

Rationale for Management of Water Releases from the Elkhead Reservoir Endangered Fish Pool to Augment August–October Base Flows in the Yampa River

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The U.S. Fish and Wildlife Service's (Service) revised base-flow recommendations for the Yampa River were attached as Appendix D to the *Management Plan for Endangered Fishes in the Yampa River Basin and Environmental Assessment* (Roehm 2004; <http://www.fws.gov/mountain-prairie/crrip/yampa.htm>). For the August through October period, the Service established a base-flow target of 93 cfs at the Maybell gage in an historical context. This target was established by adopting the results and conclusions of Modde et al. (1999; <http://www.fws.gov/mountain-prairie/crrip/doc/ModdeMillerAnderson1999.pdf>)¹, which were based on a curve-break analysis of riffle habitats (considered to be the meso-habitat type most sensitive to changes in stream flow) that simulated habitat availability at several different base-flow levels. Using this approach, Modde et al. (1999) estimated an average curve break over all riffle transects of 93 cfs and concluded that flows of 93 cfs or greater during August through October would be sufficient to maintain instream riffle habitats.

The standard deviation around the Modde et al. (1999) average 93 cfs target was 40.8, resulting in an upper flow level to maintain riffle habitats of approximately 134 cfs. Modde et al. (1999) also recognized that although an average of 93 cfs should be sufficient to maintain riffle habitats, it is less than flows identified to avoid a 50% risk of riffles becoming a potential barrier to local movements of Colorado pikeminnow because of shallow depths.

Anderson and Stewart (2003)² employed a meso-habitat approach that integrated hydraulic and biological analyses to determine minimum flows for the Yampa River. They concluded that flows less than 120 cfs do not provide sufficient habitat to adequately support native fish and recommended a monthly average minimum flow of 200 cfs, with flows exceeding 120 cfs to avoid severely degraded conditions.

Given the above information and depending on the amount of water available in the Elkhead Reservoir endangered fish pool, the Upper Colorado River Endangered Fish Recovery Program (Recovery Program) will typically request that releases from the endangered fish pool be managed to ensure minimum flows of at least 93–134 cfs (preferably 120 cfs or greater) at the Maybell gage during August–October. However, the Recovery Program may request other release scenarios to support management actions deemed appropriate to assist in recovery of the endangered fishes.

¹ Modde, T. W.J. Miller, and R. Anderson. 1999. Determination of habitat availability, habitat use, and flow needs of endangered fishes in the Yampa River between August and October. Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

² Anderson, R., and G. Stewart. 2003. Riverine Flow Investigations, Federal Aid Project F-289-R6.