United States Department of the Interior

BUREAU OF RECLAMATION
Upper Colorado Regional Office
125 South State Street, Room 8100
Salt Lake City, Utah 84138-1102

IN REPLY REFER TO:

MEMORANDUM

To: Tom Chart, Program Director, Upper Colorado River Endangered Fish Recovery Program.

From: Dave Speas (preparer), Biology Committee Representative, USBR

Re: Response to the draft Green River research flow request letter dated 2/17/16

2/26/16

Thank you for your timeliness in sharing the subject draft flow request letter with us and for the opportunity to comment on it in advance of its formal submission to Reclamation. I submit the following comments in my capacity as Reclamation's Biology Committee representative, but they also represent input from conversations and written comments from my colleagues in USBR's Upper Colorado Region, to whom I owe my thanks. Some of comments dealing with non-biological matters herein may be supplemented later through input from Reclamation's representative on the Management Committee and/or discussions through the Flaming Gorge Technical Work Group (FGTWG).

Reclamation is very concerned about its ability to meet the subject flow requests in 2016 for reasons we address in detail below. These reasons largely stem from concerns that our current NEPA coverage may not be sufficient to address some of the potential impacts of the flow requests, concerns about public relations, and water availability to meet the requests. In addition to flow request 3 (spike flows to disadvantage bass, deferred to 2017), *we suggest that formal implementation of flow request 2 (elevated base flows) be deferred until at least 2017 so that we can begin identifying impacts of the proposed flows from the NEPA perspective, seek NEPA compliance where necessary, conduct more public outreach on the new flow requests, and participate in development of a base flow study plan.* We would be pleased, however, to work within the FGTWG in 2016 in an attempt to increase base flows within our existing authority under the 2006 Record of Decision (ROD; Reclamation 2006).

Since there is more than one flow request being made this year (and likely more than one in coming years), Reclamation believes the FGTWG should be prepared to carefully prioritize the flow requests in relation to hydrology as well as status of the endangered fish as evidenced by the current state of the science. They should probably also be prepared to pursue a decision making process in the event that water availability limits implementation to one or two proposals (as

opposed to all three in one year) while meeting other established flow objectives in the 2006 ROD. Such trade-offs may become frequent with multiple flow requests in the future, also, so the Recovery Program would be best served to develop a flow- and fish status-based prioritization strategy to share with the FGTWG on an annual basis.

We offer the following comments on the three individual flow requests, two of which are considered "new" for 2016 as the letter describes.

1) **Larval Trigger Study Plan (LTSP) flows**. Spring peak flows triggered by appearance of Razorback Sucker larvae has proven to be a highly effective way of transporting these fish to favorable floodplain habitat nursery areas. Reclamation applauds the Program and its lead scientific entity, the Larval Fish Laboratory (LFL) at Colorado State University, for developing the "larval trigger" flow proposal and believes that it has to potential to become a powerful management tool in the recovery of Razorback Sucker. Reclamation supports implementation of LTSP in 2016 provided that we can obtain the appropriate documentation from the U.S. Fish and Wildlife Service (USFWS) acknowledging such action gives Reclamation the same "credit" on a biological basis as meeting the appropriate spring release objectives under the 2006 ROD, and recognizing also that flow objectives in the latter may not be attainable during years when LTSP is in effect.

   While successful rearing of age-0 fish from Stewart Lake proves a significant indicator of LTSP's potential to support recovery, we feel that floodplain management (as an aspect of habitat restoration in the Recovery Program's action plan) requires additional emphasis and resources to provide for fish production at levels sufficient to support recovery in the Green River sub-basin. In the Green River Floodplain Management Plan, Valdez and Nelson (2004) estimated that about 2,032 acres of floodplain wetland habitat need to function to produce a recruitment rate of about 1,740 adult fish per year to reach recovery targets. The implication of that study is that not only Stewart Lake, but Escalante, the Leota ponds, Johnson Bottom and five other wetlands (including Old Charlie) are necessary to provide this level of recruitment. Since the inception of LTSP (Table 1 in the request letter), successful production of age-0 Razorback Sucker has occurred at primarily at Stewart Lake, which yielded as many as 766 wild-produced fish in 2014. The significance of this cannot be overstated from a biological standpoint, yet it is evident from objectives set forth in Valdez and Nelson (2004) that the Stewart Lake example—and the associated requirements for relatively intensive water level management, non-native fish screening, monitoring and draining to facilitate escapement—needs to be replicated to consistently boost the overall level of annual recruitment. Reclamation encourages the Recovery Program to intensify its efforts to identify, secure, restore (if necessary), manage and/or operate other promising habitats (such as the Leota ponds and Johnson Bottom) to increase levels of recruitment beyond those observed mainly from

Stewart Lake. As a component of these management actions, also, the Recovery Program should consider revising and updating the LTSP study plan to account for any changes in levee breach elevation since that document, which could potentially influence spring flow elevations in the future. Finally, more focus on annual operations, monitoring and management of floodplain wetlands would also have the added benefit of resolving uncertainties identified in Valdez and Nelson (2004) and the Green River Study Plan (2007) and refining expectations of floodplain wetland production potential.

2) **Elevated summer base flows to enhance Colorado Pikeminnow rearing habitat**. I have provided comments to the authors of the report which led to this proposal (Bestgen and Hill, 2015a; in review), which were generally accepted and/or addressed by the authors. I consider the report to be scientifically sound and gave it my approval as a Biology Committee member (although the report will not receive approval from the Management Committee until later this spring). While the data set was large (22 years) and systematically collected, it was characterized by high levels of variability which required a great deal of interpretation by the authors to translate into support for the conclusions and recommendations. I view this report to be one of the more challenging works produced through the Recovery Program (for reasons I outline below), as will be implementation of its recommendations.

   The proposed base flows represent a significant departure from those currently covered in the 2006 ROD and described in Muth et al. (2000), which envisioned releases from the dam that equated as much as possible to pre-dam hydrology in the Green River. According to Bestgen and Hill (2015a), fall abundance of Colorado pikeminnow was above average in 10 of 16 (63%) years in Reach 2 (as defined in Muth et al. 2000) when base flows were between 1,700 and 3,000 cfs (Figure 18 in Bestgen and Hill 2015a). In contrast, only 17% of years when base flows were less than 1,700 cfs produced above average abundance, and abundance of pikeminnow above 3,000 cfs was always below average. Based on this, the authors recommended 1,700 – 1,800 cfs in Reach 2 during dry years (90-100% exceedance), 1,800 – 2000 cfs in moderately dry years (70-90% exceedance), and 2,000-2,600 during average years (30-70% exceedance). These new targets are about 75%, 46% and 18% above their counterparts in Muth et al. (2000), respectively, and may represent a significant deviation from the "hydrologically driven" assumptions underlying the current flow recommendations. For example, if implemented, the proposed flows for dry years would actually fall within the "average" base flows in Muth et al. (2000; 1,500 – 2,400 cfs), or two hydrologic classifications wetter than the current dry designation. Whereas Reclamation is allowed under the ROD to provide flows in excess of 40% in excess of recommended base flow objectives, this flexibility would not be sufficient to meet the new proposals for dry year objectives and

would fall short slightly during moderately dry years, also. Another significant departure from the existing ROD is specification of flow objectives for Reach 3 (see author comments regarding importance of Reach 3, also). Currently Reclamation's obligation under the 2006 ROD is to achieve flow recommendations for Reaches 1 and 2, with the assumption that such actions should achieve objectives for Reach 3 most of the time. While the Reach 3 objectives are usually met, they are not set forth as obligations under the 2006 ROD.

Over the years, Reclamation has learned from public feedback that there is controversy associated with releases from the dam that are not hydrologically or operationally driven. Although this could be assumed to be less problematic during the base flow period, it poses a precedent that is contrary to agreements and understandings during preparation of the Final Environmental Impact Statement (FEIS; Reclamation 2005) and Endangered Species Act consultation. In particular, Reclamation was informally assured by the USFWS Utah Field Office that we would not be asked to deviate from the hydrologic classifications in any given year, since the targets were based on historic hydrology that included the full range of drought years to wet years.

There are also lingering questions about how effective elevated base flows will be at supporting higher levels of Colorado Pikeminnow production and whether proposed monitoring efforts can detect such effects. Data in support of the elevated base flows were highly variable, as stated above, and it appears that the best case scenario for increased pikeminnow production would be about 63% and 40% of the time in reaches 2 and 3, respectively. In my comments to the authors, I asked whether it was "worth it" to release more water (including releases out of reservoir storage) in dry years to maintain high base flows even if there are no or few larvae in the river, which is often the case in such years. Their response was that while production of larvae is indeed low in the Yampa River during low water years, higher base flows in dry years was largely to improve habitat conditions in the Lower Green River (Reach 3 in Muth et al. 2000). While Reach 3 typically supports higher larval abundance than the Reach 2, percentage of years where fall pikeminnow abundance in Reach 3 was higher than average was only 40%, compared with 63% in Reach 2. (As stated above, also, focusing emphasis away from Reach 2 and placing it more on Reach 3 contrasts significantly with current assumptions underlying the 2006 ROD.)

It is apparent from Bestgen and Hill (2015a), also, that the exact role(s) of base flows in conveying benefits to Colorado Pikeminnow are somewhat obscure. To this end, they remarked (in written response to comments provided on earlier drafts) that, "At this point…it seems prudent to give the fish what has worked in the past, regardless of the

mechanisms involved." Although uncertainties about the causative mechanisms of a management action are not at all uncommon in fisheries management, such uncertainties about elevated base flows in dry years are a little unsettling to water managers given the inherent scarcity of water in the Green River sub-basin compounded by drought, climate change, and competing water demands. For example, benefits accrued to Colorado Pikeminnow through base flows may be offset by predation by and competition with non-native fish (widely recognized as a primary obstacle to recovery), including recent invaders like Walleye in addition to established Smallmouth Bass and Northern Pike populations. While Reclamation appreciates the effort that the Recovery Program puts forth annually to control non-native fish, the dynamic nature of the Green River fish community makes it difficult to predict (and document) how effects of flows will translate into benefits for endangered fish.

The Recovery Program identifies two ongoing projects in their request letter that are expected to document response of Colorado Pikeminnow to elevated base flows. These two projects (larval drift and fall abundance of Colorado Pikeminnow fry/fingerlings) are the same that provided data that formed the basis of the Betgen and Hill report, so it is plausible that they would be able to document a response (either positive or negative). However, unlike LTSP which has a peer-reviewed, stand-alone study plan with relatively discrete criteria for success and completion, effects of base flows on Colorado Pikeminnow will likely become evident after a considerable period of time (i.e., it took 22+ years to document patterns in the report) and could be difficult to quantify. The Recovery Program "may also consider" additional studies to supplement ongoing projects, however scopes of work for these projects have not been developed to date, and uncertainties about underlying mechanisms of higher base flows (see Bestgen comment, above) may make it difficult to document a response or lead to additional monitoring needs. As identified in Bestgen and Hill (2015a), also, a study plan should be developed which defines criteria for success, identifies a finite time frame and identifies uncertainties should be developed prior to formal implementation of elevated base flows as described in the 2016 flow request letter. Such a plan could also function as a proposed action for NEPA analysis.

The sum of the preceding points is causing Reclamation managers to wonder 1) whether water to accomplish these objectives is or will be available and 2) whether additional NEPA may become necessary to implement these base flows, especially together with LTSP and flow request 3 (smallmouth bass spike flows). Regarding the first point, no official assessment of impacts due to elevated base flows is available at this time, but preliminary modelling suggests that severe drawdown of Flaming Gorge Reservoir due to elevated base flows is possible under certain conditions. Such drawdown elevations may

fall outside levels analyzed in the 2005 FEIS and could significantly compromise authorized purposes of the dam and the ability to comply with endangered fish flow recommendations. While such a drawdown event is thought to occur somewhat infrequently, impacts associated with water delivery and implementation of flow recommendations during drawdown and recovery could be significant.

Reclamation is pleased to work with the Recovery Program and its partners to provide flows to aid in endangered fish recovery, and has welcomed the opportunity to implement LTSP largely due to its negligible impacts to water availability/delivery, its consistency with the ROD (including its hydrologic classifications as well as real-time hydrology), its high probability of success, presence of a study plan with a completion time frame, and its experimental nature. Superficially, elevated base flows (individually or together with smallmouth bass spike flows) don't resemble LTSP on the first two counts in that they could impact water supplies and/or delivery and they represent a significant departure from the existing flow recommendations covered under the 2006 ROD due to their reconfiguration of base flow objectives and assumptions as described above. Probability of success under elevated base flows is considerable (roughly 40-60%, depending on geographic locality) but uncertainties persist, as outlined above.

While the request letter characterizes elevated base flows as an experiment which is an element of adaptive management and thus a means of implementation under the 2006 ROD, the lack of a stand-alone study plan for base flows and the open-ended nature of the action is a source of concern for Reclamation as well. Also, the 2016 request letter reads, "Considering the status of Colorado Pikeminnow in the Green River as discussed in Bestgen and Hill…the Recovery Program requests that Reclamation strive to meet these proposed base flows on an experimental basis through September 30 of each year". While subtle, this statement and many of the response comments provided by Bestgen and Hill suggest that the proposal to increase base flows is driven at least as much by management needs for Colorado Pikeminnow as it is by research needs. I support the authors' contention that Colorado Pikeminnow require great strides toward enhanced management action (non-native fish removal, flows). It is apparent that experiments as described in the 2016 request letter will likely become more and more routine at Flaming Gorge, and Reclamation managers suspect that additional regulatory compliance for cumulative impacts of multiple experiments may be necessary.

As a final note on the elevated base flow request, Reclamation seeks clarification as to whether it should "strive to meet the proposed base flows" (2016 flow request, page 6, middle) or whether there are higher expectations to comply with the request. In the past few years, Reclamation has responded to requests from the U.S. Fish and Wildlife

Service to exercise its flexibility under the 2006 ROD to increase base flows by 40% beyond objectives. As the requests letter also points out, this approach met the new base flow targets in 2015 and is certainly consistent with the request. We suggest that this provision of the 2006 ROD may be an appropriate means to pursue higher base flows in 2016 while Reclamation continues to evaluate feasibility of the formal elevated base flow proposal.

3) **Spike flows to disadvantage smallmouth bass.** As with the base flow proposal, I reviewed and commented on the report (Bestgen and Hill 2015b; under review) which led to this proposal to begin planning in 2016 for for a 2-3 day spike flow (powerplant release) in 2017 to disrupt Smallmouth Bass spawning or hatching in the Green River. I have always been an emphatic supporter of this type of experiment and am very pleased to see that it is at a point to begin implementation. The latter should begin with planning and public outreach, as the flow request letter appropriately alludes to. Another benefit to deferring this experiment to 2017 includes development of a more solidified study plan, which is not in place at this time. Like the proposed elevated base flows, a study plan would function to define expectations, experimental time frames, and uncertainties and could function as the basis for a proposed action in NEPA documents.

   I have no comments on the justification for this experiment, as the scientific literature is fairly unanimous in its documentation of negative impacts from sudden and dramatic changes in flows and/or temperature during the Smallmouth Bass spawning chronology. Otolith work conducted through the LFL indicates that these fish are relatively predictable spawners in the Green River ecosystem in relation to flows and temperatures, so some advance public notification of the timing of such spike flows should be possible (but uncertain in terms of public acceptance, perhaps; see below). In general, though, the best science seems to suggest that careful timing of a disturbance from Flaming Gorge Dam should exact the desired response.

   Reclamation managers share a number of concerns that must be addressed during the coming year in advance of any experimentation in 2017. Chief among these is public outreach and evaluation of the potential for additional NEPA compliance. In terms of public outreach, Reclamation encourages Recovery Program representatives to become actively engaged in making the prospects for a spike flow known to the general public through the Flaming Gorge Working Group process in 2016 and early 2017 as well as other channels that may be appropriate public relations venues. We believe that one of the most vocal and actively engaged groups in the Flaming Gorge Work Group would be anglers, who are often collectively represented by the Green River Outdoor Guide Association (GROGA). The GROGA and its constituency will probably voice concerns

over timing, predictability and advance notice of a smallmouth bass spike flow, as they have done the same in relation to main spring peak flows for LTSP. The main reason for this would be impacts to the quality of the fishing for their clients, or equally likely is the possibility of client cancellations of trips planned outside advance notice of smallmouth spike flows. Both of these factors could impose a financial burden on these businesses. There could also be concerns about any sharp changes in temperature associated with alterations to operation of the selective withdrawal structure; they routinely monitor river parameters and usually make inquiries if something appears out of the ordinary with regards to temperature, which, like flows, can affect angling and client satisfaction. Perhaps enlisting the assistance of the Utah Division of Wildlife Resources would be helpful in reaching out to these groups.

Other groups which will likely have concerns about spike flows are agricultural operators and other residents of the Green River floodplain in Reach 1, Reach 2, and perhaps Green River, Utah in Reach 3. Reclamation is concerned that effects of post-peak flooding were never analyzed in the 2005 Environmental Impact Statement because such actions were not an element of the preferred alternative. Despite the experimental nature of Smallmouth Bass peak flows and the high likelihood of success, impacts due to flooding in the post peak period could be diverse and unquantified. As is the case with the elevated base flow proposal (request 2), also, bass spike flows may also be a significant departure from the "hydrologically driven" assumptions underlying the 2006 ROD, particularly in dry years. Reclamation will continue to determine if supplemental NEPA compliance is necessary to implement smallmouth bass spike flows.

In closing, Reclamation greatly appreciates the high-quality scientific research being conducted by the Recovery Program and its use in adaptive management for recovery purposes. Please contact us if you require additional clarification of our comments. We look forward to working with the Recovery Program in the future to resolve the concerns outlined above, and to continue to assist in the recovery of endangered fish of the Upper Colorado River.

References:

Bestgen, K.R. and A.A. Hill. 2015a [in review]. Reproduction, abundance, and recruitment dynamics of young Colorado pikeminnow in the Green and Yampa rivers, Utah and Colorado , 1979 - 2012.

Bestgen, K.R. and A.A. Hill. 2015b [in review]. River regulation affects reproduction, early growth, and suppression strategies for invasive smallmouth bass in the Upper Colorado River basin.

Muth, R.T., L.W. Crist, K.E. LaGory, J.W. Hayse, K.R. Bestgen, J.K. Lyons, T.P. Ryan, and R.A. Valdez. 2000. Flow Recommendations for Endangered Fishes in the Green River Downstream of Flaming Gorge Dam, Final Report, Upper Colorado River Endangered Fish Recovery Program Project FG-53, Denver, Colo.

Green River Study Plan ad hoc Committee. 2007. Study Plan for the Implementation and Evaluation of Flow and Temperature Recommendations for Endangered Fishes in the Green River Downstream of Flaming Gorge Dam. Final Report.

Reclamation. 2005. Operation of Flaming Gorge Dam Final Environmental Impact Statement. Bureau of Reclamation Upper Colorado Regional Office, Salt Lake City.

Reclamation. 2006. Record of Decision, Operation of Flaming Gorge Dam Final Environmental Impact Statement. Bureau of Reclamation Upper Colorado Regional Office, Salt Lake City.

Valdez, R.A. and P. Nelson. 2004. *Green River Subbasin Floodplain Management Plan*. Upper Colorado River Endangered Fish Recovery Program, Project Number C-6, Denver, Colo.