DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
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APR 30 2007

REPLY TO
ATTENTION OF

Inland Environment Team
Planning and Environmental Division

Dr. Carol Couch, Director
Environmental Protection Division
Georgia Department of Natural Resources
2 Martin Luther King Jr. Drive
Suite 1152, East Tower
Atlanta, Georgia 30334

Dear Dr. Couch:

This is in response to your letter dated April 9, 2007. As you are aware, in March 2006 we initiated formal Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA) to determine the impacts of our existing operations at Jim Woodruff Dam and releases to the Apalachicola River in support of several federally-listed species. As you note, we received comments from the State of Georgia, as well as other stakeholders in the basin, during the consultation process. We also specifically solicited input from the States and stakeholders during two technical workshops held on May 24-25, 2006, and July 12, 2006, to ensure that the appropriate modeling tools and other information were used during our evaluation of the proposed operations in support of endangered and threatened species. We considered the comments submitted by you and your staff, as well as comments received from other stakeholders, in developing a revised interim operations plan (IOP), which was submitted on June 12, 2006, for consideration by the USFWS. This revision was developed to provide lower flow thresholds for the non-spawn season, and to provide for volumetric balancing of releases in order to minimize over-releases due to controlled ramping down of flows to minimize standing and/or exposure of listed species or host fish for listed mussels. Additional information, including recent monitoring data on the Gulf sturgeon and listed mussels was considered by Mobile District and the USFWS in completing the formal consultation and issuance of the Biological Opinion (BO) by USFWS on September 5, 2006.

The BO contains five reasonable and prudent measures (RPMs) and mandatory terms and conditions for implementing the BO in order to minimize and reduce the impacts to the listed species. RPM3 recognized that during most periods, a higher flow than the 5,000 cfs minimum flow prescribed in the Apalachicola, Chattahoochee, Flint Rivers ACF water control plan can be maintained in support of the listed mussel species. However, RPM3 also recognized that during periods of sustained drought, it would not be reasonable or prudent to maintain the higher flows.

A drought provision was developed to identify those climatic and hydrologic conditions, based on the impacts to composite storage within the basin, when reversion to the lower 5,000 cfs required minimum flow would be "triggered." An additional technical workshop was held with the States and stakeholders on December 13, 2006, in order to consider the proposed concept for a drought provision operation, and to solicit additional comments/information. Several comments and alternative concepts were submitted for consideration, including your letter dated January 9, 2007. These comments and suggestions were considered in finalizing a revised IOP operation pursuant to RPM3. The revised IOP operation was approved by the USFWS on February 28, 2007, and we are currently operating in accordance with this plan. The RPM3 drought provision operation was determined to be supportive of Gulf sturgeon, critical habitat for Gulf sturgeon, the mussel species, and host fish for the listed mussel species, using evaluation criteria similar, if not identical, to that used in the BO.

We share your concerns that we could be entering a multi-year drought and could experience sustained low flows in the upcoming months. We would note, however, that the reservoirs in the ACF basin are primarily impacted by the sustained low basin inflows, rather than discretionary water management actions that might be taken by the U.S. Army Corps of Engineers (Corps).

Even during sustained drought conditions, we must continue to operate Corps reservoirs to serve multiple water resources purposes in the basin in a balanced manner, including the demands necessary to support the federally-listed endangered and threatened species. The Corps operates the system in a manner that maximizes storage in the reservoirs consistent with meeting the needs of all the authorized project purposes. Results from our modeling and our experience during previous drought conditions, as in 1998-2001, demonstrate that some project purposes, such as navigation and hydropower, may be adversely impacted as we manage for drought; however, the public health and safety, water supply, and environmental demands, including releases for water quality, and fish and wildlife resources are still met.

Although conditions in the basin are abnormally dry this year, the reservoirs on the ACF system, other than Lake Lanier, are operating close to their "top of conservation" levels. The IOP has not impacted our ability to reach these levels at West Point Lake, Walter F. George Lake, and Lake Seminole. Lake Lanier is currently approximately two feet below where it would normally be at this time of year.

The IOP makes allowance for drought conditions by requiring that only the basin inflow be released as inflows continue to fall until the minimum flow thresholds in the currently approved IOP operation are reached. Once flows reach as low as 6,500 cfs, we will attempt to sustain that flow as long as possible provided storage in the upstream reservoirs is not significantly affected, as determined by tracking the composite storage in the basin. The approved drought provision in the IOP provides for a more conservative operation once the composite storage falls below Zone 2. At that point, releases would be drawn from storage, as necessary, to maintain the required 5,000 cfs minimum flow, which was also the required

minimum flow in 2000 before the IOP was developed. Should this occur, a significant drawdown of the reservoirs could result during a sustained drought.

In order to evaluate the possible impacts of continuing drought conditions on the ACF basin we modeled the IOP operations incorporating the current IOP drought provision, using projected flows similar to the 2000-2001 hydrologic conditions, and using essentially the same assumptions that Dr. Zeng used, except for the estimated agricultural water use in the Flint Basin. A presentation of our modeling results is enclosed. Our analysis indicates that the lakes would drop, but not as severely as Dr. Zeng's analysis suggests. Our modeling shows that Lake Lanier remains above elevations observed in 2000 (elevation 1056.5 feet, 13.5 feet below elevation 1070 feet), West Point Lake remains 2 feet above the bottom of conservation pool and in this range (2 to 3 above the bottom) for 15 days or 2 percent of time; Walter F. George Lake remains 1 foot above the bottom of conservation pool and in this range (1 to 2 feet above the bottom) for 32 days or 5 percent of time. The year 2000 is the most severe drought year during the 65-year model simulation, and 1999 to 2001 is the most severe 3-year period. By imposing these severe hydrologic conditions on the ACF system, the reservoirs will be drawn down even under the most conservative operating scheme. It is important to note that our modeling indicates that the reservoirs remain above the lowest historical pool levels, despite using the most severe hydrologic period conditions.

We believe the differences in our modeling results stem from different assumptions about estimated agricultural water use in the Flint Basin. Comparison of the models provided by Mobile District and Georgia at the July 2006 workshop identified that the difference in net demands for Jim Woodruff and the Flint River are mostly attributed to differences in agricultural demands. As you may recall, basin inflow is a computed value based on measured changes in reservoir pool levels together with streamflow gage measurements. Accordingly, computed basin inflow decreases as withdrawals increase because the withdrawals are implicitly reflected in reservoir and stream gage data. Consequently, the Jim Woodruff required discharge is reduced, because it is a function of the basin inflow. However, in the HEC-5 modeling effort, if the basin inflow is not recomputed to compensate for the Flint River irrigation withdrawals, then the HEC-5 model meets the Jim Woodruff discharge requirement by drawing on storage thereby over-compensating for the agricultural withdrawals. When the basin inflow falls below 5,000 cfs, we must maintain the minimum flow of 5,000 cfs as required by the current Water Control Plan. The greatest impact of the failure to adjust for the agricultural withdrawals occurs in this situation.

We have reviewed your latest recommendations, and also note that we have considered the recommendations you presented in your January 9, 2007 letter (a copy of this letter is enclosed for your reference). Below is a summary of your recommended changes to the IOP, our considerations of your recommendations, and how they were addressed in our consultation with USFWS to develop a drought provision operation under the IOP.

1. Establish Flow Thresholds of 10,000 cfs – 11,000 cfs March – May. As described in the supporting documents for the IOP, the March-May basin inflow thresholds and

associated releases from Jim Woodruff Dam were established to provide support not only for Gulf sturgeon spawning, but also to provide for sufficient floodplain habitat inundation for species identified as host fish for the listed mussel species. As described in the BO, "These productive areas (floodplain habitats) most likely serve as spawning and rearing habitats for one or more of the host fishes of the purple bankclimber and fat threeridge" (USFWS 2006). Although flows in the range of 10,000 cfs – 11,000 cfs might provide an adequate amount of Gulf sturgeon spawning habitat, our consultation history with the USFWS suggests that these flows could potentially result in significant impacts to the amount of floodplain habitat inundated for use by the listed mussel host fishes. You may recall that the proposed drought provision concept we presented at the Drought Provision Workshop on December 13, 2006 included a proposed reduction of the upper and lower basin inflow thresholds for the spawning period. However, as described in the Biological Assessment for RPM3 submitted to the USFWS on February 16, 2007, we determined that the proposed reductions in the thresholds for spring releases would potentially result in adverse effects to the listed mussels by negatively impacting flow regime characteristics relevant to host fishes (specifically the amount and duration of connected floodplain habitat). This determination was derived by modeling the proposed changes and evaluating impacts utilizing the same statistical and effects analyses as prepared by the USFWS in the BO, and led to the development of a revised concept for the drought provision that identified a lower basin inflow threshold of 18,000 cfs. It is reasonable to assume, based on the analysis of modeling conducted in development of an RPM3 drought provision operation that spring flow thresholds in 10,000 cfs -11,000 cfs range could also result in adverse impacts to listed mussels and their host fish.

Based on our consultation history with the USFWS, we also believe your proposed reduction in spring releases may adversely impact estuarine feeding habitat for juvenile and adult Gulf sturgeon. In order to evaluate the effects of the IOP on sturgeon estuarine feeding habitats, the USFWS considered flow regime alterations (specifically the maximum number of consecutive days per year of flow less than 16,000 cfs). As described in the BO, "Floodplain inundation is also critical to the movement of organic matter and nutrients into the riverine feeding habitats of both the mussels and juvenile sturgeon, and into the estuarine feeding habitats of juvenile and adult sturgeon" (USFWS 2006). Again, it is reasonable to assume, based on our other analyses, that limiting spring releases to your proposed values during dry conditions will increase the maximum number of consecutive days per year of flow less than 16,000 cfs as compared to the Baseline and Run of River values. In the BO, the USFWS determined that actions resulting in a substantial flow regime feature alteration could adversely impact important estuarine feeding habitat for Gulf sturgeon in Apalachicola Bay.

The reduction to spring flow thresholds prescribed by the RPM3 drought provision modifications to the IOP, as approved by the USFWS, were based on the best available scientific data, relating to Gulf Sturgeon and listed mussels and their host fish habitat needs, and allows additional opportunities for storage compared to the original IOP.

2. Specific Adjustments to Flow Thresholds under the IOP. The three specific adjustments you suggest appear to have been developed to allow for more storage than

the current IOP allows. These suggestions were also included in your January 9, 2007 letter and were considered during the development of the modifications to the IOP as required by RPM3 of the BO. The current approved IOP includes greater opportunities for storage as compared to the original IOP. Although the spring thresholds in the current IOP are not as low as your suggested 10,000 cfs – 11,000 cfs, modifications to the original IOP were made that allow for storage of up to 30 percent of the basin inflow when flows are between 35,800 cfs and 18,000 cfs during the Gulf sturgeon spawning period. At flows greater than 35,800 cfs no limit on storage occurs as long as at least 25,000 cfs is being released from Jim Woodruff Dam. During dry springs, these rules will likely result in operational releases that are comparable to your recommendation of avoiding releases above 23,000 cfs except when necessary for flood control operations. Although no additional opportunities for storage were made for the June – February time frame as compared to the original IOP, the use of composite storage to determine when flows greater than 5,000 cfs can be sustained helps to ensure that maintenance of the higher desired 6,500 cfs minimum flow will not significantly impact our ability to meet other authorized project purposes. This technique is consistent with your recommendation to utilize reservoir levels to determine when minimum flows greater than 5,000 cfs can be sustained during dry periods.

3. Loosen Rampdown Rate Restrictions. The ramping rate schedule prescribed by the current IOP was developed based on the needs of the federally listed species occurring in the Apalachicola River and on an attempt to replicate natural fall rates. Lower flows are assigned more gradual fall rates, and higher flows are assigned higher fall rates. The intent of the IOP maximum fall rate schedule is to limit the potential for stranding aquatic organisms, including listed species and host fish for listed mussels, in areas that may become exposed or become disconnected from the main channel during periods of declining flow. The more gradual fall rates prescribed when flows are less than 20,000 cfs may require the use of stored water from the reservoirs. The current IOP includes several measures to prevent or offset loss of storage due to ramping. By using a 7-day moving average basin inflow calculation to determine the minimum daily release from Jim Woodruff Dam, daily fluctuations in basin inflow are dampened and less extreme day-to-day changes in the required minimum release are experienced. As described in the BO, this dampening should generally, but not always, yield a required minimum release that is also consistent with the ramping rate schedule without the release of additional water from storage. However, since the use of storage will be required to meet the gradual ramping rates a portion of the time, volumetric balancing is used to prevent a substantial drawdown of storage while following declining basin inflow. Volumetric balancing tracks the volume of basin inflow and releases. When the volume of releases required for ramping exceeds the volume of basin inflow during a given period, subsequent releases are adjusted to replenish the storage that was used for down ramping. We believe this approach addresses your concerns that over releases due to gradual ramping rates be avoided.

4. Determine Reservoir Releases Based on Remaining System Storage. We understand your concern with the Corps' ability to refill reservoirs (especially Lake Lanier, due to its large size and limited drainage area) during extended drought periods under the IOP. However, we believe that most of the delays in refill are attributable to the lack of precipitation in the upper basin and not to the IOP. Therefore, the slower refill at Lake Lanier this year appears to be due to the abnormally dry conditions. If the current dry conditions continue or worsen, we would continue to make releases that approximate basin inflows as basin inflows decline. The IOP would not require any substantial releases to be made from storage until the basin inflows fall below 6,500 cfs, as described in the RPM3 drought provision operation. At that time, the IOP provides for the use of storage to augment basin inflow to sustain the higher desired minimum flow of at least 6,500 cfs, as long as the composite storage is not significantly impacted (i.e., composite storage remains in Zones 1 or 2). Once the composite storage falls into Zone 3, the required minimum release is reduced to 5,000 cfs until the composite storage within the basin recovers to Zone 1. As previously noted, the 5,000 cfs minimum flow is required by the current Water Control Plan operations. As such, storage used to augment basin inflow to meet the 5,000 cfs minimum flow would be required regardless of whether or not the IOP was in place.

5. Avoid Releases in Excess of Flow Thresholds. As described in the supporting documents for the IOP, the IOP rules prescribe minimum requirements for releases and generally releases will be higher than those prescribed during normal flow conditions. During a given month and basin inflow rate, releases will generally be greater than the IOP minimum releases, consistent with the maximum fall rate schedule, due to releases made for other project purposes such as hydropower operations, flood control operations, balancing of reservoir levels, etc. During wet periods, releases may substantially exceed the minimum release values, but during dry periods, releases will more closely match the minimum release values, as the Corps operates to conserve reservoir storage for authorized project purposes and future endangered and threatened species augmentation flow needs. During dry periods water managers do limit releases in excess of the flow thresholds to the extent practicable. Additionally, during dry periods the use of volumetric balancing offsets the loss of storage due to down ramping releases that require greater flows than prescribed by the basin inflow value.

It should be noted that RPM1 of the BO provides for adaptive management as new information becomes available or as conditions change. We will continue to gather information that can improve our operations in support of the listed species. We are also continuing to gather more information to assist in determining the status of the federally-listed species and critical habitat for the species, which will assist in possible future adaptive modifications to our operations, as necessary, and to assist in future consultations related to water management and water supply needs in the basin. This summer we will conduct a sedimentation/river morphology evaluation pursuant to RPM4 and initiate work toward a long-term mussel monitoring plan pursuant to RPM5. We also intend to continue to consider technical information from the States and stakeholder groups to assist in improving our water management operations and protection of the endangered and threatened species.

Sustained dry conditions and increasing competition for dwindling water resources emphasizes to all parties the importance of reaching a resolution toward the equitable sharing of water resources in the basin. I would encourage you and the other States to continue working toward this end. As always, the Mobile District stands ready to assist in this effort wherever possible.

Sincerely,

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

Enclosures