006, the U.S. Fish and Wildlife Service (Service) issued a Biological Opinion (BO) for the Jim Woodruff Dam Interim Operations Plan (IOP), pursuant to Section 7 of the Endangered Species Act (ESA). In accordance with Reasonable and Prudent Measure 3 (RPM3) of the BO, the U.S. Army Corps of Engineers (Corps), Mobile District, must "Develop modifications to the IOP that provide a higher minimum flow to the Apalachicola River when reservoir storage and hydrologic conditions permit." The specific terms and conditions for RPM3 require that:

a. "The Corps, with Service concurrence, initiate IOP drought provisions that identify the reservoir, climatic, hydrologic, and/or listed species conditions that would allow supporting a higher minimum flow in the Apalachicola River, and that identify recommended water management measures to be implemented when conditions reach the identified drought trigger point(s), by January 30, 2007."

b. "If modifications to the IOP parameters for the months of March through May are adopted as part of the drought provisions, the Corps shall assess potential effects to Gulf sturgeon spawning and floodplain inundation. The Corps shall provide the models and a biological assessment of the effects of the drought provisions on listed species at least 135 days in advance of implementing the drought provisions in order to reinitiate this consultation relative to any proposed changes in the IOP."

Based on informal consultation discussions and modeling of various drought provision scenarios, and consideration of stakeholder comments submitted during the consultation period and following a workshop conducted in December 2006, it has been determined that it is feasible to provide a greater minimum flow than 5,000 cubic feet per second (cfs) most of the time by storing more water in the reservoirs during the normal refill period than is currently allowed under the IOP. Allowing for some additional storage during the months of March through May, while still providing protection for sturgeon spawning habitat areas, would allow for additional augmentation flows more of the time in support of higher minimum flows for mussels during the remainder of the year. During consultation discussions, it was agreed that the goal is to provide for a drought provision that could be implemented during the 2007 spring spawning period. This goal would require a finding that the effects of the proposed modifications to the IOP would not result in adverse effects to the listed species and/or critical habitat; or that the effects would not differ significantly from those addressed in the BO for the IOP; and therefore would not trigger a separate formal consultation requirement under Section 7 of the ESA.

In January 2007, Mobile District completed preliminary modeling and an effects analysis of a proposed RPM3 drought provision (Concept 3) that would provide the desired beneficial higher minimum flows for most of the time. However, the effects analysis also identified potential adverse tradeoff effects for host fish for mussels, due to fewer acres of floodplain inundation for these species. At that time, it was agreed to investigate additional adjustments to the conceptual RPM3 drought provision to see if these unanticipated adverse effects could be eliminated or minimized, and the Service approved an extension of the due date for implementation of the drought provision until February 28, 2007.

Mobile District has completed modeling and effects analyses of an adjusted RPM3 drought provision (Concept 5). We believe the Concept 5 drought provision operations provide the benefits of higher desired minimum flow most of the time, in support of mussel species, while still providing sufficient flows for Gulf sturgeon and host fish spawning and other life cycle needs. Concept 5 would provide for a higher desired minimum flow of 6,500 cfs for normal to wet years; and incorporates a drought provision to provide for the lower required minimum flow of 5,000 cfs during sustained dry or drought periods when it would be prudent to preserve reservoir storage to assure the ability to continue augmentation flows at or above 5,000 cfs during these periods. The drought provision is based on the status of composite storage within the basin, and would be "triggered" only when the composite storage falls below the top of Zone 3. The additional storage to provide for the higher desired minimum flow most of the time is gained by lowering the storage/flow thresholds during the March-May spawning period to 35,800 cfs and 18,000 cfs, respectively. A more complete description of the Concept 5 drought provision and analysis of the effects on listed species and critical habitat are included in the enclosed biological assessment.

The enclosed biological assessment is submitted pursuant to the requirements of Section 7 of the ESA and in accordance with the terms and conditions of the BO. We believe that the results of our effects analysis can support a determination that the implementation of the proposed modifications to the IOP contained in the Concept 5 drought provision are not likely to adversely affect the listed species or critical habitat for listed species, or will result in effects that are similar to those addressed in the BO. Therefore, we propose to implement this modified IOP operation, in accordance with the provisions of RPM3 of the BO, beginning March 1, 2007. Your approval of this modified IOP operation and concurrence with the implementation date are hereby requested.

If you have any questions, comments, or recommendations regarding our proposed operations or the enclosed biological assessment, please contact Ms. Joanne Brandt by telephone at (251) 690-3260 or by email at joanne.u.brandt@sam.usace.army.mil, or Mr. Brian Zettle by telephone at (251) 690-2115 or by email at brian.a.zettle@sam.usace.army.mil.

Sincerely,

Curtis M. Flakes
Chief, Planning and Environmental
Division

Enclosure

E-17 USFWS email to CESAM dated 21 February 2007, requesting additional information regarding consideration of RPM3 comments and alternatives provided by stakeholders

Zettle, Brian A SAM

From: Jerry_Ziewitz@fws.gov
Sent: Wednesday, February 21, 2007 8:23 AM
To: Zettle, Brian A SAM
Cc: Hrabovsky, Cheryl L SAM; Wells, Craig A LTC SAM; Flakes, Curtis M SAM; Shoemake, Deborah J SAM; Otto, Douglas C Jr SAM; Poiroux, Duane B SAM; Gail_Carmody@fws.gov; Mauldin, Gary V SAD; Hathorn, James E Jr SAM; Brandt, Joanne U SAM; Anderson, John W-OP-T SAM; Day, Kenneth SAM; Bradley, Kenneth P SAM; Cromartie, Leon M Jr SAM; Vaughan, Memphis Jr SAM; Thompson, Michael H SAM; Eubanks, Michael J SAM; Flanagan, Patricia A SAM; Robbins, Ervin P SAM; Feldmeier, Paula M SAM; Taylor, Peter F COL SAM; Burke, Roger A SAM; Smallwood, William L SAM; Fuller, William W SAM
Subject: Re: Biological Assessment for Proposed Action Required by RPM3 of the BO for the Jim Woodruff Dam IOP (UNCLASSIFIED)

Brian,

Good job on the BA. I've read it through once. I'll now go through it with more attention to all the details, and as you know, there are a lot of them. I think you've done an excellent job of laying out the logic of how the Corps got to concept 5. The only thing that I think is missing is an explicit consideration of the suggestions received from ARC, FL, GA, etc.
How shall we handle that?

Jerry Ziewitz
USFWS
1601 Balboa Ave.
Panama City, FL 32405
(850)769-0552x223

E-18 CESAM letter to USFWS dated 23 February 2007, response to request for additional information

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

February 23, 2007

REPLY TO
ATTENTION OF:

Inland Environment Team
Planning and Environmental Division

Ms. Gail Carmody
Ecological Services
U.S. Fish and Wildlife Service
1601 Balboa Avenue
Panama City, Florida 32405-3721

Dear Ms. Carmody:

On February 16, 2007, the U.S. Army Corps of Engineers (Corps), Mobile District submitted a Biological Assessment (BA) for proposed changes to the Jim Woodruff Dam Interim Operations Plan (IOP) pursuant to the requirements of Section 7 of the Endangered Species Act (ESA) and in accordance with the terms and conditions of Reasonable and Prudent Measure 3 (RPM3) of the IOP Biological Opinion (BO) issued in September 2006. As described in the BA, the proposed action (Concept 5) was developed based on informal consultation discussions, modeling of various drought provision scenarios, and consideration of stakeholder comments submitted during the consultation period and following a workshop conducted in December 2006. We are providing the following additional information and clarifications in response to a request from your office regarding our review and evaluation of the stakeholder comments during development of an RPM3 drought provision operation.

During our consultation discussions, it was agreed that the goal of RPM3 is to provide for a drought provision operation that could be implemented during the 2007 spring spawning period (March 1 – May 31). In order to meet this goal, it was necessary to develop modifications to the IOP that met the intent of RPM3 without resulting in adverse effects to the listed species and critical habitat; and/or without resulting in effects that differ significantly from those addressed in the BO for the IOP. Any proposal that would produce potentially adverse effects when considering the evaluation criteria used in the BO, or that would include a range of effects not previously addressed in the BO, would likely require the re-initiation of formal consultation under Section 7 of the ESA. Formal Section 7 consultation would likely require a minimum of 135 days to complete.

On January 31, 2007, Mobile District submitted an Annual Report of activities completed in conformance with the requirements of the BO. The Annual Report included a summary of efforts undertaken to develop a drought provision operation pursuant to RPM3 of the BO. The Annual Report stated that we had reviewed the stakeholder's alternative concepts for a drought provision or alternative concepts for the IOP and made the determination that each of the suggested concepts as a whole would constitute a change to the water control plan. The intent of the IOP and the RPM3 drought provision is to identify adjustments to water management operations within the constraints

of the existing water control plan that would support or minimize harm to the federally protected endangered and threatened species and critical habitat for those species. Therefore, the concepts presented by the stakeholders that represent changes to the existing water control plan, would more appropriately be addressed in proposals to update the water control plans at a future date. It should be noted that the proposed action in the BA addresses many of the concerns expressed by the other stakeholders, such as providing for higher flows for mussels most of the time, using some degree of storage for flow support; storing additional water during the spring refill months: and basing operational decisions on available water within the system (taking into account both basin inflow and available storage). There are possible additional elements incorporated in the alternative stakeholder concepts, such as utilizing climatic or hydrological condition forecasting in conjunction with our operations under the existing water control plan, which might merit some further consideration. However, these alternative elements could not be adequately evaluated and modeled prior to a March 1, 2007, implementation date this spring. We suggest that other possible alternatives comprising selected elements of the stakeholder alternative concepts continue to be evaluated. Possible additional modifications to the IOP, if determined practicable and beneficial, could potentially be considered for implementation at a future time under the adaptive management provisions contained in RPM1 of the BO.

A matrix is enclosed that outlines the various stakeholder comments received and describes whether they were addressed by the Concept 5 proposal, are outside the scope of the IOP, or would require additional review and evaluation for possible future modifications to the IOP.

In summary, additional comments and suggested alternative concepts for an RPM3 drought provision or other possible modifications to the IOP submitted by others will continue to be carefully reviewed and evaluated. However, this careful review will not be completed in time to formulate an additional drought provision alternative that could be implemented by March 1, 2007. In addition, many of the suggestions or alternative concepts proposed by the stakeholders would require a modification to the current ACF water control plans and cannot be considered at this time. We will continue our review, and if elements of the concepts appear to offer benefits to the current IOP or proposed RPM3 drought provision, we may recommend future adaptations or adjustments to the IOP or drought provision, consistent with the provision for adaptive management specified in RPM1. Mobile District will continue to determine what type operations are appropriate and consistent with our responsibility to operate the projects under our existing water control plans in a balanced manner, taking into account the authorized multiple project purposes and our responsibility to minimize impacts to the Federally protected species and critical habitat. We would continue to informally consult with your staff during the consideration and development of any other alternative concepts. At this time, we believe our proposed Concept 5 drought provision operations adequately meets the terms and conditions of RPM3 in the BO, can effectively be implemented during the 2007 Spring spawning period without resulting in adverse effects to spawning for Gulf sturgeon or host fish for mussels, and will provide the desired benefits of higher flows to support mussel species most of the time.

If you have any additional questions, comments, or recommendations regarding our proposed operations or the biological assessment, please contact Ms. Joanne Brandt by telephone at (251) 690-3260 or email at joanne.u.brandt@sam.usace.army.mil; or Mr. Brian Zettle by telephone at (251) 690-2115 or email at brian.a.zettle@sam.usace.army.mil.

Sincerely,

Roger A. Burke
Assistant Chief, Planning and Environmental Division

Enclosure

SOURCE	ISSUE	RECOMMENDATION	CORPS RESPONSE
SEPA	Dependable hydropower and potential loss of customers	Compensation analysis for loss benefits	The compensation analysis would be needed if proposed changes resulted in lower summer pools, impacts to dependable hydropower, or reductions in hydropower generation irrespective of hydrologic status. These types of operational modifications would require changes to the water control plan and are not being considered at this time.
GA-EPD	Best available scientific information demonstrates that flows required to support sturgeon spawning are too high. Gulf sturgeon habitat decreases at flows above 23,000 and there is insignificant gain above 10,000 cfs.	Reduce releases for sturgeon spawning to 11,000 cfs. Relate releases for spawning above this level to reservoir storage.	This action would not require a change to the water control plan. However, our consultation history with UFSWS suggests that spring flows in this range could result in adverse effects to Gulf sturgeon and host fish for mussels. The intent of RPM3 is to provide higher flows for mussels in the June – February months without adversely effecting sturgeon or host fish for mussels. Concept 5 reduces the spring flow thresholds in a manner to assure discretionary operations provide sufficient flows and into account available inflows in the basin.
	Storage during high flow is an illusion. Large portion of basin inflow is provided by Flint River and can not be stored.	Set reservoir refilling as the highest priority and maintain storage to support 5,000 cfs minimum flow.	The system is operated in a balanced fashion to support all authorized project purposes. Placing the suggested priority on these project purposes would require a change to the water control plan and could also require congressional authorization. The Concept 5 proposal allows for more storage during the spring refill month while still maintaining a balance between the goal to refill and also meet the other project purposes.
	Reservoir refill period corresponds with sturgeon spawning period; IOP allows few opportunities to gain storage.	Abolish the year-round 37,400 upper flow threshold. Avoid releases above 23,000 except when necessary for flood control.	This action would not require a change to the water control plan. The current RPM3 proposal does not include a year-round 37,400 cfs upper flow threshold; reduces the upper flow threshold; and allows for storage of a portion of the BI between when flows are greater than 18,000 cfs during the spring months (Mar-May), and when flows are greater than 10,000

SOURCE	ISSUE	RECOMMENDATION	CORPS RESPONSE
			cfs during the remainder of the year (Jun-Feb).
	IOP ramping limitation prevents storing of water	Loosen rampdown rate restrictions and offset loss of storage due to rampdown by releasing less than BI as BI rises and peaks.	This action would not require a change to the water control plan. The current RPM3 proposal does not change the rampdown schedule, but does include the volumetric balancing caveat to assist in preventing significant over releases and associated loss of storage, which achieves a similar result to the suggested operation.
	Supporting high flows during the spawning period and minimum flows above BI the rest of the time results in a year-round augmentation mode. Unable to meet the needs of all interests.	For months June-February store 100% of inflow above 5,000 minimum flow unless reservoir storage and climate forecast indicate reservoir refill will occur the following spring.	This action would require a change to the water control plan as it would eliminate a balanced reservoir system operation and would place higher priority on maintaining and refilling reservoir levels (presumably for water supply and recreation) at the detriment of downstream flow needs. Furthermore, it fails to accomplish the goal of RPM3 which is to maintain flows higher than 5,000 cfs when reservoir storage and climatic conditions allow in support of listed mussels.
	IOP ramping limitation prevents storing of water.	Allowable ramp-up rate = ramp-down rate	This action would require a change to the water control plan since it would significantly change current flood control operations.
	Current Water Control Plan Action Zones are out of date.	Raise Lake Sidney Lanier and West Point Action Zones 2 thru 4 by one foot each	Changes to the Action Zone elevations in the storage reservoirs would require a change to the water control plan and could also require congressional authorization.
ARC (Hydrologics)		Use conditional forecast technique to determine flow releases. Use available storage to determine the maximum sustainable flow. Determine Water Available and Maximum Supportable Flow: • Forecast inflow to Lake Sidney Lanier between current day and June 1	This plan requires a considerable change to the way water in the ACF Basin is managed. Almost every aspect of the plan would require a change in the water control plan for the basin. The system is currently operated in a balanced fashion to support all authorized project purposes. Placing priorities on keeping reservoirs full to support water supply and facilitating other project purposes incidentally would

<table>
<tr><th>SOURCE</th><th>ISSUE</th><th>RECOMMENDATION</th><th>CORPS RESPONSE</th></tr>
<tr><td></td><td></td><td>

Lanier used as a surrogate for system storage; when Lanier is full, the system is full
Currently using 90th percentile of forecasts
Subtract out volume needed for M&I, minimum flow, evaporation, and refill
Use graph to determine maximum supportable flow

<table>
<tr><td>System storage > full</td><td>Releases needed to maintain flood protection</td></tr>
<tr><td>System storage > 5000 cfs carry-over</td><td>Enhancement releases = max supportable flow</td></tr>
<tr><td>System storage > safety storage</td><td>5000 cfs</td></tr>
<tr><td>System storage < safety storage</td><td>No requirement</td></tr>
<tr><td colspan="2">Storage available for enhancement releases is managed to avoid the last two cases for the entire historical record</td></tr>
</table>
Provide highest minimum flow possible while refilling system by June 1 and reserve enough water to meet public health and safety requirements (2030 demands).
</td><td>require a change to the water control plan and could also require congressional authorization. Furthermore, this plan would likely result in a significantly higher frequency of flows at or near 5,000 cfs which does not meet the intent of RPM3. However, the use of a forecasting tool to assist in making operational decisions is being further considered and evaluated.</td></tr>
<tr><td></td><td></td><td>Protect Endangered Species; Reserve enough water to maintain 5,000 cfs and respect ramping rates over a multi-year period.</td><td>This aspect of the ARC plan is met by the current RPM3 proposal which includes provisions to maintain at least 5,000 cfs flow.</td></tr>
<tr><td></td><td></td><td>Maintain maximum supportable flow, but no more than 10,000 cfs</td><td>This aspect places a cap on the amount of support the storage reservoirs can provide, and relies on flows from the Flint River for the remainder of the Apalachicola River flow. Our consultation history with the USFWS suggests that flows resulting from this discretionary operation plan would likely result in adverse effects to Gulf sturgeon and listed mussels,</td></tr>
</table>

SOURCE	ISSUE	RECOMMENDATION	CORPS RESPONSE
			particularly during drought conditions. The intent of RPM3 is to provide higher flows for mussels in the June – February months without adversely effecting sturgeon or host fish for mussels in the spring.
FL DEP	IOP is reactive rather than proactive operation. No distinction between wet and dry seasons.	Develop a set of predictive conditions to select minimum Chattahoochee flow and base mussel flow target on January – March basin inflow.	Use of forecasting in making water management decisions can be implemented without changing the water control plan, and is currently utilized to some degree in Mobile District water management operations. As mentioned before, the use of a forecasting tool to assist in IOP operational decisions is being further considered and evaluated.
	5,000 cfs is an unacceptable flow floor; IOP does not allow for drafting of storage for benefit of mussels, except at 5,000 cfs.	Within the context of the IOP, the Corps can provide a higher flow in the Apalachicola River. In the majority of years a minimum flow of 6,300 cfs can be maintained and minimum flows should never drop below 5,700 cfs even under the most dire circumstances. Draft from storage to meet higher flow targets of 6,300 and 5,700 cfs June - February.	Changing the minimum flow from 5,000 cfs to 5,700 cfs would require changes to the water control plan and therefore was not considered. However, the current Concept 5 proposal generally meets the provisions of this recommendation by maintaining a desired flow of at least 6,500 cfs 95% of the simulated record (1975-2001) and resulting in flows less than 5,700 cfs only 4% of the simulated record. Flows were never below 5,000 cfs. The Concept 5 proposal also provides for those conditions when storage would be drafted to support the higher desired flow of 6,500 cfs; and those conditions when the lower required flow of 5,000 cfs would be prudent.
		Draft from storage to meet higher flow floors	The Concept 5 operation provides for drafting of storage in support of higher desired flow of 6,500 cfs for most of the time, but also provides for the drought provision which identifies when such augmentation would no longer be prudent under sustained drought conditions, but flow would be no lower than the required 5,000 cfs. Changing the minimum flow to 5,700 cfs would require a change to the water control plan.

SOURCE	ISSUE	RECOMMENDATION	CORPS RESPONSE
		Maximize refilling of Lake Lanier from December to February.	These aspects of the Florida proposal requires changes to the water control plan since it would raise the winter pool of Lake Lanier to 1071, change the rule curve in the current water control plan, potentially impact flood control operations, and requires prioritizing refill of one project at the cost of the other projects and other authorized project purposes.
		Florida Concept Protects M&I intakes at Lake Lanier (i.e., intakes at elevation 1045 ft and below)	Operations under the current water control plan take into consideration the locations of the water supply intakes in making water management decisions, but there is no provision to maintain lake levels above the water supply intakes. Such a provision would effectively raise the bottom of the conservation pool and require a change to the water control plan. The Model outputs of the Florida concept and the Concept 5 operation suggest that both plans prevent lake levels from exposing existing water supply intakes at Lake Lanier.

E-19 USFWS letter to CESAM dated 28 February 2007, approving Concept 5 proposal in accordance with RPM3

IN REPLY REFER TO:

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Field Office
1601 Balboa Avenue
Panama City, FL 32405-3721

Tel: (850) 769-0552
Fax: (850) 763-2177

February 28, 2007

Curtis Flakes
Inland Environment Team
Planning Environmental Division
Mobile District, Corps of Engineers
P.O. Box 2288
Mobile, Alabama 36628-0001

Dear Mr. Flakes:

The U.S. Fish and Wildlife Service (Service) has received your letter and Biological Assessment (BA) dated February 15, 2007, regarding modifications to the Interim Operating Plan (IOP) for Jim Woodruff Dam and the associated releases to the Apalachicola River. Reasonable and Prudent Measure 3 (RPM3) of our September 5, 2006, Biological Opinion (BO) for the IOP requires operational modifications that would allow supporting a higher minimum flow (> 5,000 cfs) in the Apalachicola River when reservoir storage and hydrologic conditions permit. The BA describes a proposal called Concept 5 that is intended to achieve the purpose of RPM3. Your letter requests our approval to begin implementing Concept 5 on March 1, 2007, and requests our concurrence with your determination that doing so will either not likely adversely affect listed species or critical habitats or will result in effects that are similar to those addressed in the BO. This letter is the Service's answer to these two requests.

As described in your BA, Concept 5 alters some of the basin inflow thresholds and the associated releases from Woodruff Dam that are included in the minimum discharge schedule of the IOP (Table 1). For comparative purposes, Table 1 shows the thresholds and releases of the IOP both with and without (in italics) the Concept 5 modifications. Concept 5 does not alter the maximum fall rate (down ramping) schedule or other components of the IOP. Changes to the IOP under Concept 5 are limited to the spring months (March through May), and to low flow conditions year-round.

Table 1. Concept 5 minimum discharge from Woodruff Dam by month and by basin inflow (BI) rates (discharge values of the IOP without the Concept 5 modifications are given in italics and enclosed in parenthesis for comparative purposes only).

Months		Basin Inflow (cfs)[a]	Releases from Woodruff Dam (cfs)
March - May	High	>= 35,800 (*37,400*)	Not less than 25,000 (*37,400*)
	Mid	>= 18,000 (*20,400*) and < 35,800 (*37,400*)	>= 70% BI; not less than 18,000 (*20,400*)
	Low	< 18,000 (*20,400*)	>= BI; not less than 6,500 (desired)[b] >= BI; not less than 5,000 (required)[b]
June - February	High	>= 23,000	Not less than 16,000
	Mid	>= 10,000 and < 23,000	>= 70% BI; not less than 10,000
	Low	< 10,000	>= BI; not less than 6,500 (desired)[b] >= BI; not less than 5,000 (required)[b]

[a] The running 7-day average daily inflow to the Corps' ACF reservoir projects, excluding releases from project storage.

[b] Drought provision: when composite storage (Lanier, West Point, and W.F. George) is within zones 1 or 2, the desired release of 6,500 cfs is supported. When composite storage falls into zone 3, the required release of 5,000 cfs is supported until storage returns to composite zone 1.

The IOP is an addition to the reservoir volume zones and schedules of the Water Control Plan (WCP) and is keyed to 7-day-average basin inflow. During the spring months, Concept 5 lowers the basin inflow thresholds and associated releases of the IOP. The general operational effects of these changes are to:

- broaden the high range of basin inflow (wherein the Corps withholds water in the reservoirs without restriction);
- shift the mid range of basin inflow downward (wherein releases are at least 70% of basin inflow); and
- narrow the low range of basin inflow (wherein releases are greater than or equal to basin inflow, but not less than a minimum level).

When basin inflow is in the low range regardless of season, Concept 5 adds a "desired" minimum release of 6,500 cfs to the required minimum release of 5,000 cfs that was already in the schedule. The desired 6,500 cfs minimum release is supported by drafting reservoir storage under certain circumstances, which are defined by the combined volume of water in Lanier, West Point, and W.F. George reservoirs relative to the zones of the WCP. The desired release is supported when composite reservoir storage is within Zone 1, and also within Zone 2, unless the system is refilling from Zone 3 levels and has not yet returned to Zone 1 levels. When storage falls into composite Zone 3, the desired minimum release is discontinued and replaced by the required 5,000 cfs minimum release. Following a drop into Zone 3, support of the desired 6,500 cfs release does not resume until composite storage has refilled to the top of Zone 2 (bottom of Zone 1).

The BA adds two sets of flow analyses to those included in the September 5, 2006, BO of the IOP: 1) flows simulated for the IOP as modified by RPM2 (called IOP Revised [IOPR] in the BA), which increases the threshold for the low range of basin inflow during June through February from 8,000 cfs to 10,000 cfs; and 2) flows simulated for the IOP with the proposed Concept 5 modifications. We find that the methods contained in the BA are consistent with those of our BO.

We have further examined the Corps' Concept 5 model results specifically to determine how the frequency of flows less than 6,500 cfs would be affected by the proposed operational modifications. This analysis was not included in the BA or BO, but is appropriate to include here, since 6,500 cfs is the desired minimum flow supported by these modifications. Table 2 shows how Concept 5 would reduce the number of days of flow less than 6,500 cfs relative to observed flows and the other modeled scenarios. For calendar years 1975-2001, the observed flow of the Apalachicola River at Chattahoochee, FL, was less than 6,500 cfs for 585 days. Consumptive water uses gradually increased to present-day levels during these years. The hydrologic models subtract year 2000 consumptive water uses from unimpaired flow for this period of record to simulate 1,115 days of basin inflow (labeled as run-of-river in Table 2) less than 6,500 cfs. The Concept 5 simulation, which also uses year 2000 consumptive demands, results in 504 days less than 6,500 cfs. Therefore, the Concept 5 simulation is augmenting low basin inflow with releases from storage for 1115-504=611 days (about 6 percent of the period). Concept 5 reduces the number of days in this low-flow range relative to historic conditions and relative to the previous versions of the IOP. Because it achieves a reduction in the amount of time that flow is less than 6,500 cfs while always maintaining a 5,000 cfs minimum flow, the Service finds that the proposed Concept 5 operations are consistent with the purpose of RPM3.

Table 2. Number of days less than 6,500 and 5,000 cfs from Jan. 1, 1975, to Dec. 31, 2001, for the Apalachicola River at Chattahoochee, FL, under observed (Baseline) and simulated (Interim Operations Plan [IOP], Run of River [ROR], IOP as revised by RPM2 [IOPR], Concept 5) operations of the Corps' Federal reservoirs in the basin.

	Number of days 1975-2001				
Flow (cfs)	Baseline	IOP	RoR	IOPR	Concept 5
< 6,500	585	561	1115	560	504
< 5,000	80	0	579	0	0

Various stakeholders provided recommendations regarding RPM3, and we recognize that some of these could possibly provide greater instream flow support consistent with the purpose of RPM3 than the proposed Concept 5 modifications. We asked the Corps to document its review of these recommendations for us, which the Corps provided to us by letter dated February 23, 2007. This review notes whether stakeholder recommendations are addressed by the Concept 5 proposal, are outside of the scope of the IOP (i.e., a departure from the WCP), or would require additional review and evaluation for possible future modifications to the IOP. In order to minimize the impacts of incidental take of listed species as described in the BO, the terms and conditions for RPM3 called for initiating by January 30, 2007, provisions for supporting a higher minimum flow when conditions permit. By letter dated February 2, 2007, we agreed with you to delay this initiation until February 28, 2007. We acknowledge that Concept 5 is the Corps'

proposal for an action, having considered alternatives and stakeholder recommendations, that: 1) fulfills the purpose of RPM3; 2) is consistent with the Corps' authorities; 3) and is feasible for immediate implementation.

The BA considers the effects of Concept 5 on: 1) the flow regime of the Apalachicola River generally; 2) submerged hard bottom substrates (sturgeon spawning habitat); 3) salinity and invertebrate populations in Apalachicola Bay (sturgeon feeding habitat); 4) submerged habitat below 10,000 cfs (mussel habitat); and 5) floodplain connectivity and system productivity. We have reviewed your analyses and find that, as intended, the IOP with the proposed Concept 5 modifications would store more water during the spring months and release more water during low-flow conditions than the IOP without Concept 5. We agree that implementing Concept 5 is likely to reduce the impacts of incidental take authorized in the BO and will not likely result in any additional impacts to listed species and critical habitats that are significantly greater than those already addressed in the BO. Until the Corps evaluates and proposes alternative operations via the adaptive management process under RPM1, the Service agrees to Concept 5 as the means of implementing RMP3 beginning March 1, 2007.

Thank you for the good effort on this task. We look forward to working with you further on system operations and fish and wildlife conservation in the basin. If you have any questions or comments, please contact Jerry Ziewitz at extension 223.

Sincerely yours,

Gail A. Carmody
Field Supervisor