Method for biodegradable marking of salmonid redds
William C. Belknap, Dwayne K. Paige and Heidy K. Barnett

Salmonid redd counts provide a relatively cost effective means of monitoring fish populations. These surveys can be less expensive than weirs, trapping or genetic monitoring and if done over several years provide excellent information on the number of spawning individuals in a section of river. One source of error for redd counts is observer error. A need to uniquely mark salmonid redds to prevent double counting within a single spawning season exists in cases where large numbers of redds are spawned within a short time period. The risk of counting redds multiple times can further be increased when multiple observers are conducting surveys within a reach. Dunham and Rieman (2001) suggest tracking redd accumulations over the spawning season rather than a single survey is important to improve redd counts. We suggest a methodology to aid in distinguishing individual redds through the spawning season.

Seattle Public Utilities (SPU) has been conducting redd surveys for a bull trout population in the Cedar River Municipal Watershed (CRMW) near the town of North Bend, Washington annually. Weekly surveys during the spawning season have been conducted for the years of 2000 through 2008. During the 2000 spawning season, it became clear that surveyors were spending excessive amounts of time determining whether a redd was new or if it was previously counted. Surveyors drew maps showing redd locations to use on subsequent surveys in hopes it would help determine new redd sites in the river, but realized a marking system would improve efficiency.

In order to rectify this problem a quick and cost effective method for individual marking of redd sites was created. A muslin bag (5.5 cm x 20 cm) is marked with the survey date and redd number using a permanent marker, then filled with gravel and tied with the drawstring. A short length of orange biodegradable flagging is tied to the drawstring for increased visibility. The flagged and weighted bag is then placed at the end of the mound or tailspill. One could place the bag at any location around the redd as long as surveyors were consistent. For some species where superimposition of redds is common, it might be better to place the bag with a longer flag in the pit area of the redd. This size gravel filled bag has been quite stable, adequately resisting displacement during high flows of up to 1,000 cfs.

The individual redd marker bags and flagging have remained intact longer than necessary to allow the marked redds to age enough so they are easily distinguishable from fresh redds. Generally few vestiges of these flagged bags are observed the following spring. Additionally, the redd markers do not appear to deter fish from spawning in an area. Bull trout in the CRMW often aggregate redds in groups within a relatively small area in the river. Sometimes, bags will be covered with fresh sand and slightly buried indicating fish activity nearby.

The marking system has few drawbacks. The time required to mark and fill a bag with gravel is approximately 2 minutes. The time saved in subsequent surveys attempting to decide if a redd is fresh or has already been marked is great, especially at aggregate

spawning locations. Additionally, more confidence can be placed in redd count data especially when multiple surveyors are working on the project. Problems associated with the marking method include keeping waterproof markers dry in the rain, because they won't mark well when wet. Also, surveyors may have to retrieve gravel (to fill the bags) from under the water in some areas of the river and in winter this can be quite cold.

References

Dunham, Jason and Bruce Rieman. 2001. Sources and magnitude of sampling error in red counts for bull trout. North American Journal of Fisheries Management 21:343-352.