United States Department of the Interior

FISH AND WILDLIFE SERVICE

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Northwest Power Planning Council
851 SW 6th Avenue, Suite 1100
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RE: 20001400

Kendra Phillips:

This letter will address the concerns of the ISRP regarding the proposal for Project 200001400 entitled "Evaluate habitat use and population dynamics of lampreys in Cedar Creek". The comments of the ISRP appear in bold type, followed by our response.

1. How will we test the assumptions of the adult lamprey mark-recapture (Objective 1)?

Spawning population abundance will be estimated from the proportion of marked (PIT tags and fin clips) adult lamprey among subsequent lots of captured lamprey (Schaeffer et al 1990). This method assumes that marked individuals will mix uniformly with unmarked fish, that the population is closed during the time of estimation, and that marked and unmarked lamprey have equal probabilities of capture.

These assumptions could be violated if marked lamprey behave differently than unmarked fish, if marked lamprey experience higher mortality than unmarked fish, or if marked fish do not pursue upstream movement.

Testing these assumptions in the field is difficult, and little information is available from the literature. USGS-BRD have used PIT tags and fin clips to individually identify their fish during laboratory swimming performance studies and have not noted any behavioral changes or an increase in mortality as a result of tagging. (Jen Bayer, USGS-BRD, Cook Wa, personal communication). It also is very difficult to determine if marked fish are not pursuing upstream movement. A fish that is marked and never recaptured either has died, has evaded the trap, or remains downstream of the trap. Without an intensive radio telemetry study, or something similar, this assumption cannot be fully tested. However, we will place a series of pot traps downstream of our release site in an attempt to collect downstream-moving lamprey.

When reporting spawning population abundances, we will be sure to note the assumptions behind the estimate as well as any violations to these assumptions.

2. How will we assess adult lamprey habitat preference as well as habitat use (Objective 4)?

Adult habitat preference will not be assessed in the same rigorous manner as we will be doing for juvenile lamprey. The only time habitat will be examined, as it relates to adult lamprey, is during spawning ground surveys. During these surveys, habitat measurements will be recorded at each lamprey nest. These measurements include habitat association (Hawkins et al 1993), nest length and width, nest depth, excavation depth, flow, and substrate. Substrate will be categorized by 30 pebble measurements across the horizontal and vertical axes of the nest. Spawning habitat preference will be determined by examining the relative proportion of habitats used. A simplified example: if we determine that 70% of all nests are created in habitats having a velocity of 3.0 f/s, and the remaining nests were created in habitats having less than 3.0 f/s, we will conclude that lamprey prefer faster moving water for spawning.

3. In detail, what is the sampling protocol for ammocoetes (Objectives 2 and 3)?

The spatial distribution and habitat association of ammocoetes (and sometimes transformers and macropthalmia) in Cedar Creek will be assessed using a modification of two techniques: a stratified systematic point-sampling technique for stream-level selections, and a cluster analysis technique to enhance our reach-level selections.

We will use our Geographic Information System (GIS) to select a minimum of 20 reaches throughout Cedar Creek (per year), spaced exactly 1000 meters apart. This sample design allows us to sample a variety of stream morphologies in a systematic-random fashion.

Sample reaches will be divided into six transects spaced 10 m apart. Each transect will contain two sampling points; the sampling points on even-numbered transects will be located at 1/3 and 2/3 of the wetted width and the sampling points on odd-numbered transects will be located at water's edge. Sampling points will have an area of 1 m^2. Specific habitat characteristics will be measured at each sample reach (temperature, pH, dissolved oxygen, conductivity, and gradient), transect (wetted width), and sample point (depth, water velocity, canopy density, and substrate). The presence/absence of ammocoetes will be determined at each sample point by electrofishing. An AbP-2 backpack electrofisher (Engineering Technical Services, University of Wisconsin, Madison, Wisconsin) will be used. The electrofishing unit delivers 3 pulses/second (125 volts DC) at 25% duty cycle, with a 3:1 burst pulse train (three pulses on, one pulse off) to remove larvae from the substrate (Weisser and Klar 1990). Once larvae emerge, 30 pulses/second will be applied to stun the larvae. Each point will be sampled for 90 seconds per pass, with a minimum of two passes. Captured lamprey will be anesthetized with MS-222, identified to species, and measured for length and weight.

If ammocoetes are collected from a sample point, additional points adjacent to the original point will be sampled. If ammocoetes are not collected from the sample point, no further sampling will occur adjacent to the original point. This cluster technique will allow us to increase the number of "successful" points sampled, improving the significance and power of our habitat use models (logistic and categorical regression).

Ammocoetes (as well as other larval lamprey stages) moving in the water column will be captured using a floating rotary screw trap (constructed by E. G. Solutions, Inc., Corvallis, OR) with a five-foot diameter cone placed in a pool upstream of Grist Mill falls in Cedar Creek. When fishing, the trap will be checked daily during high flows and approximately every other day during low flow conditions.

Captured lamprey will be anesthetized, identified to species, and measured for length and weight. Trap efficiency and lamprey abundance will be estimated through mark/recapture (Thedinga et al. 1994). Ammocoetes will be marked using colored elastomer injections. First-time captures will be released approximately 50 m upstream of the trap and recaptured individuals will be released approximately 50 m downstream of the trap. Lamprey measuring less than 50 mm and all wounded lamprey will be released downstream without a mark.

4. How many reaches will be sampled for larval lamprey distribution and habitat use (Objective 2)?

A minimum of 20 reaches per year will be sampled.

5. How will the larval lamprey sampling reaches be selected (Objective 2)?

This question was addressed in the response to question 3.

6. How will the larval lamprey sampling actually be done?

This question was addressed in the response to question 3.

Literature Cited

Hawkins, C. P., J. L. Kershner, P. A. Bisson, M. D. Bryant, L. M. Decker, S. V. Gregory D. A McCullough, C. K. Overton, G. H. Reeves, R. J. Steedman, and M. K. Young. 1993. A hierarchical approach to classifying stream habitat features. Fisheries: 18(2): 3-12.

Schaeffer, R. L., W. Mendenhall, and L. Ott. 1990. Elementary survey sampling. PWS-Kent Publishing Company, Boston. 390 pp.

Weisser, J. W. and G. T. Klar. 1990. Electric fishing for sea lampreys (*Petromyzon marinus*) in the Great Lakes region of North America. *In* Developments in electric fishing. Cambridge University Press, Cambridge, UK. 59-64.

Thedinga, J. F., M. L. Murphy, S. W. Johnson, J. M. Lorenz, and K. V. Koski. 1994. Determination of salmonid smolt yield with rotary-screw traps In the Situk River, Alaska, to predict effects of glacial flooding. North American Journal of Fisheries Management 14:837-851.

We would like to thank the ISRP for their consideration of our proposal.

Sincerely,

Jen Stone
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