

Peace River Water Use Plan

Monitoring Program Terms of Reference

- **GMSMON-1 Peace River Creel Survey**

April 10, 2008

Terms of Reference for the Peace River Water Use Plan Monitoring Program: Peace River Creel Survey

1.0 Monitoring Rationale

1.1 Background

The Peace Water Use Plan Committee (hereafter known as the Committee) recommended monitoring fishing pressure to account for the confounding effects of sport fishing when evaluating the effectiveness of operational changes or physical works projects designed to improve fish habitat and fish productivity. Results of the Peace River Creel Survey monitoring program are designed to complement monitoring programs within the Peace River (PCR) Side Channels Plan, PCR Ramping Plan and PCR Flood Pulse Plan management plans (BC Hydro 2003). All three plans are designed with the intent of improving fisheries habitat downstream of the Peace Canyon (PCN) Dam. An interim review in Year 5 of the PCR Side Channels Plan will determine if enhancement through physical works was a sufficient means of improving habitat, or if an alternative minimum base flow regime is required. The PCR Ramping Plan aims to maintain or improve downstream fisheries productivity and the PCR Flood Pulse Plan was developed to improve downstream fisheries productivity and riparian habitat for flora and fauna by investigating the feasibility of periodic flood pulse events to maintain side channel and riparian habitat downstream of the PCN Dam.

1.2 Management Questions

The key management questions are:

- 1) Are there changes to sport fishing preference and/or pressure over time and if so, does the change potentially confound efforts to evaluate success of physical works project designed to improve fish habitat/productivity?
- 2) Can the creel survey data be used as an index of fish productivity – is it sensitive to changes in the fish community?

The Committee believed that greater fishing pressure could occur as a result of increased boat access and/or fish abundance increase in response to operational changes or physical works projects. An increase in sport fishing activity on the Peace River could increase total catch per year of sport fish. Sport fish in the river include mountain whitefish, rainbow trout, lake trout, arctic grayling, bull trout, walleye, northern pike, burbot, goldeye, lake whitefish, and kokanee. In order to properly assess fish response to physical works projects or operational changes, it is necessary to account for the fish removed through the sport fishery (this study). Results of this work could also provide an estimate of relative population size and complement the work of other monitoring programs (e.g., PCR Fish Index).

1.3 Detailed Hypotheses about the Ecological Impacts

The primary hypotheses¹ to be tested are:

H₁: Fishing effort is changing over time on the Peace River;

H₂: Total catch from the fishery is changing over time on the Peace River;

H₃: Species composition of the total catch is changing over time on the Peace River.

1.4 Key Water Use Decision Affected

The key water use decision affected by the results of the monitoring program is a potential change in the current minimum discharge regime from the PC Dam. After Year 5 of the PCR Side Channels Plan, a novel experimental regime may be implemented if this study, in combination with other effectiveness monitoring programs, indicates that physical works are ineffective at improving fish habitat. Ramping regimes may also be affected if this monitoring program, in combination with other studies, indicates the PCR Ramping Plan did not improve fish productivity.

2.0 Monitoring Program Proposal

2.1 Objective and Scope

The objective of the monitoring program is to assess catch and effort of sport fishing over time and to determine if it is a confounding variable for stock assessment of fish populations in the river. It is not the intention of the monitoring program to assess recreational or tourism related issues such as angler satisfaction.

Beginning in Year 1, a creel survey will take place every second year between May and September over a 10-year period. Creel data will be collected from both shoreline and boat anglers on the Peace River between the PCN Dam and the confluence with the Pine River. Data will be collected on all species; however, the analysis will focus on bull trout, Arctic grayling, mountain whitefish, and rainbow trout as these are the species commonly caught by anglers (Cowie 2004) unless the creel survey indicates otherwise.

Data collection, data analyses, and reports will also be done each monitoring year over the study period and a final study report will be produced in Year 9 that summarizes the results of the entire monitoring program and the conclusions that can be drawn pertaining to the management questions and hypotheses.

2.2 Approach

The monitoring approach is a bus route access type survey. Survey agents will interview shoreline and boat anglers at public boat launches on the Peace River and collect effort data while at the launch site. Data will be collected every two years over the spring and summer seasons. The data collected will be analyzed to provide estimates of catch rate, fishing effort, and species composition of fish released and fish retained. This information will determine if the sport fishery is a confounding variable for stock assessment of fish populations in the Peace River.

¹ For clarity, the hypotheses are stated as the alternate hypotheses. Analyses will test the null hypotheses of no effect or difference.

2.3 Methods

2.3.1 Task 1: Project Coordination

Project coordination will involve the general administrative and technical oversight of the monitoring program. This task will include but not be limited to: 1) budget management, 2) study team management, 3) logistic coordination, 4) technical oversight of field and analysis components, and 5) facilitation of data transfer among other investigators associated with the Peace River Side Channels Plan, the Peace River Ramping Plan, and the Peace River Flood Pulse Plan.

In particular, project coordination will be necessary with the Peace River Fish Index for collecting the necessary information related to population abundance of target species.

2.3.2 Task 2: Site Selection and Study Design

Creel surveys will be conducted at public boat launches along the Peace River between the Peace Canyon Dam to the Taylor Provincial Park/Peace Island Park. Survey agents will travel along a predetermined route following a schedule of arrival times, waiting period, and departure times at each survey location (Robson and Jones 1989; Pollock et al. 1994; Chen and Woolcock 1999). Methodology should follow Pollock et al. (1994). Stratifying the survey area will reduce travel distance between sites. The survey will also be temporally stratified by:

- Monthly period (or some alternative multi-week period)
- Day type (weekday and weekend)
- Time of day (early period and late period)

The survey will occur during the spring and summer which is the peak fishing period. Within each month and area strata, the sample days will be selected randomly. It is expected that more fishing will occur on the weekend days and as such sampling allocation for each day type should be weighted accordingly. Holiday weekdays should be considered a weekend day. The early and late period work shifts will include the beginning and the end of the fishing day, respectively. Half of sampling days will be chosen at random to cover the beginning of the fishing period and one-half to cover the end of the fishing day. Any overlap of the early and late periods work shifts should be taken into account during the data analysis.

Study design may need to take into account fishery area closures on the river. Boat launches in an area closure may still be active with fishing parties launching from the site and fishing outside of the closed area.

2.3.3 Task 3: Field Sampling Program

Collection of catch and effort data will occur only during the waiting period at each boat launch site. Catch data will be collected via interviews from shoreline anglers and those anglers returning by boat from a fishing trip. Effort data will be collected either through a time interval count method (car counts) or through a direct expansion method (Pollock et al. 1994).

For each access point, the following should be included on the data form:

- Date and name of survey agent
- Access point

- Length of waiting period
- Weather conditions
- Effort Data (e.g., car count)

Data to collect during an interview will include but are not limited to:

- Total fishing time (including start and finish time)
- Total number of each species retained
- Total number of each species released
- Fork length and weight of fish retained
- Number and species of fish with a tag or adipose fin clip
- Fishing location
- Type of fishing (shoreline or boat)
- Gear type
- Party size
- Number of fishing rods typically used at any one time
- Level of fishing experience
- Target species, if any

An interview that is in progress should be completed even if the waiting period ends. However, no additional interviews are initiated after the end of the official waiting period. The interviewer will ensure that participants are aware of the purpose of the study and that participation is voluntary. Any refusals to participate should be noted. Adjustments within the analysis will be required in cases where anglers chose not to participate in survey as well as if it is ascertained that a boating party did not partake in fishing activities.

The field sampling program described above is a suggested methodology; alternative cost-effective methods will be considered.

2.3.4 Task 4: Data Entry and Analysis

The proponent will develop a Microsoft Access database to enter, check and store all data collected during the creel survey. Data analysis will focus on bull trout, Arctic grayling, mountain whitefish, and rainbow trout as these are the species commonly caught by anglers (Cowie 2004), unless the creel survey indicates otherwise. Data will be analyzed based on Pollack et al. (1994) and Chen and Woolcock (1999). Effort will be measured in units of angler-hours and total catch will be extrapolated based on the catch rates estimated through interviews. Data will be analyzed to estimate both catch (retained and released fish) per unit effort and harvest (retained fish only) per unit effort. If a given species is commonly targeted more so than others, then species-specific effort for the given species will be calculated. Annual catch and catch rates will be summarized by monthly period and area stratum.

Multi-year data will be analyzed to determine trends in total catch, catch rate, and effort over time. Multi-year analysis will also include testing for correlations between catch and effort data, assessing for significant differences among fishing seasons. Tests for homogeneity of variances will be tested and where possible analysis of variance will be used; otherwise data will be tested using non-parametric tests. A multiple comparison test will be used to determine where differences exist.

In the final year (Year 9), data will be compared to the PCR Fish Index monitoring program to assess if catch rate can be used as an index of productivity; this exercise

may be limited to mountain whitefish due to the difficulty of estimating abundance of rarer species in the Peace River.

2.3.5 Task 5: Reporting

Project reporting will consist of a series of annual data reports and a single final report at the conclusion of the monitoring program. The data report will simply document the findings of the year and will include a discussion on how the year's data compare with that collected in previous years. Included in this discussion will be the results of all pertinent hypothesis testing.

A final report will be compiled following the conclusion of the monitoring program in Year 10 that collates all of the data and includes:

- a) an executive summary of the annual report;
- b) field methods, including a map that indicates survey locations;
- c) analytical methods used to determine estimate of total catch, effort and, catch rate as well as any assumptions made;
- d) biological characteristics of captured fish;
- e) estimates of total catch, effort and, catch rate as well as any other notable observations;
- f) an assessment of the findings as they relate to the management question and hypotheses;
- g) any recommendations towards future monitoring (if any) needed

All reports will follow the standard format that is being developed for WUP monitoring programs. This includes providing a version of the report in Microsoft Word and Adobe Acrobat (*.pdf) and all maps and figures in their native format either as embedded objects in the Word file or as separate files. Raw data will be submitted in a Microsoft Access database. All photos will be submitted electronically.

2.4 Interpretation of Monitoring Program Results

Monitoring results will be used to assist in determining the success of the PCR Side Channels Plan, the PCR Ramping Plan, and the PCR Flood Pulse Plan in improving fish habitat and productivity. The information from this study will be used within stock assessment projects (i.e., PCR Fish Index, PCR Side Channel Fisheries) when drawing overall conclusions. Variable fishing effort and/or catch rate over time will indicate that the sport fishery is a confounding variable in estimating population abundance. However, the significance of this confounding variable will depend on the total catch relative to the total population. If a small proportion of the total population is removed by the sport fishery then, we can assume little effect on the population estimate. If a large proportion of the population is removed, then it may be difficult to account for changes in the population during years in which no creel survey occurs. Stock assessment methods may need to be adjusted to account for this information.

Interpretation of results will also need to consider if the fisheries impacts of the sport fishery outweigh the benefits of side channel habitat enhancement. A change in daily harvest limit may be warranted if the sport fishery is deemed to have a significant effect on the fish populations.

2.5 Schedule

Monitoring is scheduled to begin in Year 1 and will be repeated every two years over the 10-year study period. The survey will be conducted between May and September.

2.6 Budget

The estimated total cost for the monitoring program over the 10-year study period is \$227,551. Table 1-1 summarizes the budget by labour and expenses estimated in 2007 dollars.

Table 1-1: Estimated costs for the Peace River Creel Survey

Sub-total		\$192,190
Inflation	2%	\$24,526
Contingency	5%	\$10,836
Total		\$227,551

2.7 References

BC Hydro. 2003. Consultative committee report: Peace River water use plan. Prepared by the Peace River Water Use Plan Committee.

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Chen, S.X. and J.L. Woolcock. 1999. A condition for designing bus-route type access site surveys to estimate recreational fishing effort. *Biometrics*. 55: 799-804.

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