

Yukon River Panel's Restoration and Enhancement Fund

Guidance for Sonar Proposals

The primary focus of this document is to assist proponents in the creation of sonar proposals and to assist the Yukon River Panel's Joint Technical Committee's reviewers in their evaluation of sonar project proposals.

For Proponents Developing Proposals

This document provides information on requirements for sonar proponents when completing the *Approach* and *Capacity to Deliver* sections of the Yukon River Panel's Restoration & Enhancement Fund project proposal form, specifically: sonar site selection, equipment selection, sonar sampling plans, and species apportionment. Whether this is a feasibility project, or a season of full sonar operations, it will be important to include details on the topics listed below.

For Reviewers Scoring Proposals

The evaluation of a sonar proposal should consider if the appropriate methods were selected, if the rationale for the methods selected is sound and, if the methods are appropriately described.

The following sections provide guidance to help proponents prepare an appropriate sonar project application and identifies criteria used by reviewers to score proposals.

1) Site Selection

- Why is sonar the most appropriate method for this system compared other methods? (e.g., weirs, aerial or foot surveys, counting towers, etc).
- Where is the site in relation to spawning and harvest? (e.g., if located below all spawning it can help to determine total run abundance. If located above some or all harvest it can be used to estimate spawning escapement).
- The ensonified area should be described. (e.g. entire channel or no coverage mid-stream?)
- Describe the river morphology and flow at the site – is it static or dynamic? Is the flow laminar? Are there channels or eddies? How could this effect sonar accuracy or fish behaviour?
- Describe the substrate. Preferably gravel, cobble or fine sediment composition. Large rubble or a boulder bottom is less appropriate.
- Describe the bathymetric profile - ideally it would have a 'V' or skewed 'V' shape with smooth banks.
 - For ongoing projects: Has the profile been re-assessed in subsequent years to verify stability?

2) Sonar Equipment Selection

- Describe the sonar equipment being proposed for use and how its configuration is appropriate for the river and the ensonified area. (e.g., one vs. multiple sonars ? Split-beam or imaging ?)

- What will the resolution be and how does that align with project goals ?

3) Sonar Operations

- Describe the stands/pods, fish deflection weirs and aiming procedures.
 - Any required permitting should be identified.
- Describe the sampling schedule. (e.g., 24 hours/day, inshore/offshore etc.)
 - Cycling between strata (inshore/offshore) can be used to increase resolution or optimize ping/frame rates.
 - How will time gaps be interpolated if not recording one range for 24 hours/day ?
- Describe sonar recording settings if applicable. (e.g. high or low frequency)
- Describe counting technique and software. (e.g. echogram or video)
 - Will downstream fish be subtracted from upstream counts? Will targets displaying freshwater behaviour (milling or cycling) be counted? Will targets of all sizes be counted, or will a size cut-off be applied? (e.g., only consider fish over 50cm)
- Describe quality control procedures to ensure the repeatability and accuracy of counts. Will there be estimate of precision produced ?
- Describe any training or standardized testing used to assess technician counting proficiency.
- Describe data storage protocols such as long term post-season and short term in-season methods.
- How frequently will the sonar be physically monitored to ensure proper positioning and adjusted to account for changing river conditions?

4) Sonar Testing/Verification

- If the entire channel is not ensonified there must be a test for the presence/absence of fish in the un-ensonified area. Alternatively, reference supporting documents to support assumptions of no fish passage.
 - Testing should include drifting through the un-ensonified zone with an appropriate sized net. (e.g., 7.5 inch mesh for Chinook or 5.25 inch mesh for chum)
- Target testing should be completed annually to ensure the sonar is adequately covering the whole profile or counting area. It should include testing for target detection across the entire range and through multiple depths. Target testing should also occur following high-water events that have the potential to alter bottom profiles.
- Bathymetric profiles should be collected annually.
- An assessment of detected fish distributions should be completed annually to ensure sufficient sonar range. (i.e., Desirable to have majority of fish passing near the sonar with very few fish detected in the offshore area).

5) Sonar Calculations

- Sampling error should be calculated and Confidence Interval estimates provided.
- Species apportionment calculations should be applied, daily, weekly or seasonally as appropriate.
- Interpolation and extrapolation methods should be accurately described.

6) Test Fishery

The species composition of the Yukon River and its tributaries varies widely from the mouth to the headwaters. A test fishing method should be specific to the design of a particular sonar project proposal. A test fishery may be required for collecting escapement data such as age, sex and length (ASL) of target species. Species apportionment work may also be required if there are co-migrating fish or large freshwater fish that have the potential to be misidentified as a salmon.

- Describe the purpose of the test fishery. If a test fishery is not proposed, appropriate justification should be provided.
- Describe any known fish migrations or resident species using all available information.
- Describe the test fishery location. (e.g., how close to the ensonified range?)
- Describe the gear and methods (e.g., drift or set gillnets). Because set gillnets may create a bias towards smaller fish, or shore-oriented fish, discuss why set-netting is the preferred method. Set gillnets, when left unattended, can also increase mortality significantly, discuss how this will be addressed.
- Describe how gear will target a range of body sizes, ages and sexes to obtain representative samples. For example, if using nets to target Chinook, 3 to 4 net sizes should be used with mesh size ranging from 5" to 8.5".
- Describe how captured fish will be measured, and detail any other samples collected. (e.g., scales, genetics, etc.)
- Describe how proposed methods will minimize mortalities.

7) Capacity to Deliver

Sonar projects require experienced sonar personnel. Sonars are technical equipment that have limits to their application and must be deployed appropriately and in proper locations. At minimum, there should be biological oversight and one experienced field staff member for sonar operations on site. Personnel should have relevant sonar experience including previous study design, deployment, operations, troubleshooting, target testing and species apportionment experience (preferably with drift netting). This experience should be clearly presented in project proposals. If a test fishery is proposed, field staff should have experience with fish identification, collecting biological samples and handling fish. Hands-on training and experienced oversight must also be provided for all new or inexperienced technicians.