

Katrina Grantz, Program Manager  
Glen Canyon Dam Adaptive Management Program  
Upper Colorado River Region  
Bureau of Reclamation  
Salt Lake City, UT

Dear Katrina:

High Flow Experiments (HFE) are a valuable tool for conserving sediment and building recreational beaches in Marble and Grand canyons. At the same time, there are times when the benefit to sand conservation are outweighed by the risk or impacts to other high values resources of concern to the Glen Canyon Dam Adaptive Management Program (GCDAMP). The HFE protocol allows for careful consideration of these risks and impacts in determining whether to implement an HFE. Currently, there appears to be sufficient sediment to meet the trigger for an HFE. However, we believe that a fall HFE should be deferred in 2018 because of the potential impacts on other resources and goals identified in the Long Term Experimental and Management Plan (LTEMP).

The conditions that led to last year's motion that was passed unanimously by the Adaptive Management Work Group (AMWG) have not changed or been addressed:

“AMWG informs the Department of the Interior that it has concerns about the risks posed by brown trout to native fish (including the endangered humpback chub) and the rainbow trout fishery, and the potential connection between recent increases in brown trout catches and fall HFEs. AMWG encourages a decision-making process for the 2017 Fall HFE that considers all the new data from the brown trout workshop, and requests that the decision-making process give due weight to the risks associated with the possible expansion of brown trout when deciding whether an HFE should be conducted. AMWG also encourages the due consideration of tribal concerns in this decision-making process.”

In addition, the continued presence of green sunfish in the slough area, which led to deferring the 2015 fall HFE, persists and is now compounded by reports of smallmouth bass and striped bass joining them. A clearly defined strategy for permanently managing the risks associated with nonnative fish in the slough area has yet to be decided. In addition, recent scientific information from the Grand Canyon Monitoring and Research Center (GCMRC) that has been made available since the LTEMP was finalized indicates that repeated fall HFEs may be linked to:

- Increases in rainbow trout in Marble Canyon (including possible increases in rainbow trout spawning and recruitment in Marble Canyon);
- A reduction in the condition of the aquatic food base, the quality of the Lees Ferry rainbow trout fishery, and the condition of the endangered humpback chub at the Little Colorado River; and

- Inadequate persistence and availability of sandbars in Marble Canyon and other critical reaches into the high-use summer boating season.

Attachment 1 provides a more complete summary of these concerns.

Based on these concerns, the AMWG supported a scientific assessment by GCMRC of the effects of past HFE's on high valued resources of concern to the GCDAMP. GCMRC agreed to report its finding at the February 2019 Annual Reporting meeting and the March 2019 AMWG meeting. Based on the risks and uncertainties noted above, we the undersigned are requesting that the HFE Technical Team recommend that a fall HFE be deferred in 2018.

Thank you for your consideration.

Sincerely,

John Jordan, John Hamill, Jim Stroger, and Bill Persons

Recreational Fishing Representatives—AMWG and TWG

cc HFE Technical Team

AMWG and TWG members

**Attachment 1.** Recent scientific papers and presentations from GCMRC regarding effects of fall HFEs on impacts of fall HFE's on areas of biological concern.

**Brown trout and fall HFEs.** Excerpts from [Runge et al. 2018](#); Brown trout workshop paper: Summary (pg. 73-74): Since 2013, there is evidence for at least one very large immigration event and an increase in reproductive success. It is possible that fall HFEs have played a complicated role in encouraging immigration of large brown trout from downstream reaches. There is a 64-percent chance the intrinsic growth rate is large enough to sustain long-term growth; under this circumstance we forecast the population growing to 3 times, or possibly even 10 times, the current size. There is good reason to believe that downstream migrants could increase the threat to humpback chub near the confluence with the LCR. Strategies designed around [reducing] the frequency of [fall] HFEs would work to reduce brown trout abundance if, in fact, fall HFEs are a causal driver of increases in immigration or reproduction.

**Rainbow trout in Marble Canyon/LCR reach and fall HFEs.** This concept is founded on observations from the Natal Origins project which indicate that the number of rainbow trout at the LCR can be reduced by limiting the frequency of fall HFEs when trout abundance in Marble Canyon is high. The Natal Origins project found that one of the factors affecting rainbow trout abundance in Marble Canyon is a trout's ability to maintain a positive condition factor by efficiently finding and consuming food. Because rainbow trout are sight feeders and eat macroinvertebrates drifting in the water column, feeding efficiency can be substantially reduced by a relatively small increase in turbidity. The Natal Origins projects found that rainbow trout in Marble Canyon typically only grow in the winter and spring because turbidity in the summer and fall is too high for them to find food. Modeling has indicated that foregoing a fall HFE in a year with a large sediment input from the Paria River allows enough fine sediment to remain in Marble Canyon to provide a small increase in turbidity (from ~5 NTU to ~35 NTU) over the subsequent winter. The model also predicts this small increase in turbidity reduces the maximum reactive distance of rainbow trout by 20-30% when compared to conditions if a fall HFE was implemented. Modeling indicates that a reduction in reactive distance of this magnitude is sufficient to reduce condition factor enough to limit reproduction and abundance of rainbow trout below the Paria River. [\[5\]](#)

This treatment would be most effective during periods of high trout abundance in Marble Canyon and large sediment inputs from the Paria. This treatment could also be considered immediately following a large recruitment event of rainbow trout in the Lees Ferry reach since data from the Natal Origins project suggests that immigration to Marble Canyon increases under these conditions.

Increasing turbidity in Marble Canyon to the levels discussed here would likely not impact humpback chub and other native fish since they evolved in a turbid river environment. This treatment has the potential to be able to reduce the Program's reliance on mechanical removal and other more lethal and expensive approaches to TMFs that some groups (i.e. Tribes, anglers, power users, etc.) find objectionable. Increased turbidity may also reduce direct predation pressure on native fish by nonnative fish like rainbow trout. Predation by other nonnative fish,

## Attachment 1 (continued)

like brown trout, appear not to be affected by the levels of turbidity being discussed here. Reducing the number of fall HFEs would have a negative impact to sediment-related resources unless the sediment accounting periods in the HFE protocol could be adjusted to allow for fall sediment from the Paria be used for a spring HFE, of which a number of resources would benefit including foodbase, the trout fishery, and recreational beach use.

[http://gcdamp.com/index.php?title=Trout\\_Management\\_Flows](http://gcdamp.com/index.php?title=Trout_Management_Flows)

**Foodbase and fall HFEs:** Fall-timed floods are bad-to-neutral for foodbase. Fall HFEs do not increase abundances of midges and blackflies which are primary food items for rainbow trout and humpback chub. Fall HFEs do not control numbers of NZMS resulting in an increase of this "trophic dead-end." [https://www.usbr.gov/uc/rm/amp/twg/mtgs/17jan26/AR19\\_Kennedy.pdf](https://www.usbr.gov/uc/rm/amp/twg/mtgs/17jan26/AR19_Kennedy.pdf)

**Humpback chub and fall HFEs:** Since 2013, condition of humpback chub and annual number of spawning adults at the LCR have been low.

[https://www.usbr.gov/uc/rm/amp/twg/mtgs/17jan26/AR9\\_Yackulic.pdf](https://www.usbr.gov/uc/rm/amp/twg/mtgs/17jan26/AR9_Yackulic.pdf) This coincides with declining food base availability at the LCR. Midge catch rates in light trips and drift biomass at the LCR have decreased by >50% since 2013.

[https://www.usbr.gov/uc/rm/amp/twg/mtgs/17jan26/AR19\\_Kennedy.pdf](https://www.usbr.gov/uc/rm/amp/twg/mtgs/17jan26/AR19_Kennedy.pdf)

**Lees Ferry rainbow trout fishery and fall HFEs:** Fall HFEs appear to reduce trout growth in fall and winter in Glen Canyon when assessed based on differences among years but nutrients released from GCD and trout competition appear to have a bigger effect on growth than fall HFEs. <https://www.usbr.gov/uc/rm/amp/twg/mtgs/18jan25/AR12.pdf>

### **Persistence and availability of sandbars during the high-use summer boating season:**

Controlled floods can lead to increases in campsite area, however, erosion of flood-deposited sandbars during normal dam operations following controlled floods causes these increases in campsite area to be short lived. The controlled floods conducted in November 2012, 2013, 2014, and 2016 did not cause long-term increases in campsite size. Campsite surveys conducted approximately 11 months after each of those events have not detected any long-term net gains in campsite area. <https://pubs.er.usgs.gov/publication/sir20175096> Sandbars erode to pre-HFE size over a 6 to 12-month period after each fall HFE.

[https://www.usbr.gov/uc/rm/amp/twg/mtgs/15jun11/Attach\\_02,.pdf](https://www.usbr.gov/uc/rm/amp/twg/mtgs/15jun11/Attach_02,.pdf)