Fish Entrainment Investigations from the Yellowstone, Sun and St. Mary Rivers in 2003, with Prelimnary Evaluations of an Experimental Electric Barrier at the St. Mary Diversion[AFS]

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Efficient, economical methods are needed to reduce the loss of fishes to agriculture diversions. Such methods depend on developing techniques for quantifying canal entrainment and fish barrier effectiveness. Three entrainment projects conducted this year were designed to both quantify entrained fish as well as evaluate any present or future fish protection measures employed at the diversions. Fort Shaw (Sun River) and Huntley (Yellowstone River) diversions are unscreened with fyke net systems (nets) developed and installed to sieve 100 percent of diverted flows. At Huntley, 7628 fish were collected comprising 28 species, while over 2500 fish, comprising 10 species were collected at Fort Shaw, during 2003. Standardized sampling efforts indicated diel differences in catch for most species. The St. Mary diversion entrainment sampling was initiated in 2002 with nets sub-sampling a large portion of the irrigation flows (60-81 %) in standardized effort periods. Netting during the 2002 season showed highest entrainment at night and later in the irrigation season. Bull (*Salvelinus confluentus*) and cutthroat (*Oncorhynchus clarki*) trout represented relatively small proportions (1. 1 % and 9.4%) of catch totals. An experimental electrical barrier was installed in the canal head works during 2003 and the nets were used to conduct initial evaluations of its effectiveness. First year data indicates that, at the manufacturers recommended settings and voltage fields, the barrier has low effectiveness on small fish (< 200mmTL). Further work is necessary to determine appropriate settings and configurations; however, effectiveness and operational data obtained from the barrier evaluation will be valuable in determination of its utility at other sites.