

## Enclosure 1

### Interim Operations Table

**U.S Army Corps of Engineers, Mobile District  
Interim Operations 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)	Justification
March - May	>= 37,400	not less than 37,400	Max. known flow of sturgeon spawning in the Apalachicola. All of rock shoal inundated by more than 4.59 ft. Majority of floodplain aquatic habitat (61%) in which mussel fish hosts may spawn is connected to the main channel. Peak flows of this magnitude or greater have occurred in all but 5 out of 85 years of record. No evidence of adverse effects to listed species if Corps stores BI above this level in these months while observing down ramping rates.
	>= 20,400 and < 37,400	>= 70% to 90% BI; not less than 20,400	In 2005 successful sturgeon spawning was documented to occur between 20,400 cfs and 37,400 cfs. All of rock shoal habitat at NM 105 is inundated in this range, and most (>73%) inundated with > 4.59 ft (the min. reported depth of Gulf sturgeon spawning in any river). Storing up to 10% of BI (i.e., releasing >= 90% BI) in this flow range would insignificantly affect the area of the rock shoal inundated or other characteristics that may influence its suitability as spawning habitat. During normal to wet periods releases would equal or exceed 90% BI. During extended dry or drought periods, if composite storage is less than full, it may be prudent to release less than 90% in order to all some refill for future augmentation flows. Releases between 70% and 90% of basin inflow would still provide access for spawning to between 74% and 100% of the rock ledge habitat at NM 105.
	< 20,400	>= BI; not less than 5,000	No discretionary action except flow augmentation and ramping rates. 5000 cfs is the minimum condition to ensure using water stored during discretionary actions in other flow ranges and time periods.

Months	Basin Inflow (BI) (cfs)	Releases from JWLD (cfs)	Justification
June - February	$\geq 37,400$	not less than 37,400	Majority of floodplain aquatic habitat (61 %) in which mussel fish hosts may spawn and rear is connected to the main channel. Peak flows of this magnitude or greater have occurred in all but 5 out of 85 years of record. No evidence of adverse effects to listed species if Corps stores BI above this level in these months while observing down ramping rates.
	$\geq 8,000$ and $< 37,400$	$> 70\%$ to $90\%$ BI; not less than 8,000	Max. known stage of listed mussels on the river bed (8000 cfs). Storing up to 10% of BI (i.e., releasing $\geq 90\%$ BI) in this flow range would insignificantly effect habitat features relevant to sturgeon and mussel conservation in these months while observing down ramping rates. No mussels would be exposed. During normal to wet periods releases would equal or exceed 90% BI. During extended dry or drought periods, if composite storage is less than full, it may be prudent to release less than 90% (store some water from rain events) in order to allow some refill for future augmentation flows. Water stored during these conditions would be available for future augmentation to maintain flows above BI when $8000 \text{ cfs} > \text{BI} \geq 5000 \text{ cfs}$ , and above 5000 cfs when $\text{BI} < 5000 \text{ cfs}$ .
	$< 8,000$	$\geq \text{BI}$ ; not less than 5,000	No discretionary action except flow augmentation and ramping rates. 5000 cfs is the minimum condition to ensure using water stored during discretionary actions in other flow ranges and time periods.

## Down Ramping Rates

Release Range	Maximum Fall Rate (ft/day), measured at Chattahoochee gage	Justification
Exceeds Powerhouse Capacity* (~18,000 cfs)	0.5 to 1.0 ft/day	Apalachicola River fall rates of greater than 0.5 ft/day were extremely rare prior to construction of the Corps ACF projects (analysis of gage records from the 1920s to present), except during flood pulses. Mussels and early sturgeon life stages have limited mobility to avoid stranding. The Corps ability to control fall rates at less than 0.5 ft/day when releases exceed the powerhouse capacity is very limited, but the stranding risk to listed species at these high flows is also limited (e.g., all of the known sturgeon spawning rock shoal is inundated by flows greater than 18,000 cfs). Previous operations have attempted to produce a fall rate of 0.5 ft/day or less whenever flows are less than 20,000 cfs, and less than 1.0 ft/day at flows greater than 20,000 cfs. These rates represent the best attempt within current capabilities to limit stranding risks of other species in the floodplain, such as potential mussel host fishes. Rates will approximate 0.5 ft/day, but not more than 1 ft/day except in emergency conditions.
Within Powerhouse Capacity and > 8,000 cfs*	0.25 to 0.5 ft/day	More gradual (lesser) fall rates become a greater conservation concern at flows that approach the stages at which the mussels are found and are achievable when releases are from the powerhouse instead of the spillway gates. 8,000 cfs is the highest stage at which the listed mussels are found. Fall rates of approximately 0.25 ft/day in advance of this stage gives mussels several days to move to lower bed elevations. 9,000 cfs provides approximately 0.5 ft or greater above the highest-stage listed mussels.
Within Powerhouse Capacity and <=8,000 cfs*	0.25 ft/day or less	8,000 cfs is the highest stage at which the listed mussels are found and when the most gradual rates are required if flows decline further. Fall rates of approximately 0.25 ft/day give the mussels several days to move to lower elevations. Rates of less than 0.25 ft/day may be possible when making releases from the powerhouse, but are more difficult to achieve (incremental reduction in releases of 500 cfs/day approximates 0.25 ft/day). Previous operations have been in range of 0.25 and 0.5 ft/day during sustained low flow periods. These rates appear to be within the tolerance of the two species ability to move to lower stages. It is supported mainly by the fact that they are present at stages above 5000 cfs after several years of flows hovering around 5,000 cfs for extended periods during the drought of 1998-2002.

\*Consistent with safety requirements, flood control purposes, equipment capabilities.

**Note:** These operations are considered sufficient to minimize adverse effects on the listed species to the maximum extent practicable or feasible based on equipment constraints, and safety concerns. Consideration is also given to the need to balance releases to the river with the need to refill or conserve storage in upstream reservoirs in the interest of having adequate storage in later months when augmentation flows may be necessary to protect listed mussel species. Any of the numbers in this table are subject to revision based on better information that may be developed during the Section 7 consultation process. FWS recommends the release of 90% of BI as the degree to which the Corps could store water during intermediate flow ranges (i.e., March through May when BI is between 37,400 cfs and 20,400 cfs; and June through February when BI is less than 37,400 cfs and greater than 8,000 cfs) such that the amount of flow depletion would not measurably alter habitat quality features in those flow ranges (e.g., temperature, DO, channel area inundated, etc.). Although this requirement can be met during normal to wet periods, it may not be reasonable or prudent during extended dry or drought periods. Therefore, the Corps proposes a sliding percentage between 90% and 70% BI that would be released during extended dry or drought periods. The goal would be to release 90% BI. In the event this was not feasible or prudent (i.e. would prevent sufficient refill or conservation of storage to guarantee future augmentation flows for mussels or to meet other critical project purpose needs), then informal consultation discussions would be conducted with FWS to determine the appropriate percentage release and the justification for the reduced percentage release. The release to the Apalachicola River would be at least 70% BI. The 70% to 90% BI release would assure that at least 74% of the rock ledge spawning habitat at NM 105 would be submerged to a depth of 4.59 ft or greater during spawning periods during these intermediate flows during this discretionary action. No mussels would be exposed during these intermediate flows due to discretionary action. Any reduction in releases would represent a trade-off of minimal impact on other habitat or host species requirements in order to provide future augmentation flows as required to prevent or minimize mussel mortality due to exposure.