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FISH AND WILDLIFE SERVICE

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In Reply Refer To:

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Memorandum

To: Director, Upper Colorado Region, Bureau of Reclamation
Chair, Flaming Gorge Technical Working Group, Bureau of Reclamation

From: Field Supervisor, Utah Field Office, U.S. Fish and Wildlife Service

Subject: 2012 Green River Spring and Base Flows to Assist in Recovery of the
Endangered Fishes

This letter describes our recommendations for 2012 spring and base flows in Reach 2 of the Green River for discussion by the Flaming Gorge Technical Working Group (FGTWG) in development of recommendations for Flaming Gorge Dam operations. Our intent is to work with other FGTWG members to ensure consistency with the 2005 biological opinion (BO; U.S. Fish and Wildlife Service 2005) and 2006 record of decision (ROD; U.S. Department of Interior 2006), which call for flows to protect and assist in recovery of endangered fishes. The following recommendations are subject to forecasted and real-time May – July hydrologic conditions in the upper Green River drainage, with recognition that trade-offs of spring and base flows should be considered and used to adjust operations as deemed appropriate.

Spring-runoff research flow

We support the Upper Colorado River Endangered Fish Recovery Program's (Recovery Program) 2012 Spring Flow Request, as explained in their March 26, 2012 letter. We believe their primary objective, to time Flaming Gorge releases and resultant floodplain connection with the presence of wild produced razorback sucker larvae, is consistent with the intent of the Flow and Temperature Recommendations for Endangered Fishes in the Green River Downstream of Flaming Gorge Dam (Flow Recommendations; Muth et al. 2000), the 2005 BO, and the 2006 ROD. Specifically, the objectives and criteria presented in their letter are consistent with the common goal of the Flow Recommendations, BO and ROD: to use the best available science to guide Flaming Gorge operations and recovery actions in an adaptive management framework.

The Recovery Program, in an effort to scientifically evaluate the results of operating Flaming Gorge concurrent with the presence of larval razorback sucker, developed the *Study Plan to Examine the Effects of Using Larval Sucker Occurrence in the Green River as a Trigger for Flaming Gorge Dam* (Larval Trigger Study Plan or LTSP). The Study Design matrix (Table 2 in the LTSP) details the range of experimental conditions the Recovery Program would like to assess with recognition that more than set of flow conditions of that matrix could be accomplished in a single year. This is an important document that will assist in consistent evaluation into how Flaming Gorge operations are benefiting razorback sucker.

The LTSP and updated flow release is supported by the most recent scientific research into endangered fish ecology and floodplain management (Bestgen et al. 2011). As the Recovery Program described in the LTSP, the Bestgen et al. (2011) report synthesized long term data, evaluated the ability to operate Flaming Gorge Dam for the purpose of entraining wild razorback larvae into floodplain habitats, and created a set of conclusions and recommendations to guide future management. The Flow Recommendations recommended utilizing up-to-date research and monitoring, such as the Bestgen et al. (2011) draft report:

“the collection of additional data on endangered fishes and their habitats should focus on the evaluation and possible modification of our recommendations by following an adaptive-management process” (Muth et al. 2000, p. 5-39);

as well as biological information to guide the onset of spring peak flow:

“Examples of real-time and other year-specific information to be considered in determining annual patterns of releases . . .

- Initial appearance of larval suckers in established reference sites in Reach 2 (e.g., Cliff Creek)” (Muth et al. 2000, p. 5-9, Table 5.3).

Similarly, the 2005 BO calls for adaptive management in implementing the proposed action (operations of Flaming Gorge Dam) (U.S. Fish and Wildlife Service 2005, p. 16) and set forth this process as a conservation measure:

“The adaptive management process will rely on the Recovery Program for monitoring and research studies to test the outcomes of implementing the proposed action and proposing refinements to dam operations” (U.S. Fish and Wildlife Service 2005, p. 17);

and

“[Bureau of] Reclamation, Western [Area Power Administration], and the [U.S. Fish and Wildlife] Service will use any new information collected in these studies to determine the need for management actions or modification of operations as determined appropriate” (U.S. Fish and Wildlife Service 2005, p. 17)

Therefore, we believe that the Recovery Program's 2012 Spring Flow Request and implementation of the LTSP is supported by the 2005 BO and we support the Bureau of Reclamation's (BOR) implementation of this request. The Recovery Program has determined that a minimum of six study years are needed to meet the objectives of the LTSP. Unless otherwise specifically stipulated, this letter conveys the Service's interpretation of ESA compliance under the 2005 BO as it relates to BOR's future LTSP-related spring operations. We recognize that BOR's targeting of a biological trigger (presence of larval razorback sucker) rather than a hydrological one (Yampa River flows) deviates from past operations and may require greater volumes of water in some years. However, we conclude that this experiment is consistent with the intent of the Flow Recommendations and will assist in the recovery of the endangered fish.

We further recognize that timing releases from Flaming Gorge Dam consistent with the Recovery Program's 2012 Spring Flow Request and the LTSP may require the hydrologic tradeoff of not meeting the 2000 Flow and Temperature Recommendations for Reach 2. Nevertheless, we support Reclamation following the Recovery Program's 2012 Spring Flow Request and LTSP, and consider that doing so will meet Reclamation's responsibility to the ROD objectives in 2012.

Base flow operations

Because of projected drier than average year conditions, we believe that base flow augmentation is a very important consideration for 2012. Base flows are important for a variety of ecological reasons. We propose the following approach to base flow operations in 2012, which mirrors our suggested approach in 2010. The 2010 proposal relied on the most up-to-date research available and biological data collected that year indicated that numbers of Colorado pikeminnow collected continue to improve.

Our understanding is that BOR will pick a Reach 1 base flow target commensurate with the April – July hydrologic condition in accordance with the ROD and the BO. BOR selects a Reach 1 target that creates a flow condition in Reach 2 that falls within the appropriate base flow range when coupled with projected Yampa River base flows (Muth et al. 2000). For reasons mentioned below, we request that BOR release higher flows than the scheduled base flow target through September 30, 2012, with the understanding that BOR may need to release less than the base flow target through the remainder of the base flow period (October to March) to balance annual operations.

Specifically, we request that BOR augment the Reach 1 calculated base flow target by as much as 40%. For example, if BOR determines that a release of 1,100 cfs is necessary to comply with the ROD and BO, then we request that up to 1,540 cfs be released through Sept 30, 2012. This augmentation is in accordance with the Reach 2 summer - autumn seasonal flow variability recognized in the Flow Recommendations.

We believe that the Flow Recommendations intended that seasonal variability be incorporated into dam operations to assist in the recovery of the species and accommodate natural variability, but not allow for manipulation that targets a specific operational pattern. Our 2012 base flow proposal, which complies with the ROD and the BO, is consistent with

the intent of the flow recommendations, is based on information gathered by the Recovery Program, and responds to current biological conditions in the Green River system.

Our rationale for requesting elevated base flows through September 30 is similar to our request in 2008, 2009, 2010, and 2011, and is intended to accomplish two goals:

- 1) provide improved nursery conditions for age-0 (young-of-year) Colorado pikeminnow in Reach 2; and
- 2) hinder nonnative smallmouth bass in Reaches 1 and 2 by delaying their spawning time and decreasing growth of the age-0 cohort.

Goal 1: Habitat conditions for age-0 Colorado pikeminnow

Since 2000, there has been a wide range of base flow conditions in Reach 2. Many of the lower base flow years coincided with low age-0 Colorado pikeminnow catch rates as determined each autumn via Recovery Program Project 138¹ – Interagency Standardized Monitoring Program (Table 1). For example, during the summers of 2001, 2002, 2003, 2006, and 2007 base flows in Reach 2 dropped below 1,000 cfs for varying periods of time and age-0 Colorado pikeminnow catch rates were in the single digits (Badame et al. 2010, p. 8).

Contrastingly, in 2009 and 2010, Reach 2 experienced average base flows that exceeded 2,000 cfs for the second and third consecutive year, and for only the second and third time in the most recent eleven year period. Those same years, Utah Division of Wildlife Resources (UDWR) biologists reported the highest catches of age-0 pikeminnow since 1991 (Badame et al. 2010, p. 8; Table 1). We understand that there are many variables that could contribute to the increased catch of age-0 CPM, such as numbers of spawning adults, densities of nonnative fish throughout the larval drift zone, densities of nonnatives in backwaters, productivity of backwaters, and sampling efficiency. However, we believe that the higher base flows (approximately 2,400 to 2,600 cfs) in Reach 2 in 2008, 2009, and 2010 played an important role in this increase.

In 2011, the Green River and its tributaries had very wet conditions, which in some cases were the wettest on record. While these flows facilitated ecological function for floodplains and larval sucker production, they likely exceeded the ecological threshold for successful Colorado pikeminnow recruitment. Data collected in 2011 bears this prediction out, as zero age-0 Colorado pikeminnow were collected. Average flows during the base flow period were 8,660, which is much higher than those in years with high age-0 Colorado pikeminnow collections (approximately four times higher).

However, predicted 2012 conditions are much drier than average, indicating that this year, the FGTWG must again attempt to provide adequate base flow conditions for Colorado pikeminnow and prevent the base flows from dropping to levels not compatible with age-0 Colorado pikeminnow survival.

¹ Can be found online at : <http://www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2010/rsch/138.pdf>

Most above-average Colorado pikeminnow recruitment events in the middle and lower Green River occur when summer flows ranged from about 1,800 to 2,700 cfs (Bestgen 1997; in Muth et al. 2000). The relationship between base flow elevations and quality of nursery habitat is an information need identified in the Green River Study Plan (Green River Study Plan ad hoc group 2007) and is currently being investigated through a Recovery Program project entitled “Historical assessment of factors affecting young Colorado pikeminnow abundance and physical habitat availability in the Green River, Utah.”

Year	# of age-0 Colorado pikeminnow collected	Average flow between July 15 and September 30	Years base flows dropped below 1000 cfs
2000	31	1423	
2001	8	1073	X
2002	0	876	X
2003	2	1101	X
2004	60	1367	
2005	8	1958	
2006	5	1213	X
2007	3	1122	X
2008	18	2376	
2009	325	2610	
2010	454	2244	
2011	0	8660	

Table 1. Age-0 Colorado pikeminnow (CPM) standardized catch and corresponding flow conditions in Reach 2 as measured by the USGS at their Jensen, Utah gage

Goal 2: Hinder smallmouth bass reproduction

Information continues to indicate that higher and cooler base flows delay smallmouth bass spawning and reduce growth of the age-0 smallmouth bass cohort. This information was gathered on the Yampa River and on the Green River in Reaches 1 and 2.

The effect of flow and temperature on the onset of smallmouth bass spawning is clearly demonstrated with data collected in Lodore Canyon, Green River (Figure 1). During a relatively wet and cool year (2005), smallmouth bass spawning occurred nearly 3 weeks later than during a drier, warmer year (2007). The same relationship was observed in related investigations on the Yampa River.

Also, preliminary information from Yampa River studies (Recovery Program Project #s 115 and 140) indicate that age-0 smallmouth bass measured in September 2005 were on average 30 millimeter smaller than those collected in September 2007. Thus, high flows and associated cool temperatures appear to not only delay spawning but also slow

the growth rates of age-0 smallmouth bass which in turn decreases their likelihood for overwinter survival (Shuter et al. 1980).

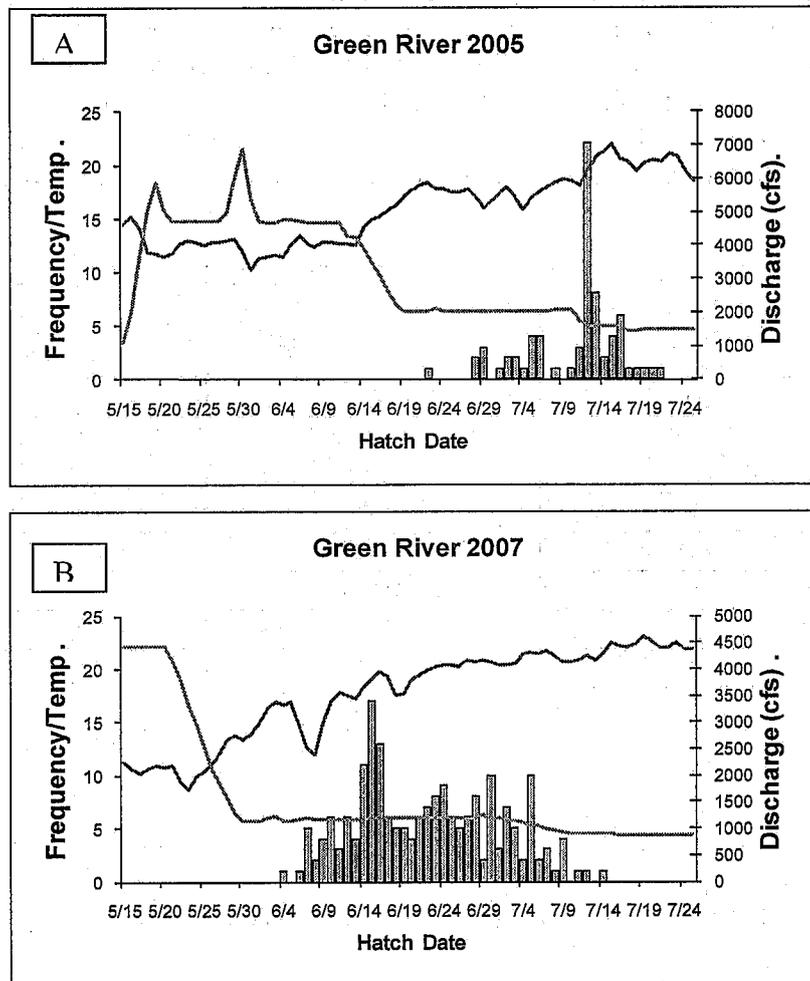


Figure 1. A comparison of flow (green), temperature (purple), and smallmouth bass hatching dates (bars) in Lodore Canyon (Green River - Reach 1). A) 2005 conditions included higher base flows and cooler temps; B) 2007 conditions included lower base flows and warmer temps. Figures excerpted from Recovery Program Project #115 2009 Annual Report (preliminary information)²

Conclusion

In summary, we request that BOR operate Flaming Gorge Dam as follows:

- Time spring flow releases to correspond with the presence of wild produced razorback sucker larvae according to the LTSP in order to improve entrainment success; and

² Available online at: <http://coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2009/naa/115.pdf>

- Enhance summer base flows at the expense of winter base flows to continue to improve Colorado pikeminnow nursery conditions, support age-0 Colorado pikeminnow, and disadvantage smallmouth bass.

We believe that data gathered by the Recovery Program make a strong case for these proposed operations in 2012 and should benefit young life stages of endangered fish. We hope that hydrology conditions in the Upper Green and Yampa River drainages will supply sufficient water to meet these needs. We understand that hydrologic conditions are ever-changing and the BOR may need to adjust operations accordingly.

We thank BOR for the opportunity to provide this input and look forward to participating in the Flaming Gorge Technical Working Group process. If you have any questions or concerns, please contact Kevin McAbee or Paul Abate at 801-975-3330.

A handwritten signature in black ink, appearing to read "L. Burt". The signature is written in a cursive style with a long horizontal stroke extending to the right.

Literature Cited

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