Assessment of Culverts as Fish Passage Barrier in a Montana drainage Using a Multi-Tiered Approach[AFS]

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Culverts may be a major factor contributing to the fragmentation and isolation of fish populations by potentially restricting movement through important migratory corridors.

Culverts can impede movement of fish due to high water velocities, inadequate water depths, and excessive outfall heights, among other factors, depending on the swimming and jumping capabilities of the fishes. The objective of our study was to assess the extent to which culverts restrict movement of fishes across a large drainage basin. We used three different approaches to investigate fish passage through culverts throughout the upper Clearwater River drainage, Montana. First, we measured physical conditions at 48 culverts sites to determine fish passage status using the FishXing software package. Second, we electrofished above and below a subset of 23 culverts to assess what culvert characteristics may be influencing fish distribution, abundance, and size structure. At a further subset of 12 sites, we measured passage directly by monitoring movement of marked fish through culverts with varying physical characteristics. The large-scale assessment of culverts using FishXing indicated that over 90 percent impaired fish movement at some discharge. However, electrofishing results showed little difference in fish population characteristics above and below culverts. Results from the mark-recapture studies indicate that fish passage is occurring at 11 of 12 of the culverts studied, but over half showed a degree of restricted movement relative to control reaches. Our findings suggest that using a combination of methods is advantageous for thoroughly assessing fish passage through culverts.