

Section 7 Consultation
Jim Woodruff Dam Water Management Operations
Adjustments to the Interim Operations Plan

Use of 7-Day Moving Average for Computation of Basin Inflows and Releases from Jim Woodruff Dam.

Adjustments have been determined to be necessary to manage releases from the dam to meet the specified minimum percent of basin inflows as described in the Interim Operations Plan (IOP). The IOP describes monitoring the 3-day average basin inflows and making releases based on that average. However, due to the logistics of managing flows with the system, there can often be a several day delay, as long as 7 to 10 days, before rainfall received in the upper basin can be moved and released from Jim Woodruff to the Apalachicola River. Additionally, it is often difficult to predict how much the basin inflow will increase for a given rainfall event or how quickly it may fall once a rainfall event has diminished. By using the 7-day average of basin inflows, it provides a smoother transition when making the necessary adjustment to the releases to accommodate the variations in the basin inflows that result following rainfall events. The 7-day average would also allow smoother transitions and more gradual ramping rates which would aid in minimizing the possibility of stranding of sturgeon or other fish, and be protective of mussels, especially during low flow conditions. Model runs have shown that the 7-day average allows for a smoother transition than when the 3-day average is used and helps to minimize the impacts due to excessive use of storage to meet the gradual ramping rates.

Therefore, we plan to use the 7-day moving average in the IOP as a means of making release decisions at Jim Woodruff Dam. It will also be used in conjunction with the volumetric computation described below as the means to determine compliance with the criteria specified at the various thresholds as described in the IOP.

Use of Chattahoochee Gage in Computation of Basin Inflow

The documented variation in the flows between the Woodruff Discharge and the flow at the Chattahoochee Gage on the Apalachicola River may be the result of differences in the estimated turbine and spillway discharge ratings and due to other flow movements beneath the dam that are not readily measurable. Therefore, a revised method of computing the basin inflow is necessary to closely tie the basin inflow computations to actual flow observed at Chattahoochee gage. The computation of the basin inflow will substitute the average daily flow at Chattahoochee gage recorded at midnight in place of the 24-hour average discharge currently recorded at Jim Woodruff Dam. This results in a recomputed local inflow for Woodruff/Chattahoochee that could then be substituted into the overall computations of basin inflow.

Basin Inflow = Local Inflow at Buford + Local Inflow at West Point + Local Inflow at George +
Recomputed Local Inflow at Woodruff/Chattahoochee.

Since the Chattahoochee gage is a widely recognized and accepted indicator of flows on the Apalachicola River and is routinely maintained and calibrated by the U.S. Geological Survey, it is recommended that the Chattahoochee gage be used in the computations of basin inflow which will better integrate the Corps operations and computations with an accepted and easily accessed reference point. The Chattahoochee gage will continue to be the reference point for determining the quantity of flows on the Apalachicola River. The Jim Woodruff Powerhouse operators, at the instruction of the Corps Water Management Section, will make the necessary releases to match the specified flows required at the Chattahoochee gage.

Ramping Rates

Another recommendation is that the releases necessary to provide for gradual ramping rates should be considered as part of the computed release in order to avoid over-releases that could adversely impact storage in upstream reservoirs. When basin inflows decline rapidly, as occurs after sporadic rain events or flood pulses, the requirement to make releases with much more gradual ramping rates than the rate of declining basin inflows means more storage would be required to provide the gradual ramping of releases, resulting in the release of more than 100 percent of basin inflow. In order to more closely match releases to basin inflows when managing releases after rain events, the Corps proposes to release less than the peak basin inflow during the rain event (as measured by the 3-day average basin inflow), but use the balance to assist in providing smoother transitions and more gradual ramping rates. This represents more of a volumetric computation of the amount of inflows and releases, rather than trying to follow daily fluctuations in the basin inflows - which is difficult if not impossible to achieve from a system management perspective. As discussed in the earlier paragraph regarding the 7-day average, it is expected that using the 7-day average will minimize the over-releasing and aid in achieving the ramping down rates that are necessary when basin inflows decline. The required volume as computed in relation to the volume of basin inflow would still be released

Another clarification to the IOP is to identify the appropriate ramping rates associated with flood control operations following a rain event, and other threshold values associated with the appropriate gradual ramping rates. The actual ratings for the new turbines at Jim Woodruff Powerhouse is around 16,000 cfs rather than 18,000 cfs, so the IOP table has been revised to reflect a ramping down of flows at rates of 0.25 to 0.5 ft/day when releases are between 8,000 cfs and 16,000 cfs, and at rates between 0.5 and 1.0 for flows between 16,000 cfs and 20,000 cfs. When operating for flood control purposes, releases can usually be made at rates less than 2.0 ft/day when flows are less than 30,000 cfs. It is difficult to ramp down gradually and not prudent to do so (either inconsistent with the flood control purpose or would require excessive storage needlessly) when flows are greater than 30,000 cfs. Therefore, for flood control purposes the IOP table has been revised to reflect a ramping down rate of between 1.0 to 2.0 ft/day for flows between 20,000 cfs and 30,000 cfs (unless a greater rate is necessary under emergency conditions), and no required ramping rate for flows greater than 30,000 cfs.

Volumetric Computation of Basin Inflows and Releases

During consultation discussions, FWS has noted that it is better for the species to maintain a steady flow for longer periods than to provide for numerous fluctuations in attempts to match the basin inflow exactly. For this reason, as well as for better management of the water resource, it is recommended to use the volumetric method for comparison of inflows to releases.

Due to the lag time between adjustments of the discharge in response to the basin inflows, and to avoid unnecessary short-term fluctuations in releases, it is proposed that a volumetric computation of the basin inflows and releases on the Apalachicola River be maintained on a continuous basis. This would allow the opportunity to compare the volumes of inflows and releases as a means of tracking compliance with the IOP, especially during periods when the goal is to match releases with basin inflows. By tracking the volumes, it will also provide an indication of the magnitude of any temporary imbalance of the volumes which could allow for periodic adjustments to the releases to bring the differences in the volumes closer to 0 percent. The 7-day average would be computed on a continuous running average basis and the volumes would be computed each day. Whenever the difference in volumes exceeds 5%, a readjustment shall be made to the discharges from Jim Woodruff Dam and recorded at the Chattahoochee gage. This readjustment would be consistent with the other requirements of the IOP, such as ramping rates, thresholds, etc. In the event that rebalancing can be done through other operations, such as flood operations or when the basin inflows are at thresholds that require the minimum 70 percent of basin inflows releases, the Corps will make the rebalancing adjustments as necessary.

The intent of the 7-day average, volumetric computation, and readjustments is to compensate for and minimize the potential for over-releasing due to the gradual ramping rates and to allow for any adjustments that will allow the IOP to achieve the goals of each threshold criteria.

Therefore, we plan to maintain volumetric computations of the basin inflows and releases on the Apalachicola River as necessary for compliance at the various threshold levels. In the event that the differences in the volume balances exceed 5 percent, a readjustment will be made consistent with the areas discussed in the previous paragraph, in order to assure that the required flow releases are made (i.e., 100 percent basin inflow, or minimum 70 percent basin inflow, as appropriate.).

Consideration of Jim Woodruff Hydropower Operations

It is proposed to also incorporate into the IOP the existing hydropower generation operation that occurs at Jim Woodruff powerhouse, where releases are temporarily increased for a few hours daily to meet contractual hydropower demands, as described in the enclosed memorandum for record. During this operation, releases may result in a temporary increase in local stages above the base flow release for that day, but releases will not decline below that base release during the day due to this operation. Therefore, the temporary increase in power generation should not significantly affect the ramping rates described in the IOP. The results of this operation can be

observed in the daily gage readings for the Chattahoochee gage. Releases made as a result of this operation are included in the volumetric computation of the release for that day, and do not result in a net increase in the volume of releases made from Jim Woodruff Dam.

Adjusted Flow Threshold for Months of June – February

The flow thresholds and operating plan for the months of June – February are intended to be protective of young sturgeon, listed mussels, and host fish for the listed mussels. The 8,000 cfs threshold is based on the flow necessary to fully inundate documented mussel habitat. Flows above 8,000 cfs are considered necessary to assure that host fish necessary for successful reproduction of the listed mussels maintain access to important spawning, rearing and feeding habitats in the off channel and adjacent floodplain areas. Further consideration of operations under the IOP under extended dry conditions have led us to propose an adjusted upper flow threshold for the months of June – February. The IOP submitted in the 7 March request to initiate formal consultation included an upper flow threshold of 37,400 cfs. Excess basin inflow above this threshold could be stored with no restriction; up to 30 percent of basin inflows less than or equal to 37,400 cfs and greater than 8,000 cfs could be stored; and 100 percent of basin inflows would be released for basin inflows of 8,000 cfs or less. We have concern that the flow threshold in the IOP may be overly restrictive and not allow sufficient refill of storage when significant rain events occur during the low flow months, as well as during the winter months of December through February. We have completed a review of average monthly flow data for June through February (see Enclosure 35 to our 7 March letter); the flow needs for potential host fish spawning and nursery habitat in the adjacent floodplain areas during the summer and fall months, as previously provided by the Florida Fish and Wildlife Conservation Commission by letter dated 12 November 2002; and the estimated area of adjacent floodplain connected for various flow levels, as documented by the U.S. Geological Survey (USGS Professional Paper 1594, Aquatic Habitats in Relation to River Flow in the Apalachicola River Floodplain, Florida). Based on this review, we propose adjusting the upper flow threshold to a lower flow level that would still provide for access to floodplain habitat for the potential host fish species necessary for successful reproduction by the listed mussels. We propose to reduce the upper flow threshold value of 37,400 cfs in the IOP for the months of June – February to 23,000 cfs. For basin inflows below 23,000 cfs, a release equivalent to 70 percent of basin inflows would provide for up to 16,000 cfs release during the non-sturgeon spawn portion of the year. There would be no restriction on storage for inflows greater than 23,000 cfs and up to 30 percent of inflow could be stored for flows between 23,000 cfs and 8,000 cfs. The 16,000 cfs flow is important because data indicate that it will provide sufficient flow for mussel host-fish, as well as provide connectivity between the main channel of the Apalachicola River and back channel areas used by mussel host-fish as well as young Gulf Sturgeon. This flow is equivalent to approximately the average monthly flow levels for June – August. At this flow level there is still approximately 7,000 acres of floodplain habitat connected to the river channel; at a flow of 8,000 cfs, there are only several hundred acres of floodplain habitat available. This adjustment to the IOP will allow additional waters to be stored when hydrologic conditions permit. The additional stored water would be used to support federal project purposes and would be available for future augmentation flows as necessary to support the listed mussel species during extended low flow

periods. The enclosed preliminary modeling results demonstrate the proposed change and anticipated changes on upstream storage over the period of record for 1939-2001.

The proposed adjustment to the IOP would result in the following operations for June – February:

- BI \geq 23,000 cfs, then release at least 16,000 cfs
- BI \geq 8,000 cfs and $<$ 23,000 cfs, then release at least 70 percent BI, but not less than 8,000 cfs
- BI $<$ 8,000 cfs, then release \geq BI but not less than 5,000 cfs

Future Adjustments to Flow Threshold Values

The current IOP table contains various flow threshold values such as the 37,400 cfs, below which at least 70 percent of basin inflows would be released and 20,400 cfs below which at least 100 percent of basin inflows would be released during the March-May sturgeon spawning period. These flow thresholds represent the range of flows within which sturgeon eggs were collected during the 2005 spawning period. Monitoring of sturgeon spawning success was repeated during this 2006 spring spawning period, which was an extremely dry season, and sturgeon eggs were collected within in a range of much lower flows. We are awaiting the results of this year's monitoring, but propose to re-evaluate the necessary flow thresholds for inclusion in the IOP table once we have the opportunity to review the more recent monitoring data. It is possible the thresholds for releasing at least 70 percent of basin inflows and for releasing 100 percent basin inflows during the spring spawning period could be adjusted downward, if justified by review of the data. We are also completing a computation of the available hard bottom spawning habitat at various flow levels for the upper Apalachicola River. This data could also be used in conjunction with the sturgeon spawning monitoring data to determine the appropriate threshold values. Additional adjustments to the IOP could be made if future continued monitoring demonstrates a need to adjust the operations plan, and/or that the proposed adjustments would still be protective of the Federally-listed species. This would be consistent with adaptive management of the IOP as new information or better data becomes available. In the event a proposed adjustment or change to the IOP is determined to be a significant change, then formal consultation pursuant to Section 7 would be re-initiated. If the proposed modification is determined not to be significant, then the modification could be addressed as an amendment to the Biological Opinion.