Northern Fund Projects 2005/06

The following is a descriptive list of the projects that are being funded by the Northern Boundary and Transboundary Rivers Restoration and Enhancement Fund Committee in 2005.

ENHANCEMENT

SOCKEYE SALMON

Trapper Lake Sockeye Access Improvement

Project Lead: Brian Mercer, Contract Biologist, Whitehorse, Yukon.
Project Cost: $84,670 CAN $68,244 US

The ultimate goal of this project is to provide better access to returning adult sockeye salmon to Trapper Lake and rebuild the existing remnant sockeye population; thereby increasing the total production of Taku River sockeye.

The goals of the project are consistent with and will contribute to the bilateral obligations to increase transboundary river sockeye production as per Annex IV, Chapter 1, section (b) (iv) of the Pacific Salmon Treaty. This project would build on the data collected and the preliminary engineering work performed in 2004. The objectives of the 2005 proposal are to finalise the engineering design of a fishway, continue with baseline studies and monitoring of Trapper Lake, and conduct an egg take at Little Trapper Lake in order to initiate the process for the establishing a self sustaining sockeye run.

Trapper Lake Sockeye Access Improvement. Final Report 1 Final Report 2

Tuya Fish Harvest Structure. Year 2

Project Lead: Peter Etherton, Senior Technician Stock Assessment, DFO, Whitehorse.
Ron Josephson. Alaska Department of Fish and Game.
Project Cost: $582,330 CAN $444,357 US

Canada and the United States have undertaken a joint sockeye enhancement program on the Stikine River consistent with the Transboundary Annex provisions of the Pacific Salmon Treaty. The Stikine program involves taking broodstock in Tahltan Lake and transporting fertilized eggs to the Snettisham Hatchery in Alaska for incubation. Resulting fry are transplanted back into Tuya Lake and/or Tahltan Lake. The goal of this enhancement is to produce 100,000 additional sockeye from the Stikine River. Tuya Lake is currently inaccessible to returning adult sockeye due to migration barriers located in the Tuya River just upstream from its confluence with the Stikine River. Although some of the fish returning to the barrier have been harvested in a terminal *Excess Salmon to Spawning Requirements (ESSR*) fishery, fishing success has been less than originally planned or desired (catches have ranged from 200 to 7,000 sockeye). The majority of the sockeye returning to the river are left to unsuccessfully continue to attempt to ascend the barrier, or to spawn in either the lower Tuya River or in other areas downstream in the

Stikine River or it's tributaries. The difficulties encountered in terminally harvesting the fish and the inability of the remaining sockeye to ascend the barrier have prompted concerns on behalf of the Tahltan First Nation, other local residents and Transboundary River Panel members.

The Transboundary Technical Committee has raised additional concerns associated with the straying of fish and potential genetic and other impacts of Tuya sockeye spawning in areas already frequented by wild spawning stocks. The crux of the problem is that in order to reach the goal of producing 100,000 enhanced sockeye on the Stikine there needs to be large out-plants in Tuya; however that creates large numbers of excess salmon at the barrier that with present methods can not be adequately harvested. The objectives of this project are to develop and implement an effective, cost efficient system of capturing a minimum of 80 per cent of the Tuya River sockeye near the mouth of Tuya River; and to harvest fish in concert with the construction of a fish trap facility.

Tuya River Sockeye Harvest Research, 2005-2007. *Final Report*

Evaluation of Enhancement Options for Morice Lake Sockeye

Project Lead: Walter Joseph, Manager Fisheries Dept, Office of the Wet'suwet'en, Smithers.
Project Cost: $24,960 CAN $20,118 US

Morice Lake is the principal sockeye nursery lake in the Bulkley watershed. Until 1953, escapements to this lake were in excess of 70,000. The sockeye population then crashed abruptly and escapements were in the 3,000 to 5,000 range until the 1990s when they rose to 20,000 to 40,000.The population has since declined again to the low thousands. Morice Lake sockeye are among the earliest to enter the Skeena River. The low productivity of this stock now limits the opportunity to hold early sockeye fisheries on the North Coast of BC (Areas 3 and 4). The Wet'suwet'en First Nation has been calling for restoration of this sockeye population to historic levels for the past decade. A useful first step would be a technical review of the enhancement options and an assessment of their likelihood of success. Artificial fertilization would be one option to increase escapement. Other techniques to consider include transfer of spawners to spawning and rearing habitat above Nanika Falls (Nanika and Kidprice Lakes), lowering the

exploitation rate of this and other early Skeena stocks, and short term hatchery production. This proposal seeks to provide the means to complete this first step towards rebuilding.

Evaluation of Enhancement Options for Morice Lake Sockeye.
Final Report 1 *Final Report 2* *Final Report 3* *Final Report 4* *Final Report 5*
Final Report 6 *Final Report 7a* *Final Report 7b*

Tatsamenie Lake Review

Project Lead: Ron Josephson, Alaska Department of Fish and Game, Juneau, Alaska.
Project Cost: $37,200 CAN $30,000 US

The issue of enhancement, specifically the lack of success towards meeting Treaty objectives for enhanced sockeye salmon production from the Taku River, has been vexing for the Transboundary River Panel for a number of years. It is clear that the enhancement program is of concern to the Treaty Process and that expanding the review of the program by including independent reviewers would at least be instructive and could be of significant value in overcoming the obstacles the Enhancement Subcommittee continues to face. In the course of this project the Transboundary River Technical Committee, Enhancement Subcommittee will provide selected scientists with a summary of the project to date and then meet with them in a focused workshop. As many of the members of the Enhancement Sub-Committee as possible would participate in this review.

Tatsamenie Lake Review. *Final Report*

Kitwanga River Sockeye Salmon Recovery Strategy

Project Lead: Mark Cleveland, Gitanyow Fisheries Authority, Kitwanga, BC.
Project Cost: $21,950 CAN $17,692 US

A species of significant importance in the Kitwanga River are sockeye salmon. Historically, Kitwanga sockeye numbered in the 10's of thousands, and were actively fished for sustenance purposes by the Gitanyow who inhabited the watershed. However, drastic declines in stock abundance were observed in the 1960's and today the stock is no longer fished even for Food, Social and Ceremonial purposes because of conservation concerns. In response to these concerns the GFA have initiated a rebuilding plan to preserve the genetic uniqueness of the stock. In co-operation with DFO the plan has included the reduction of the Kitwanga sockeye catch in the commercial sector and the implementation of accurate adult and juvenile stock assessment programs in river on a yearly basis. Numerous studies to investigate the adequacy of Kitwanga sockeye spawning and rearing habitat have also taken place over the last five years and the results are available in various reports that have been produced by GFA and the DFO. Presently, the highest priority task includes the development of a recovery strategy to help boost Kitwanga sockeye production to more sustainable levels. The recovery strategy will focus on bringing all of the available data on Kitwanga sockeye together in one catalogue. The catalogue will then be reviewed by a recovery committee who will make recommendations on how to proceed to rehabilitate the stock. The production of this recovery strategy will be the focus of this proposal.

Kitwanga Sockeye Salmon Recovery Plan (KSRP). *Final Report*

HABITAT RESTORATION

SOCKEYE SALMON

Little Klukshu Sockeye Habitat Restoration Project

Project Lead: Linaya Workman, Renewable Resources Manager, Champagne and Aishihik First Nations, Haines Junction, Yukon.
Project Cost: $15,500 CAN $12,493 US

Champagne & Aishihik First Nations' ultimate goal is to re-establish sockeye into the Little Klukshu system. To accomplish this goal, we will be doing the following;
Lowering and removing beaver dams.
Two trained CAFN members will spend approximately 5 to 7 days mapping and removing dams and while they are there, they will remove any beavers that they see.
Monitor the Little Klukshu Creek and Lake.
Beginning at the end of May or early June we will spend a minimum of three days seining various locations in the lake and we will set up a small mesh size Fyke net and sample any out migrants in the lake. During the fall season we will attempt to monitor adult movement in the system from aerial and ground surveys.
Determine the best means to re-establish sockeye populations in the Little Klukshu area.
During 2003 and 2004 adults were transplanted and this past spring of 2004 we confirmed that we had sockeye and coho out migrants in Little Klukshu Creek. We do not yet know if the sockeye found were from the adults transplants or the eggs and an additional year of work will determine that and allow us to monitor for any returning adults.


2005 Little Klukshu Sockeye Habitat RestorationProject. *Final Report*

Lakelse Lake Sockeye Rehabilitation Program: Hatchery Creek Spawning Habitat Improvement Project

Project Lead: Ian Maxwell, President, Lakelse Watershed Society, Terrace, BC.
Project Cost: $28,750 CAN $23,173 US

Linear development, logging and beaver activity have all contributed to the reduction in quality and elimination of suitable spawning habitat in Hatchery Creek. The creek was once a side channel of the adjacent Granite Creek, and has been isolated from that flow and gravel source with the construction of a flood control structure (a dike). Since its isolation from Granite Creek, formerly suitable spawning sections of the upper reaches of Hatchery Creek have been replaced by accumulations of small woody debris and fine sediment, and gravel is no longer recruited from Granite Creek to replenish these areas. The project proposes to improve sockeye spawning habitat in the upper reaches of Hatchery Creek through the removal of small woody debris and resulting sediment accumulations, placement of large woody debris (LWD) complexes and gravel, as well as excavation of the upstream groundwater table to increase flows to the improved areas. This project proposes to design and implement the project in one field season. Upon completion of the project, spawning habitat for more than one thousand spawners will have been rehabilitated.


Lakelse Lake Sockeye Rehabilitation Program:Hatchery Creek Spawning Habitat Improvement Project. *Final Report*

COHO SALMON

Kitwanga River Coho Salmon Habitat Enhancement

Project Lead: Mark Cleveland, Head Fisheries Biologist, Gitanyow Fisheries Authority, Kitwanga, BC.
Project Cost: $11,392 CAN $9,182 US

Coho salmon returns to the Kitwanga River in recent years have been extremely good, yielding escapements as high as 3,500 adults in some years. These good returns have resulted in habitat saturation by coho salmon in most of the lower Kitwanga River and its tributaries. However, the upper reaches of the river, despite being an important historical coho use area and composed of excellent spawning and rearing habitat, are presently not used by coho because they have been rendered inaccessible by the construction of beaver dams that have over-run the lower 4 kilometers of the upper river. Breaching activities will enable adult coho to access the upper reaches of the river, help re-channelize the stream flow, and help lower the water table which will in turn promote re-vegetation by coniferous trees. This initiative has been implemented by GFA in the past and each time was successful in allowing adult access to the upper reaches of the river.

Kitwanga River Coho Salmon Habitat Enhancement – 2005. *Final Report*

MULTI-SPECIES

Highway #16 and CN Rail Passage Assessment and Restoration – Lower Skeena

Project Lead: Allen Gottesfeld, Head Scientist, Skeena Fisheries Commission, Hazelton, BC.
Project Cost: $38,000 CAN $30,628 US

Coho, chinook, pink, and chum are the most prevalent salmon returning to spawn in Skeena River tributaries and off-channel sloughs flowing through valley bottomlands that constitute prime habitat. Presently, there is intensive linear development on the north bank of the Skeena River with CN Rail and Highway #16 situated on the floodplain for much of their length. Railway construction completed in 1912, and subsequent re-alignments caused many instances of blocked access to fish. Completion of Highway #16, linking Prince Rupert to Terrace in 1944, saw the continuation of similar practices that cut-off back channels and side channels to returning adults.

This project will assess, prioritize, and provide engineering plans to restore free migration access. This project, Highway #16 and CN Rail Fish Passage Assessment and Restoration in the Lower Skeena is a continuation of the Middle Skeena Fish Passage Assessment project of 2004.

Lower Skeena Fish Passage Assessment Highway #16, #37S, & CN Rail.
Final Report
Please contact PSC for additional information and project maps.

Evaluation of Restoration Works in the Lower Nass & Development of Remedial Measures

Project Lead: Cheryl Stephens, Fisheries Manager, Nisga'a Fisheries Program, New Aiyansh, BC.
Project Cost: $53,775 CAN $43,343 US

Since 1994, the Nisga'a Lisims Government Fisheries Program has followed a systematic assessment and prioritization of stream restoration needs throughout the Nass watershed. Tributaries to the lower Nass River (downstream of New Aiyansh) are important producers of coho salmon and were severely impacted by logging. Numerous reports have been completed detailing watershed overview assessments, detailed assessments of stream habitat, and restoration designs. Construction "as-built" reports were completed for every watershed that received restorative treatments and some monitoring was completed within 1-2 years after construction. It has now been 5-10 years since the numerous structures were built in the Lower Nass tributaries. This proposal is to rigorously evaluate the effectiveness of stream restoration works in the lower Nass River tributaries and develop remedial measures where appropriate. Restoration of salmon habitat in the lower Nass River area is a high priority for the Nisga'a, the Department of Fisheries and Oceans (DFO), and the province of BC and is an important aspect of management of coho stocks. Alaskan fishers also have a keen interest in lower Nass coho stocks and their habitats as they are significant harvesters of these stocks.

Evaluation of Restoration Works in the Lower Nass Watershed & Development of Remedial and Additional Restoration Measures, 2005. *Final Report*

Early Marine Juvenile Salmon Habitat Studies on the North Coast of BC

Project Lead: Teresa Ryan, Director of Fisheries and Aquatic Resources, Tsimshian Nation, Prince Rupert, BC.
Project Cost: $150,007 CAN $120,906 US

Currently, there are many plans for industrial development on the North Coast of British Columbia such as oil and gas exploration, aquaculture expansion for both fin fish and invertebrates, wind farms and a substantial increase in marine traffic through Chatham Sound due to the development of a large container port in Prince Rupert. The current knowledge base on the presence and movement of marine organisms and their habitat and understanding of the circulatory models throughout the North Coast and Chatham Sound area is limited. This project will be a continuation of the ***Early Marine Juvenile Salmon Habitat on the North Coast of BC and Baseline Sea Lice Studies*** project that was funded in 2004. Some of the issues that were addressed in the 2004 study and will be addressed in the 2005 study are to provide more knowledge to marine resource managers in their decisions to allow marine based development.

2004-2005 North Coast Marine Baseline Survey and Sea Lice Research Program. *Final Report*

IMPROVED INFORMATION

SOCKEYE SALMON

Kitwanga River Sockeye Salmon Enumeration 2005

Project Lead: Mark Cleveland, Head Fisheries Biologist, Gitanyow Fisheries Authority, Kitwanga, BC.
Project Cost: $50,358 CAN $40,589 US

The Gitanyow Fisheries Authority is proposing to enumerate adult sockeye salmon escapement to the Kitwanga River through the operation of a salmon enumeration facility constructed in 2003. GFA is also proposing to extend the enumeration period of the project past the end of the sockeye run to collect accurate estimates of chinook, pink, chum and coho salmon escapement to the river in 2005. Data collected through the project will not only help guide Kitwanga sockeye rebuilding plans but will also help assess the health of all salmon species inhabiting the Kitwanga River.

The Kitwanga River Salmon Enumeration Facility is strategically located near the mouth of the river below most of the salmon spawning sites. Salmon are funneled into trap boxes located on each side of the fence, where they can be counted, identified, sexed and sampled as desired. Each trap box is equipped with two chutes where salmon pass through, floating view boxes made of see-thru Plexiglas are installed over each chute making it easy to see and recognize distinguishing features of each salmon. For the most part, salmon traversing through the chutes are not handled, as they move upstream. However, a percentage of the salmon are randomly captured to collect scales, fork lengths measurements and to visually describe the general health of captured fish. Fish are then sexed and returned to the trap chutes where they are allowed to recover and swim upstream when they are ready. After each shift crews complete salmon escapement reports, which are entered into a data base twice daily. The escapement results are then sent to DFO fishery managers by the project biologist twice a week.

Kitwanga River Sockeye Salmon Enumeration, 2005. *Final Report*

Sockeye Salmon Video Enumeration Program on Village Creek

Project Lead: Linaya Workman, Renewable Resources Manager, Champagne and Aishihik First Nations, Haines Junction, Yukon.
Project Cost: $25,850 CAN $20,835 US

This project proposes to conduct an enumeration program for sockeye salmon on Village Creek, a tributary of the Alsek/Tatshenshini River system, using an underwater video surveillance system. Village Creek is an important contributor of sockeye salmon to total escapement of sockeye on the river system. Sockeye migrating up Village Creek are also important to the Aboriginal food fishery with most of the migration occurring from June to early August (constituting early-run

sockeye which are preferred by the Aboriginal Fishers). In past years sockeye on Village Creek have been enumerated using an electronic counter. Accuracy of the counts from this device has been questionable and it does not identify species so hitherto it has been assumed that any fish/object triggering the counter is a sockeye salmon. Despite this assumption the numbers derived from the counter have been used in the management of the fishery. This project will determine the accuracy of the electronic counter; provide important data to a proposed mark-recapture study (each salmon can be observed for presence/absence of a tag without the need to physically handle the fish); in addition to allowing a thorough test of the video surveillance system.

Champagne and Aishsihik First Nations Sockeye Salmon Video Enumeration Program 2005. *Final Report*

Lakelse Lake Sockeye Rehabilitation Program: Tributary Sockeye Escapement Monitoring and Mapping

Project Lead: Wilfred McKenzie, Head, Kitselas Fisheries, Terrace, BC.
Project Cost: $18,202 CAN $14,671 US

Lakelse Lake sockeye salmon are currently depressed relative to historic levels. As part of the Lakelse Lake Recovery planning process stock status monitoring (adults in, juveniles out) has been identified as a key component of the evaluation process. Currently, juvenile production is being monitored intermittently using acoustic surveys of the lake each summer and fall, and adult escapements are assessed visually. Lakelse Lake sockeye spawn in thirteen tributary creeks draining into the lake, with the three largest being Williams, Scully, and Sockeye Creeks. Visual foot surveys are carried out on some systems but coverage is not complete. Standardization and improvements of the visual surveys are required to assess current status and the response of the sockeye to other rehabilitative measures being planned as part of the Lakelse Lake Sockeye Rehabilitation Program (spawning ground improvements, fry-outplanting enhancement). Spawner counts over the past few years have indicated very low escapements into Lakelse Lake tributary streams. Adult escapement monitoring, in concert with juvenile acoustic surveys of the lake, is a high priority stock assessment project for the Lakelse Lake Sockeye Rehabilitation Program.

Lakelse Lake Sockeye Rehabilitation Program: Tributary Sockeye Escapement Monitoring and Mapping. *Final Report*

Assessing the Historical Salmon Presence and Productivity at Transboundary Sockeye Nursery Lakes Using Stable Isotopes Within the Paleolimnologic Sediment Record

Project Lead: David Barto, ADF&G Habitat Biologist, Commercial Fisheries Division, Douglas, Alaska.
Project Cost: $119,040 CAN $96,000 US

This paleolimnologic study is designed to collect and analyze sediment cores for $\delta^{15}N$ distribution in two sockeye salmon nursery lakes (Little Trapper and Tatsamenie) and one control lake that is currently barriered to anadromous salmon (Trapper). This barriered lake supports a resident kokanee population. All three of the lakes are located in British Columbia. Both of the nursery lakes currently contribute sockeye salmon to subsistence, personal use and commercial fisheries on the Transboundary Taku River.

Previous studies have documented that the reduced availability of salmon marine derived nutrients (MDN) has resulted in a decline in freshwater productivity, which is closely coupled to juvenile sockeye prey organisms and subsequent adult salmon production. Changes in the magnitude of returning adult salmon have the potential to alter the amount of MDN transported from the sea to freshwater. Climate and commercial fishing can also influence inputs of salmon MDN, thereby affecting lake and salmon productivity. Results from similar studies in Alaskan lakes, indicate the use of the sediment $\delta^{15}N$ proxy may be useful in determining historical salmon escapement and nutrient trends in sockeye nursery lakes within the Transboundary river watersheds. The historical escapement proxy information resulting from this study could be a useful indicator of the carrying capacity of the lake. Carrying capacity information could be compared to present day in-lake productivity indicators and combined with the existing stock assessment information to refine or modify existing management strategies.

In addition to the information collected on the existing sockeye nursery lakes, this project has the potential to produce historical lake productivity information on the barriered lake that is believed to have supported sockeye populations in the past. This information could be useful in developing any potential outlet modification or fry-stocking enhancement projects considered for this lake by providing an indication of the lakes historical carrying capacity for fish production.

Assessing the Historical Salmon Presence and Productivity at Transboundary Sockeye Nursery Lakes Using Stable Isotopes Within the Paleolimnologic Sediment Record.
Final Report

CHINOOK SALMON

Microsatellite Variation in Northern BC Chinook Salmon

Project Lead: Terry Beacham, DFO Research Scientist, Pacific Biologocal Station, Nanaimo, BC.
Project Cost: $200,000 CAN $161,200 US

The project will consist of surveying microsatellite variation of chinook salmon in northern British Columbia to develop a joint database with 7 collaborating American-based laboratories. This joint microsatellite database would then be applied to estimate stock compositions of chinook salmon in fisheries on both sides of the border. As allozymes are not practical or cost effective to apply to chinook salmon, an alternate method of stock composition is required. Estimates of stock composition are used to determine stock-specific interception estimates in mixed-stock fisheries, and determination of these interception estimates are required under the Pacific Salmon Treaty. This project is an extension of an initial joint 8-laboratory project funded by the Chinook Technical Committee for 2004/05.

Report on Survey of Microsatellite Variation in Northern British Columbia Chinook Salmon. *Final Report*

Habitat-Based Chinook Escapement Goal Calibration: Clear Rivers in Northern BC

Project Lead: Chuck Parken, DFO Biologist, Pacific Biological Station, Nanaimo, BC.
Project Cost: $41,300 CAN $33,288 US

The Pacific Salmon Treaty outlines tasks for the Chinook Technical Committee, which include establishing MSY or other biologically-based escapement goals. Typically MSY escapement goals are calculated from stock-recruitment analyses of several years of spawner escapements and subsequent production. The approach can take several years (15-20) to acquire sufficient data and often requires considerable resources. For these and other reasons, many stocks do not have sufficient spawner and production data to estimate optimal spawning escapements. Consequently, habitat-based methods have been developed as low-cost, quick alternatives. We've developed a habitat-based approach to estimate the optimal spawning escapements based on the size of the watershed used by the stock. The habitat model predicts the total number of optimal spawners needed, but most data limited stocks only have indices of abundance and additional information is required to convert the indices to total spawners. To apply the habitat model to data limited systems, we propose to use calibration studies and generate expansion factors to convert the spawner indices into estimates of total escapement. This involves estimating total escapement by mark-recapture or direct count methods while performing the index method, which is typically peak counts from visual surveys. We will attempt to address the primary objective of generating expansion factors for visual escapement indices at three sites, two coastal streams and a tributary of the Skeena River. On the two coastal streams, the Kwinamass River and the Khutzeymateen River, mark-recapture programs will provide escapement estimates with a reasonable level of accuracy to allow for the development of expansion factors for existing visual indices of escapement. The Skeena River tributary selected for the program is the Kitwanga River. At this site the project is the inverse; we will generate visual indices of chinook salmon escapement for a system where a true estimate of escapement is derived from a counting fence.

Calibration of Chinook Salmon Escapements to Three Clear Rivers in Northern BC (2006 Report). *Final Report*

COHO SALMON

Assessment of the Distribution, Timing, Fate and Numbers of Coho Salmon Returning to the Middle and Upper Nass Watershed Using Radio Telemetry and Mark-Rate Sampling

Project Lead: Cheryl Stephens, Fisheries Manager, Nisga'a Fisheries Program, New Aiyansh, BC.
Project Cost: $300,000 CAN $241,800 US

Since 1994, the methodology to estimate the coho escapement to the Middle and Upper Nass River has been based on a mark-recapture design that involves tagging a portion of coho caught at the Nisga'a Fisheries fishwheels and recovering tag information from only one recapture location (Meziadin River fishway). But the Meziadin River has been estimated to contribute only 4-7% of the total coho escapement to the Upper Nass watershed. In 2004, in-season escapement estimates over-estimated the Nass coho run size by 40%, whereas for other species with more detailed knowledge of stock status and tag recovery information, in-season estimates were more accurate (sockeye: post-season estimate was 4% greater than in-season estimate; and chinook: post-season estimate was <1% different than in-season estimate). This proposal is intended to improve the current coho escapement estimate methodology by collecting the following information: (1)

Middle/Upper Nass stock composition (distribution, run timing and abundance of all stocks), (2) total run size (estimate the % of run that enters after the normal period of operation of the fishwheels), (3) run timing of stocks through the lower river during fisheries, (4) collect mark-rate information from Kwinageese River (and other Nass tributaries) for generating a radio-tag, system-wide population estimate for comparison with the conventional-tag estimate (5) handling and mortality and/or behaviour changes of tagged fish, (6) portion of Meziadin coho escapement that uses the Meziadin fishway and (7) validity of the assumptions of the mark-recapture technique and habitat-based model. The results of this study will also improve pre-season forecasting and in-season escapement estimates.

Final Report outstanding.

Stikine River Coho Salmon Radio Telemetry Study

Project Lead: Peter Etherton, DFO Stock Assessment, Whitehorse, Yukon.
Project Cost: $85,000 CAN $68,510 US

The 1999 Pacific Salmon Treaty agreement requires development of new abundance-based management regimes for Stikine River coho salmon, supposedly by 2004. A central requirement of any abundance-based management program is the development of defensible abundance estimates; ideally stock specific abundance and run timing.

Although not through lack of trying, post season estimates of Stikine River coho salmon escapement and run size are not robust and in-season abundance data is lacking/unproven. Total in-river escapement before 2000 (1986-1999) was approximated based on the performance of a coho test fishery augmented with annual aerial surveys of eight index sites. However, there has not been any confirmation that the test fishery is a reliable indicator of coho abundance. From 2000 to 2003, a joint Canada/U.S. coho mark-recapture study was conducted as a pilot experiment; however, because the numbers of tags applied and recovered were both low, the estimates of run size were relatively weak and therefore did not provide a reliable measure of abundance. This study design will not provide an immediate estimate of total run size, but is designed to assess stock specific run timing and distribution with the objective of identifying key, representative coho stocks. These key stocks will become the objects of focused enumeration and sampling (including genetics) projects leading to a system wide population estimate by expansion of spawning abundance and catch of key coho stocks.

Over the long term, the in-river population estimates derived from an expansion of key stock sizes will be correlated with the performance of a coho test fishery to be conducted in concert with the above. It is anticipated that the performance of the test fishery, which has been done since 1986 (some years were incomplete), will provide the basis for the development of an in-season abundance based management model, similar to the Stikine River sockeye model presently used.

Mark-Recapture and Radiotelemetry Studies of Stikine River Adult Salmon, 2000-2005.
Final Report 1 *Final Report 2*

PINK SALMON

Forecasting Pink Salmon Abundance in Southeast Alaska from Juvenile Salmon Abundance and Associated Environmental Parameters

Project Lead: Alex Wertheimer, Early Ocean Salmon Task Leader, NOAA Fisheries, Auke Bay Laboratory, Juneau, Alaska.
Project Cost: $217,062 CAN $175,050 US

This project will collect information on juvenile salmon and associated biophysical parameters in the marine environment of Southeast Alaska to determine the feasibility of using such information for forecasting pink salmon abundance and to increase understanding of the trophic relationships and ecological interactions of wild and hatchery juvenile salmon. The project has four specific objectives: (1) Forecasting pink salmon abundance in Southeast Alaska; (2) Evaluating regional concordance in relative abundance and growth of juvenile pink and chum salmon in northern and southern regions of Southeast Alaska; (3) Estimating daily prey consumption rates of juvenile pink salmon with a bioenergetic model to determine proportion of zooplankton standing crop consumed; and (4) Comparing total prey consumption of juvenile pink salmon to total prey consumption of wild and hatchery juvenile chum salmon in northern and southern regions of Southeast Alaska.

Forecasting Pink Salmon Abundance in Southeast Alaska From Juvenile Salmon Abundance and Associated Environmental Parameters. *Final Report*

MULTI-SPECIES

Upgrading the Pacific Biological Station Molecular Genetic Laboratory Infrastructure

Project Lead: Terry Beacham, DFO Research Scientist, Pacific Biologocal Station, Nanaimo, BC.
Project Cost: $565,440 CAN $456,000 US

The DFO PBS Molecular Genetics Laboratory is the highest throughput laboratory of fisheries genotyping in North America. It is the only laboratory in British Columbia currently involved in intensive genotyping of fish. Mixed-stock analysis is routinely done on an in-season basis, and estimates of stock composition are used by the PSC and DFO to open and close sockeye and chinook salmon fisheries. The laboratory uses on a daily basis 4 ABI 377 automated DNA sequencers to screen microsatellite variation in salmon. The last year of manufacture of the 377 model was in 2001. Applied Biosystems (the manufacturer) is legally obligated to provide parts for a minimum of 5 years after cessation of production of the model. They will supply parts only until June 2006 (the five-year minimum legally required). After June 2006, they will no longer provide any support (either parts or service) for the 377 model. The sequencers will become functionally obselete by this time. In order to ensure that in-season and post-season estimates of stock composition will be available to mangement agencies in a timely manner, replacement sequencers will be required. The approach taken would be to enhance the capabilities of the Molecular Genetic Lab by obtaining a new capillary-based DNA sequencer so as to move towards the infrastructure standards currently available in other agency genetics laboratories (ADF&G and WDFW genetics laboratories have modern ABI 3730 capillary-based automated DNA sequencers, NMFS Seattle laboratory and CRITFIC Idaho laboratories have ABI 3100 capillary-based systems). Microsatellite analysis demands are expected to be highest in the DFO

MGL compared with any laboratory on the Pacific Coast, as it is the single laboratory in Canada dealing with all fisheries of PSC interest. This will require automated sequencer capabilities of greater capacity than normally found in American-based laboratories.

Upgrading Infrastructure of the Molecular Genetics Laboratory at the Pacific Biological Station. *Final Report*

Building Infrastructure for Genetic Stock Identification of Salmon in Northern Pacific Salmon Treaty waters

Project Lead: James Seeb, ADF&G Principal Stock Status Scientist, Gene Conservation Laboratory, Anchorage, Alaska.
Project Cost: $790,500 CAN $620,000 US

Identification of the stocks of salmon caught in Southeast Alaska and northern British Columbia Pacific Salmon Commission fisheries is a major area of on-going research. Over the past 25 years, stock identification has primarily been through recovery of coded-wire tags and/or scale pattern analysis, sometimes complemented with analysis of brain parasites, egg sizes, and/or otolith banding. Past genetic studies based upon allozyme analyses were informative, but limited due to the number of markers. More recent work with DNA-based genetic methods has provided the potential for improved and more detailed estimates of stock composition. Currently, Chinook salmon caught in Southeast Alaska commercial troll, seine, and gill net fisheries and in sport fisheries are sampled for tissues for genetic analysis. Sampling is also on-going for sockeye salmon caught in southern Southeast Alaska commercial net fisheries. An important benefit of the genetic based methods is that they offer the potential for use in in-season management, not simply as a post-season estimate of the stock composition. Thus, the methodology may prove very useful in meeting Pacific Salmon Treaty Annex provisions, such as those involved with sockeye salmon catch limitation in southern Southeast Alaska and the origin of Chinook salmon captured in various commercial and sport fisheries. This project provides the infrastructure and equipment needed by the Alaska Department of Fish and Game (ADFG) to support genetic stock identification work for the Pacific Salmon Commission process. This investment should provide sufficient processing power and throughput to meet the foreseeable future needs of the PSC. ADFG actively supports and encourages transparent and repeatable genetic databases as well as tissue exchanges, and this proposal advances those objectives. Further, in addition to long-standing agreements with NOAA Fisheries, ADFG recently reached formal agreement on open data and tissue exchange with Canadian Department of Fisheries and Oceans (CDFO).

Building Infrastructure for Genetic Stock Identification of Salmon in Northern Pacific Salmon Commission Fisheries.
Final Report 1 *Final Report 2* *Final Report 3* *Final Report 4*

Molecular Genetics Lab Infrastructure Upgrading

Project Lead: Richard Wilmot, Fisheries Geneticist, NOAA Fisheries, Auke Bay Laboratory, Juneau, Alaska.
Project Cost: $254,200 CAN $205,000 US

The ability to identify discrete Pacific salmon stocks is critical for effective management decisions and evaluating treaty agreements. Advanced genetic techniques can increase resolution and accuracy in stock discrimination. These techniques include microsatellite DNA variation which is being used by the Canadian DFO in effective stock identification applications for Pacific salmon and single nucleotide polymorphism (SNP) which is being used by ADF&G and is showing promise for stock identification of Pacific salmon. NOAA's Auke Bay Lab (ABL) currently has capabilities and experience using both techniques, and through its high seas and marine sampling programs has a strong interest in promoting and contributing to the establishment of common standardized genetic baselines. To help achieve these baselines, and to continue to work efficiently with both DFO and ADF&G labs as well as others, ABL needs to standardize its equipment and allow for greater throughput of samples. This proposal is a request to enhance the capabilities of the laboratory by obtaining a new capillary-based DNA sequencer to move towards the infrastructure standards currently available in other agency genetics laboratories (ADF&G and WDFW genetics laboratories have modern ABI 3730 capillary-based automated DNA sequencers, NOAA's Seattle laboratory and CRITFIC Idaho laboratories have ABI 3100 capillary-based systems).

Molecular Genetics Laboratory Infrastructure Upgrading. *Final Report*

Fishery Operations System (FOS) Importer Module Development

Project Lead: Bruce Patten, A/Head, DFO Escapement & Fisheries Data Unit, Pacific Biological Station, Nanaimo, BC.
Project Cost: $29,925 CAN $24,120 US

Fishery managers and stock assessment biologists rely on a variety of information when performing analyses and making decisions. Often that information must be collected and disseminated within a very short time. To do this requires that we can process large volumes of data in an efficient manner. The Fishery Operations System (FOS) is a computer application used by Fisheries and Oceans Canada to store and analyze salmon fishery data. It contains commercial, First Nations, recreational and test fishery components. One of the ways in which data are input into the FOS is with the Importer Module. This component allows the FOS to import data from text files and e-mail messages. To do this, an Import Specification must be created for each format of import data. The Import Specification defines how the Importer Module is to interpret the source data and how it is mapped into the FOS data structures.

One example of how the Importer Module is currently used is to receive a daily catch report from fishers participating in the Area F (North Coast) troll fleet. Instead of telephoning the salmon logbook call centre to report catch, the fisher enters data into a form on their shipboard computer. Then, they send the data to DFO via a satellite e-mail message. When the message arrives at the DFO e-mail inbox, the FOS Importer Module reads the message and converts the text into database records. These records are then available to fishery managers for summary analysis. There are potentially several other types of data that could be imported using the Importer Module.

Currently, the Importer Module is very restricted in the structure and order of data fields that it may handle in its input text. The result is that the design of an Import Specification is complex and time-consuming. This limits the number of file formats and e-mail message formats that can be supported. This project proposes to perform a major revision of the Importer Module to improve its performance and flexibility. The improved Importer Module will increase the efficiency and cost-effectiveness of fishery data collection.

Fishery Operations System (FOS) Importer Module Development. *Final Report*

Electronic Collection and Transfer of Salmon Fishery Biological Data

Project Lead: John Wilcock, ADF&G Fishery Biologist, Douglas, Alaska.
Project Cost: $143,305 CAN $115,569 US

Accurate estimates of the stock composition of harvests of sockeye, chinook, and coho salmon in Southeast Alaska and Northern British Columbia fisheries are required for successful implementation of abundance-based harvest sharing agreements outlined in the Treaty. Results from stock assessment studies based on scale patterns analysis, genetic analysis, or recovery of marked otoliths and coded wire tags are critical to meeting treaty provisions that define these harvest sharing agreements. This project seeks to improve collection efficiency, processing efficiency, availability, and reliability of salmon biological data, particularly this stock assessment data. Under the proposed project, techniques for automating stock assessment data collection in the field using handheld computers will be developed and deployed in two SE Alaska locations. Results of this project will be conveyed to Canadian salmon researchers in hopes of facilitating streamlined data exchange between the two countries.

Electronic Collection & Transfer of Salmon Escapement Biological Data. *Final Report*

Area 3, 4 and 5 Salmon Net Catch Monitoring

Project Lead: Danny Wagner, DFO Resource Manager Area 3,4,5, Prince Rupert, BC.
Project Cost: $70,848 CAN $57,103 US

The purpose of this proposal is to improve the quality and timeliness of the Area 3 and 4 Canadian catch data. The program will improve the in-season hailed catch information and shift the sales slip catch collection and recording from a regional (Vancouver) responsibility done post-season, to a local (Prince Rupert) activity to be completed weekly more in keeping with the Alaskan style of catch monitoring. The project has two parts. The first is to increase the field capacity for gathering on grounds catch and effort information. At present the information provided has some gaps, a result of not having the physical capacity to cover all of the fishing area. This involves hiring a vessel with the capability of gathering the catch by hailing fishermen, recording the number of vessels fishing in a defined area and reporting it daily. The second part involves gathering the catch information after the fisherman has delivered. This involves either gathering the sales slips directly and entering the data or developing a program that fishing companies can record deliveries in and send to the Department for timely transfer to the Fisheries Operations System. A combination of both is most likely for 2005 depending upon the capacity of various fishing companies. The system in place now provides the same information post-season, however these proposed changes will make the catch data base more accurate by sub-area with a

final calculated catch on a weekly bases rather than at the end of the year. The more accurate and timely reporting of catch provides huge advantages for both domestic and international fish management obligations. These advantages include such things as meeting allocation targets by gear and treaty and the ability to react quickly and in a timely manner to either increase catch or address conservation concerns.

Final Report outstanding.

Radio Tag Tracking of Stikine River Chinook and Sockeye Salmon 2005

Project Lead: Bill Waugh, DFO Senior Fisheries Technician, Whitehorse, Yukon.
Project Cost: $140,000 CAN $112,840 US

The project will assess the stock composition, run timing, and distribution for sockeye and chinook salmon stocks within the Stikine River drainage using stationary towers and aerial surveys to track radio tagged sockeye and chinook salmon. The tags will be applied through joint DFO and ADF&G projects anticipated to be funded in 2005. The funding applied for from the Northern Fund will be used exclusively in executing the tracking component of the program. Results from the program will be used to develop and improve abundance based management regimes for sockeye and chinook salmon as specified in the current Transboundary Rivers annex of the Pacific Salmon Treaty. Data regarding distribution will be used to assess the completeness of baselines being developed for improved stock ID. It will also be useful in determining where additional enumeration programs (i.e. weirs, aerial surveys) should be located if necessary.

Distribution of Radio Tagged Sockeye & Chinook Salmon in the Stikine River Drainage, 2005. *Final Report*

Stikine Fish Sustainability Plan – Scoping Project (Project Cancelled)

Project Lead: Cheri Frocklage & Richard Erhardt, Tahltan Fisheries – Iskut First Nation, Dease Lake, BC.
Project Cost: $23,300 CAN $18,804 US

This project is to design a framework for watershed-based fish sustainability planning on the Stikine by assessing what would be required and is available in terms of capacity and level of consultation. This would be accomplished by meeting with the various Transboundary agencies and interests in regard to their ability to be involved and their suggested options for implementation. Preliminary consultations would be conducted in Juneau, Dease Lake Telegraph Creek, Wrangell and Whitehorse. The resulting information will be used to create a process blueprint which will include: recommended meeting schedules; required staff and equipment; potential participants; existing data sources; funding requirements; suggested work plan; and overall feasibility. The preliminary focus will be on early outreach and process design. Instead of inviting various parties to participate within the bounds of a set schedule and a defined process, we are asking how, when and to what extent interested parties would like to be involved.

Project cancelled Final Report unavailable.