GUIDE TO PROJECT OPERATIONAL PLANS

FOR DIVISION OF COMMERCIAL FISHERIES, REGION I

by

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[1] The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data, this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries.

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INTRODUCTION

The Project Operational Plan is a formal, written description of the objectives and methods of a project. The plan is a means to communicate how the project will be carried out in precise scientific language. The plan needs to be written in such a way that supervisors and other department people can understand the goals of the project, can understand what data will be collected, understand how the data will be analyzed, and understand how various data outcomes will reflect on the questions the project was put in place to address. The operational planning process is a shared endeavor between project leaders, their assistants, research coordinators, regional supervisors, and biometricians.

Peer review is the very basis of American science, and project peer review is almost impossible without a written plan. By having others review your project, you should be able detect expensive statistical problems with data collection, improve projects by having a group with a wider set of experiences contribute ideas, and as the project leader, you should have a big jump on reporting as you have already produced a good draft Introduction, Methods, and Literature Cited.

Use plain, simple, straightforward writing in an operational plan. Please avoid jargon, pretentious words, and please avoid acronyms. For example, use the word "use" instead of "utilize," if that is what you mean. Other common advice is that the first sentence of each paragraph should serve as a "topic sentence." Put important new ideas in at the beginning of paragraphs and state important points and conclusions at the end of paragraphs for emphasis. Think about the subject, and think about the verb: "Statistics tell us that these fish are overexploited," is a good example of a bad match of subject and verb. Have a look at Strunk and White (2000) for advice about how to write well.

Certain sections, especially the Introduction, will need to be written in paragraph form. Simplified forms, such as bullets or outlines often are more useful to emphasize key points and simplify presentation. Consider the following paragraph, which is very typical of the style of writing for these plans.

Paragraph form:

> *Other tasks will be done or may be done as part of this study. Mean length (within $\pm$ 5 mm MEF 95% of the time) of chinook salmon will be estimated. Additionally, the escapement past Canyon Island of "small" (£400 mm MEF) chinook salmon will also be estimated, providing tagging and recovery totals are adequate. Another primary task of this project is to recover coded wire tags (CWTs) from spawning adults to determine the marked fraction of each year class carrying CWTs, which is used to estimate smolt production and marine harvests (objective criteria are covered in a separate operational plan for 2001 entitled "Production of chinook and coho salmon in the Taku River").*

An alternate, bulleted form, seems easer to grasp at a glance.

The following tasks will be done as part of this study, if possible:

- *Estimate mean length (within $\pm$ 5 mm MEF 95% of the time) of chinook salmon*
- *Estimate escapement past Canyon Island of "small" (£400 mm MEF) chinook salmon, if tagging and recovery totals are adequate*

- *Recover coded wire tags (CWTs) from spawning adults to determine the marked fraction of each year class carrying CWTs. The information is used to estimate smolt production and marine harvests in the project* ***Production of chinook and coho salmon in the Taku River****.*

To simplify the task of reading and studying these plans, we do want a standard format, but we also want to give authors flexibility too. An example for a Project Operational Plan is included in Appendix 2. Below is a preferred outline for our project operational plans.

PROJECT OPERATIONAL PLAN OUTLINE

Organize the plan into three major sections:

- Title page
- Synopsis (or Executive Summary)
- Detailed plan

Title page

The title page must have the following three elements:

- Title
- Names of the principal investigator, project leader, and assisting personnel (including consulting biometrician)
- Place for the signature of the regional research supervisor

Synopsis

The synopsis is also known as the statement of work. Think of it as the executive summary of the plan. This part of the plan should fit on one or two pages, and it should be organized into the following seven sections:

- Need
- Benefits
- Objectives
- Procedures
- Deliverables
- Location
- Budget Summary

Need

The statement of need provides the justification for this project, and describes scientific question or resource issues to be addressed. A *statement of goals* can replace this statement, as the need and goals are two ways of addressing the same thing.

The difference between *goals* and *objectives* is often confusing, because they seem to be synonyms. For our purposes, we are considering a *goal* to be the overarching purpose for a study, and *objectives* as specific steps that must be checked off to reach the goal. For example, a *goal* might be to manage a salmon stock for the best possible yield. *Objectives* might be to (1) establish an escapement goal, (2) develop an inseason escapement monitoring system, and (3) close the fishery to all fishing in every case when the end-of-the-year escapement is not going to be at least 80% of the escapement goal. In general, the goals of the study should be discussed in the Introduction and the statement of need, and the objectives should be listed, one by one, in the Objectives section.

Benefits

A statement of benefits explains how results from the project will benefit the public and the resource. This is where the *needs* are linked to the *objectives*.

Objectives

The statement of objectives is an itemized list of specific, measurable, or observable things that will be accomplished by this project. These objectives appear in two places: in the Synopsis and in the Detailed Plan, described below.

A good example of an objective would be “Estimate the spawning stock size of sockeye salmon to Bear Lake, so that the estimated coefficient of variation is less than 5%.” An example of a questionable objective would be “Estimate the spawning stock size of sockeye salmon in Bear Lake, such that the estimate is within 10% of the actual abundance 95% of the time.” Notice that at the end of the study, we will not be able to tell if we met that objective, since the difference between the true value and our estimate is unknowable. Also, notice that it is not clear how to evaluate what will have happened “95% of the time,” because we will be evaluating the success of this one study by itself — without reference to all the statistical outcomes in other, similar studies.

Procedures

The description of procedures briefly explains the general methods to be used in this project. In general terms, explain experimental or sampling designs, how data will be collected, and the analyses to be performed. In this part of the plan, avoid complicated equations and technical terms. Descriptions like, “and then the data will be analyzed using analysis of variance,” or “mark-recapture methods will be used to validate the weir counts,” are about as detailed as this section should be.

Deliverables

Deliverables are the quarterly, annual, or final reports that must be written to fulfill the project requirements. Quarterly reports are generally one or two page summaries, with information on budgets, data collected, and whether project deadlines for the previous three months have been met. Annual reports contain the full analysis of data collected during the previous field season. Final reports are written for projects with specific ending dates, and resemble annual reports. For this section, list types of reports (quarterly, annual, or final), and their due dates.

Location

The description of the location should provide a specific, geographic site of the populations to be studied, or where other data will be collected. Include a description of specific lakes, streams, estuaries, access points, fisheries, and so forth.

Budget Summary

In this section, describe how much money is available by line item. Multiyear budget summaries will be necessary for projects that have a specific ending date. List the budget manager and all personnel that are funded by the project, by name and PCN.

Detailed Plan

The detailed plan should contain up to ten or so sections, and each section should go into considerable detail. The following is a suggested list of sections. The items noted with an asterisk should be considered obligatory.

- Introduction*
- Objectives*
- Study Design*
- Data Collection
- Data Reduction
- Data Analysis*
- Schedules and Reports*
- Responsibilities*
- Literature Cited*
- Appendices

Introduction

The Introduction should provide a context for the project. You should review the literature, and discuss previous attempts to do this kind of study. After reading this section, the reader should understand the problem you are trying to address, and have some understanding of what others have previously done with this kind of problem.

Objectives

Make objectives specific. Wherever practical, include a measurable value or criteria. For example, a measurable objective might be "to collect at least 400 tissues samples for genetic analysis, by week" or "measure at least 40% of the scales recovered in the escapement." If a fraction of the population will be examined, include sampling objectives (e.g., "collect at least 60 heads for otolith sampling," or "measure every 9th fish"). For a description of the differences between goals and objectives, refer back to Objectives in the Synopsis section (page 7).

If all of the animals will be counted or measured, usually this is called a census (i.e., sample size and population size are the same). Measures of sampling error, such as confidence intervals are not needed for a census. Still, measures of how things vary within the population might be very important. For the objective *to count the number of coho salmon entering Bear Lake to spawn* the desired outcome is a complete census of that population. If fish are counted with a sonar, the standard deviation or variance among hourly counts might not have any logical place constructing a confidence interval if all hours are sampled. However, this estimate would be helpful in deciding how to proceed next year, if to save money, fewer hours are sampled — the variation among hours will determine how big a sample is needed.

Study Design

If the study is primarily about sampling, describe sampling using appropriate sampling terms. Name what you consider to be the *statistical universe* and the *sampling units* (see Thompson 1992 for an explanation of these terms if you are not sure what they mean). Spell out specific, desired sample sizes and expected precision. Consider how the sample is to be generated, and write this down clearly. Mention sampling goals and provide a brief outline of your reasons for choosing these sample sizes. Do not gratuitously use the word "random" with the word "sample." A *random sample* is a specific kind of sample.

If the study uses techniques like analysis of variance, describe the construction of hypothesis test, experimental units, error terms, and expected mean-squared errors.

If statistics are modified, describe and defend these modifications. Include a literature citation for standard methods. However, when citing a source for methods, the methods must be completely described within that citation. Unpublished statistical methods should be fully developed and described in an appendix.

Talk about the mechanics of sampling. Describe the sampling gear, the means by which it will be used, and how samples are to be handled. Be sure to be specific about what information the sampling crews are to record, where it is to be recorded, and how this information will accompany the samples.

Data Collection

The data collection section contains descriptions of types of data collected, and protocols for collecting them. Consider using further subheadings, bulleted forms, or outlining to clarify the descriptions. The following paragraph is an example *data collection subsection* of an operational plan:

> *Every coho salmon captured at the fish pass will be counted, visually inspected for the presence of a missing adipose fin, and passed through a detector to determine the presence of metal (indicating a CWT) in its snout. Fish which are missing their adipose fin but have no indication of metal in their snout will be sacrificed for closer inspection for a CWT (in the Juneau Tag lab). During the first several weeks of sampling, every coho salmon will also be sampled for scales, length (nearest 5 mm MEF), and sex (visual examination of secondary maturation characteristics). All data will be recorded on the appropriate forms noted below.*

Later these authors added a very useful summary:

> *<u>In Summary:</u>*
>
> *(1) count **every** coho salmon encountered; check each fish (regardless of size) for an adipose fin and metal (a CWT) in its snout, and record all data on the appropriate form (Daily Trap Sampling Summary Form or Adult Coho Cumulative Summary Form Appendices A1, A2); **and***
> *(2a) sample **every** coho salmon for length, scales, and sex. Be sure to gather ageable scales by taking scales from the preferred area. Record data on ADF&G Alternate Age Weight Length Version 1.0; **or***
> *(2b) if an unexpectedly large return occurs, discontinue (2a) above, and sample **every-other** coho salmon for length, scales, and sex. Also determine the relative size (jack = under 16 inches or 1-ocean adult = 16 inches or more) of every fish not measured for length. Be sure*

to gather ageable scales by taking scales from the preferred area. Record data on an ADF&G Alternate Age Weight Length Version 1.0 form.

Data Reduction

If this section is included in the plan, the author should use it to outline a path data will take from the field to final analysis. The following is an example.

It is the responsibility of the field crew leader to insure that all data are recorded on a daily basis. Data forms will be kept up to date at all times. If time allows and if a computer is available in the field, Daily Sampling Summary and Adult Coho Cumulative Summary forms will be transferred from field forms to EXCEL spreadsheet files. Otherwise, this step will be performed in the office. Data will be sent to the Petersburg ADF&G office at regular intervals and inspected for accuracy and compliance with sampling procedures.

Once the data has been transferred to EXCEL files, the original field forms will be compared with the electronic files and error checked. Inspection for errors will include: mathematical errors, incorrect dates, transposed nonsensical lengths (i.e., 360 mm when the fish was actually 630 mm), correct length measurement method used. Scale cards will be checked to insure that scales are clean and mounted correctly, and that cards are correctly labeled and match up with corresponding data forms.

At the end of the field season, AWL mark sense forms will be checked for errors and sent to Juneau with the associated scale cards. There, the scale samples will be read to determine ages, and recorded on the AWL forms. These completed forms are given a final check for errors before sending them to Anchorage for op scanning; the final electronic AWL results will be inspected for obvious errors and copied to EXCEL files after they are returned to Petersburg.

Data Analysis

In this section, the project leader demonstrates a command of analysis methods he or she proposes to use. Methods should be described in detail. This includes equations of estimates and variances, and pertinent references. If the analysis method has not been published in the literature, a complete derivation of the method and associated variances should be presented in an appendix.

Schedules and Reports

The schedules and reports section contains timelines for milestone dates and activities for the project. List deadlines for sampling events and other field activities, data compilation, analysis, and reports due.

Responsibilities

This section contains the names of all personnel associated with this project, their PCNs, and the duties that they are expected to complete. You may describe duties for each person in incomplete sentences.

Literature Cited

This section contains the references to all citations to scientific literature in the report.

Appendices

Materials which are relevant to the project but which do not fit neatly into a section are placed into an appendix. Types of materials include maps, examples of data, sampling forms, detailed explanations of statistical procedures, and so forth.

LITERATURE CITED

Strunk, W. and E. B. White. 2000. Elements of style, 4th ed. Allyn and Bacon, Needham Heights, Massachusetts.

Thompson, S. K. 1992. Sampling. John Wiley and Sons, New York.

APPENDICES

Appendix 1. Example synopsis.

OPERATIONAL PLAN

Alaska Department of Fish and Game
Division of Commercial Fisheries
Southeast Region

SPAWNING ABUNDANCE OF BEAR RIVER SOCKEYE SALMON

PERIOD COVERED: 2002 FIELD SEASON

Principal Investigators:

Woogie Fritzmeir, Fishery Biologist, ADF&G

Assisting Personnel:

Sandy Beaches, Fishery Biologist, DFO
Marg Inoverr, Biometrician, ADF&G
Vacant, ADF&G Fishery Technician III
Waren Peace, Senior Fishery Technician, DFO

Submitted: June 14, 2001
Last Revised: June 14, 2001

	Approved	Date
Regional Research Supervisor	_____	_____

Synopsis

Spawning Abundance of Bear River Sockeye Salmon

Principal Investigators:

Woogie Fritzmeir, Douglas Island Center Building, 802 Third Street, P.O. Box 240020, Douglas, Alaska 99824. Email: woogie_fritzmeir@fishgame.state.ak.us

Need:

This project is the sole means to estimate the spawning stock size of sockeye salmon into Bear Lake.

Benefits:

Estimates from this project will be used for active, inseason management of the sockeye salmon fishery in Dropoff Straights. The inseason abundance estimation model for Bear River sockeye stocks has over projected the run for the last three years. Escapements of the Bear Lake stock were below the goal during the last four years. We hope this project will lead to development of a reliable inseason run assessment program. This would enable fishers to take advantage of run surpluses in years of high run abundance and enable managers to avoid under escapement in years of low run abundance.

Objectives:

1. Establish a weir on Bear River
2. Develop mark-recapture estimates of sockeye spawning stock size
3. Communicate inseason run-strength information to fishery managers
4. Develop a history of stock size and subsequent recruitment

Procedures:

Standard multi-event mark-recapture statistical methods will be used. Seven, independent mark-recapture events will occur, and standard closed-population methods will be used.

Deliverable Products:

Semi-annual reports will be submitted to the fund coordinator. A final report by the project leader will appear in the Division of Commercial Fisheries, Regional Information Report Series and two copies will be forwarded to the fund coordinator when completed.

Synopsis – Spawning Abundance of *Bear* River Sockeye Salmon (Cont.)

Budget:

Bear River Sockeye Weir and Tagging Budget		STATE FY			
Line		2001 4/01-6/30	2002 7/01-6/30	2003 7/01-6/30	Total
100		$8,000	$36,000	$36,000	$80,000
200		$533	$1,133	$1,210	$2,876
300		$560	$5,120	$5,120	$10,800
400		$624	$4,000	$1,700	$6,324
500		$0	$0	$0	$0
Total 100-500		$9,717	$46,253	$44,030	$100,000
3% Admin		$292	$1,388	$1,321	$3,000
Total	$10,009	$47,641	$45,351	$103,000	$103,000

100 Project technician salary June 11–August 30

200 Airline flights to Wrangell for travel to work site and crew placement

300 Travel to work site, aerial surveys, radio tracking

400 project supplies, sampling gear, nets, groceries

Appendix 2. Example detailed plan.

INTRODUCTION

The Stikine River is a transboundary river system originating in Canada and passing through Southeast Alaska before emptying into the ocean near the community of Wrangell, Alaska. It is one of three transboundary rivers that produce major runs of sockeye salmon under joint management by the Alaska Department of Fish and Game (ADF&G) and the Canadian Department of Fisheries and Oceans (DFO).

Stikine River sockeye salmon are harvested in U.S. commercial gillnet fisheries in Alaska Districts 106 and 108, in Canadian commercial gillnet fisheries located in the lower and upper Stikine River, and in a Canadian aboriginal fishery in the upper portion of the river. In addition, since 1993, a Canadian terminal area fishery has operated in the lower Tuya River or at Tahltan Lake when escapements are estimated to be surplus to spawning requirements (Figure 1). In 1995, a United States personal use fishery was established in the lower Bear River. Additional catches of unknown quantity are taken in U.S. troll and seine fisheries and in sport fisheries near Wrangell and Petersburg. The 1979–2000 average Stikine sockeye salmon harvests in these fisheries were U.S. commercial, 45,554 fish, U.S. personal use, none reported, Canadian aboriginal, 4,644 fish, Canadian commercial, 26,782 fish, and Canadian ESSR, 5,765 fish. The U.S. fisheries are managed by ADF&G and the Canadian fisheries are managed by DFO

The Transboundary Technical Committee meets prior to the season to update joint management and enhancement plans, develop run forecasts, and determine new parameters for input into the inseason run forecast model, referred to as the Stikine Management Model. The model is upgraded annually to provide inseason forecasts of the total Stikine sockeye salmon run as well as the following components of the run: the Tahltan stock (wild and planted combined); the planted Tuya stock; and the mainstem stocks. The model for 2001 will be based on CPUE data from 1985 to 2000 from District 106 and the Canadian commercial fishery in the lower river and from 1986 to 2000 from the lower Stikine test fishery. Linear regression will be used to predict run size from cumulative CPUE for each week of the fisheries beginning in week 26 for all three fisheries, however, due to changes in gear efficiency for commercial fisheries the test fishery data will be the primary model input.

In 2001, preseason forecasts of run strength will be used for fishery management during the first two weeks of the commercial fisheries. From the third week of the fishery through the remainder of the season the inseason forecasts of total run size and total allowable catch, produced by the Stikine management model and based on catch-per-unit-effort (CPUE) data, will used to assist in determining weekly fishing plans. The weekly inputs to the model included: the catch, effort and stock composition (proportion Tahltan/Tuya from egg diameters, proportion planted Tuya from thermal mark analyses of otoliths) in the Canadian lower river test and commercial fisheries; the upper river catch in the aboriginal fishery (AF) and upper river commercial fishery; the catch, effort and assumed stock composition in Subdistrict 106-41; and, the catch and assumed stock composition in District 108 and Subdistrict 106-30.

Preliminary results of thermal mark analyses will be available inseason for the lower inriver fisheries to account for Tuya production in the model and reduce the risk of over-estimating the total allowable catch of Tahltan sockeye salmon, which was expected to be below average in 2001.

The weir at Tahltan Lake will again be used to enumerate the spawning escapement of that stock. The spawning escapements for the Mainstem and the Tuya stock groups are estimated indirectly by computing the ratio of Tahltan to Mainstem and Tuya components in the total inriver sockeye salmon run. Stock

identification data are collected in the lower river commercial and test fisheries. The ratios of Tahltan:Mainstem and Tahltan:Tuya are applied to the estimated inriver Tahltan run size to develop an estimate of the total inriver sockeye salmon run. The escapements are estimated by subtracting the inriver catches from the inriver run estimate.

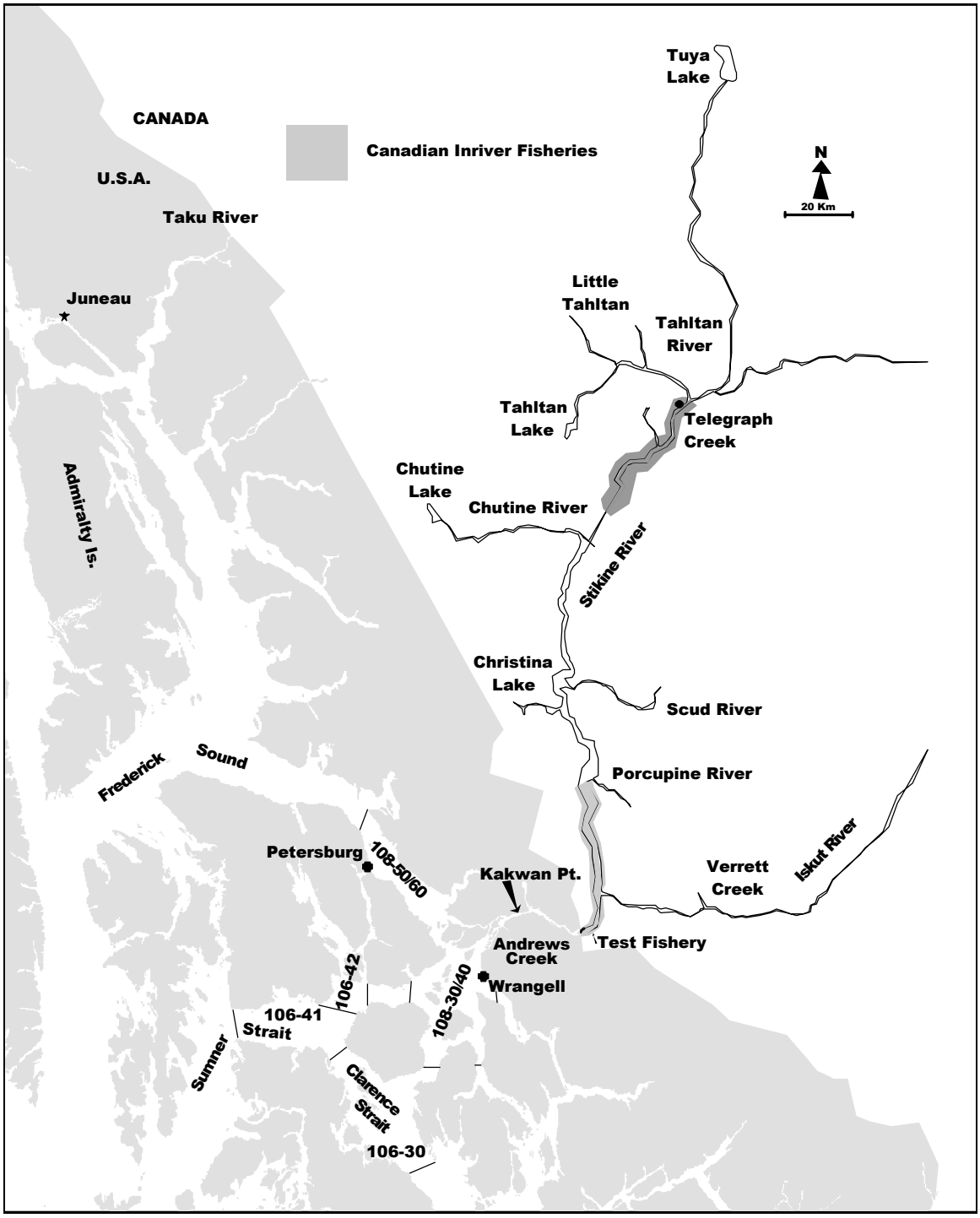

Figure 1. The Stikine River and principal U.S. and Canadian fishing areas.

A new sockeye salmon mark-recapture program was initiated in 2000 to explore the feasibility of developing an alternate abundance-based management regime for Stikine sockeye salmon stocks. The continuation of this study in 2001 will, in many respects, replicate the pilot mark recapture project in 2000. The 2001 run study will start on Wednesday, June 13, one week earlier than in 2000.

An additional aspect of this program will be capturing fish holding below the Tuya barrier, radio tagging healthy fish, and transporting and releasing these fish above the Tuya barrier. Additional unmarked fish will also be transported above the barrier. Radio tagged fish will be tracked up the Tuya River and into Tuya Lake. This program will provide information on the ability of the fish to successfully reach potential spawning areas in Tuya Lake. Data may be used to assess the potential of developing a bypass to the Tuya barrier to allow anadromous access to Tuya Lake.

OBJECTIVES

The research objectives for 2001 are to:

1. estimate the number of salmon spawning upstream of the U.S./Canada border in 2001 such that the estimated coefficient of variation is within ± 15% of the estimate;

2. estimate the age, sex, and length composition of the sockeye salmon spawning above the border in 2001 such that all estimated coefficients of variation are within ± 2%;

3. estimate the run timing of Tahltan, Mainstem, and Tuya bound sockeye salmon through the lower Stikine River;

4. estimate the proportion of Tahltan, Tuya, and Mainstem sockeye salmon within the total Stikine sockeye salmon escapement/run;

5. opportunistically tag chinook salmon captured at the sockeye salmon capture and tagging site in accordance with the protocols detailed in the chinook project operational plan (Spawning abundance of chinook salmon on the Stikine River; period covered: 2001 field season); and

6. estimate the success of fish transported above the Tuya barrier to continue migration to Tuya Lake.

STUDY DESIGN

A mark-recapture experiment will be used to estimate abundance of sockeye salmon entering the lower Stikine River past the U.S./Canada border in 2001. Immigrating sockeye salmon caught at Rock Island Eddy, approximately 13 km downstream of the U.S./Canada border, will be tagged and marked before being released as the first of two sampling events. Chinook salmon captured at this location will also be tagged according to protocols established in the project operational plan for the chinook salmon mark-

recapture study. The second sampling event will consist of sampling (inspecting) sockeye salmon for marks upriver in the Canadian commercial and test fisheries located above the U.S./Canada border. Additional sampling will occur in the upper river fisheries and spawning areas. Recovery effort/sites will include 1) Live fish that pass through the Tahltan River weir, 2) sampling live or post-spawn fish in three or more mainstem spawning grounds, 3) fish sampled from the Canadian aboriginal and commercial fisheries near the community of Telegraph Creek; and fish sampled from catches in the Tuya fishery.

Wild Stikine sockeye salmon generally emigrate from freshwater as yearling smolt, spend two to three years at sea and return to the river during June, July, and August, although some of the mainstem fish migrate to sea the year they emerge from the gravel. We expect the majority of the escapement to be aged 1.3 (~70%) and 1.2 (~10–15%). Planted Tuya sockeye stocks often exhibit a life history strategy different from the Tahltan and mainstem fish with a protracted fresh-water rearing period. Age 2.2, 3.2, and 3.3 fish are not uncommon in this stock but are rare in the wild fish.

Capture and Tagging at Rock Island Eddy

ADF&G and DFO personnel will capture sockeye salmon in set gillnets fished in the Stikine River near Rock Island Eddy, approximately 13 km downstream of the U.S./Canada border. Each net will be 40 meters (120 feet) long with 12.7 to 13.7 mm (5” to 5 3/8”) mesh, hung relatively loosely at approximately a 3:1 ratio. In 2001, nets will be fished daily beginning June 16 and continue through about August 30. A minimum of three persons will operate each skiff during the gillnet tagging operation. The crew will fish seven days per week. Crews will carefully record fishing and processing time on the appropriate form, Appendix A1, to insure that nets are fished for seven (or so) hours daily.

Upon realization that a sockeye salmon has been captured (a tug of the net), fish will be carefully removed from the net, cutting the net if needed, and placed into a sling in a box partially filled with water. Sockeye salmon captured in good condition will be measured (both mid-eye fork [MEF] and post-orbit to hypural plate [POH]), sampled to determine their sex and collect scales, triply marked, and released. The primary mark shall be a numerically coded, solid-core, spaghetti tag. The second mark will be a hole punched in the upper one-third of the left operculum with a paper punch (UOP). The third mark will be to clip off the left axillary appendage at the base (LAA), located at the left pelvic fin. These three marks are to ensure that when a fish is examined on the spawning grounds 1–3 months later, we will be absolutely sure of whether or not it was ever marked at Rock Island Eddy. The condition of each fish will be assessed and noted. Fish with deep wounds, damaged gills or fish in a lethargic condition will not be sampled for length, sex, and scales and will be released without being tagged. Opercular flap samples (hole punch samples) will be collected and stored in 100% ethanol. The samples will be separated by statistical week and not by individual fish.

Vinyl tubing “Floy” spaghetti tags consisting of a piece of hollow orange tubing measuring 12" (30 cm) with lettering “PH 867-393-6722” on the first line and “Salmon Tag #K000??” on the second line will be used. Each tagged fish will have a tag number unique to each tag, beginning with number 0001 for the 2001 field season. The tag will be threaded through the back of the fish using standard methods and the ends firmly tied together. The subsequent knot should be as close to the fish's body as possible thus avoiding the presence of an exposed loop in the tag. Chinook salmon will be marked using the procedures as outlined in the 2001 Stikine River chinook mark-recapture study plan.

Radio Tagging at the Tuya Block

It is anticipated that there will be an ESSR fishery below the Tuya barrier in 2001. A subset of 50 to 75 fish captured in this fishery will be implanted with a radio tags and transported above the Tuya barrier.

Radio tags must be checked to ensure that tags are emitting the proper frequency and codes prior to application to the fish. Tag application will follow standard procedures as done in other transboundary projects conducted on the lower Stikine, Taku, and Alsek rivers, whereby healthy fish are immersed and the tag is gently slid down the fish's esophagus with the use of tag insertion tube. As with standard spaghetti tag application procedures the radio tag frequency and tag code must be recorded and cross-referenced with tagged fish. The time of application must also be recorded to the minute.

Spaghetti Tag Recovery in Commercial and Test Fisheries

The second event sampling strategy will include tag recovery from five fisheries, the lower river commercial and test fisheries, the aboriginal and commercial fisheries near Telegraph Creek, and the ESSR fishery located near the Tuya barrier. Additional sampling will be done on escapements through Tahltan weir and on major mainstem spawning grounds. The principal tag recovery source and hence the data used to generate an inriver population estimate will originate from the lower river commercial and test fisheries.

Personnel of DFO will sample fish at or near the spawning grounds on the mainstem Stikine River. DFO will operate the weir on the Tahltan River from July 6 through September 14 to count and sample live fish. DFO personnel will sample sockeye salmon captured in the commercial, aboriginal, and test fisheries. Sockeye salmon sampled in the second event will be closely examined for tags and/or secondary marks, examined to determine their sex, measured (MEF/POH), sampled to obtain scales, and marked to ensure that these fish are not double sampled. A hole will be punched on the lower (ventral) left operculum if the fish is live sampled or from a creel survey. A $5.00 (Canadian funds) tag reward will be offered. This should ensure that all tags caught in the commercial and aboriginal fishery will be delivered to DFO personnel. A minimum goal of 5,000 samples from the commercial/test fishery and spawning locations is desired. Sockeye salmon collected during carcass surveys will be slashed along the left side.

Sample Size

Besides the 1,400 sockeye salmon we expect to tag at Rock Island Eddy (the first sampling event), we anticipate examining all fish captured in the lower river test fishery, 2,000–3,000 fish, fish captured in the lower river commercial fishery plus volunteer delivery of tags from an expected commercial catch of 10,000 fish, about 500 sockeye salmon in fisheries near Telegraph Creek, plus volunteer tag submission from the anticipated catch of 5,000 fish, 800 fish passing through Tahltan weir, and all fish harvested in the Tuya ESSR fishery. Up to 200 sockeye salmon will be sampled from the mainstem spawning areas. All fish in the lower river fisheries which have tags will be sampled for egg diameters, scales, sex, and length, and otoliths and all samples will be labeled with unique sample numbers for later sample

coordination. Commercial fishers will extract tags and submit them to DFO along with total catch numbers, thus most fish sampled from the commercial catch will already have the tags removed. Fish sampled from the commercial catch that are secondarily marked but do not have a tag will not be sampled for additional biological data but the numbers of marked fish in a sample along with the total sample size will be recorded. Tags will be left on the test caught fish and from this group an element of tag loss can be calculated to apply to the commercial fishery tag harvest.

Radio Tag Monitoring and Recovery

Radio tagged fish will be monitored via two stationary receivers placed in the following locations.

1. Immediately above the Tuya barrier. This site will provide the frequency of tagged fish that continue migration up the Tuya River and will, by deduction, provide the frequency of migrants that do not continue upstream.

2. Near the mouth of Tuya Lake. This tower will enumerate the total number of tagged fish migrating into Tuya Lake and by deduction will indicate fish use of habitat in the Tuya River or mortality below the tower.

In addition to the use of stationary radio tower receivers, several over flights will be conducted from late July through August to monitor fish migration and to define spawning sites located between stationary tower sites.

Age Composition of Sockeye Salmon Escapement

Age compositions for the lower river gillnet sampling and each escapement spawning location (tributary) will be tabulated separately. Data for separate sampling locations may be pooled. Samples from the spawning grounds, especially at the Tahltan Lake weir, should be more representative of that stock.

DATA COLLECTION

Capture and Tagging

Effort and catch during gillnetting operations will be recorded on forms drafted by ADF&G. Set gillnets shall be fished 7 hrs/day, excluding sampling time and time required to clean debris from the set, and clear snags. Gillnets shall be fished seven days weekly. Onsite staff in consultation with the project leader shall

determine weekly scheduling and effort. Fishing time, catch, etc. shall be recorded on **Setnet Recording Forms, Appendix A.1.** River height to nearest 1/10 foot, temperature to nearest 1°C (both at 0900 each day), any shutdown time, and other comments will be recorded on the forms.

Data collected from each sockeye captured will be recorded on the **Gillnet AWL Forms (Appendix A.2)** and includes the date and time caught, fish number, sex, length in mm MEF and POH, spaghetti tag number, and any pertinent comments (state of maturation [bright, red, etc.], condition, wounds, etc.). Under fish number, begin with the first sockeye salmon tagged and continue sequentially throughout the remainder of the season. This means each sockeye salmon caught and tagged will have a unique fish number; fish that are injured or otherwise unhealthy will not be tagged or sampled for biological data and therefore will not have a unique fish number (see example Appendix A.2). Fish number is sequentially assigned to keep track of total numbers tagged and released and is not to be confused with the spaghetti tag number. There should be a line of data on the AWL form for each fish sampled to insure that scales match up with length data. If a tagged fish is recaptured note the tag number and the condition of the fish but do not collect AWL data.

Chinook and coho salmon will be sampled, tagged, and recorded in similar manner as detailed in the chinook operational plan. In the event that a chinook or coho salmon with a adipose fin clip is netted, sacrifice the fish, sample for AWL [sex, length, and scales], apply a cinch strap with a TAG LAB cinch tag and record the cinch strap # on the GILLNET AWL FORM. For each day you catch and sample chinook salmon, fill out a **Coded Wire Tag Sampling Form (Appendix A.3)** and send any heads with cinch straps and forms into Juneau each week, clearly labeled.

Samplers will collect AWL (scales, sex, and length) data from each sockeye captured in the gillnets. Three scales will be collected per fish. Scales will be taken from the left side of the fish from the preferred area (taken 2–3 rows up from the lateral line and 1" apart horizontally from each other). Scales will be affixed anterior side up on completely labeled gum cards. Begin a new gum card each 10 fish and record the gum card # along the right margin of the AWL form (see example Appendix A.2). It is very important that gum card and AWL forms be labeled completely so that the scales and data can be matched up in the ageing lab.

Recovery

All fish sampled from test, commercial, aboriginal, and ESSR fisheries or on the spawning grounds will be inspected for the three primary tagging marks and also for marks indicating the fish had been previously inspected at the recovery site. We will attempt to sample salmon shortly after their death to increase the likelihood of recognizing marked salmon. Note that the first time a sockeye salmon is examined at the weir or on spawning grounds, it will be given a hole punch on the lower (ventral) left operculum (LOP) after it has been sampled. <u>It is extremely important that during the spawning grounds sampling, we obtain an accurate count of the total number of fish inspected and accurately detect any fish that were marked at Rock Island Eddy</u>.

Follow these steps for sampling each fish. First, look for the <u>lower</u> left opercle punch (LOP), which means the fish has already been inspected on the spawning grounds and should not be sampled again. On fish that do not have a LOP, look for: 1) an <u>upper</u> opercle punch (UOP), or 2) a spaghetti tag (or scar where a spaghetti tag may have once been affixed) or 3) a missing left axillary appendage (LAA). Any of these three marks indicate this fish was tagged at Rock Island Eddy and is a valid recovery of a marked fish. In addition, fish will be radio tagged at the Tuya block and transported above the block so it is also important to check fish sampled for the presence of a radio tag indicated by a small wire like antenna protruding from

the fish's mouth. Once you are done sampling the fish, punch a hole in the lower left operculum and, if the fish is dead, slash the left side as well to prevent double sampling. Note that, in the event that the spaghetti tag falls off, it is vital that the other marks (tag scar, UOP or LAA) be found. These marks may heal partially or fully, but because they are standardized and there are three of them, it should be fairly standard to detect them with careful inspection.

Record all recovery sampling information on the **Spawning Grounds AWL form (see Appendix A.4** for an example)--record a data line of information each time you encounter a fish that has not been previously sampled. Record date, fish #, sex, length (MEF and POH), and spaghetti tag number (if present). For the lower river commercial and test fishery samples all fish bearing spaghetti tags will be sampled for otoliths and all females will be sampled for egg diameters. These data will be recorded with unique numbers to allow subsequent matching of the tag number, scale, sex, length, otolith, and egg diameter. Leave blank columns for age and AEC (ager error code). **(note: field notes will be transcribed into an excel spreadsheet as part of the standard record keeping functions of the program. To transcribe the data onto Appendix A.4 will be too time consuming)** Most importantly, record a "Y" if the upper opercle punch is present and detectable under the column labeled UOP (even for fish with a spaghetti tag) and record a "Y" under LAA for fish without a left axillary appendage. If you find a fish with no spaghetti tag but with a tag scar, write "scar" under Spaghetti Tag # and note that one or both of the other marks should be there as well. Sample all fish on spawning grounds for scales (3 anterior side up), sex, and both lengths (MEF and POH). As before, mount the scales on gum cards, 10 fish per card and record the gum card number along the right margin of the AWL form. If a carcass is in such bad shape that a length measurement is not possible, determine sex if possible, and still try to get scales, even if from outside the preferred area. The opercle punch should be visible in carcasses that are little more than a head, and if the head can be examined and size and sex determined, it is a valid and valuable sample. Each chinook should also be examined for adipose fin clips to determine the rate of straying of marked fish, as few CWT marked chinook salmon are expected in the Stikine River in 2001. Any chinook salmon with an adipose fin missing will be sacrificed, the head saved, a cinch strap tag (from the ADF&G Tag Lab) affixed around the left jaw, and the cinch # recorded on the Spawning Grounds AWL Form (sex, lengths, and scales from every fish without an adipose fin will also be taken). Fill out a row for each cinch-strapped fish on the Chinook CWT Sampling Form (Appendix A.3).

Tahltan River Weir

The weir crew will sample as many sockeye salmon as possible, as described above. Each fish sampled will receive a LOP which will allow the possibility of additional sampling above the weir. It is important that fish be sampled randomly without targeting on tagged fish. It is impossible to individually sample every fish and some will be passed without being handled. Each of these fish will be observed as it passes through the weir and observation of a spaghetti tag will be recorded.

Canadian Aboriginal, Upper River Commercial, and Escapement Surplus to Spawning Requirements

The upper river fisheries will be sampled for sex, length, scales and tag recovery. In addition, a reward of $5 per spaghetti tag and $20 per radio tag returned will be offered which should insure that all tags captured in these fisheries will be recovered.

DATA REDUCTION

The leader of the field crew at Rock Island Eddy will record and error check all data from the tagging operation. Errors may consist of incorrect dates, transposed nonsensical lengths (360 mm when the fish was actually 630 mm or POH length > MEF), transposed or nonsensical tag numbers. Data forms will be kept up to date at all times. Scale cards will be checked to insure that scales are clean and mounted correctly and that the cards are correctly labeled and matched up with the corresponding data form. Scales will be remounted when necessary. Data will be sent to the DFO and ADF&G offices at regular intervals and inspected for accuracy and compliance with sampling procedures. Data will be transferred from field books or forms to EXCEL spreadsheet files in the DFO office. The scales will be pressed and ages determined in the scale ageing lab in Nanaimo or Juneau. Scale ages will be entered into the spreadsheet files. When input is complete, data lists will be obtained and checked against the original field data. Duplicate pressings of scale cards will be made and provided to ADF&G to allow a cross check of ages with the DFO aging lab. DFO crewleader (Etherton) will do the same for the Canadian fisheries, Tahltan Lake weir and carcass recovery, checking field data for accuracy, copying field data and sending in all data (+ any tags removed) to Juneau. Data will be transferred and checked as above. If errors are found during preliminary analysis, corrections are made to the sheets and the original forms. Frequency data needed for contingency tables are built from the Excel files.

When error checking is complete, copies of the data will be sent DFO Whitehorse and ADF&G Douglas for archiving with the final report. Scale cards, acetates, and copies of AWL forms will be archived at the CF scale aging lab and acetates and AWL forms will be archived at the ADF&G scale aging lab.

DATA ANALYSIS

Abundance

Assuming the experiment does not need to be stratified by time/area, we will use Chapman's modification of the Petersen Method (Seber 1982 pg. 60) to estimate abundance of sockeye salmon escapement as:

$$\hat{N} = \frac{(\hat{M}+1)(C+1)}{(R+1)} - 1 \quad (1)$$

where: $\hat{N}$ = estimated abundance of sockeye salmon on the spawning grounds;
$\hat{M}$ = estimated number of marked sockeye salmon on the spawning grounds;
C = number of adults inspected for marks on spawning grounds; and
R = number of adults with marks in samples taken on spawning grounds.

The conditions for accurate use of this methodology are that all sockeye salmon within a strata:

1. have an equal probability of being marked at Rock Island Eddy; or
2. have an equal probability of being inspected for marks; or
3. marked fish mixed completely with unmarked fish in the population between events; and
4. there is no recruitment to the population between events; and
5. there is no tag-induced mortality; and
6. fish do not lose their marks and all marks are recognizable.

The first and third conditions may not be met for sockeye salmon in different stocks within the Stikine River. Because stocks within the Stikine River may have different migratory patterns, mixing of marked and unmarked fish may not be complete. With our inability to meet these two conditions, our ability to form an unbiased estimate of spawning abundance depends on meeting the second condition; every fish has an equal chance of being recaptured in the lower river fisheries. Gillnets will be fished with consistent effort throughout the immigration past U.S. Canada Border. This relatively constant sampling effort will tend to equalize the probabilities of capture for all fish passing by the border *regardless of when they pass* (condition 1). We will test the assumption of proportional tagging by comparing marked-to-unmarked ratios between or among fisheries, at Tahltan weir, and on spawning grounds using a chi-square test (Seber 1982 pg. 439) second test for consistency in estimates in two-event experiments with data pooled over tributaries. If the test indicates that tagging was not proportional we will used stratified population estimates using maximum likelihood techniques (Plante 1990) and associated variances when *s* (the number of tagging stratum) and *t* (number of recovery stratum) are not equal. For cases in which *s*=*t*, we will use stratified population estimates based on Chapman and Junge (1956) and Darroch (1961). This stratified population estimates allow the probabilities of capture in tagging and recovery strata to vary across the strata. Each gillnet-tagged fish will receive a numbered tag and secondary and tertiary marks, meaning marks will be recognizable during the second event sampling and any tag loss will be accounted for in the analysis (condition 6).

Marked fish may have a greater mortality rate than unmarked fish (condition 5) because some handled sockeye salmon delay their migration and sometimes move back downstream. In similar studies on the Taku River, marked fish have been caught in marine commercial and recreational fisheries and in late-starting commercial fisheries upstream after delaying their migration (Andel and Boyce *in prep*). Independent programs run by ADF&G sample harvest in the U.S. commercial gillnet fisheries near the Stikine River. Marked fish recovered in these sampling programs, expanded for fractions of harvest sampled, will be censored from the experiment. The estimated number of marked fish recovered in the lower river fisheries ($\hat{M}$) will be the number of uncensored marked fish remaining in the experiment. Because a reward will be given for marked fish caught in the Canadian fisheries, we assume that we can account for all such fish caught in that fishery. Redefinition of the marked population in this way implies that estimates of abundance will be the number of fish passing the U.S./Canada border.

An estimate of the variance for $\hat{N}$ will be obtained through bootstrapping (Efron and Tibshirani 1993) according to methods in Buckland and Garthwaite (1991). The fate of the estimated $\hat{N}$ in the experiment will be divided into capture histories (Table 1) to form an empirical probability distribution (*epd*). A bootstrap sample of $\hat{N}$ will be drawn from the *epd* with replacement. From the resulting collection of resampled capture histories, R^*, C^*, $\hat{M}^*$, and $\hat{N}^*$ will be calculated. A large number (B) of bootstrap samples will be so drawn. The approximate variance will be calculated as:

$$\mathrm{var}(\hat{N}) = \frac{\sum_{b=1}^{B} (\hat{N}_b^* - \bar{\hat{N}}^*)^2}{B-1}, \qquad (2)$$

where $\bar{\hat{N}}^*$ is the average of the $\hat{N}_b^*$.

Length, Age, and Sex Composition

Estimates of mean length at age and its variance will be calculated with standard normal procedures. If there is no evidence of strong size-selective sampling at the tagging or recapture sites, estimates of relative age/sex/length composition will be estimated as proportions from multinomial and binomial distributions:

$$\hat{p}_i = \frac{n_i}{n} \qquad var(\hat{p}_i) = \frac{\hat{p}_i(1-\hat{p}_i)}{n-1} \qquad (3)$$

where n_i is the number of sockeye salmon in the sample of age or sex *i*, *n is* the sample size, and $\hat{p}_i$ is the estimate proportion of the population comprised of age or sex *i*. If sampling proves to be size or sex-selective, a stratified estimate of age or sex composition will be calculated.

SCHEDULES

Field activities for tagging sockeye salmon at Rock Island Eddy will begin inriver around June 12 and extend through to late August. Recovery effort from the lower river fisheries will be initiated in mid-June and continued through the end of August. Field activities for recovery of tagged sockeye salmon will begin in mid-July at the Tahltan weir and the upper river fisheries. Capture, tagging, and transport of fish at the Tuya barrier will occur primarily in July while radio telemetry flights will occur in July and August. Tag collection shall occur throughout the duration of the fishery and weir operations. Data on tagging from Rock Island Eddy will be entered and edited in Whitehorse by DFO and distributed to the other principal investigators by November 1, 2001. A draft report will be written in Whitehorse by DFO by March 1, 2001 and distributed for editing and further writing to ADF&G. Changes to the report will be submitted by

ADF&G to DFO by April 1, 2001 and the final report will be submitted for final peer review by May 1, 2001.

RESPONSIBILITIES

Agency Responsibilities

ADF&G

- Will work with DFO in planning the project.
- Will provide two people to participate in the tagging event at Rock Eddy.
- Will provide logistic support from Petersburg and Wrangell offices.
- Will provide support aerial survey and radio telemetry work.
- Will work with DFO on data analysis and report writing.

DFO

- Will work with ADF&G in planning and reporting of the project.
- Will operate the Tahltan River weir and commercial, test, and aboriginal fisheries.
- Will take the lead role and provide core staff required to tag fish at Rock Eddy and to recover tags from mainstem Stikine spawning grounds.
- Will cover the costs and logistics associated with tagging and tag recoveries and tag awards to Canadian fishers ($5.00/spaghetti tag; $10/radio tag).
- Will cover the cost of fuel and food for the sockeye salmon tagging crew at Rock Island Eddy. Will participate in informal meetings with U.S. and Canadian, commercial, sport and aboriginal fishers.
- Will coalesce recovery data from recovery locations.
- Will perform analysis and take responsibility for analysis of data and first draft of report.
- Will provide final data and draft of report for review to ADF&G.

Tahltan First Nations

- Will assist in planning of project.
- Will assist in recovery sampling of Aboriginal and ESSR fisheries.

U.S. Personnel Responsibilities

Kathleen Jensen and Jim Andel, fishery biologists. Will work in concert with Wrangell and Petersburg office staff and Peter Etherton to set up all aspects of the project, including planning, budget, sample design, permits, equipment, personnel, and training. Will be responsible for scheduling and supervising U.S. crew at Rock Island Eddy. Will work with Peter Etherton to coalesce, edit, analyze, and report data and assist with field work.

FTII and FT III. Two fish and game technicians shall be responsible for assisting in all aspects of tagging field operations, including safe operation of riverboats, and other equipment, tagging, data collection, and general field camp duties. Will assist in equipment maintenance and field construction.

Canadian Personnel Responsibilities

Sandy Johnston. Assist in the development of the program. Provide editorial comments on the report.

Peter Etherton. Will work in concert with Kathleen Jensen and Jim Andel to set up all aspects of project, including planning, budget, sample design, permits, equipment, personnel, and training. Will be project leader for Canadian aspects of the program, including: tagging and tag recovery and report preparation. Will be responsible for scheduling and supervising Canadian staff at Tahltan weir, at Rock Island Eddy, and at fishery and spawning ground recovery sites. Will review data and provide the first draft report to be submitted to ADF&G for edits.

Alex Joseph. Will act as supervisor of the Canadian component of the project. Will assist in drafting work schedules, logistic support, safe operation of equipment, maintenance of equipment, data reduction, and regular contact with the Whitehorse office of DFO.

Gerald Quash. Will assist in all aspects of the Rock Island tagging operation, including the safe setting and fishing of gillnets, the safe operation of boats, the ordering of supplies through the project supervisor. Gerald will act as supervisor in the absence of Mr. Joseph

Andy Carlick. Will assist in all aspects of the Rock Island tagging operation, including the safe setting and fishing of gillnets, the safe operation of boats, the ordering of supplies through the project supervisor. Andy will act as supervisor in the absence of Mr. Joseph and Mr. Quash.

Derrick Louie. Will work in concert with Nigel Young to: sample commercial and test-caught sockeye salmon and collect spaghetti tags, sample sockeye for age, size and stock information, distribute tag reward money, assist colleagues in regular camp chores, and maintain regular contact with the Whitehorse office of DFO.

Nigel Young. Will work in concert with Derrick Louie to: sample commercial and test caught sockeye salmon and collect spaghetti tags, sample sockeye salmon for age, size, and stock information, distribute tag reward money, assist colleagues in regular camp chores, and maintain regular contact with the Whitehorse office of DFO.

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Appendix A1.–Stikine River set gillnet recording form, 2001.

Date	Location	Crew	Water Temp.	Water Depth	Weather Comments: Clear, % Clouds, Overcast (high, mid, low), Wind, Rain.
5/8	**SN1**	**Bowen, Swain**	**2**	**1'9"**	**Sunny, clear skies, calm wind**

Tide/Time	Total Time on Site (start/end)*	Total Process Time	Fishing Effort (hrs.)	Number Caught	Fishing Comments: (tally and explanation of process times, numbers of other fish, etc.)
16.3'/1448	**0940-1640**	**0**	**9**	**0**	**1 Steelhead (4 male,**

* = process time + fishing effort

Date	Location	Crew	Water Temp.	Water Depth	Weather Comments: Clear, % Clouds, Overcast (high, mid, low), Wind, Rain.
5/9	**SN1**	**Bowen, Swain**	**2**	**1'6"**	**Mostly cloudy**

Tide/Time	Total Time on Site (start/end)*	Process Time	Fishing Effort (hrs.)	Number Caught	Fishing Comments: (tally and explanation of process times, numbers of other fish, etc.)
16.5'/1534	**0840-1800**	**10**	**9.0**	**1**	**1 eulachon**

* = process time + fishing effort

Date	Location	Crew	Water Temp.	Water Depth	Weather Comments: Clear, % Clouds, Overcast (high, mid, low), Wind, Rain.
5/10	**SN1**	**Bowen, Swain**	**2**	**1'9"**	**Rain, calm, foggy**

Tide/Time	Total Time on Site (start/end)*	Process Time	Fishing Effort (hrs.)	Number Caught	Fishing Comments: (tally and explanation of process times, numbers of other fish, etc.)
16.4'/1621	**1157-1635**	**18**	**9.1**	**2**	**Sigh fished better today**

* = process time + fishing effort

Date	Location	Crew	Water Temp.	Water Depth	Weather Comments: Clear, % Clouds, Overcast (high, mid, low), Wind, Rain.
5/11	**SN1**	**Bowen, Swain**	**2**	**3"**	**Overcast, calm wind**

Tide/Time	Total Time on Site (start/end)*	Process Time	Fishing Effort (hrs.)	Number Caught	Fishing Comments: (tally and explanation of process times, numbers of other fish, etc.)
15.5'/1803	**0830-1710**	**53**	**8.9**	**7**	**1 chum (male)**

* = process time + fishing effort

Date	Location	Crew	Water Temp.	Water Depth	Weather Comments: Clear, % Clouds, Overcast (high, mid, low), Wind, Rain.
5/12	**SN1**	**Bowen, Swain**	**3**	**37**	**Overcast, rain, windy**

Tide/Time	Total Time on Site (start/end)*	Process Time	Fishing Effort (hrs.)	Number Caught	Fishing Comments: (tally and explanation of process times, numbers of other fish, etc.)
12.1'/0725	**0820-1705**	**60**	**9.0**	**2**	

Appendix. A2. Gillnet AWL and capture form - Stikine River Sockeye Salmon, 2001.

Description:____
Species: _____________ Stream Code: 108-70-_____ Year: 2001
Card #s:_______________________

Fish #	Date	Time Caught	Sex	Length MEF	POH	Spagh. Tag #	Radio Freq	Radio Tag Code	Lice	Age	AEC	Comments

CARD #

CARD #

CARD #

CARD #

Appendix A.3. Coded wire tag sampling form.

Alaska Department of Fish and Game

Coded Wire Tag Sampling Form

Hatchery Rack and Escapement Survey
Southeast Region

SAMPLE NUMBER: 9 | PROJECT CODE (TAG LAB USE ONLY) | PAGE | OF | PAGES

HARVEST TYPE: (circle one) hatchery-rack escapement-survey

SURVEY SITE: _____

SAMPLE TYPE: random select

SAMPLER: _____

DATE SAMPLED: __ - __ - 9

SAMPLING INFORMATION

THIS BOX IS TO BE COMPLETED ONLY FOR RANDOM SAMPLES

SPECIES (CODE)	TOTAL # FISH COUNTED	# ADIPOSE CLIPS SEEN	WERE ALL SAMPLED?
(410)CHIN			y n
(411)JACK CHIN-ONLY			y n
(420)SOCK			y n
(430)COHO			y n
(440)PINK			y n
(450)CHUM			y n
(540)STHD			y n

AREA INFORMATION (DISTRICT - SUBDISTRICT)

101-	106-	111-	116-	157-	191-
102-	107-	112-	150-	181-	192-
103-	108-	113-	152-	182-	
104-	109-	114-	154-	183-	OTHER DISTRICTS
105-	110-	115-	156-	189-	

NAME OF PLACE SURVEYED: (NAME OF HATCHERY OR STREAM) _____

WATER TYPE: saltwater freshwater

ANADROMOUS STREAM# (FRESHWATER-ONLY) ____ - ___ - ____ - ____ - ____ - ____ - ____ - ____ - ____ - ____

COMMENTS

HEAD RECOVERY INFORMATION

✓	HEAD NUMBER	SPECIES CODE	FORK LENGTH (mid-eye to fork in mm)	CLIP	SEX

T:\FORMS\RAKSE96.VSD -4/96

Appendix A.4. Spawning grounds AWL form-Stikine River sockeye salmon, 2001.

Description:_Tahltan Weir_____
Species: 42 (sockeye) Stream Code:_____ Year: 2001
Project: 04 Gear:_Weir_____ Card #: _001___ Length Type: 2 (MEF)

Date	Fish no.	Sex	MEF	POH	Age	AEC	Spag/rad Tag #	UOP	LAA	Cinch Tag #	Comments
8/2/96	1	M	445	380						p	
8/3/96	2	M	640	545						p	
"	3	M	885	755						p	
"	4	M	740	625						p	
8/4/96	5	M	735	620						p	
"	6	F	820	720						p	
"	7	M	795	670						p	
8/5/96	8	F	765	645						p	
"	9	M	760	640			K00130	Y	Y	p	Light Blue Spaghetti Tag, OP regenerated
"	10	M	600	510						p	
"	1	M	690	590						p	
"	2	M	715	610						p	
"	3	M	830	710						p	
8/6/96	4	F	820	710						p	
"	5	F	780	660						p	
"	6	M	465	395						p	
"	7	M	355	300						75001	Ad clip--good clean clip
"	8	M	360	305						p	
"	9	M	740	625						p	
8/7/96	10	M	950	805						p	
8/7/96	1	M	680	570						p	
"	2	M	690	575						p	
"	3	M	940	790						p	
"	4	M	995	865						p	
"	5	M	650	545						p	
"	6	M	735	610						p	
"	7	F	810	695						p	
"	8	F	770	675						p	
"	9	F	840	705						p	
"	10	F	755	636			K00235	Y	Y		Lt blue spaghetti tag--OP partial regen
8/7/96	1	M	325	275						p	
"	2	M	310	260						p	
"	3	M	570	485						p	
"	4	M	785	665						75002	2nd Ad Clip--good clip, red flesh
"	5	F	820	705						p	
"	6	F	760	650						p	
"	7	F	825	735						p	
"	8	M	595	510			K00155	Y	Y	p	Lt blue spaghetti tag--OP good
"	9	M	925	790						p	
"	10	M	345	300						p	

The Alaska Department of Fish and Game administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

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