Southern Boundary
Restoration & Enhancement Fund

Project Concept 2008

(two pages only- additional information will not be considered by the Committee)

Project Title: Quantifying complexity of Fraser River sockeye management: the effects of new in-river fisheries objectives and fine-scale escapement goals on management performance

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Southern Fund Strategic Plan Mission Category:	***(Check ONE)***	**Grant Amount Requested:** ***(Specify currency)***
1. Improve management of stocks & fisheries	X	$ 75,000 CAN
2. Address priority stocks of interest	☐	$
3. Improved collaboration	☐	$
4. Ecosystem based management	☐	$

Project Location:	**Is this proposal a continuation of a project previously funded by the Southern Fund ?**	**No**

Start Date: January 2008 **End Date:** December 2008

1. Overview:

The biological and management systems associated with Fraser River sockeye fisheries are characterized by considerable variation and uncertainty, as well as complex, competing management objectives. Fishery managers consider a hierarchy of catch and allocation objectives, both between and within Canada and the United Sates, as they attempt to control the harvesting system on short time-scales given uncertain information. Ongoing changes to domestic fishery objectives arising from First Nations treaty settlements and Canada's Wild Salmon Policy (WSP), which requires escapement targets for individual Conservation Units (CUs) of fish, are increasing Canada's obligations to provide sufficient abundances of sockeye in terminal areas. These new objectives raise at least two questions that are relevant to Pacific Salmon Treaty fisheries:

(1) How will new in-river fisheries obligations and finer-scale escapement objectives constrain management options and yield in ocean fisheries?, and

(2) What are some of the biological, social, and economic consequences of inaccurate and/or imprecise information on CU-specific run-size, arrival timing, and migration rates?

This project will provide approximate answers to these types of questions using a management model of fish movement, harvest, and natural mortality through space and time from entry into Fraser River Panel waters to terminal spawning areas.

2. Correspondence with SEF Goals:

The proposed project is directly relevant to Strategic Goals 1 and 3 of the Southern Fund Committee's 2008 call for proposals. It supports Goal 3 by expanding the capability of the existing PSC preseason sockeye planning model to evaluate the consequences of up-river (above Mission, BC) fishery and escapement objectives. It supports Goal 1 by evaluating the consequences of new Canadian up-river fishery and escapement objectives on PST fisheries. This evaluation will inform processes aimed at refining Canadian management goals and assessment procedures.

3. Relevance to the Pacific Salmon Treaty:

The proposed project is relevant to annual fisheries planning and decision rules for harvesting Fraser River sockeye salmon, which is the responsibility of the Fraser River Panel Committee in Panel waters under Annex 4 of the Pacific Salmon Treaty. Specifically, it will allow an evaluation of alternative management strategies that attempt to meet fine-scale objectives related to harvest, allocation among fishing sectors, and escapement objectives for more than 40 CUs of Fraser sockeye identified under the WSP. For example, the modelling tool could be used to examine how alternative management strategies affect spawning ground escapement to low-abundance CUs such as Cultus Lake. Alternatively, it could be used to examine how new in-river fishery objectives, such as a minimum number of sockeye that are available for First Nations harvest at a given terminal location, affect yield in ocean-based fisheries. An examination of such questions will quantify trade-offs within the management system and help decision makers identify management strategies that increase the probability of achieving PST objectives.

4. Objectives:

Objective 1: Compilation and analysis of available catch, radio telemetry, and acoustic telemetry data to estimate ocean and in-river migration rates. Objective 2: Modify the PSC preseason planning model to simulate sockeye migration and fishery catch through Fraser River Panel waters to terminal spawning areas. Objective 3: Use the planning model within a numerical optimization procedure to quantify trade-offs among conservation, catch, and allocation objectives that arise when new in-river objectives are added to existing objectives for ocean and lower-river fisheries. Objective 4: Examine how uncertainties in sockeye migration parameters and abundance forecasts are translated into various risks. This objective will be achieved by embedding the optimization procedure from Objective 2 in a Monte Carlo simulation framework that includes uncertainty in biological dynamics and observations. Risks will be quantified by combining probability distributions of management outcomes with biological, social, and economic consequences.

Deliverables include a report documenting the methods and results for Objectives 1-4 and recommendations for further development and improvement of the management models.

5. Context:

The long-term goal of this project is to answer specific questions related to the design and performance of alternative in-season management systems for Fraser River sockeye. The specific project proposed here is a step toward this long-term goal. Input provided by representatives from Fisheries and Oceans Canada, the Pacific Salmon Commission, First Nations, industry, and environmental NGOs during a workshop hosted by the principle investigators in April 2007 contributed substantially to scoping the range of questions that should ultimately be addressed. In most cases, questions raised by these groups are not currently being addressed by any other research projects or management models. In particular, issues related to in-river First Nations fisheries objectives and CU-specific escapement objectives have not been evaluated for Fraser River sockeye, yet such issues will present complex in-season management trade-offs that will likely be confronted in the future.