Okanogan Monitoring and Evaluation Program

Field Manual

Snorkel Survey Methodology

Final Draft

March 7, 2007

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INTRODUCTION

The Colville Confederated Tribes developed this field manual to provide specific guidance related to anadromous fish population monitoring in the Okanogan Subbasin for the 2005 Okanogan Basin Monitoring and Evaluation Program (OBMEP). This monitoring program was designed to collect data related the long-term status and trends needed to feed into future adaptative management. Therefore, this field manual should be considered a "living document" with the following methods potentially subject to some level of modification over time as new information becomes available.

The methods contained within this manual are closely aligned with the Environmental Monitoring and Assessment Program (EMAP) developed by the Environmental Protection Agency (EPA) as adopted into the Upper Columbia Monitoring and Evaluation Strategy (Hillman 2004). These protocols were further refined to address specific program needs and for compatibility with the Ecosystems Diagnosis and Treatment (EDT) Model developed by Mobrand Biometrics Incorporated. EDT is the primary assessment tool used by subbasin planners throughout the Columbia Basin and specifically within the Okanogan Subbasin. Periodic updating of EDT input fields with empirical data will be necessary to assess changes that may occur within the subbasin over time in order to complete the adaptive management loup.

ACKNOWLEDGEMENTS

We greatly appreciated the original documents that were prepared by Paul Wagner with input from Rhonda Dasher in 2004. Ken MacDonald (USFS) also provided valuable information pertaining to the snorkeling protocols from the Wenatchee Subbasin. Field testing and suggestions used for improving these methodologies have come from: Micheal Rayton, Paul Wagner, Rhonda Dasher, and Sydney Sam..

METHOD FOR ENUMERATING FISH SPECIES ASSEMBLAGES USING SNORKELING

Modified methodology taken from: *Rodgers (2002), Thurow (1994), and Peck et al. (Unpubl.)*

PURPOSE

Estimating the abundance, species, and density of fish observed at sites located throughout the Okanogan River subbasin can be used as an indicator of habitat change. Juvenile salmonids with a primary emphasis on summer steelhead allows the investigator to obtain a sample over time of the change in abundance of rearing juvenile salmonids produced in the Okanogan River basin. Collection of information pertaining to salmonids and other species of fish may be collected but is ancillary to the goal of estimating juvenile summer steelhead production in the Okanogan subbasin. In addition,

information pertaining to the presence of salmonids and non-salmonids can be used to provide input for the Ecosystem Diagnosis and Treatment Model in the Predation Risk, Fish Community Richness, and Fish Species Introductions attribute fields.

EQUIPMENT

Persons conducting snorkel counts should be equipped with dry suits or wet suits, masks, snorkels, rubber soled boots, hand held thermometer, field forms/data logger, wrist slates, and a stopwatch. Additional equipment such as hand counters, underwater white boards, and measuring rods are helpful for enumerating fish and determining fish lengths. A submersible halogen light may be useful to search for fish in shaded locations.

SITE SELECTION

The sample reach is laid out according to Section 1 of the OBMEP Physical Habitat Field Manual.

SAMPLING DURATION

Sampling for fish species should occur during the low flow period in late summer when water temperatures exceed 9^0C.

PERMITS

Be sure that all necessary collection permits and ESA clearances are obtained and copies of required permits are with you while in the field.

SNORKELING METHODOLOGY

Step 1: After team members don their wetsuits, a quick equipment check will ensure that all members have the necessary tools to complete their survey.

Step 2: Measure the visual distance to determine the number of snorkelers needed to survey a given reach on a given day. Three rules are applied to do this: 1) if one snorkeler can observe the entire width of the stream then only one snorkel should conduct the survey. This will be the case for most small tributary streams. 2) On medium sized tributaries a snorkeler should take one end of a measuring tape and back away from the bank while another person holds the tape. Once the snorkeler can no longer clearly see detail along the bank. The person on shore will take a measurement of this distance. Then measure the wetted width of the stream and divid the wetted width by the visual distance to determine the number of snorkels. 3) The maximum number of snorkels will be five reqardless of the size of the stream or river. On larger streams with maximum depths greater than 3 meters the visual depth should be measured. A snorkeler will enter the deepest area of the stream and drop a small unpainted lead weight attached to a string toward the bottom until it can no longer be seen then slowly begin raising the weight, marking the string at the depth where it first becomes visible again. The string can be measured on shore to determine the depth.
Note: A minimum of two persons should be present during snorkel surveys. A two person snorkeling crews can conduct snorkel surveys in many wadeable streams. In wadeable stream reaches, one crew member should snorkel each transect and record their

observations on a wrist slate. The second crew memberlocates transect flags and makes sure the snorkeler knows when they reach the end of the transect. The second crew member also provides an added measure of safety for the snorkeler.

Step 3: Before starting a survey, record the weather conditions and water temperature (clear, overcast, rainy, etc). In all wadeable and most non-wadeable stream reaches, snorkeling should involve only a single pass through areas that are deep enough to survey. At the end of the entire reach again record weather conditions, temperature, and total time required to snorkel the reach.

Note: Team members need to look downstream periodically and read the water for areas of increased flow or change of gradient (riffles, falls, or rapids). Before making a pass through an area of increased flow, consider possible safety issues. Objects such as boulders and woody debris can pose a significant hazard, if team members are not prepared. Studying the reach, before a survey, will alert team members to possible hazards so that they can develop a plan for working through difficult areas.

Step 4: .
Wadeable Streams: Begin at the downstream boundary (Transect A) of the sample stream reach and proceed upstream through the pools and riffles. All movements in the water need to be slow and careful to aviod creating a flight response in fish observed (Thompson 2000) or reduce the visual distance by disturbing fine sediments. Members will slowly proceed upstream with team members keeping each other in their line of sight. Where possible, members should float, to avoid stirring up sediment with their feet or hands. If there are multiple groups within a reach, each group should minimize disturbance so that visibility downstream is not compromised. Data should be recorded for each transect by the snorkeler on a wrist slate.
Non-wadeable Streams and Rivers: Begin at the upstream boundary (Transect K). A team of five snorkelers will be used and work as three separate groups. Two snorkels will work in tandem to observe fish along the right bank and other group of 2 will work the left bank. The bank teams will position one member so that they can visually observe the bank and the other member will remain within an area approximately 2 times the visual distance of the bank snorkeler or within visual distance of the secondary drop-off shelf. The fifth and final snorkler will roam the mid-channel area looking for the most like holding cover possible. Past surveys indicate that few fish are observed in this area regardless of the number of snorkels used and most fish were observed in conjunction with woody debris or mid channel bars. The fifth snorkeler should avoid being closer than 2-times the visual distance of any other snorkeler. Snorkel survey on non-wadable streams will occur in a downstream direction. Data should be recorded for each transect by the snorkeler on a wrist slate.

Step 5: Counts of the number of fish should be recorded along entire transect area (A-B, B-C, etc.). When enumerating and identifying fish observed, three levels of identification are possible. First, all fish encountered during the snorkel survey should be identified to species, this is especially critical for salmonid species. Second, fish are identified as unknown species of a known family. Lastly, every effort should be made to

at least classify fish as a member of the family salmonidea or unknown. Care should be taken to minimize the number of unidentified fish.

Step 6: In addition to enumerating all fish, salmonids should be lumped into the following length categories: 1) young of the year (<100 mm), 2) juveniles (100-300mm), and 3) adults (>300mm).

Step 7: After snorkeling, the underwater visibility of each study reach is ranked on a scale of 0 to 3 where 0 = not snorkelable due to an extremely high amount of hiding cover or zero water visibility (No snorkel survey should be conducted, <25% visibility); 1 = high amount of hiding cover or poor water clarity (25%-50% visibility); 2 = moderate amount of hiding cover or moderate water clarity, neither of which were thought to impede accurate fish counts (50%-75% visibility); and 3 = little hiding cover and good water clarity (>75% visibility). If possible all snorkel surveys should be conducted when conditions are rated at a 2 or 3.

Step 9: To calculate fish densities (fish/m^2), determine the area for each reach by utilizing the physical habitat data collected (previously described in Section 2 of the OBMEP Physical Habitat Protocols Field Manual). To calculate the density of fish multiple the average width by reach length to get the area sampled. Then divide the total number of fish along with the total number of all identified categories by the area sampled. Total count by species and for the family salmonidea, and total O. m*ykiss* should be developed along with the densities for juvenile *O. mykiss* and total fish abundance should be calculated for the entire reach.

Step10: Consult Thurow (1994) for additional information.

LITERATURE CITED

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