March 1, 2004

MEMORANDUM

TO: Fish and Wildlife Committee

FROM: Kerry Berg

SUBJECT: Presentation by Bill Miller of Miller Ecological Consultants, Inc. on Montana IFIM Project

Application of a Two-Dimensional Habitat Model for Instream Flow Investigations on the Flathead River, upstream of Flathead Lake, Montana.

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Abstract:

A modified Instream Flow Incremental Methodology (IFIM) approach was used on the mainstem Flathead River from the South Fork Flathead River downstream to Flathead Lake. This study quantified changes in habitat for the target fish species, bull trout (*Salvelinus confluentus*) and west slope cutthroat trout (*Oncorhynchus clarki lewisi*), as a function of discharge. Two dimensional hydraulic simulations were combined with habitat suitability criteria in a GIS analysis format to determine habitat area as a function of discharge. Results of the analysis showed that habitat area is more available at lower discharges than higher discharges. Comparison of the pre-dam hydrology with post-dam hydrology showed that pre-dam baseflows provided more stable habitat than the highly variable post-dam flow regime. The GIS analysis showed that sub-adult fish, in particular bull trout, were required to use less productive stream margin areas that are constantly wet and then dried as flows fluctuate. These areas have highly varying productivity for lower trophic levels and consequently are less productive for higher trophic levels, especially bull trout sub-adults. The analysis demonstrates that highly variable flows likely put stress on a bull trout subadult and west slope cutthroat trout, due to the additional movement required to find suitable habitat. The GIS approach presented here provides both a visual characterization of habitat as well as Arcview project data that can be used for additional analysis of flow regimes and spatial variability of habitat

within the three reaches of the river.

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Dr. Miller has over 24 years experience in fisheries, instream flow, and aquatic ecology studies. He has worked extensively throughout the western U.S.on instream flow studies, water temperature modeling and habitat assessments. His experience includes research and evaluations for several threatened, endangered, and candidate aquatic species in the Colorado River, Platte River and Rio Grande basins. He has extensive experience in designing and conducting studies using the Instream Flow Incremental Methodology (IFIM), instream water temperature modeling and developing and implementing ecological models for aquatic systems. He is a former member of the USFWS Instream Flow Group and co-authored the Stream Network Temperature Model, Instream Flow Information Paper 16. Bill's experience includes designing and directing basinwide instream flow evaluations. He has completed instream flow evaluations for US Forest Service, US Fish and Wildlife Service, Montana Fish Wildlife & Parks/ Bonneville Power Administration (BPA) and U.S. Army Corps of Engineers (USACE). He is developing a methodology for determining flow/habitat relationships for the aquatic community in the Rio Grande River in New Mexico. Both the BPA and USACE projects include 2 dimensional hydraulic modeling and habitat evaluations.