

Western Area Power Administration
2012 Interim Base-flow Proposal
June 12, 2012

Western requests base-flow releases from Flaming Gorge Dam be set so that flow in the Green River at Jensen is 1,100 cfs. Implementation of this request would require monitoring of Yampa River flows in order to adjust releases from Flaming Gorge Dam. Further, Western requests that base flow be revisited in early July, once backwater topography data and updated hydrologic data are available. This request is prudent based on current dry hydrologic conditions; is consistent with implementation of *Flow and Temperature Recommendations for Endangered Fishes in the Green River Downstream of Flaming Gorge Dam* (Flow Recommendations; Muth et al. 2000), the preferred alternative in the 2005 final environmental impact statement (FEIS; U.S. Department of Interior 2005), and the 2006 record of decision (ROD; U.S. Department of Interior 2006); and conserves water until real-time data are available to modify flows to maximize near shore habitat important for endangered fishes.

Based on the May 1st April – July inflow forecast for the Upper Green River (82% exceedence) and Yampa River (96% exceedence) basins, the hydrologic classification for 2012 spring peak flow was dry. Currently, hydrologic conditions do not appear to be improving, and it appears likely the classification for the summer base-flow period will remain dry. Western's request for a base flow of 1,100 cfs at the Jensen gage is supported by the recommendation for dry years (900-1,100 cfs with up to 40% variation around the mean daily flow) in the Flow Recommendations and the FEIS. The extreme dry conditions in the Yampa River Basin and the Green River Basin trending solidly towards drier conditions warrant a dry classification and a conservative approach to determining base flows.

Compounding the need for a conservative approach is the implementation of the *Study Plan to Examine the Effects of Using Larval Razorback Sucker Occurrence in the Green River as a Trigger for Flaming Gorge Dam Peak Releases* (LTSP), a study plan to scientifically evaluate the effectiveness of modifying the timing of spring peak releases from Flaming Gorge Dam to coincide with the presence of larval razorback sucker (Larval Trigger Study Plan *ad hoc* committee 2012). Conditions this year, especially in the Yampa River Basin, resulted in spring peak flows in the Green River being primarily driven by releases from Flaming Gorge Dam. To meet flow targets this year, five days of bypass release (up to 7,400 cfs) was necessary, resulting in much higher releases than stated in the Flow Recommendations. The impacts of the increased volume of water required as a result of implementing the study plan are not understood at this time, especially in the dry conditions experienced thus far this year.

Creation of backwater habitat was a primary factor considered by Muth et al. (2000) in developing recommendations for base flows. Backwater habitat is especially important for larval and young Colorado pikeminnow (CPM). The importance of backwater habitat for early life stages of CPM was apparent in survey data collected by the Recovery Program. In 2010, Argonne National Laboratory conducted a correlation analysis of factors affecting young CPM catch data collected by Badame et al. (2009). They found surface area of backwaters was the best predictor of YOY Colorado pikeminnow catch rate (Figure 1; unpublished data), but area of backwater habitat was not correlated with

magnitude of flow (Figure 2; unpublished data). Further, Tyus and Haines (1991) found an inverse relationship between size and abundance of young CPM and mean flow in August and September.

Variability of sand bar topography, inherent in a complex river system such as the Green River, makes establishing an optimum base flow difficult. This difficulty is further evidenced in results reported by LaGory et al. (2009), where they found the relationship between backwater characteristics and discharge complex and variable from year to year. Establishing an optimum base flow this year may be especially difficult since it is a dry year following an unusually wet year in 2011.

Muth et al. (2000) recommended base flows be tied specifically to hydrologic conditions (i.e., higher in wet years) and the magnitude of peak flows. However, they acknowledged uncertainty with their base-flow recommendations and the difficulty in establishing an optimum base flow due to unpredictable sediment processes and associated variability in sandbar topography from year to year. They advocated for the collection of real-time biological and physical data each year and using this information to adaptively implement base-flow recommendations. Table 5.3 in Muth et al. (2000) lists elevation of sandbars in nursery areas as an example of real-time information to be considered when developing base-flow magnitude.

Argonne National Laboratory will be collecting sandbar topography data beginning June 25, 2012, and these data and the resulting relationships between flow and backwater surface area, volume, and depth will be available by July 6, 2012. The availability of this information will provide a real-time understanding of the current physical conditions within the middle Green River allowing for establishment of a suitable base flow. Until these topographic data are available, it is prudent to establish an interim base flow that conserves water but also has been demonstrated to create backwater habitat.

A review of topographic data from 2003 – 2008 indicated a flow of 1,100 cfs consistently created suitable backwater habitat (LaGory et al. 2009). While 1,100 cfs did not create the optimum surface area, it did create backwater area comparable to flows of 1,540 cfs (the maximum allowable in the Flow Recommendations in a dry year) without the risk of overtopping some backwaters as was observed in 2003. Therefore, an interim flow of 1,100 cfs at the Jensen gage should be suitable until real-time topographic data become available. The base flow should be revisited and modified using available real-time topographic and hydrologic data in early July to establish appropriate base flows for the remainder of the base-flow period.

Western believes a sensible base flow for the duration of the base-flow period cannot be established at this time. We believe an interim flow of 1,100 cfs until early July is the most logical approach to determining base flows for 2012. This approach adheres to the Flow Recommendations, FEIS, and ROD; is reasonable considering dry hydrologic conditions; and is supported by available scientific data.

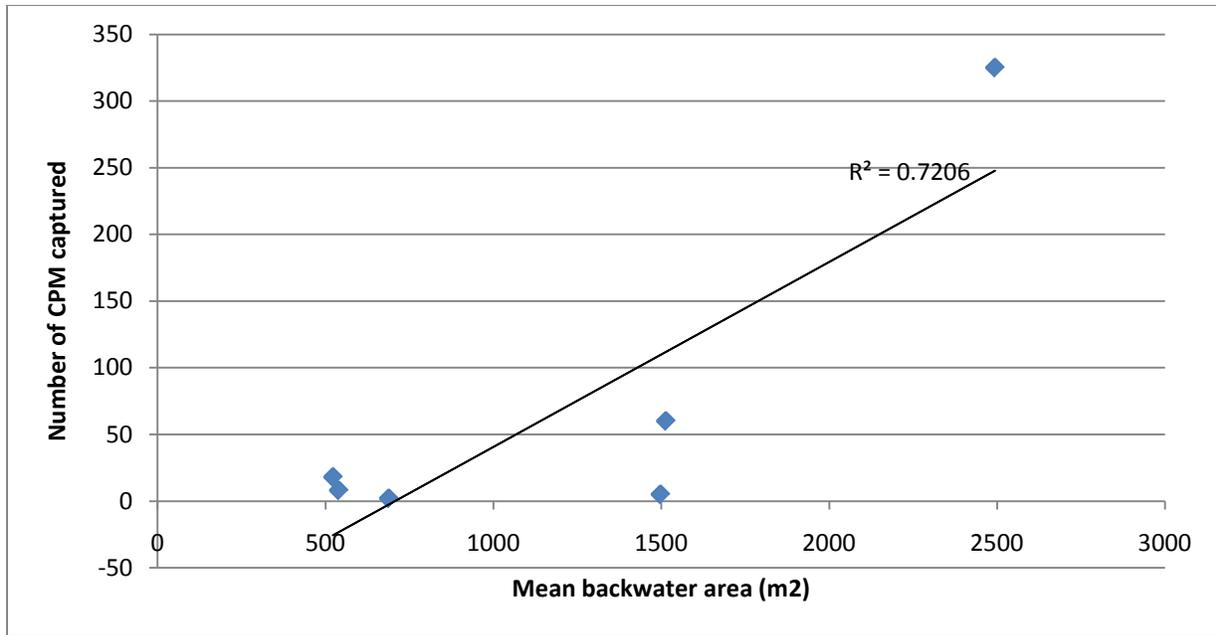


Figure 1. Relationship of mean backwater area to number of YOY Colorado pikeminnow captured in the Middle Green River derived from backwater topographic mapping conducted 2003-2009 (figure provided by Dr. Kirk LaGory, Argonne National Laboratory).

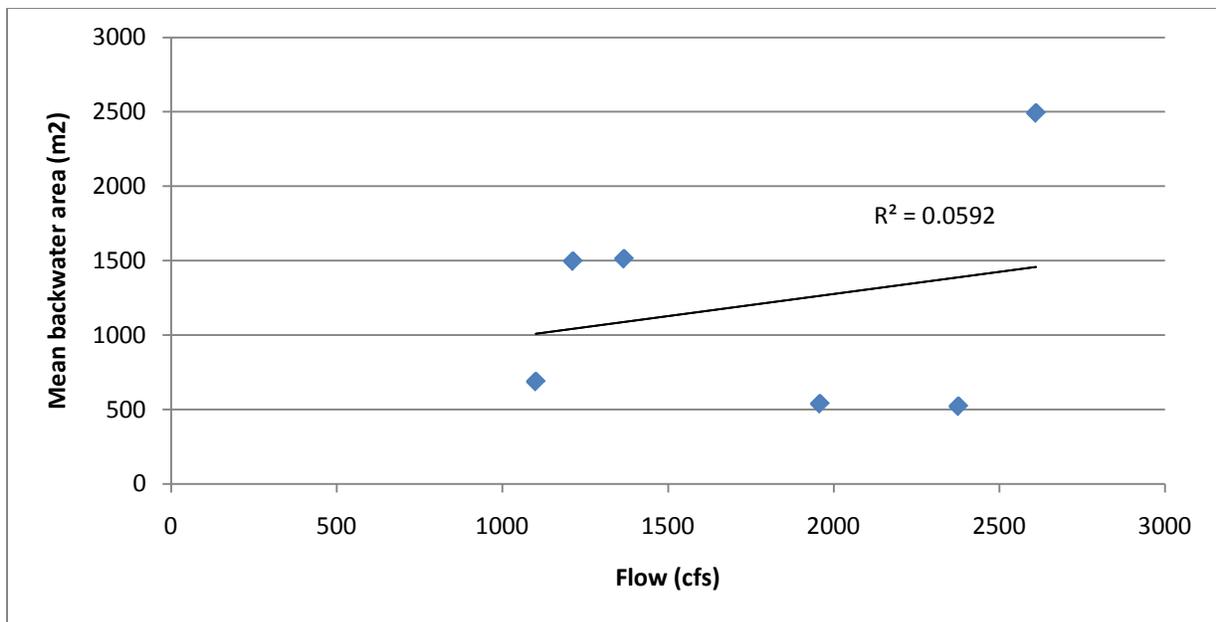


Figure 2. Relationship of flow to mean backwater area for the Middle Green River derived from backwater topographic mapping conducted 2003-2009 (figure provided by Dr. Kirk LaGory, Argonne National Laboratory).

Literature Cited

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