Southern Boundary Restoration & Enhancement Fund 2004/2005

Project A-050 Development of FRAM Base Period

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August 2005

Canadian Coho FRAM Base Period Expansion Project #A-050

Summary

The objective of this project was to compile the necessary data from regional and area-specific Fisheries and Oceans Canada (CDFO) databases and other available records to expand the coho FRAM base period, currently years 1986-1991, to better represent variable fishery patterns and stock distributional profiles. Priority was given to the years: 1) 1992 to 1997; 2) pre 1986; and 3) 1998 to current. Contractors were hired to work with agency staff to compile agency data. For efficiency, the data compilation included all periods where available.

Specific work tasks for implementation of this project and progress are outlined below:

Task 1. Development and documentation of an access database of historic catch, effort, and escapement data by current fishery management strata. With the assistance of agency staff, assemble all digital and hardcopy historic records. *Completed where available*.

CDFO catch, effort, sample, escapement, and coded wire tag (CWT) recovery databases were reviewed and available data compiled. Sample and effort data for sport fisheries are not readily available at this time (see task 6). Catch data for Johnstone Strait sport fisheries is limited. Archived hardcopy files from the Alert Bay and Port Hardy CDFO offices were reviewed for catch and effort data for Johnstone Strait sport fisheries and for historic escapement counts.

Task 2. Development and documentation of a database of representative CWT groups for additional base period years. With the assistance of regional managers, identify CWT groups that are indicators of stock distribution and exploitation. *Completed*

The Mark Recovery Program (MRP) CWT release data were reviewed and tagcodes representing production regions and management units selected.

Task 3. Separate historic recovery data recorded for multiple gear and areas into area and gear specific strata. *Completed where available.*

Catch, sample, and recovery data were compiled by gear, statistical area, and sub-area or recovery location where available. We are developing methods to separate BC Interior coho from lower Fraser coho in terminal Fraser fisheries

Task 4. Identify terminal fishery strata where appropriate. *Ongoing.*

Related to task 3, this task is ongoing. Fraser River fisheries have been identified as terminal fisheries strata for FRAM. Within this terminal area, fisheries intercept stocks from two management areas. The intent is to use DNA analysis of historic test fishery samples to determine the stock composition of coho harvested by these fisheries..

Task 5. Development of tools to roll up CWT recovery data by production region for fishery strata used by FRAM and Mixed Stock Model (MSM, an additional model that assembles inputs to FRAM), and roll up catches from CDFO databases. *Completed.*

A Microsoft Access database (Crest.mdb) was developed and used in this analysis to provide catch, sample, and recovery data in the appropriate format (strata) for input to the Mixed Stock Model and FRAM

Task 6. Identify data deficiencies, and address in consultation with agency staff. *Completed*

During this project we attempted to compile historic data for all years. Some data types and years were more accessible than others. Sport sample and effort data are not readily available at this time. CDFO is currently transferring data systems from Fortran to Oracle. Sport information is inherently difficult to interpret as it is not provided or maintained in a standard format. Since the cost of compiling these data and translating the various expansion algorithms was beyond the resources of this project and it will be completed by CDFO in the future, it was decided to proceed with the existing data and expansions. Catch/ sample estimates and recovery data for modified sport fisheries will be updated when they become available.

Task 7. Collate data necessary to generate distributional profiles. Priorities:

(1) 1992-1997 *Completed*
(2) pre 1986 *Raw data compiled*
(3) 1998 – date *Raw data compiled*

We have compiled all raw data available. With the resources available we focused on expanding the base period to include the first set of priority years. Data from years 1992 to 1997 were used to develop the MS Access tool to convert existing catch, sample, and recovery data into fishery strata used by the MSM and FRAM. Distributional profiles for the remaining years can now be processed quickly with the same tool. The 1992-1997 data have been incorporated into the MSM and initial model testing has been conducted. As the data and model inputs may require minor adjustments, the remaining base period profiles will not be completed until the methodology and results have been reviewed bilaterally and approved.

List of Deliverables:

1. Compiled databases with catch, release and recovery data (provided on CD)
2. List of CWT groups selected for distribution profile (provided on on CD)
3. Modifications to recovery data and fisheries strata (provided on on CD)
4. Tool for rolling up catch and recovery data (provided on on CD)
4. Documentation report: Canadian Coho FRAM Base Period Expansion

Overview

Historical fisheries data (catch, sample, and recovery) are maintained in multiple Canadian Department Fisheries and Oceans (CDFO) agency databases. The content and format of these databases have changed over time. In CDFO databases the definition of a fishery (catch region) is determined by gear and location of recovery (statistical management area). Over time, the definition of some fisheries and how they are managed has changed. In order to compare existing fisheries to base period fisheries, data (catch, sample and recovery) must be in the same format (fisheries / catch regions must be equivalent). A MS Access tool (CRest.mdb) was developed to roll up CWT recovery data by production region, catch, and samples for fishery strata used by FRAM and Mixed Stock Model (MSM, an additional model that assembles inputs to FRAM).

CRest.mdb Access Database

CRest.mdb converts base period data into the current fishery design, by adjusting fisheries definitions and calculating new estimates for catch, sample, and recoveries for commercial fisheries that have been affected. Fisheries that have been modified include: South Central troll, Georgia Strait troll, South Central sport, and Southern Georgia Strait sport. Two new fisheries, Johnstone Strait troll and Fraser sport have been created. Modifications to fisheries definitions result in changes to estimates of catch and sample size, and consequently catch sample ratios and estimates of recoveries of both Canadian and US tagcodes in these fisheries.

In the CDFO commercial salmon catch database catch is recorded by statistical week (three digit field defining month and week within month). Freezer troll catch is reported to the catch system in the statistical week it was landed but has to be allocated to the statistical week it which it was likely caught for MRP analysis. To allocate catch to statistical week caught, the assumption is that the freezer troll fishery (gear 31) will have the same characteristics as the ice boat fishery (gear 30). The proportion of annual iceboat catch that was caught in each statistical week was calculated by summing the iceboat fishery per statistical week divided by the total annual catch within the catch region. Then freezer boat catch was apportioned to statistical weeks using the calculated proportions of the ice boat catch during these periods.

As the CDFO Mark Recovery Program (MRP) corrects recovery estimates for unknown tagcodes (categories NP- no pin, LP-lost pin & ND-no data), CRest.mdb first recreates the existing calculations to determine the expansion algorithms before calculating new catch / sample ratios.

Based on gear and statistical area, catch and sample tables are updated to current fishery strata (catch region). The above steps, conversion of freezer troll and adjustments for unknown tagcodes, are then repeated for the revised fishery strata, and new catch, sample and expansion estimates are calculated for the new fisheries. Finally the data are converted to RMIS format for compatibility with the Mixed Stock Model. The following tables were exported to excel files for input to MSM :

Crest.mdb Table	Excel File
T10-0-1 RMIS TagEsts	RMIS TagEst.xls
T14-0 CS_Changes	MSM Com Catch Changes.xls
T13-1 Sport Recoveries	MSM Sport Rec Changes.xls

Since sport catch/sample data are not available by sub-area, modifications to sport catch are estimated externally in an excel file (MSM Sport Catch changes.xls).

Data Limitations

This analysis and base period development is very much a work in progress. Data limitations were not known until the information was compiled and interpreted. There are still some outstanding data requirements:

- Sport sampling information is not readily available at this time due to loss of agency staff and transition between database systems. Resources for a database programmer and the estimated time for completion are beyond the scope of this project. Sample information will be updated when CDFO completes the data system transfer.
- Catch, sample and recovery data are limited for some fisheries and years, particularly Johnstone Strait sport. The MSM relies on recovery of CWTs from mixed stock fisheries to estimate stock composition and to create production expansion factors (PEF) for each management unit. Production expansion factors are necessary to expand total estimated catch to reported catch. PEFs can be user-defined if additional information is available. Archived datafiles from the CDFO Port Hardy office (Johnstone Strait area) were reviewed for additional information related to catch, effort and stock returns that might be useful to develop indices of abundance, catch and effort.
- To date, BC terminal area fisheries have not been defined as separate fisheries in FRAM (i.e. Fraser). Currently, the FRAM base period contains place holders for Fraser River terminal fisheries. We are compiling commercial, First Nations and recreational catch information. However these fisheries impact both BC Interior and Lower Fraser stocks. Historic scale samples have been identified from Fraser test fisheries conducted during the base period years. These samples are currently undergoing DNA analysis to determine fishery stock composition. Once stock composition is known and catch assigned to stocks, run reconstruction will be improved for these base period years

Crest.mdb Design

CRest.mdb consists of data tables (T) and queries (Q). Original raw data tables were imported from CDFO databases and subsequent analyses performed in a numbered sequence.

Imported Tables:

Table	Content and Source
1 imp_catch	Commercial catch and sport catch for years 92-97 from CDFO Saleslip database, prepared June 15, 2005 Sport catch, when available, is rolled up by month and reported in the first statistical week of each month.
2 imp_samples	MRP Catch sample raw data for years 92-97 prepared July 1, 2005 Source 1984-1998 AN2:[CWTSYS.RECOVERY]FCSMPLEyy.DAT
3 imp_recoveries	MRP CWT recovery data for years 92-97 Source MRP Query rec8804.qry prepared June 30, 2005 See rec8804_summary.txt
4 imp_Period_Conversion	Conversion table for date, MRP statistical week, MRP period and RMIS period
11 imp Catch_Loc	Conversion table for MRP catch location codes, revised catch regions and MSM fisheries
13 imp SportRecs	RMIS CWT sport recovery data for Canadian fisheries, years 92-97, Prepared July 28, 2005
AlltagsBY8897	List of tagcodes released by agency during 1988 to 1997
MRP_V3_2_LU_Catch_Region _Codes	Look up table Catch Region Codes
MRP_V3_2_LU_Stat_Area_MRP _Codes	Look up table Statistical Area Codes

Queries

**Queries 1 thru 6 are performed with data recorded under historic catch region definitions to determine expansion algorithms.

Q1 Adjusts freezer troll recoveries to statistical weeks similar to ice boat troll recoveries

Q1-1-1	Sum catch by year, catch region, gear 30
Q1-1-2	Sum catch by year, catch region, statistical week, gear 30
Q1-2	Sum catch by year, catch region, gear 31 (not caught in statistical weeks delivered)
Q1-3	Calculate gear 30 proportion of annual catch by statistical week
Q1-4	Apportion gear 31 catch to statistical week using gear 30 proportions
Q1-5-1	Sum catch by year, catch region, statistical week, gear (not 31)
Q1-5-2	Assign gear 31 by statistical week, sum by year, catch region, statistical week, gear
Q1-5-3	Combine all troll catch by year, catch region, statistical week
Q1-6	Format catch region code & statistical week code, sum by year, catch region, statistical week

Q2 Formats Sample data

Q2-1	Format catch region code in samples, & remove non-random sample ID types T and S

Q3 Formats Recovery data

Q3-1	Format catch region code and remove non–random recovery types Z, S & T

Q4 Adjusts recovery estimate for unknown tags (categories: no pin, no data, and lost pin).

Q4-0-3	Sum total estimated recoveries by year
Q4-1-1	Count recoveries by year, catch region, statistical week, & tag status
Q4-1-2	Convert null status counts to zero
Q4-2	Sum samples by year, catch region, & statistical week
Q4-3	Sum estimated recoveries (status code 1) by yea,r catch region, & statistical week
Q4-4	Links catch, sample & recovery tables by year, catch region, & statistical week. Adjusts estimated CWT for no pin, lost pin & no data. Calculates new catch / sample ratio & new (adjusted) catch / sample estimate
Q4-5	Format statistical week and period.

Q5-1	Selects and makes table T5-0 of unique catch region/statistical areas within samples (samples include combined statistical areas, number greater than 30)
Tables:	
T5-0	unique catch region Statistical area within samples
T5-2	updates T5-0 with new catch regions & fixes null Statistical areas

Q6-1	Selects and makes table T 6-0 of unique catch region/statistical areas/gear in catch
T6-2	Updates T6-0 with new catch region / statistical areas (no statistical areas numbered greater than 30, all catch assigned in catch region)

** Queries 7 -14 apply to revised data (updated catch regions / fisheries strata)

Q7 Updates catch with new catch region definitions

Similar to Q1 adjusts for freezer troll (gear 31) using ice boat troll catch by statistical week

Compares catch under new catch region definitions to historic catch regions

Q7-1-1	Sum catch by year, new catch region, gear 30
Q7-1-2	Sum catch by year, new catch region, statistical week, gear 30
Q7-2	Sum catch by year, new catch region, gear 31 (not caught in statistical weeks delivered)
Q7-3	Calculate gear 30 proportion annual catch by statistical week
Q7-4	Apportion gear 31 catch to statistical week using gear 30 proportions
Q7-5-1	Sum catch by year, new catch region, statistical week, gear (not 31)
Q7-5-2	Assign gear 31 by statistical week, sum by year, new catch region, statistical week, gear
Q7-5-3	Combine all troll catch by year, new catch region, statistical week
Q7-6	Sum catch by tear, new catch region, stat week (standard formatting)
Q7-7-1	Sum catch by year, new catch region
Q7-7-2	Sum catch by year, original catch region
Q7-7-3	Compare catch under original catch region definitions versus new catch region

Q8 Samples

Similar to Q2 updates samples with new catch region

Q8-0-1	Import samples and fill null stat areas
Q8-0-2	Update new catch region codes
Q8-1	Format catch region code in samples, & remove non-random sample ID types T and S

Q9 Recoveries

Similar to Q3 update recoveries with new catch region

Q9-0-1	Import recoveries and fill null stat areas
Q9-0-2	Update new catch region codes
Q9-1	Format catch region code in samples, & remove non-random sample ID types T, S, and sport type Z

Q10

Similar to Q4, Adjusts recovery estimate for unknown tags (no pin, no data, and lost pin).

Q10-1-1	Count recoveries by year, new catch region, statistical week, & tag status
Q10-1-2	Convert null status counts to zero
Q10-2	Sum samples by year, new catch region, & statistical week
Q10-3	Sum estimated recoveries (status code 1) by year, new catch region, & statistical week
Q10-4	Links catch, sample & recovery tables by year, new catch region, & statistical week. Adjusts estimated CWT for no pin, lost pin & no data. Calculates new catch / sample ratio & new (adjusted) catch / sample estimate
Q10-4-1	Calculated catch / sample estimate for new catch regions
Q10-4-2	Link revised catch / sample estimates to recovery table
Q10-4-3	Make table of revised catch, sample & estimates for CR 04,57 & 55
Q10-4-4	Convert statistical weeks to RMIS period
Q10-4-5	Make table 10-0-1 revised CWT estimates CR 04, 57, 55 (RMIS format). **Table 10-0-1 is revised commercial recovery data for 1992-1997 base period.**

Q11

Q11-0	Make conversion table for location codes (MRP, RMIS, MSM)

Q12

Q12-0	Format Conversion table for location codes
Q12-2	Make table of revised catch, sample, and calculated estimate for CR 04,57, 55 (RMIS format)

Q13

Q13-0	Format imported RMIS sport recoveries for CSPT & GSPTS
Q13-0-1	Select JSPT recoveries and rename
Q13-0-2	Select FSPT recoveries and rename. **Updated table 13-1 is revised sport recovery data for 1992-1997 base period.**

Q14

Q14-1	Calculated catch / sample estimate for new catch regions, includes catches not sampled
Q14-2	Calculated catch / sample estimate for new catch regions, includes samples without catch
Q14-3	Union of unique catch and sample records
Q14-4	Commercial catch / sample changes for MSM. **Table 14-0 is revised catch / sample data for 1992-1997 base period.**

Appendix 1: Data Compiled on CD

- Historical Catch

File	Cohocatch.xls
Source and Content	1979-2000 CDFO Saleslip database, Prepared June 15, 2005 2001-2004 CDFO Fishery Operations System Commercial and sport catch by area, period, and gear

- Historical Effort

File	Cohoeffort.xls
Source and Content	1952 - 2000 Catch and salesslip data from PacHarv 2001-2004 Catch and effort data from FOS Commercial catch (weight & pieces) and effort by year, area, period, and gear. Prepared July 13, 2005

- Historical Sample

File	Cohosample.xls
Source and Content	1979-1983 NAN7:[CWTSYS.HISTORY]FCSMPLEyy.DAT 1984-1998 NAN2:[CWTSYS.RECOVERY]FCSMPLEyy.DAT 1999-2004 NAN2:[CWTSYS.RECOVERY]yyyySAM.CSV MRP Catch Sample raw data, Prepared July 1, 2005

- Coded Wire Tagcode Recoveries

File	CohoRec.mdb, rec79-87_summary.txt, rec8804_summary.txt
Source and Content	CDFO Mark Recovery Program MRP_V3_2.VW_RECOVERIES T Coded wire Tag recoveries in all Canadian fisheries, Prepared June 30, 2005

- First Nations Food Social and Ceremonial Fisheries

File	FSC.xls
Source and Content	1951- 2004 CDFO Information Management Division, Pacific Region Aboriginal Catch Statistics, Prepared June 17, 2005 Aboriginal Catch by year, species, area, and gear

- Escapement

File	Esc.zip
Source and Content	CDFO Nuseds database, Prepared June 15, 2005

- MS Access Tool

File	CRest.mdb
Source and Content	Prepared August 31, 2005

- MSM Data Inputs

Content	File
Commercial	RMIS Tagest.xls
Commercial	MSM Com Catch Changes.xls
Sport	MSM Sport Rec Changes.xls
Sport	MSM Sport catch Changes.xls
CDFO MRP (CWT) Releases	DistTags.xls Tagcodes representing stock / management unit distribution

Appendix 2: Statement of Expenditures

Name	Date	Description	Hrs	Salary	Expenses	SEF Total
Contract Services:						
Colin Peters CMP Biological Consulting Nanaimo, BC 250-716-0440	Jan-Feb, 2005	Travel to and from Port Hardy	20	$358.40	*Paid by CDFO* *991.95*	$ 358.40
Colin Peters	Jan-Feb, 2005	Data Collection at Port Hardy	45	$806.40		$806.40
Colin Peters	March 2005	Data Summary in Nanaimo	20	$358.40		$358.40
Colin Peters Total				1523.20		**$1523.20**
Adrienne Cooper Zoetec Consulting Nanaimo, BC 250- 758-9117	May 2005	Data Compilation	18	$390.02		**$390.02**
Cheryl Fraser Nanaimo BC 250-751-0570	July -Aug 2005	Sport/effort data compilation	180	$3360		**Estimate $3,360.00**
Terry Beacham PBS Nanaimo		Stock Separation of historic terminal Fraser coho catch				**Estimate $8100.00**
Expenses:						
Arlene Tompkins	May 2005	Software license requirement for contractor			227.20	$227.20
Arlene Tompkins	June 2005	Misc computer supplies related to contractor access to CDFO databases			$172.02	$172.02
Arlene Tompkins	July 2005	2 memory sticks			$200.00	$200.00
Arlene Tompkins	Aug 2005	Olympia Wa Meeting with US CoTC to evaluate base period expansion data			894.39	$894.39
Arlene Tompkins Total						**$1493.61**
Total Expenditures					**Estimated:**	**$14,866.83**