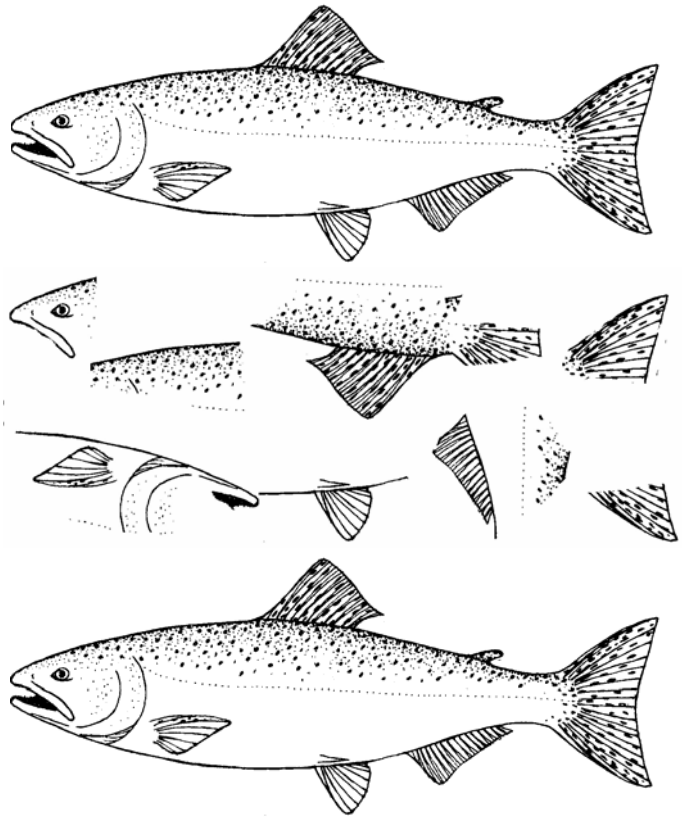
FISHERY REGULATION ASSESSMENT MODEL (FRAM)

User Manual for Chinook and Coho



MODEL EVALUATION WORKGROUP

Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220-1384
(503) 820-2280
www.pcouncil.org

September 2007

ACKNOWLEDGMENTS

MODEL EVALUATION WORKGROUP

MR. ANDY RANKIS, CHAIR
Northwest Indian Fisheries Commission, Olympia, Washington

MR. LARRIE LAVOY, VICE CHAIR
Washington Department of Fish and Wildlife, Olympia, Washington

MR. ETHAN CLEMMONS
Oregon Department of Fish and Wildlife, Newport, Oregon

MR. ROBERT CONRAD
Northwest Indian Fisheries Commission, Olympia, Washington

MR. ALLEN GROVER
California Department of Fish and Game, Santa Rosa, California

MR. JIM PACKER
Washington Department of Fish and Wildlife, Olympia, Washington

MR. RISHI SHARMA
Columbia River Intertribal Fish Commission, Portland, Oregon

MR. DELL SIMMONS
National Marine Fisheries Service, Lacey, Washington

MR. HENRY YUEN
U.S. Fish and Wildlife Service, Vancouver, Washington

PACIFIC FISHERY MANAGEMENT COUNCIL STAFF

MR. CHUCK TRACY
MS. RENEE DORVAL
MS. CARRIE MONTGOMERY
MS. KIM MERYDITH

The MEW and the Council staff express their thanks for the expert assistance provided by Ms. Angelika Hagen-Breaux and Mr. Jeff Haymes, Washington Department of Fish and Wildlife, Ms. Carrie Tabor-Cook, U.S. Fish and Wildlife Service, and Mr. Curt Melcher, in completing the FRAM documentation.

This document may be cited in the following manner:
Model Evaluation Workgroup (MEW). 2007. *Fisheries Regulation Assessment Model (FRAM) User Manual for Chinook and Coho.* (Document prepared for the Council and its advisory entities.) Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 101, Portland, Oregon 97220-1384.

A report of the Pacific Fishery Management Council pursuant to National Oceanic and Atmospheric Administration Award Number NA05NMF4410008.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

The FRAM application functions as an accounting tool, calculating the FRAM fishery related mortalities inflicted on the forecast abundance of each FRAM stock unit. A 1995 'Draft FRAM Users Manuel' introduces the computer program as: "The Fishery Regulation Assessment Model (FRAM) is an age-structured, deterministic computer simulation model designed to aid planning of Chinook and coho salmon fisheries … over the course of one year…" Since 1995 much has changed regarding computer modeling tools and how the application is actually run, but the basic structure of the program remains much the same as conceived in the late 1970's. Fishery impacts upon coho and Chinook are modeled independently. Separate species model runs are required to assess the impacts of regulations on stocks of each species. The parameters for a unique model run are carried/entered in a Command File (CMD File). The user designated coho or Chinook CMD File (see Section 3) will initialize FRAM internal settings for the respective species modeling mode.

For background details and a general understanding of FRAM, please refer to the recent 'FISHERY REGULATION ASSESSMENT MODEL (FRAM) – An OVERVIEW for CHINOOK and COHO' (MEW 2007a). Familiarity with the material in the OVERVIEW is assumed before proceeding to run the FRAM application. The OVERVIEW will provide the reader with a basic grasp of key FRAM modeling concepts. These include: time steps, mortality rates, modeled stocks and fisheries, input types and input development, and model computational structure. A more technically detailed presentation of the FRAM program can be found in MEW (2007b). This User Manual will focus upon the running of the FRAM application to simulate effects of annual sets of fishery regulations upon designated stock groupings of coho and Chinook salmon, and upon obtaining and interpreting model outputs. These model Stocks are listed in Appendix 1 (Coho) and Appendix 2 (Chinook). Fisheries being modeled are found in Appendix 3 (Coho) and Appendix 4 (Chinook).

The modeling of fishery impacts upon Puget Sound Chinook stock units cannot proceed without inter-action with a Terminal Area Management Module spreadsheet (TAMM). The Chinook TAMM accepts user inputs and prepares additional input to FRAM. FRAM modeling will then return output to the TAMM, which will then perform additional calculations before generating reports. The coho TAMM functions primarily as a convenient way to input Puget Sound fisheries in the FRAM process and then accept FRAM output to generate user friendly reports; however, the coho TAMM does perform some modeling functions for Washington coastal and Columbia River fisheries and stocks as well.

The FRAM fisheries simulation could be considered the final of four modeling work phases. The first phase would be the coding of the program (FRAM***.exe). Relatively recently FRAM was re-written in VISUAL BASIC, thus enabling user interface screens through the MS WINDOWS operating system. Many of these screens are described and presented as figures in this User Manual. The second phase is a calibration of fishery catches, stock abundances, and Coded Wire Tag (CWT) recoveries during a predefined set of years, to produce an historical base period pattern of stock distributions and corresponding stock specific harvest rates by time-period and fishery (coho and Chinook Outfiles). This rather complicated phase is detailed in MEW (2007c) and in MEW (2007d), for coho and Chinook respectively. The simulation (phase 4) begins after annual sets of stock abundances are provided to seed an initial "CMD File" (third phase) for each species. Figure 1 (applicable to both coho and Chinook) illustrates the contribution of the first two model construction phases to the final two annual phases.

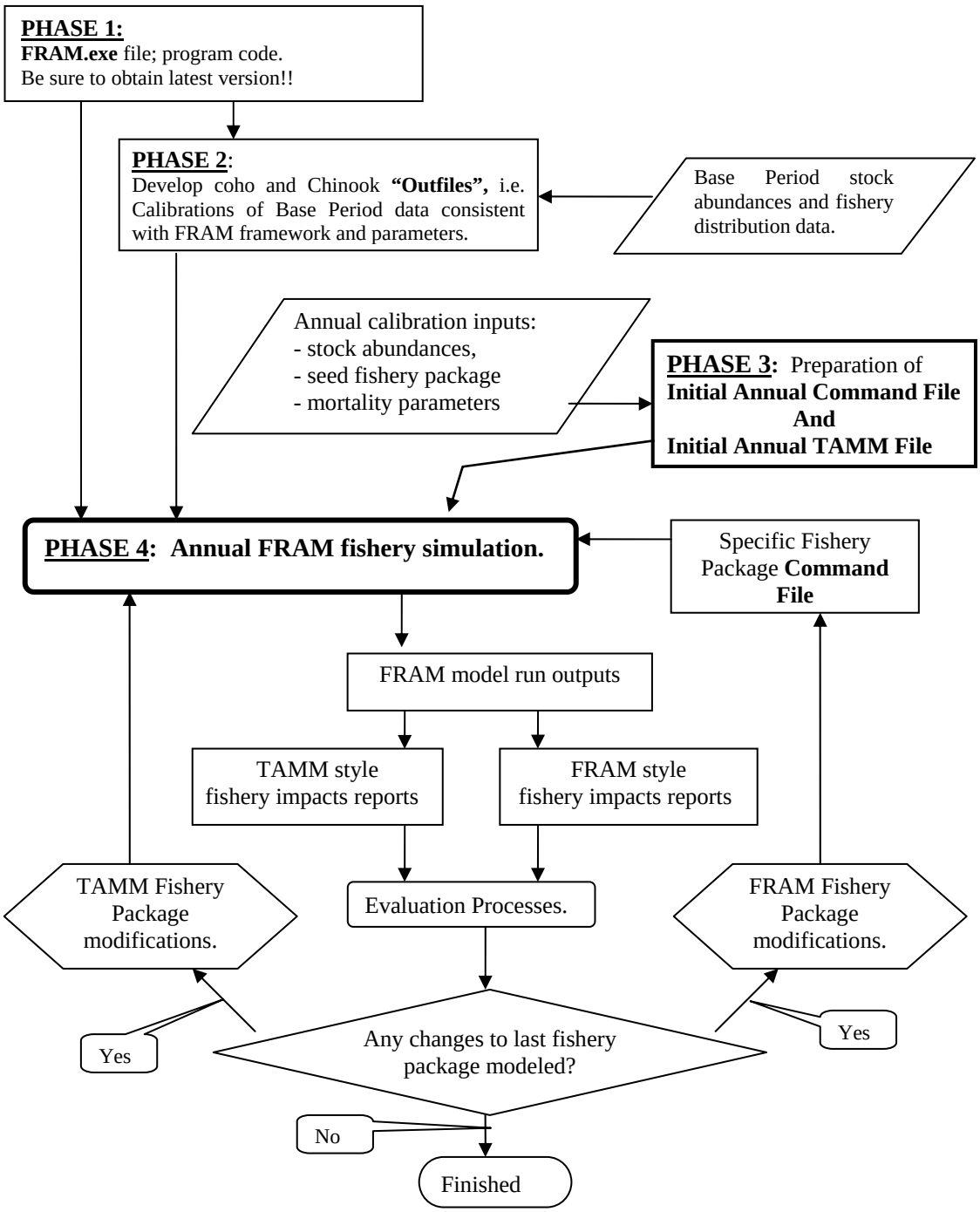


Figure 1. Flow chart of the "four phases" of FRAM fisheries modeling, applicable to both Chinook and coho.

2. MODEL PREPARATION AND SUPPORT FILES

The files needed to initiate FRAM modeling are listed in Table 2-1. Each CMD File specifies the appropriate Outfile. The FRAM program expects the specified Outfile to be present in the same file directory as the selected CMD File. For organizational purposes, files for coho and Chinook modeling should be placed in different directories. The FRAM application itself can be in another location *(for help installing model see Appendix 12 'FRAM Installation').* Although the TAMM input files can reside in any directory, it is advisable to initially keep these files in the appropriate CMD File's directory. Similarly, it is advisable that the directory containing the active CMD File remains designated to receive all output files from that FRAM model run.

The FRAM application and the two species-specific Outfiles may be the same year to year, but program and data upgrades/fixes occur frequently. In practice the latest versions of the FRAM application, coho and Chinook Outfiles, and initial template coho and Chinook CMD Files are provided annually by a model preparation team. Likewise, all needed TAMM related files are provided annually. Do not mix files from past years. [Along these lines: To duplicate historic modeling results, the same version of FRAM and all support files may be required.]

Table 2-1. Files Needed to Initiate FRAM modeling. Core files (File Type column, bold typeface) are required to model PFMC ocean mixed stock type fisheries. If impacts upon Puget Sound stocks are needed, then the "optional" TAMM related files are also needed. Outfile names may change from year to year. CMD File and TAMM spreadsheet names usually change from one model run to the next. The named files were used to finalize the 2004 PFMC/NOF fishery planning process.

Coho		**Chinook**	
File Name	**File Type**	**File Name**	**File Type**
FRAM516.exe	**Application**	FRAM516.exe	**Application**
CohoBase87917.out	**Base Period Outfile**	Stk025AEQ2sfm.out	**Base Period Outfile**
0420.cmd	**Command File**	1604.cmd	**Command File**
Coho0420.xls	TAMM spreadsheet (optional)	Chin1604.xls	TAMM spreadsheet (optional)
TAAETRSnum.txt	TAMM harvest rate definitions (optional)		
PSCFishSumAll.DRV PSCStkSum.DRV PSCTable2.DRV PSCTRuns.DRV	Driver Files to produce FRAM Reports (text files) that populate TAMM (optional)	Ckti1604.tam	TAMI inputs to FRAM (optional)

2.1 BASE PERIOD (Outfile)

Each species-specific base period file defines the stocks, fisheries, and time-steps that will be included in a FRAM run. These files are referred to as the "coho Outfile" or the "Chinook Outfile" (see Section 6.1 for detailed Outfile structures). The Outfile attempts to duplicate an historical base period relationship between key parameters of:

- Fishery impacts,
- Stocks and their relative abundances by age, and
- Time step specific natural mortality rates, stock maturity rates, and stock/age specific fishery exploitation rates.

The FRAM user provides model simulation input via a CMD File, but each CMD File is created to fit exactly with a specific base period structure. Each CMD File names the appropriate base period file, and FRAM will structure itself to accommodate the model parameters (number of stocks, fisheries, time steps, etc.) as presented in that Base Period file. If the required Outfile is not in the same directory as the activated CMD File, then a "Base Period File not found …" error message appears which requests the user to copy the specified Base Period Outfile into the CMD File's directory.

2.2 ANNUAL ABUNDANCE INPUT (Command File)

Prior to each annual cycle of FRAM modeling, that year's forecasted abundance of FRAM stock management units is used to seed each initial species-specific CMD File (see Section 6.2 for CMD File data structures). This corresponds to "Phase 3" as portrayed in Figure 1. Individual stock forecasts are developed regionally from a variety of methodologies and subsequently are presented in a variety of units. Forecast units may range, for example, from "mature fish expected back to a terminal area" to "ocean recruits". FRAM management unit abundances are calibrated base period age specific recruits at the start of the fishing year, prior to natural mortality. Thus, annual pre-season stock forecasts need to be converted to consistent base period units. In addition, for Chinook it is often necessary to combine regional stock forecasts into the larger stock aggregates as used by FRAM. For these reasons the initial CMD Files, with each year's stock recruit scalars, are generally provided by a model preparation team.

2.3 FISHERY PACKAGE TO BE MODELED (Command File)

The core of FRAM processing is the attempt to simulate the effect of a given set of fishing regulations (anticipated catch or effort, quotas, seasons, minimum size constraints, bag limits, species non-retention, mark selective, gear and fishery specific release mortality rates, and regulation compliance) upon the annual abundance levels of modeled stocks. These sets of regulations are reflected in appropriately modified CMD Files (see Section 4.1 for CMD File data entry details). In general, most values associated with regulation changes are calculated outside of FRAM by appropriate regional staff and then provided to the modelers for input.

The initial "pre-season" annual CMD Files (containing the current season's stock recruit abundance scalars) traditionally carry the final fishery packages accepted through the PFMC/NOF process the preceding year. Running those "start up" coho and Chinook CMD Files through FRAM will show how this year's combination of stock abundances would be impacted by last year's fisheries. The results are reported in annual Council reports, for example: "PRESEASON REPORT I, Stock Abundance Analysis for 2005 Ocean Salmon Fisheries" (PFMC 2005). This CMD file provides a starting point to begin shaping appropriate fisheries packages for the present stock abundances.

At times, other types of CMD Files are used. The types of potential FRAM model runs include:

- Pre-season planning (the focus of this manual),
- In-season evaluation,

- Post-season evaluation, and
- Base period comparisons.

As needed, CMD Files can be updated with in-season catch information, to gage if results from actual fisheries may be exceeding impacts on stocks of concern. A post-season CMD File would contain actual landed catch; post-season stock abundance is more problematic and may or may not be part of a particular analysis. Sometimes there is an interest in what stock impacts a fishery (or set of fisheries) functioning at base period level would have upon a given level of stock abundances. In such a case, those fisheries would be modeled with a fishery scale factor of 1.0; thus directing FRAM to apply base period exploitation rates (stock, age, and time step specific rates) to each stock in that fishery(s).

2.4 TERMINAL AREA MANAGEMENT MODULES (TAMMs)

FRAM can import Puget Sound fishery input values from coho and Chinook TAMMs, and subsequently the TAMMs can accept FRAM output for additional analysis and report generation. If the user is interested in the impacts of Puget Sound (and Washington coastal coho) terminal or extreme terminal fisheries upon these regional stocks, then the appropriate TAMM input source must be specified to accompany the modeling of a CMD File (see Section 3.1.3 for coho, and Section 3.2.3 for Chinook).

Coho FRAM can, when directed by the modeler, activate a coho TAMM macro to import Puget Sound fishery inputs directly from the specified coho TAMM spreadsheet. The Chinook TAMM works differently; prior to running FRAM a "TAMI" text file (i.e., Ckti1604.tam) must be created by the spreadsheet macro. Chinook FRAM will ask for the name of the "TAMI" file to import. As long as TAMM fishery inputs remain the same, the same TAMM input source file can be used for subsequent FRAM model runs. However, take care to appropriately rename the TAMM file when the latest FRAM output is incorporated to populate the TAMM reports (see Section 7.2). Generally the FRAM CMD File name would be incorporated into the TAMM spreadsheet name. Section 7 is devoted to TAMM modeling and reporting functions.

2.4.1 COHO TAMM SUPPORT FILE (TAAETRSnum.txt)

The coho specific TAAETRSnum.txt file (Appendix 5) provides FRAM with information specifying how Puget Sound coho fishery harvest rate inputs, as provided via the TAMM, are to be applied. These harvest rates are specific to aggregations of defined fishery catches and associated stock escapements. The "TAA" and "ETRS" notations refer to "Terminal Area Abundance" and "Extreme Terminal Run Size", respectively, which serve to instruct FRAM regarding the type of calculations to perform. This TAMM support file will be prepared and provided to model users by the model preparation team, as these harvest rate definitions may change from time to time. Section 7.1.1 provides more information on the structure and use of this file. For additional technical details regarding TAAETRSnum.txt file structure, and FRAM modeling of TAA and ETRS harvest rates, refer to MEW (2007b).

3. RUNNING THE FRAM APPLICATION

Producing a FRAM model run can be a simple and straightforward process, depending upon the complexity of input changes from the previous CMD File. Section 4.1 focuses on this input complexity in detail. This section provides instructions for getting through simple model runs. Section 7 provides more detail on the TAMMs and on FRAM/TAMM modeling interactions. For the relatively simple examples in this section, where the only changes are anticipated Catch Inputs, the steps are:

1) Open the FRAM application to the Main Menu.
2) Specify the species-specific CMD File to be changed.
3) Enter the new catch for the fisheries (by time step).
4) Save the modified CMD File with a new four character name.
5) Run the model using the new CMD File and TAMM input.
6) Produce FRAM text file output for TAMM spreadsheet.
7) Load text files into TAMM for TAMM style reports.
8) Clean up.

FRAM works fundamentally the same for coho (Section 3.1) and Chinook (Section 3.2) model runs. But there are some different procedures for Chinook and those differences will be the focus of material presented in Section 3.2.

3.1 MAKING A SIMPLE COHO FRAM MODEL RUN

3.1.1 Start FRAM and Choose a Coho Command File

After the application is open, the above steps 2 through 6 happen via FRAM's user interface windows. Like other computer programs, FRAM can be started a variety of ways: desktop shortcut, startup menu shortcut, or by opening the program from Windows Explorer. The FRAM program opens with a presentation of the Main Menu (Figure 2). The program has nothing to work with until a species-specific CMD File is specified via the "Open Command File" button. In the popup screen the user can browse through their directories to find the CMD File to be used or modified for the next model run. Once a CMD File is specified and "opened" you are returned to the Main Menu window, where the directory path to the specified CMD File now appears at the bottom of the Main Menu screen (i.e. "C:\FRAM\Coho files\0319.cmd" in Figure 2).

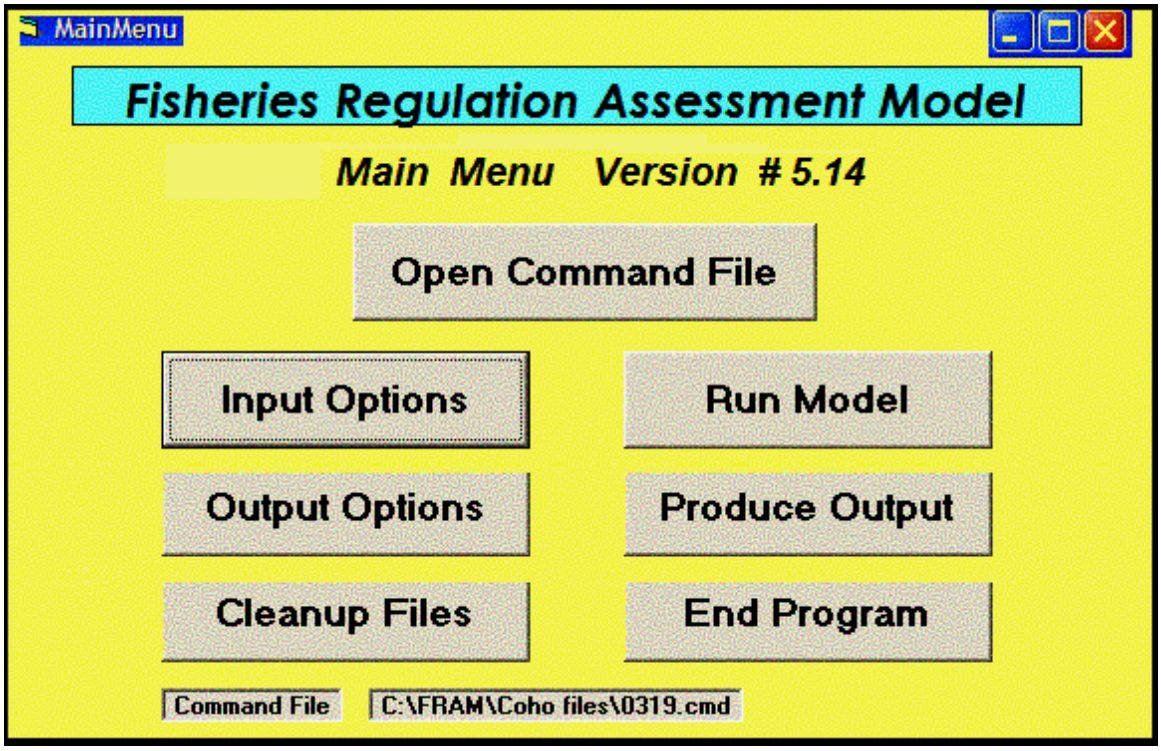


Figure 2. The FRAM application's opening window, from model version 5.14.

3.1.2 Modify Fishery Input and Save the New Command File

The "Input Options" button on the Main Menu accesses the Input Options Menu screen (Figure 3). This screen provides the user access to modify a CMD File as appropriate for annual abundances and the set of fishery regulations being modeled. Note that when a coho CMD File is active, then the "Read Canada Coho Input Data" and "Read USA Coho Input Data" buttons appear and offer an automated option for combining the two sets of CMD File inputs.

From here the "Catch Controls" button will bring up the FRAM fishery Catch Control interface window (Figure 4). This is the most commonly used input screen. This window lists all model fisheries in the outside column, while the fishery time steps are shown across the top of the screen. Anticipated fishery impacts (for both mark selective and non-selective fisheries) can be input as Quotas (expected catch), Exploitation Rate Scalars (relative to base period ER), or Ceilings (combines quota with scalar, catch is calculated from scalar but not allowed to exceed quota). The Input window requires that values are flagged accordingly to input type, as seen in Figure 4 under "Normal Controls" or under "Selective Controls".

For this coho example refer to the Area 6-7ANetNT and Area 6-7ANetTR Fisheries in Figure 4. These non-treaty and treaty net fisheries are being modeled as simple expected catches during all of four time steps. All but one time step/fishery cell are flagged "1" as normal (non-selective) quota fishery. The Area 6-7ANetNT cell for the September time step is flagged "8" as a mark selective fishery (MSF). To change a modeled catch simply click on the value to change and type in the new value. Change the flag if needed. Be sure to click off the last modified cell before selecting the "OK-Done" button as FRAM will not recognize changes to the last highlighted cell. The "OK-Done" button will produce the Selective Fishery Parameter screen (Figure 5), showing every fishery designated as a mark selective fishery in the Catch Control screen (Note the Area 6-7ANetNt Fishery, Time Step 4, is listed).

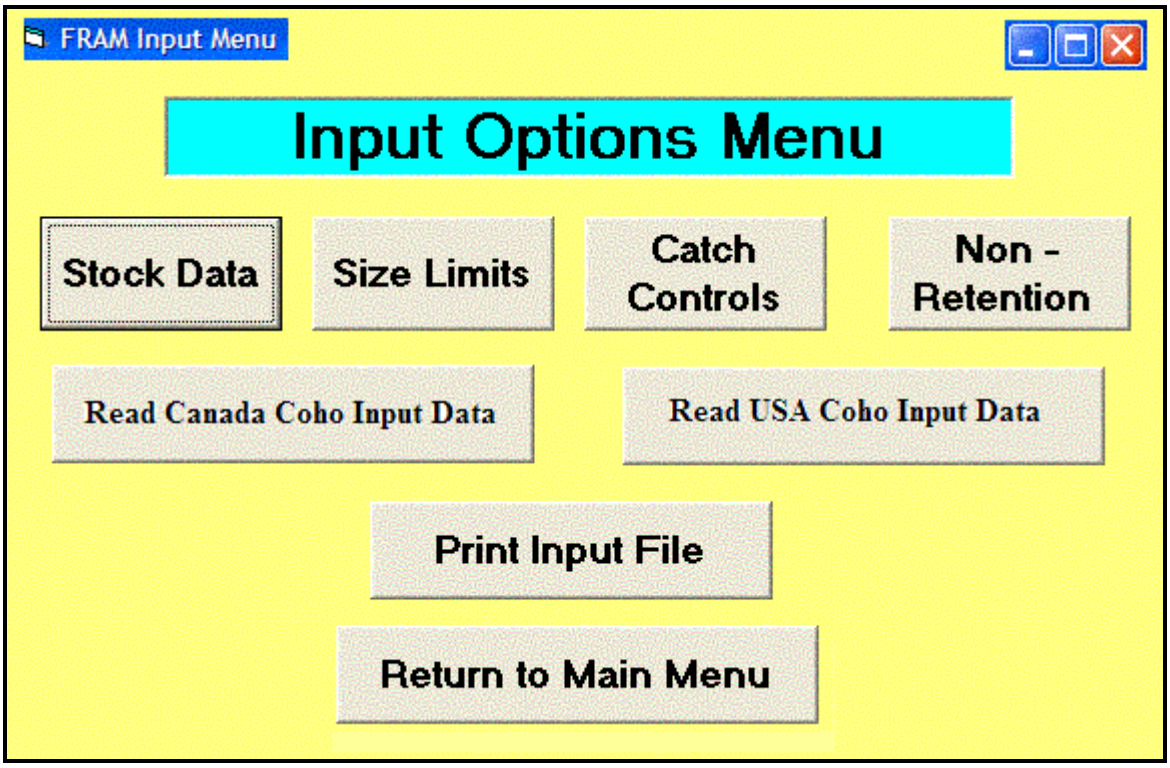


Figure 3. Input Options coho menu screen.

The required selective fishery input parameters are: Release Mortality Rate, Marked Mis-identification, Unmarked Mis-identification, and Drop-off/Drop-out Mortality Rate. When a new selective fishery is added via the Fishery Catch Control screen, then that fishery automatically is added to the list of fisheries in the Selective Fishery Parameters screen – with zero as default values. The model requires non-zero values for each of these four cells (or it will crash during a model run). A value of ".001" is sometimes used in place of an actual "0". If no new selective fisheries were added, or if there is no need to modify parameters of previously flagged selective fisheries, we would click "OK-Done" to pass through this window back to the Input Options Menu (Figure 3).

If no other inputs are to be changed then click "Return to Main Menu" button, which will first bring up the Save Command File screen (Figure 6) so the recent changes can be saved as a new CMD File. The file can be given a new file name and new overall title, or changes can be saved to the existing CMD File name (thus replacing the earlier CMD File). This name appears in the headers of all FRAM output reports; the title appears in some reports. Remember, the CMD File name must have exactly four characters, and no commas in the CMD File title. In the CMD File comments area the user can enter descriptive text as a reminder of what is reflected in the modified CMD File. The "OK-Save" button brings up a Save As screen (Figure 7) where the new CMD File name can be confirmed (or changed) and the Save To directory can be designated. This screen returns the user to the Main Menu (Figure 2).

If file storage space is not a problem then multiple directories (unique to the modeling task and the related set of CMD Files) can be created according to user preference as long as each directory contains the required support files. Again, the FRAM application itself can reside in any directory.

3.1.3 Do a Coho Model Run

Model input has been changed and the CMD File has been saved (usually with a new file name). From the Main Menu (Figure 2), click the "Run Model" button. The FRAM Run Controls screen (Figure 8)

pops up. Here you can again browse to find the directory containing the CMD File for the desired model run. Remember, this same directory needs to contain all the species-specific FRAM support files listed in Table 2-1 and discussed in Section 2. The FRAM Run Controls screen shows all CMD Files in the selected directory. Pick the one to model. The option is offered to include TAMM modeling parameters for Puget Sound marine and freshwater coho fisheries. For coho modeling all Excel files ("xls" suffix) in the selected directory are listed. If so desired, pick the TAMM file with the appropriate fisheries package to accompany the selected coho CMD File. Hit the "OK" button.

If an associated coho TAMM "coho****.xls" file was selected to model with the selected CMD File, then FRAM will access that Excel file to obtain fishery inputs for specified Puget Sound coho fisheries. Spreadsheet macros must be "enabled" for this operation to proceed. If that spreadsheet is already open and macros were enabled then the program will proceed to the model run; if not then FRAM will ask if it is OK to Enable Macros as seen in Figure 9. Click the "Enable Macros" button to allow FRAM to extract coho TAMM fishery input values. Then the FRAM program begins processing the impacts of fishery inputs (as specified in the TAMM or in the CMD File) upon the stock abundances (as specified in the CMD File). While processing, the Model Run Control Selections screen will show progress through time steps and provide brief messages indicating that FRAM is at work (Figure 10). The Main Menu (Figure 2) appears when the model run is completed.

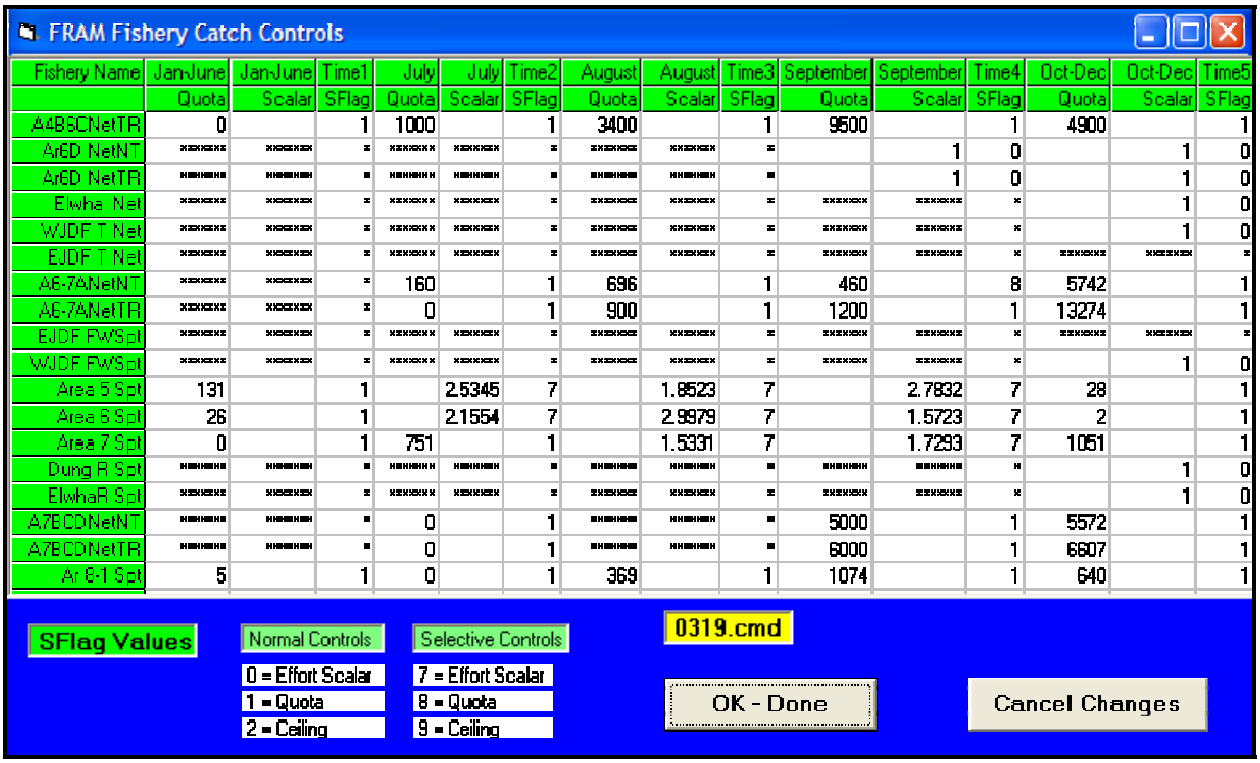


Figure 4. Catch Control input screen (coho example) for each fishery at each time step.

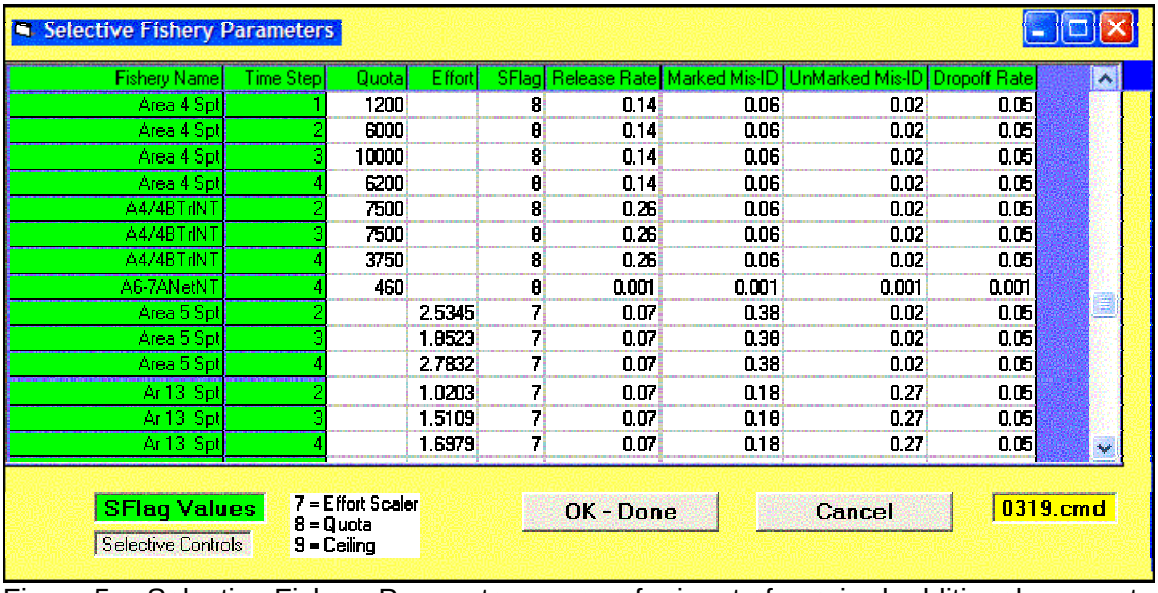


Figure 5. Selective Fishery Parameters screen for input of required additional parameters.

Figure 6. The Command File Save screen to save changes and name a Command File.

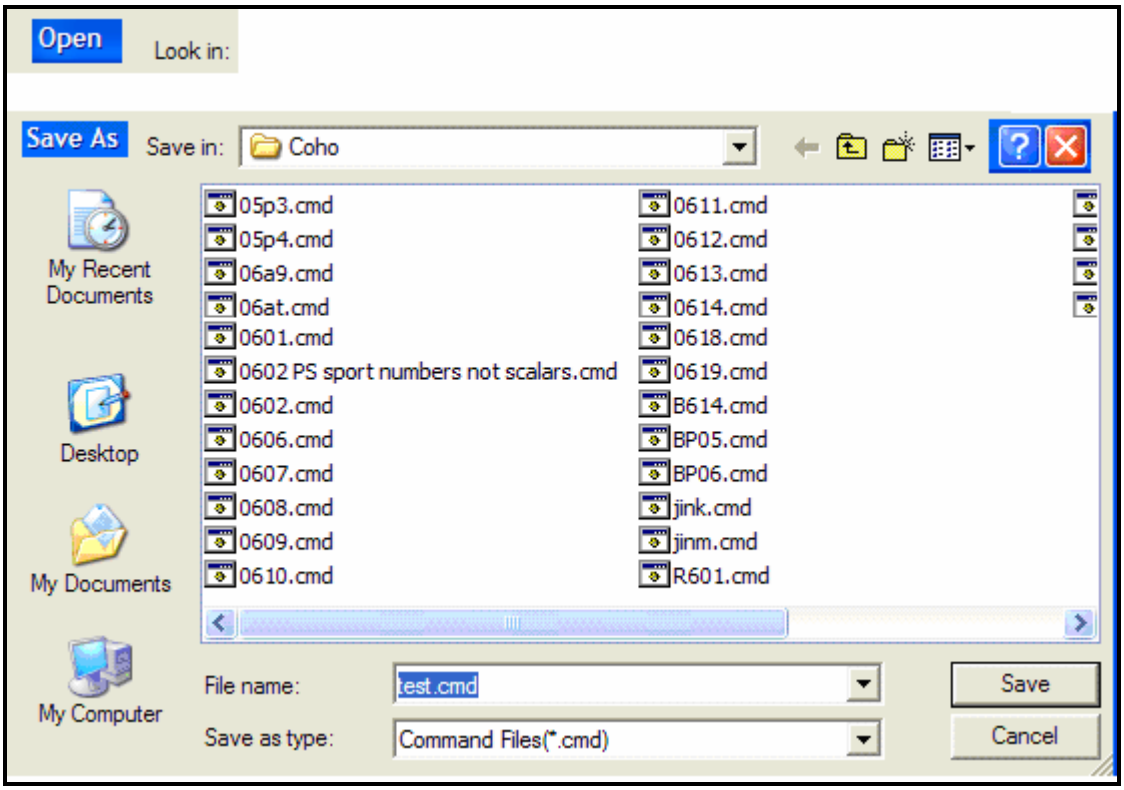


Figure 7. Standard Windows file browsing screens for locating files (Open) and for saving (Save As) modified files to destination of choice.

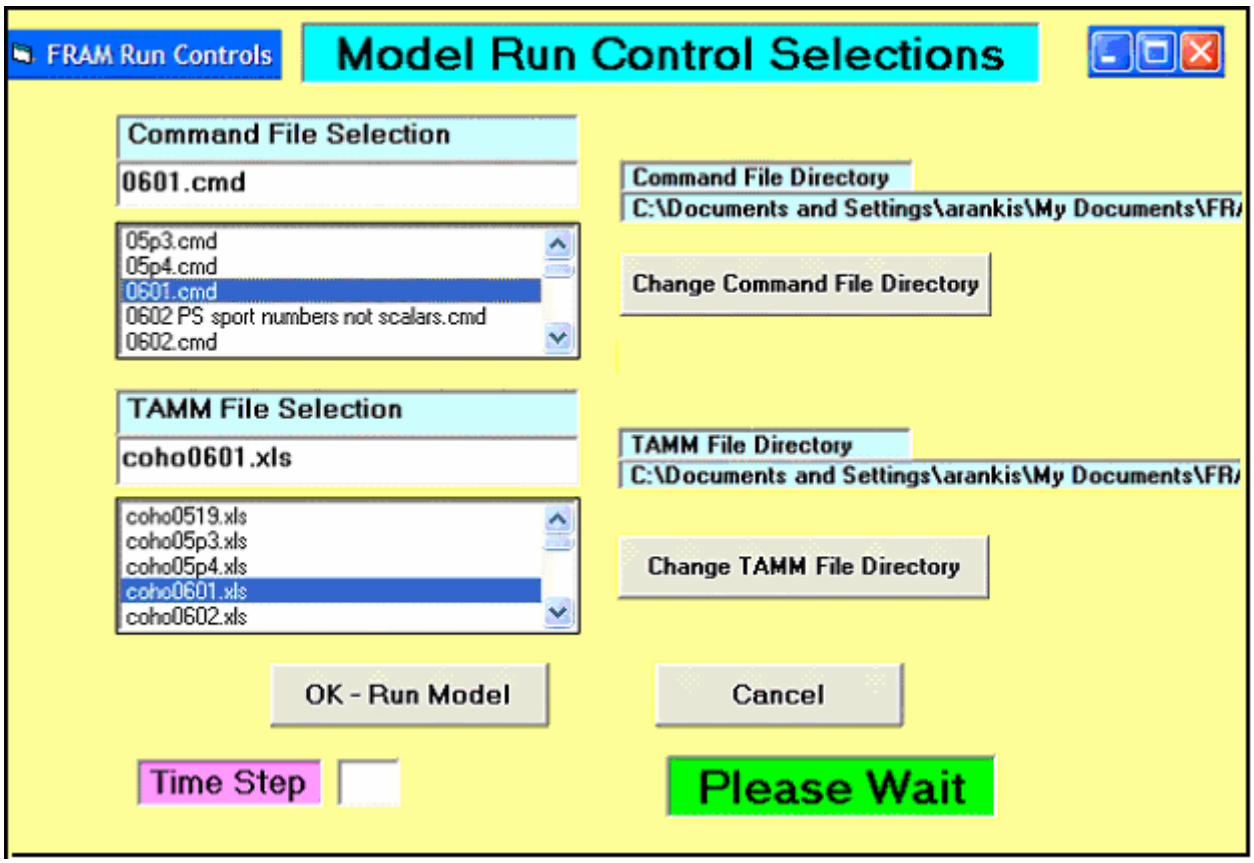


Figure 8. The Model Run Control Selections screen used to specify a Command File (and optional TAMM input file) for a model run.

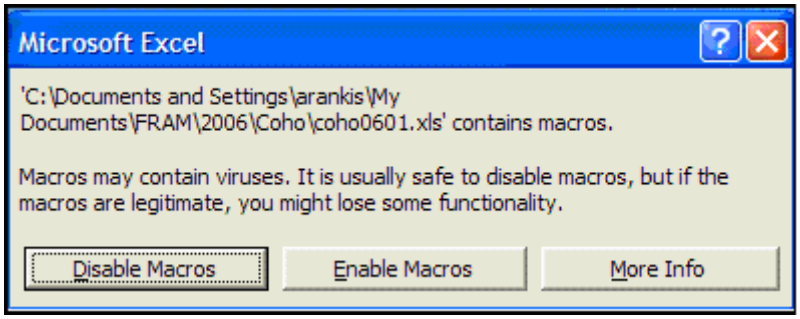


Figure 9. The Enable Macros screen allows FRAM access to coho TAMM spreadsheet input.

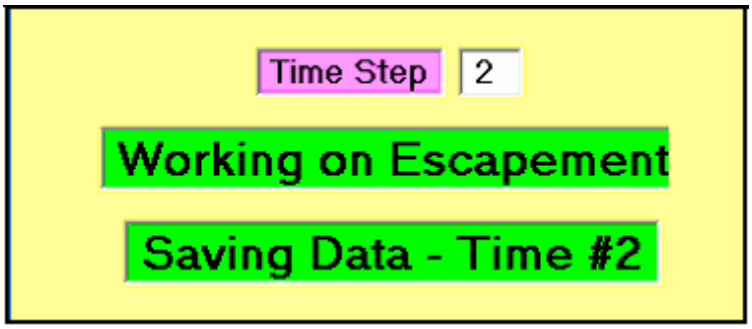


Figure 10. FRAM processing messages from the Model Run Control Selections screen.

3.1.4 Produce Coho Output Reports

The actual model run time is relatively quick, while generating user-friendly reports is more time consuming and can initially be challenging. Table 3-1 lists the FRAM output files automatically produced from coho and Chinook model runs. Note the file naming convention applied by the program. The CMD File name becomes the first four characters of the FRAM output files. For the shown 2004 PFMC/NOF model runs, the naming convention for coho has the year (04) in front of the model run number (20). Chinook convention reverses this, having the model run number (16) proceeding the year (04).

These files are not meant for direct user interpretation. Two "styles" of user-friendly reports are available: there are FRAM generated reports (Section 5) and TAMM generated reports (Section 7.4). To obtain FRAM Reports the user must direct FRAM to populate any desired preformatted reports with the results from the appropriate CMD File's model run. The TAMM style reports are created within TAMM spreadsheets after the model user has loaded specific required FRAM reports into the TAMM spreadsheet.

Table 3-1. Output Files Generated From FRAM Model Runs.

Output files automatically generated from FRAM model runs.	
Coho	**Chinook**
framchk	framchk
0420MRT	1604MRT
0420ESC	1604ESC
0420COH	1604COH
0420CAT	1604CAT
	CKTX1604.TAM
	CKTT1604.TAM
	CKTL1604.TAM

The Main Menu (Figure 2) has an "Output Options" button and a "Produce Output" button. The "Output Options" button will bring you to additional FRAM screens allowing the user to specify how pre-existing FRAM report formats are to be populated, and to customize some of those reports to focus on stocks or fisheries of interest. This is the process of creating "driver files". Once created, the model user can then repeatedly access a driver file by clicking the "Produce Output" button. This entire process, and the associated FRAM screens, will be presented in Sections 4.2 and 4.3.

This simple coho model run section will focus on creating the more user-friendly output reports generated by the coho TAMM spreadsheet after FRAM output is loaded into those spreadsheets. TAMM generates many of the coho reports widely used during the PFMC/NOF pre-season planning process. Although coho TAMM is centered upon Puget Sound stocks, the TAMM report tables address coho stocks from the Oregon coast, the Columbia River, the Washington coast, and the upper Fraser River. To obtain the coho TAMM reports, the user must first direct FRAM to produce specific preformatted text files ("prn" suffix) that will later be loaded into the coho TAMM, using an Excel macro.

To produce the four required coho "prn" files, in the Main Menu screen, click on the "Produce Output" button to bring up the Output Report Generation screen (Figure 11). Under the "Output Run File" title there will be a list of ****MRT files, containing CMD File specific FRAM output. By naming

convention the CMD File name precedes "MRT". Be sure the appropriate ****MRT file is selected. The four coho report Driver Files provided to the user at the model preparation stage (Table 2-1) are seen among choices under the "Report Driver File" title:

1) ***FishSumAll.DRV..... is used to produce ****FishSumAll.prn.
2) ***StkSum.DRV ..... is used to produce ****StkSum.prn.
3) ***Table2.DRV ..... is used to produce ****Table2.prn.
4) ***TRuns.DRV ..... is used to produce ****TRuns.prn.

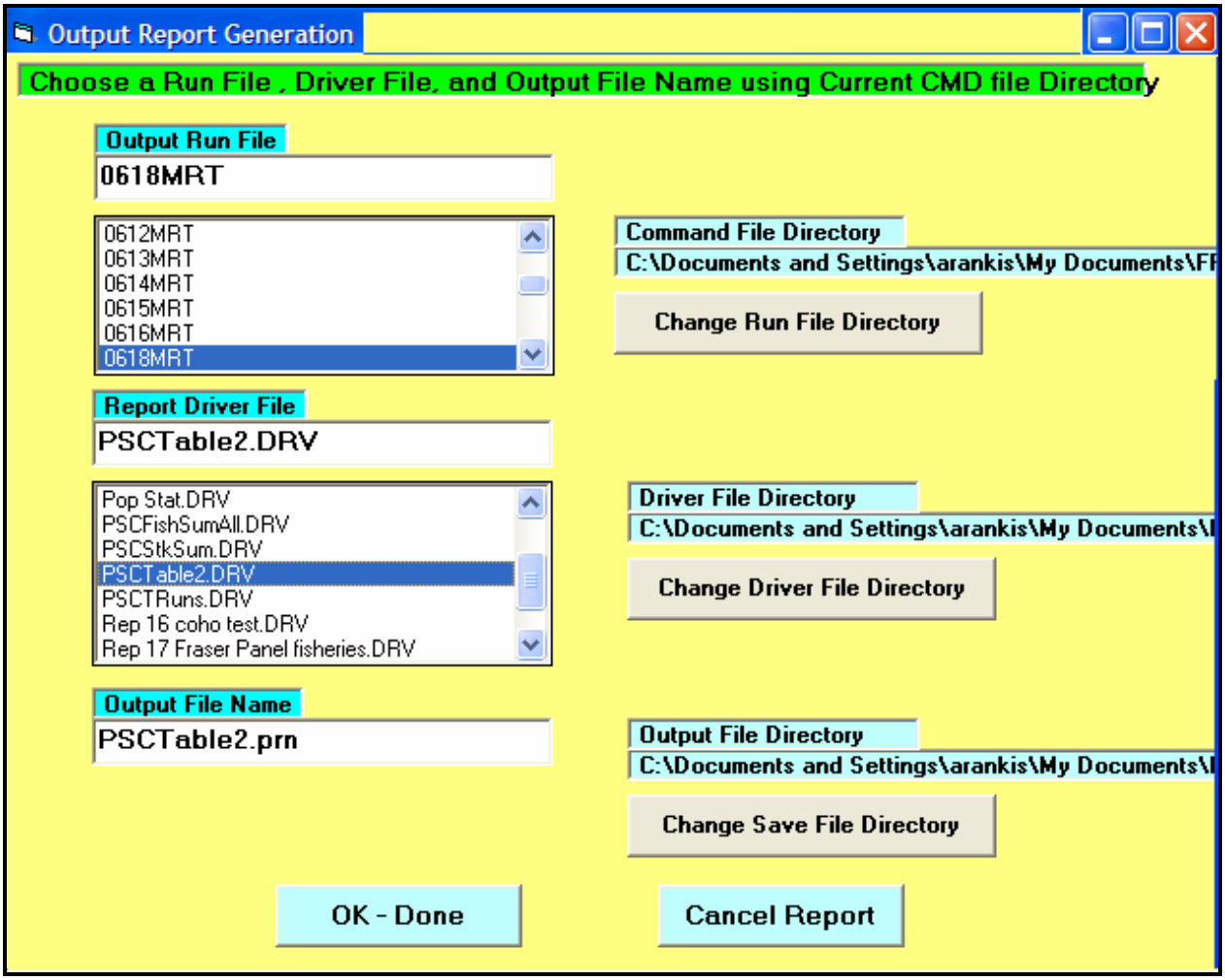


Figure 11. The Output Report Generation screen shows available Report Driver Files.

These four Driver Files will generate text files that fit as pages into the coho TAMM spreadsheet and are referenced by the spreadsheet to populate TAMM reports. From the Output Report Generation screen, select the first of the required four Driver Files. FRAM will display that file name into the "Output File Name" box in front of a "prn" suffix. The name can be left or the four characters of the CMD File name can be added at the beginning. For example, using the Driver Files provided for 2004 modeling and the CMD file model run as seen in Table 2-1, an assigned Output File Name may be "0420PSCFSumAll.prn". Alternatively, as seen in Figure 11, the "PSCTable2.DRV" was chosen and the output file name was simply left as "PSCTable2.prn". Once a file name is given, click "OK-Done". If the name of the "prn" file was not changed, a popup may tell you the "PSCFTable2.prn" file name already exists in that file directory and ask if you want to write over the older file. Click "Yes". If you want to save any particular "prn" file you should give it the unique prefix of the CMD File name. While a

"prn" file is being produced the screen will display the hourglass symbol. When finished and the screen returns to the Main Menu, proceed to click the "Produce Output" button again and select the second Driver File, and so forth until the four required "prn" files are produced. It is a good idea to check the file creation dates and times through Windows Explorer to be sure all four "prn" files were produced at the same time and thus from the same model run.

3.1.5 Load FRAM Output into Spreadsheet for TAMM Style Reports

At this point the FRAM program can be closed and a coho TAMM spreadsheet opened, generally this would be TAMM that provided input to that FRAM model run (see Section 7 regarding TAMM modeling). That spreadsheet needs to be loaded with the FRAM output, i.e., the four "prn" files.

Immediately upon opening, a pop-up screen in the spreadsheet will warn that the spreadsheet contains macros and ask if you want to enable macros. Do so by clicking the "Enable Macro" Button. After the spreadsheet opens, from the Excel toolbar, select Tools/Macro/Macros. You will then see the coho TAMM macros for loading the "prn" files and for printing specific TAMM reports (Figure 12).

Select the included "Import_Fram_prnfile" macro. In the summer of 2006, this macro was being revised just as this User Manual was being completed. If you are using a newer coho TAMM spreadsheet (2007 or later version), after clicking on "Run" follow the on screen instructions and skip to section 3.1.6.. If you are using an older TAMM, then the following paragraph applies.

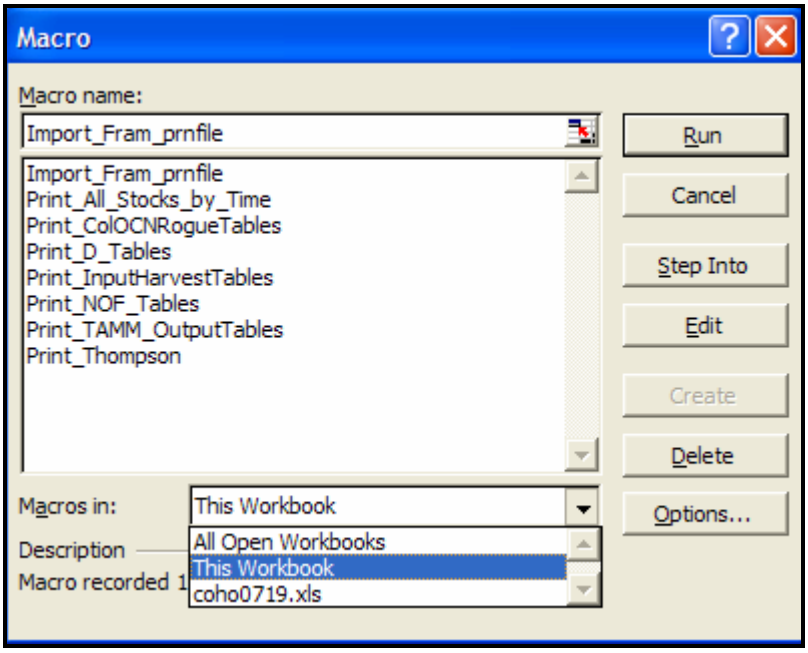


Figure 12. Macros available within coho TAMM spreadsheet.

In earlier macros, this operation was more involved; a pop-up screen with six fields required user inputs. The first field is for the path to the directory holding the four "prn" files. As instructed on the screen, end the path with a backslash. In the second field enter the name of the currently open spreadsheet. The next four fields show four "x"s in front of each "prn" file name. Those "x"s are for the four characters of the source CMD File, if you choose to add those characters to the name of the "prn" files when they were created. If not, then delete the four "x"s. After all six fields have been correctly filled in, click the "Click to Load Files …." button at the bottom of the screen. An error message will appear if anything is amiss. Even if all instructions were properly followed, a "This file is not in a

recognizable format …" message may appear and ask for your acceptance. Click the "OK" button. This may (or may not) happen four times, once for each "prn" file being imported. During this process the TAMM is loaded with the four "prn" report pages, as Excel opens the four text files that FRAM created with the "prn" suffix. These files must be closed before another FRAM run can produce outputs with the same file names. The FRAM program will crash if you attempt to create these four PRN files, re-using the same file names while they are open. After importing the "prn" files, all existing output reports in the coho TAMM spreadsheet (Section 7) should automatically update and be ready for review.

3.1.6 Clean Up

Each coho FRAM model run will produce about 15 MB of output files (the files in Table 3-1). In addition the CMD File itself is about 1 MB and the coho TAMM spreadsheet approaches 4 MB. Chinook FRAM/TAMM files and associated output files are smaller but numerous.

The Main Menu includes an inactive "Cleanup Files" button. You have to clean up after yourself. Are you a "saver" or a "tosser"? Take a look in your garage (or kitchen pantry) to determine your approach to cleaning up FRAM files that you "might need someday." Remember, all output can be regenerated from saved CMD Files, and associated TAMM files (given the same Base Period Outfile, and given the same version of FRAM program).

The key annual CMD Files and TAMM files should be retained during active modeling periods/projects to serve as documentation and as starting points for input modifications. Associated FRAM output files also have value. For example, later in the season (or anytime in the future) there may be a request for information that wasn't produced as part of the standard pre-season reports. A "****MRT" file is needed to create reports. Retaining key "****MRT" files would help insure that the newly requested and produced report is consistent with any earlier reports associated with a particular past CMD File. Remember that results are specific to the versions of the FRAM application and the Base Period Outfile.

Use Windows Explorers to delete files when no longer needed.

3.2 MAKING A CHINOOK FRAM MODEL RUN

Because FRAM works fundamentally the same for coho and Chinook model runs material already provided in the previous coho Section 3.1 will not be repeated. This section will present procedures unique to Chinook modeling, which primarily are how FRAM accesses Chinook TAMM input and produces output for Chinook TAMM. It is suggested that the reader do a few coho model runs, following through Section 3.1, before using these instructions for making a Chinook model run.

3.2.1 Start FRAM and Choose a Chinook Command File

The CMD File references a species-specific Outfile (Section 6.1) which provides the model parameters that put FRAM into a coho versus Chinook modeling mode. Please reference Section 3.1.1 for general CMD File selection instructions. Note with FRAM version 5.25, separate TAMX output is produced for Area 10 and 11 sport fisheries. This update is not compatible with Chinook TAMM spreadsheets from years prior to 2007 (Area 10 combined with Area 11). Check the box in Model Run Control Selections window (Chinook only) if modeling with older Chinook TAMMs.

3.2.2 Modify Fishery Input and Save the New Command File

The Chinook Input Options Menu screen (Figure 13) functions the same as for coho modeling (Section 3.1.2), but lacks the buttons for merging US and Canadian CMD Files.

The Catch Controls screen input options, along with the Selective Fishery Parameter screen, function exactly as for coho. However, note the different time steps across the top of the Chinook Catch Controls screen (Figure 14).

The CMD File saving and renaming screens, are described in coho Section 3.1.2.

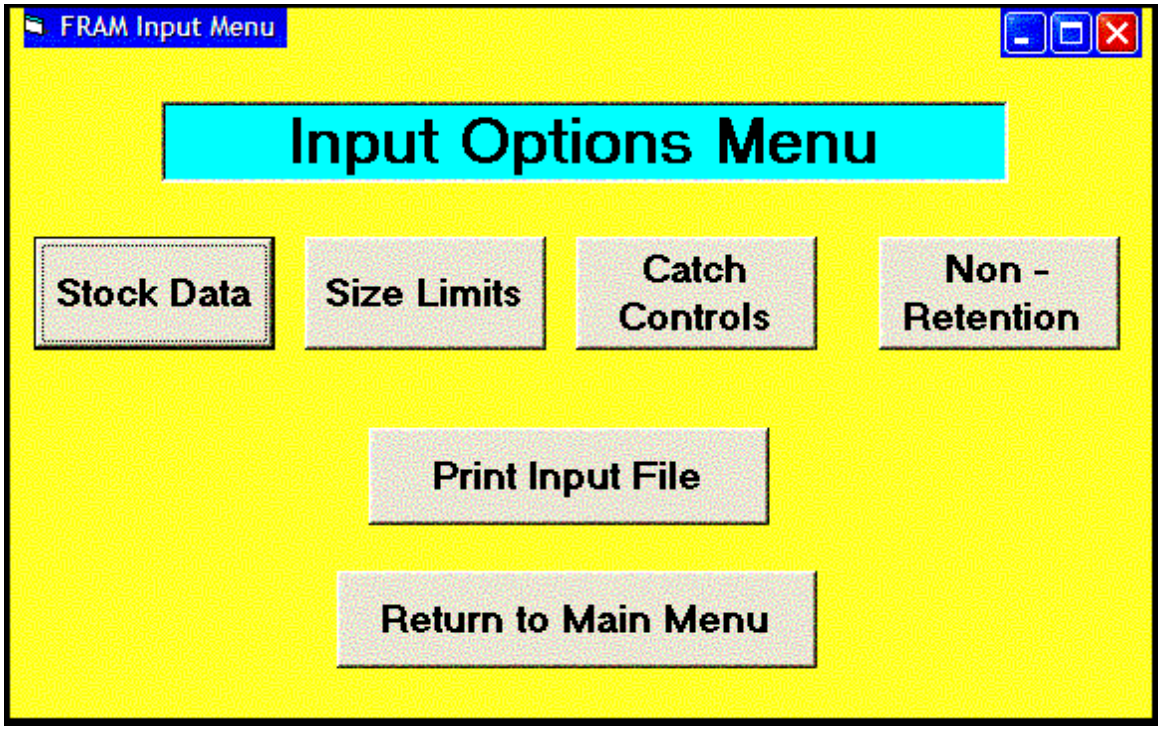


Figure 13. Chinook Input Options Menu screen.

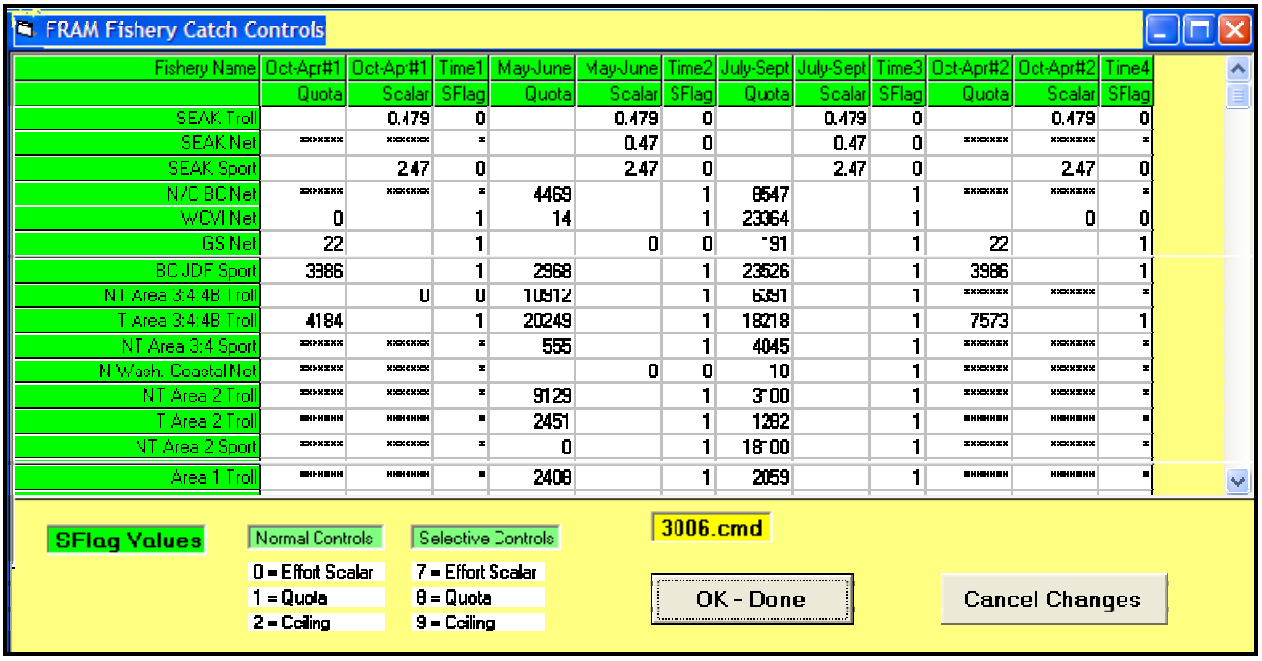


Figure 14. Catch Control input screen (Chinook example), listing fisheries by time step.

3.2.3 Do a Chinook Model Run

When the user clicks the "Run Model" button, from the Main Menu (Figure 2), the FRAM Run Controls screen (Figure 8) pops up; showing "cmd" and "xls" type files in the active file directory. As for coho, the file directory containing the active Chinook CMD File also needs to contain the Chinook Outfile.

There are two significant differences between coho and Chinook FRAM/TAMM inter-actions:

1) Chinook base period fisheries are essentially all marine areas and many Puget Sound stocks are aggregated. Coho base period includes marine and freshwater fisheries, and all individual Puget Sound stocks. The Chinook Outfile does not carry the resolution needed for management of Puget Sound stocks and fisheries. Thus, when the focus includes Puget Sound fisheries and/or stocks, the inclusion of Chinook TAMM input to FRAM and the return of FRAM output to TAMM is required (see Section 7 for additional TAMM modeling details).
2) The model mechanics to exchange data between FRAM and TAMM function differently between the species. To provide TAMM fishery inputs to FRAM, the Chinook FRAM Run Controls screen will list "TAMI" type text files (in contrast to listing the names of coho TAMM spreadsheets). A "TAMI" file is created (in a separate prior user operation) by a macro in the Chinook TAMM spreadsheet. Thus, for a Chinook FRAM model run the user would select a Chinook CMD File and the associated "ckti****.tam" file (see example files in Table 2-1).

While CMD File input is running through the FRAM program, the FRAM Calculation Program Running screen (Figure 10) will be shown. The Main Menu (Figure 2) appears when the model run is completed.

3.2.4 Produce Chinook Output Reports

The information regarding FRAM style reports in the coho Section 3.1.4 also applies for Chinook. However, the mechanics for producing TAMM style reports are different. The user does not have to use Driver Files to produce the FRAM Chinook reports to feed to the TAMM. Chinook FRAM output (as seen in Table 3-1) automatically includes a set of three "CKT*****.TAM" files, which are not produced for coho runs. These three files are jointly referred to as the TAMX files. They carry the information needed by the Puget Sound oriented Chinook TAMM to complete modeling tasks needed for those stocks and terminal area fisheries.

3.2.5 Load FRAM Output into Spreadsheet for TAMM Style Reports

If your modeling task includes an interest in Puget Sound Chinook stocks and fisheries, then you must load FRAM output back into the Chinook TAMM. Open up the Chinook TAMM spreadsheet corresponding to a specific FRAM run (see Section 7 regarding TAMM modeling). Immediately upon opening, a pop-up screen in the spreadsheet will warn that the spreadsheet contains Macros and ask if you want to enable macros. Do so by clicking the "Enable Macro" button.

For Chinook, a macro ("Load_TAMX_Files") available in the TAMM spreadsheet will load the contents of FRAM's three "CKT*****.TAM" files (Table 3-1) into appropriate locations in the spreadsheet for additional TAMM processing and the creation of TAMM reports (Section 7.4.2). If you are using a post-2006 Chinook TAMM spreadsheet, just follow the on screen directions. For older TAMMs, refer to coho Section 3.1.5 for "load" macro instructions.

4. FRAM APPLICATION SCREENS– STRUCTURE AND PURPOSE

This section will present the FRAM application screens. Most of these screens are seen in both the coho and Chinook modes of operation; however, some screens have species-specific customizations and not all screens are applicable to both. A few screens will provide a message stating they are not active, or not applicable for the present species mode. Some screens receive the annual inputs to prepare the initial CMD File (i.e., recruit scalars) and would generally not be modified again during that pre-season year. Other screens are rarely, if ever, used. After the user has navigated through many screens and reviewed their structure, the screens' purpose/use should become clearer.

A "tree structure" relationship of all FRAM screens is presented in Figures 15, 16, and 17. On the opening Main Menu screen there are seven buttons the user could click (Figure 2). Each button (except the "End Program" button) will lead to another screen with more buttons leading to more screens. Section 3, in presenting a simple model run, described the short sequence for the Main Menu buttons (Figure 15). The details of "Input Options" (Figure 16 and Section 4.1) and "Output Options" (Figure 17 and Sections 4.2 and 4.3) are described in this section. Section 5 will describe, and show examples, of each of the 14 active FRAM reports.

4.1 INPUT OPTIONS (to Command File)

Input parameters must be provided to the model specifying what the annual initial abundance is for each FRAM stock and specifying what mortality levels can be expected from all salmon directed fisheries. Values for all potential input parameters are included in every CMD File, initially as default or "seed" values, then as annually calculated (or accepted) parameters. Most fishery inputs provided by fishery managers are calculated outside of the FRAM model itself, as are annual stock abundances, and input into a FRAM CMD File via the Input Options Menu (Figure 3). When the model user is done entering new sets of inputs, the updated CMD File must be saved before a model run can be initiated (see Section 3.1.2). A FRAM model run will use these input values to calculate and assign fishery specific mortality impacts to each stock according to the relative presence of each stock in each fishery, by time step.

Figure 16 represents how the Input Options Menu leads to more specific input type screens. Note that "Print Input File" leads to a Print Menu (Figure 18), which allows the user to produce a hardcopy of various CMD File model inputs. FRAM will use the following model parameters to calculate the individual fishery and cumulative fishery effects on each modeled Stock:

1) Stock Recruit Scale Factors;
2) Stock Specific Exploitation Rate Scalars for a Fishery;
3) Minimum Size Limits;
4) Fishery Catch inputs;
5) Selective Fishery mortality and compliance rates; and
6) Non-Retention Mortality Estimates.

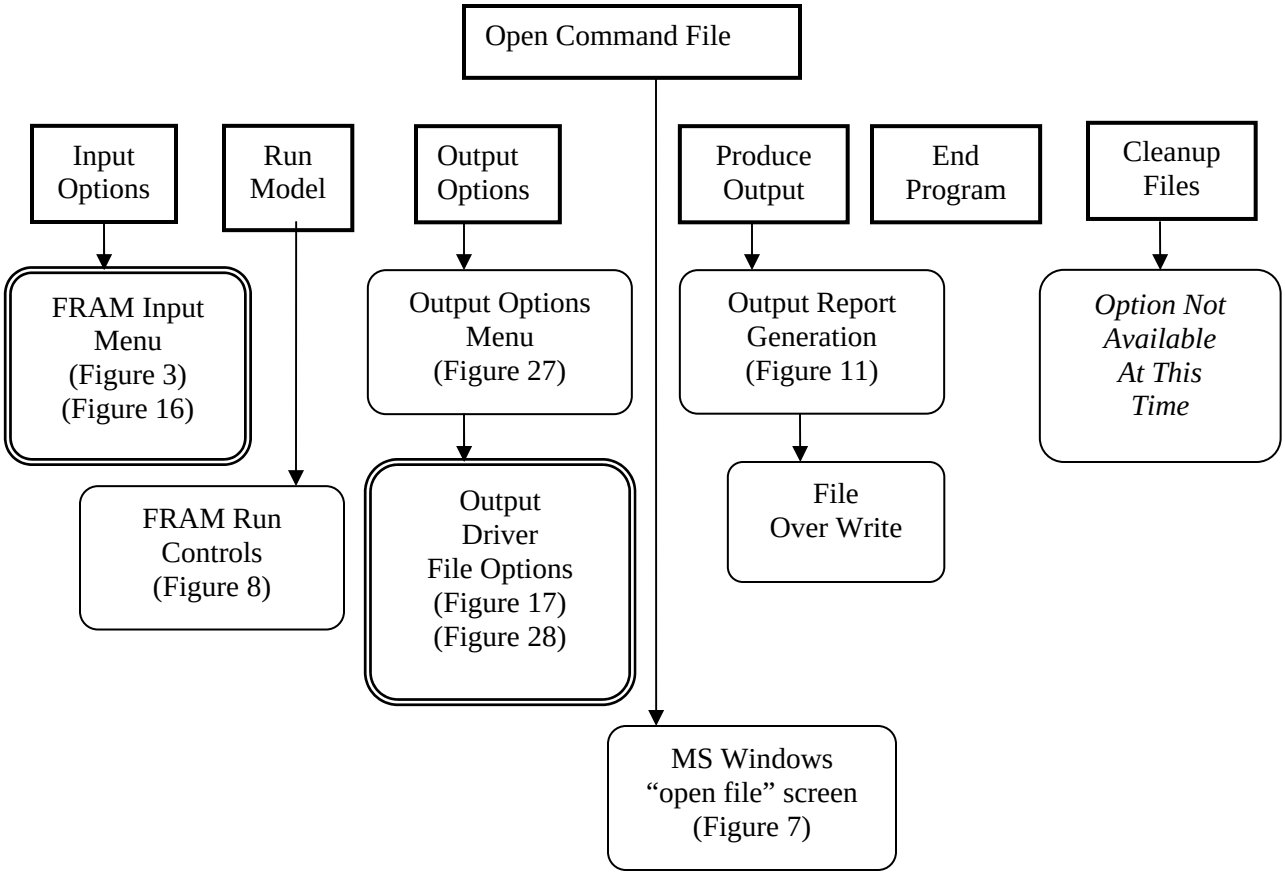


Figure 15. Representative "tree structure" arising from FRAM Main Menu screen (Figure 2).

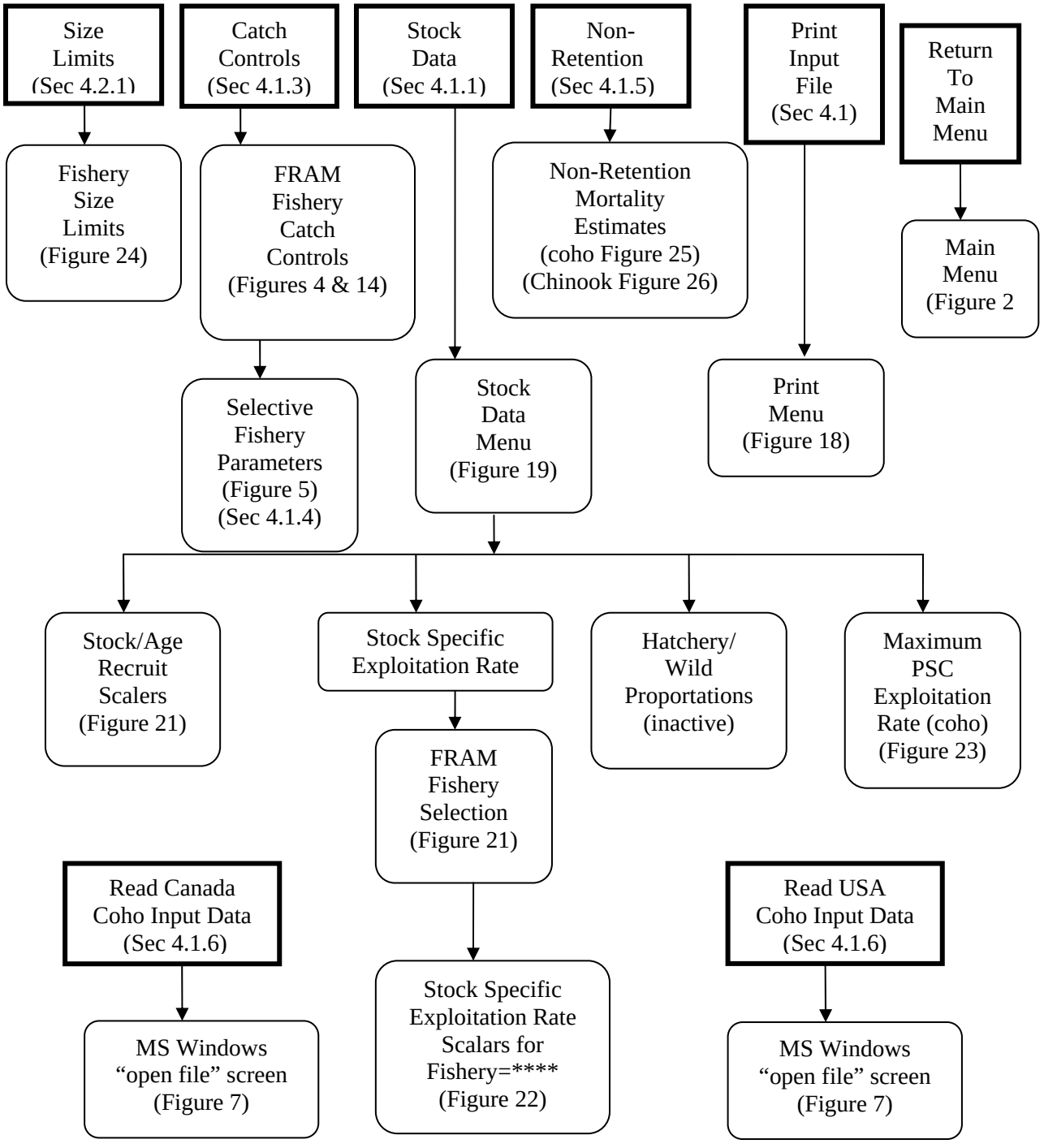


Figure 16. This "tree structure" arises from FRAM's Input Menu screen (Figure 3).

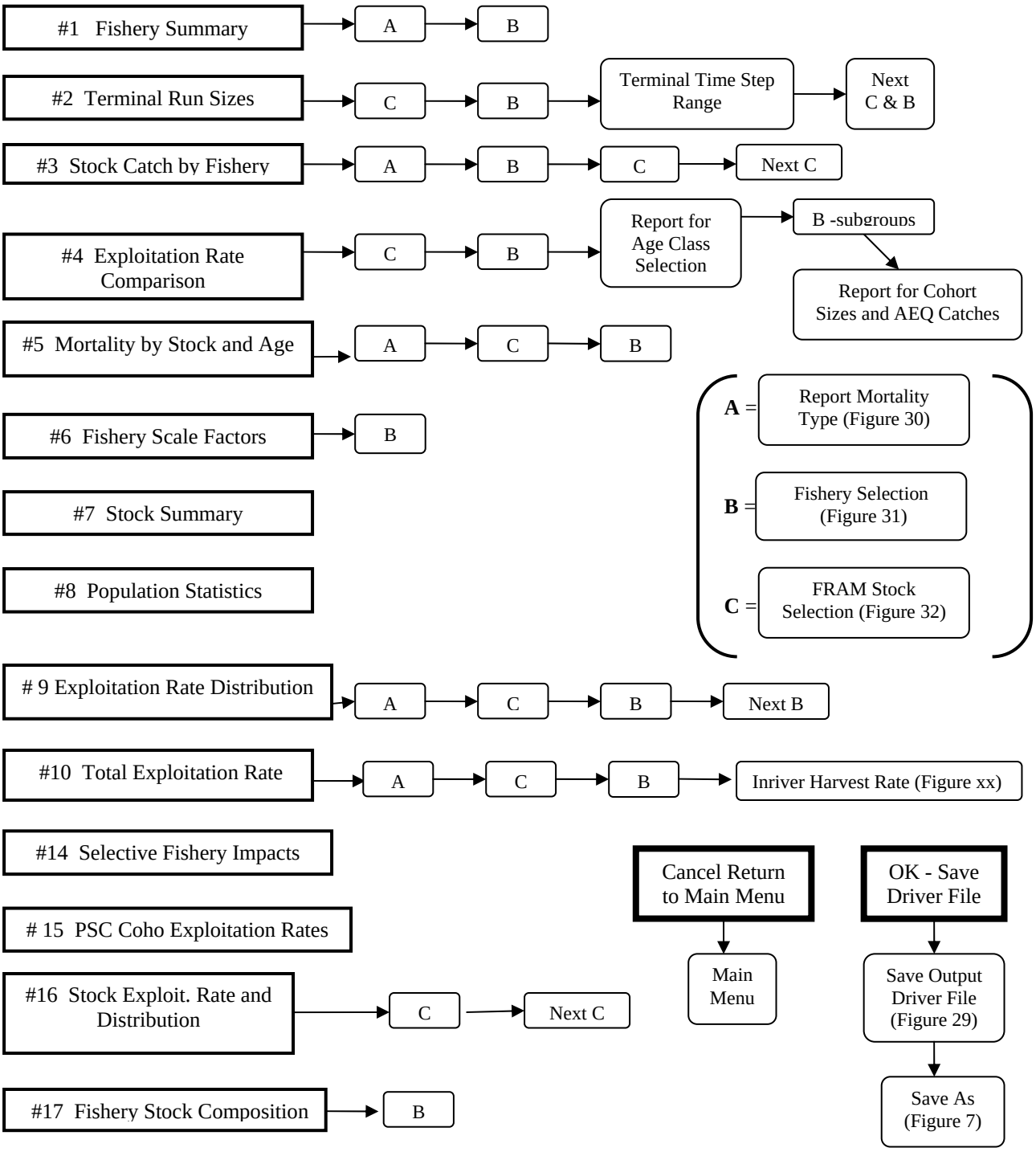


Figure 17. FRAM reports (and report id #), with user customization options. Some reports lead to menu screens for specification of: mortality type (A), fishery selection (B), stock selection (C), or additional parameters. See Section 5 for Report descriptions and examples (i.e. for report #1 see Sec 5.1 and see Table 5-1). Created reports with user specifications are saved as Driver Files (Sec 4.3).

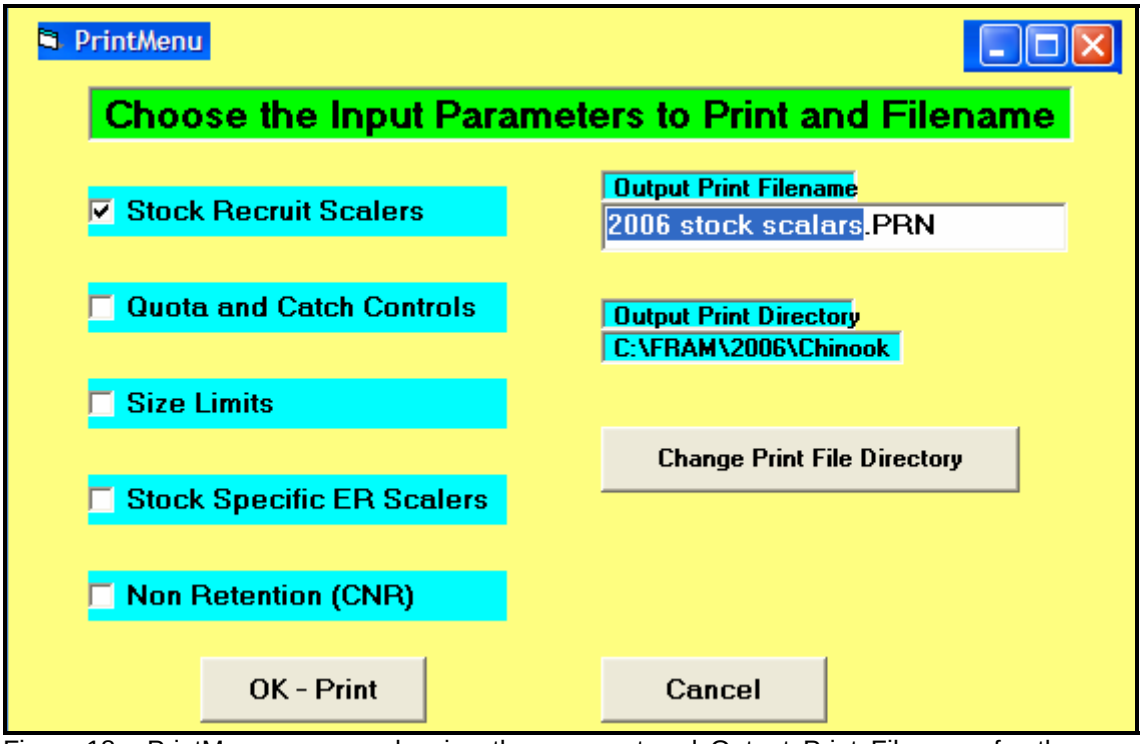


Figure 18. PrintMenu screen, showing the user entered Output Print Filename for the user selected Stock Recruit Scalars option.

4.1.1 Stock Data

The Input Options Menu (Figure 3) allows access to the Stock Data Input Menu (Figure 19). This menu allows access to FRAM input screens for Recruits Scale Factors, Stock Specific Exploitation Rate Scalars by fishery, Hatchery/Wild Proportions (coho only), and the PSC Maximum ER (coho only). The Recruit Scalars and coho PSC Maximum ER generally would not be modified from the initial yearly command file. The Stock Specific Exploitation Rate adjustment input option is very rarely used but can serve as a tool to reflect fisheries truncated in area or time. The coho Hatchery/Wild Proportions screen is not active in this version of FRAM.

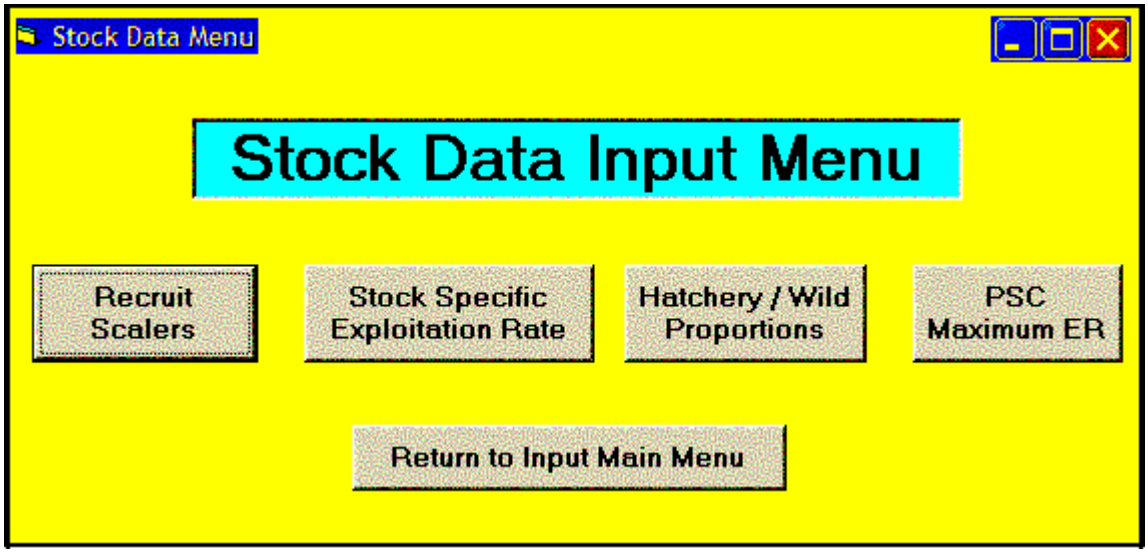


Figure 19. Stock Data Input Menu screen directs the modeler to stock specific input screens.

The Recruit Scalar screen (Figure 20) shows stock recruit scalars, equal to or greater than zero, for each FRAM stock by age class. FRAM will multiply these values by base period stock abundance to produce the initial annual expected stock abundances. For example, a value of "1" indicates an annual abundance for that stock equal to the base period. Only a single age class is modeled for coho, beginning with January age-3 abundance. The Chinook Recruit Scalar screen requires four age class specific recruit scalars.

Calculation of the annual recruit scalars is external to the model. Simply put, the stock base period abundance is divided by the pre-season forecasted abundance [See MEW (2007b) for a description of forecast abundance methods]. For coho this is relatively straight forward. For Chinook this becomes more complicated as annual recruit scalars are needed by age class; when the forecast type is of "total terminal run size," then this must be converted to age specific initial ocean abundance values. For both species complicating factors arise as forecasts for regional stock units may or may not be the same as FRAM stock units, and adjustments are required. Mark rates introduce another layer of complication. For these reasons, and to ensure consistency, the recruit scalars are annually prepared by technical experts and then shared with other modelers; these values then remain constant for the given season.

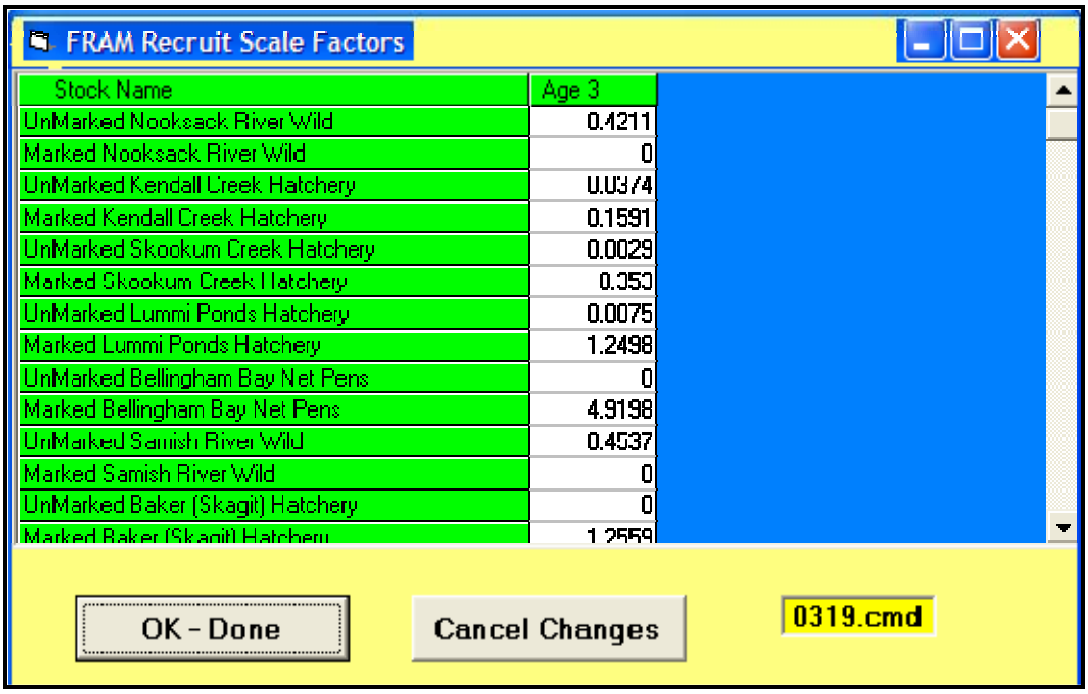


Figure 20. FRAM Recruit Scale Factors screen for annual coho stock abundance inputs.

The Hatchery/Wild Proportions input was once used for some coho stocks, but is not needed with the present expanded coho base period. Independent hatchery and wild stock recruit scalars now address this past coho function.

The Stock Specific Exploitation Rate button essentially offers the ability to modify a stock(s) base period distribution pattern, by fishery and time step, in response to recognized deviations from base period conditions. The model user is first directed to a FRAM Fishery Selection screen (Figure 21) to specify the fishery to be adjusted in the subsequent Stock Specific Exploitation Rate Scalars for Fishery = *** screen (Figure 22). These scalars function similarly to recruit scalars. The listed scalar values are multiplied by the base period stock specific ER rates. It is very rare that any of these exploitation rate scalar values would be changed from the default value of "1". Any adjustments would have to be supported by an external analysis of fishery-stock interactions which demonstrates how and why a FRAM fishery would be expected to have different stock specific contribution levels (independent from abundance changes) than it had during the base period years.

The Maximum PSC Exploitation Rate input screen (Figure 19), reached via "Stock Data" button, accepts management guideline criteria for reporting purposes but not as modeling parameters.

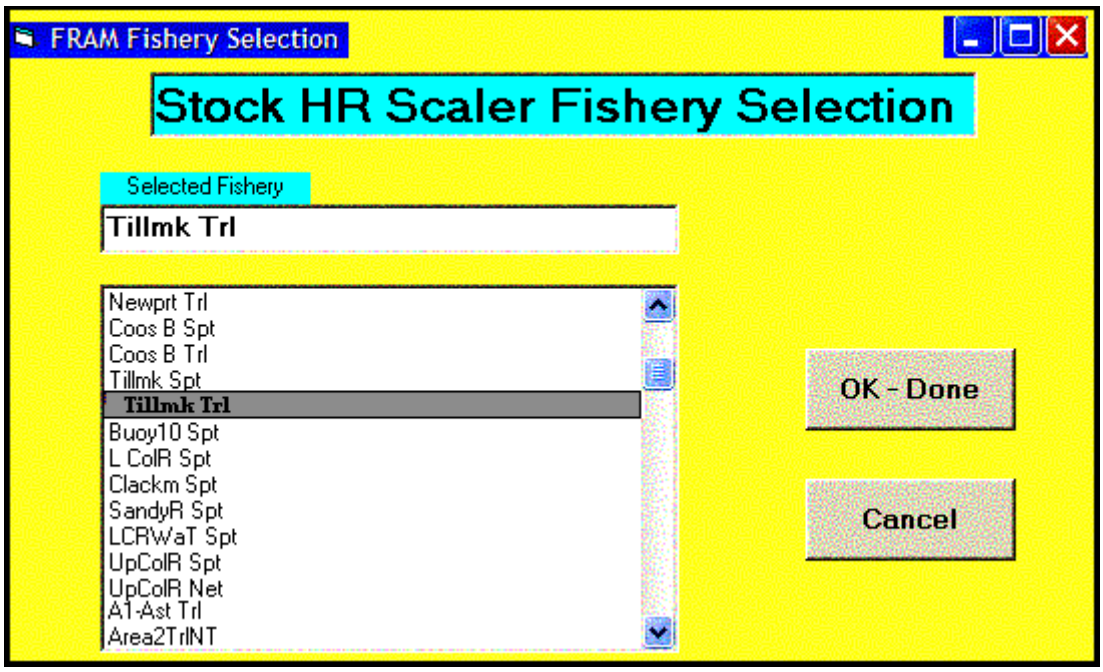


Figure 21. Stock Harvest Rate Scalar Selection screen to select fishery for stock specific adjustments.

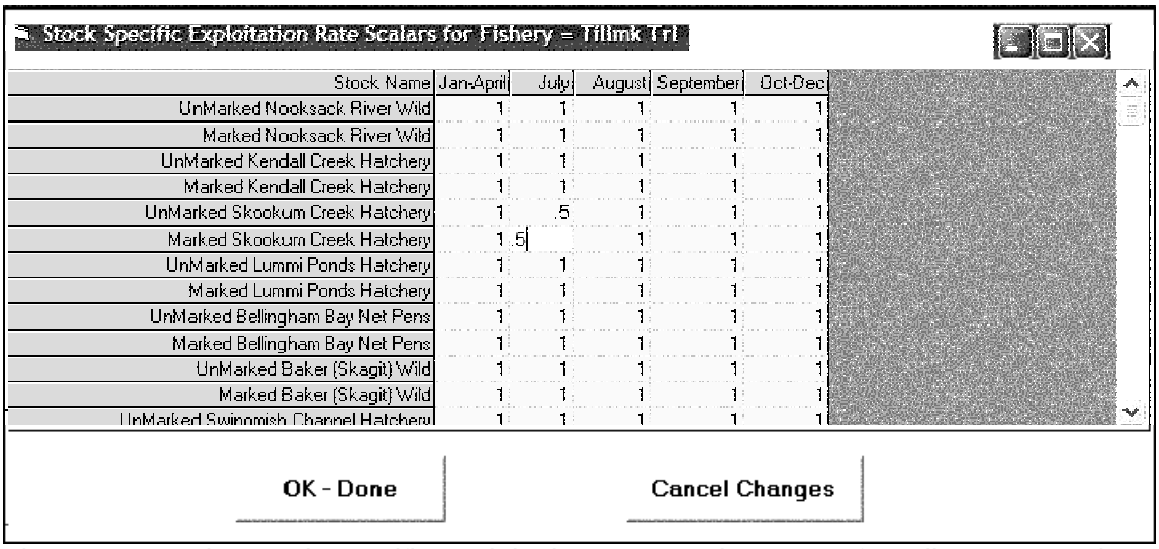


Figure 22. A coho Stock Specific Exploitation Rate Scalar screen for adjustments to base period exploitation rates.

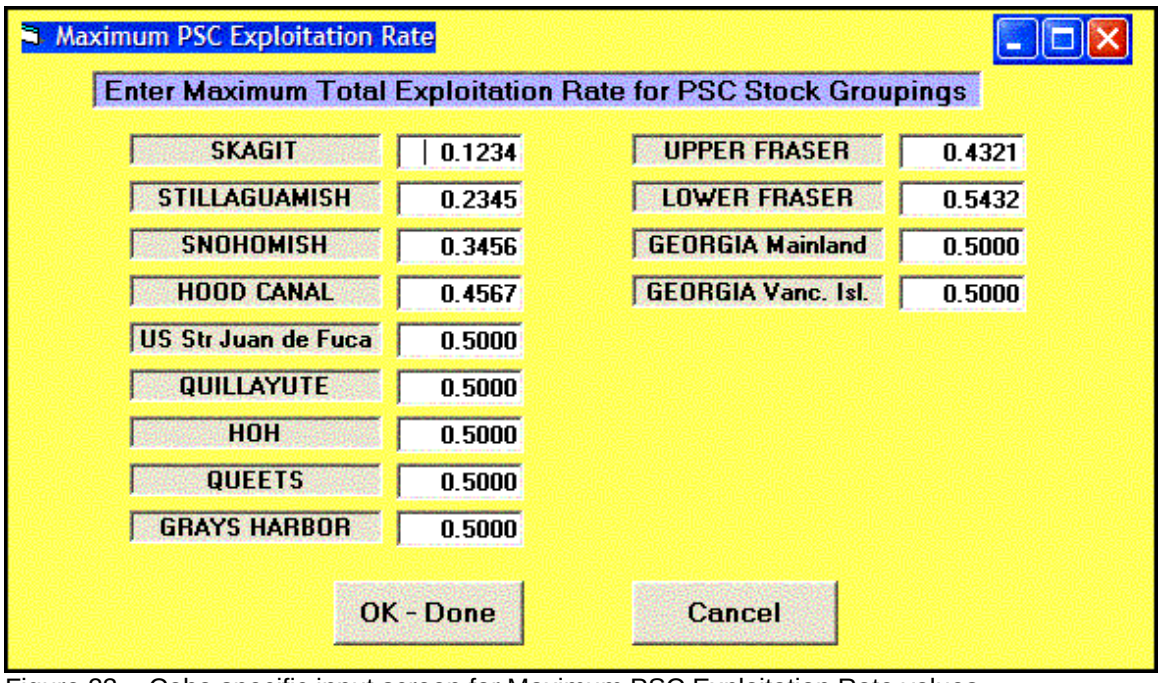


Figure 23. Coho specific input screen for Maximum PSC Exploitation Rate values.

4.1.2 Minimum Size Limits

The Input Options Menu provides access to the "Size Limit" button, and thus the fishery Size Limits screen (Figure 24). This function is relevant for multi-aged Chinook modeling where the minimum retention size limit (fork length in millimeters) may vary annually, by fishery and/or by time step. The Chinook Outfile contains time step and fishery specific mortality rates applied to released sub-legal fish; number of fish released by age class is a function of stock specific growth rates as carried in the Outfile, and of the annual age specific recruit scalars. The present coho base period was developed for age-3 fish, thus a minimum size limit to decrease impacts on younger age classes is not relevant.

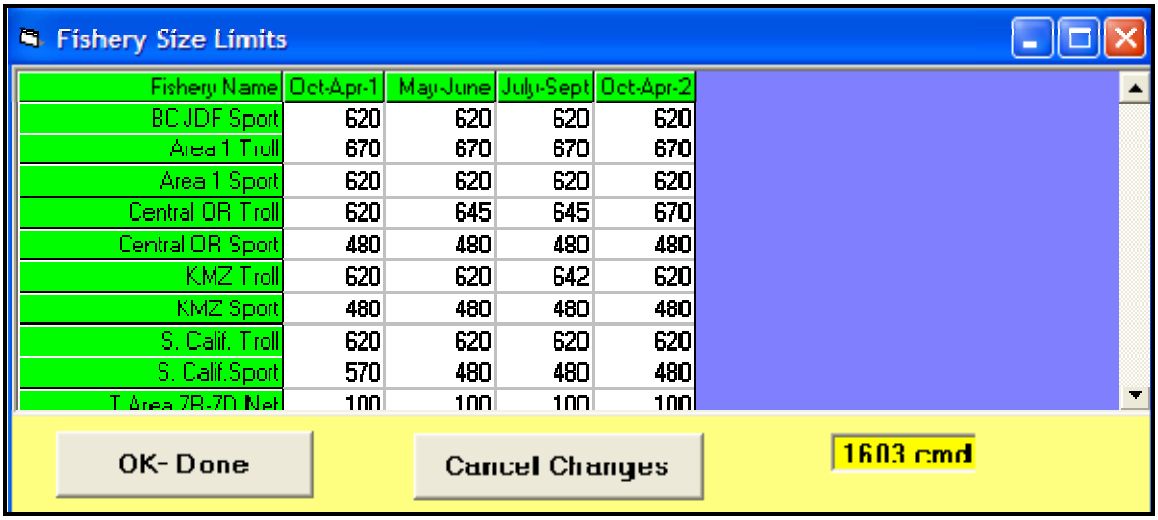


Figure 24. Fishery Size Limits input screen for Chinook minimum legal size limits.

The FRAM accepts minimum size limits input in millimeters for a fork length measurement. Many fishing regulations describe a minimum size limit for total length, and use inches as the unit of measurement. The conversion between inches and millimeters is straightforward; the fork length to total

length conversion is not. Conrad and Gutmann (1996) utilized several data sets and considered several models before their recommendation to use a geometric mean regression (GMR) model. They combined all data sets to derive size range specific fork length to total length relationships. These relationships produce different total length to fork length conversions than the PMFC (1970) relationship used for many years. In practice it appears modelers have the discretion to choose, or average, the results of the GMR and/or PMFC relationships shown below (units are in centimeters):

GMR Length Range	GMR Equation	PMFC Equation
35 cm ≤ FL ≤ 68 cm	TL = 1.023 + (1.045FL)	TL = 1.717 + (1.056FL)
68 cm ≤ FL ≤ 80 cm	TL = 1.488 + (1.032FL)	
37.6 cm ≤ TL ≤ 71.7 cm	FL = (0.957TL) – 0.979	
71.7 cm ≤ TL ≤ 84 cm	FL = (0.969TL) – 1.442	

4.1.3 Catch Controls

Section 3 introduced the Catch Controls input screen (Figure 4) in the example of a simple model run. Note that many of the fishery/time step cells are filled with asterisks, designating a lack of a base period harvest rate. For a variety of reasons the fishery didn't exist in that time step, or produced too low a catch for meaningful sampling and analysis. If the user now has a fishery operating in one of these cells, then the catch impacts need to be combined with adjacent FRAM fisheries or time steps. Check fishery input for all cells, as fisheries without an input will be modeled with a default fishery effort scalar of 0.0.

FRAM is capable of modeling both mark selective fisheries (MSF) and non-selective fisheries. For each fishery, the catch impact levels are calculated outside of FRAM and then input using one of three catch input types; and designated as a MSF or a non-selective (normal) fishery using the flagging shown in Table 4-1. FRAM will use these catch impact levels to calculate stock and age specific landed catch and total mortality by fishery and by time step.

Table 4-1. Catch Input Screen flags designating Selective or Non-Selective fishery modeling.

Catch Input Screen Flags to Designate Type of Fishery Regulation		
Catch Input Type	**Normal Fishery**	**Mark Selective Fishery**
	Flags	**Flags**
Effort Scalar	**0**	**7**
Quota (or expected catch)	**1**	**8**
Ceiling	**2**	**9**

Effort Scalars

Fishing rate Effort Scalar factors are multiplicative adjustments to the base period calibrated stock/fishery/time step harvest rates. By default, the scale factor for a given fishery and time step is set to 1.0, and when multiplied times the calibrated rates (as carried in the Outfile, Section 6.1), results in no net change in the stock/fishery/time step harvest rates. The user may choose to enter a fractional number (greater than or equal to zero) which is then used to adjust each of the stock specific harvest rates associated with a given fishery/time step. The numeric value of the effort scalar factor can be determined in an analysis external to the model.

An alternative method of obtaining fishing rate effort scalars is to enter the expected, or historical, landed catch for encounters when available in the catch input field (Flag 0), run the FRAM, and request a Fishery Scale Factors report (see Section 5.6). This report will provide FRAM's calculated fishing rate effort scale factor (for the specified fisheries), which is a reflection of how much fishing power will have to deviate from base period levels to achieve that input catch level, given the present set of stock

abundances. Using an effort scalar for catch input allows FRAM to calculate a catch level that is responsive to abundance changes imposed by fisheries in prior time steps. In recent years, Puget Sound coho MSFs have been modeled using a similarly derived fishery effort scale factor. The assumption is that effort will be similar to recent years, although those years were not MSF. The Effort Scalar, with Flag 7, will then produce the number of marked landed fish (by stock) given that specified effort level. FRAM will also proceed to calculate associated mortality of non-landed and released fish.

Catch Quota

Landed Catch estimate is perhaps a more straight forward method of entering catch input. Simply enter the number of fish expected to be landed (and retained). This type of input is called "Catch Quota", as used in the Section 3 example. The input value may be an actual value actively managed for, or it may be a best available estimate of expected landed catch.

Catch Ceilings

Catch Ceilings are essentially a combination of the scale factor and quota methods where the user inserts an adjustment to the fishing rates but also sets a maximum, or ceiling, on the overall catch in the fishery/time step cell. Depending on stock abundance, catch in other fisheries, etc., this will result in a fishery catch up to but not exceeding the ceiling level. In this case the scale factor drives landed catch until the ceiling value is reached. This type of catch input may be used where a fishery is being managed to not exceed a landed catch number, but is anticipated to actually catch less fish than the quota.

4.1.4 Selective Fishery Parameters

The input screen for selective fisheries parameters (Figure 5) appears after modifications are made to the FRAM Fishery Catch Controls (Figure 4). Only fisheries/time steps previously flagged with the "Selective Controls" values will appear on the Selective Fishery Parameters screen. The quota or effort scalar values from the Catch Controls screen will again appear, and they can be modified in the Selective Fishery Parameters screen as well as from the Catch Controls screen. This Selective Fishery Parameter screen is presented for the input of mortality rates and mark identification rates that in combination determine the number landed and the total mortality of marked and of unmarked FRAM stock units. The parameters are described in more detail in the FRAM Overview (MEW 2007a) and FRAM Technical (MEW 2007b) documents, and include:

1) Mortality rate on legal sized released fish;
2) Mark mis-id, or rate of release of marked fish that could legally be retained;
3) Unmarked mis-id, or rate of retention of unmarked fish that should have been released; and
4) Drop-off rate, or mortality rate of hooked fish that escape but die as the result of injury.

4.1.5 Non-Retention Mortality

Chinook or coho non-retention fisheries (CNR) also require input indicating the resulting mortality levels. The differences between the coho input screen (Figure 25) and the Chinook screen (Figure 26) reflect the different methodologies. For each species all fisheries/time steps are listed; the user simply provides input for any fishery (or portion of a fishery) that will be open to salmon fishing but requires release of coho or Chinook. Note that at present there is no attempt to model mortalities from fisheries that are not salmon directed.

Coho mortality is calculated outside of the model (based upon historical observations) and entered as total number of dead fish resulting from the non-retention portion of a fishery/time step. This value is derived from a historic level of landed coho by applying both a release mortality rate and the drop-off mortality rate to that historical level of landed fish and summing the two types of mortalities.

Chinook non-retention mortalities are FRAM estimates derived from one of three different methods (see MEW 2007a for general descriptions and MEW 2007b for algorithms), all of which calculate legal and sub-legal mortalities. These methods are based upon:

- Input levels of open versus non-retention effort within each time step (Flags '0' & '1');
- Input estimates of legal and sub-legal encounters (Flag '2'); or
- An input estimate of total encounters (Flag '3').

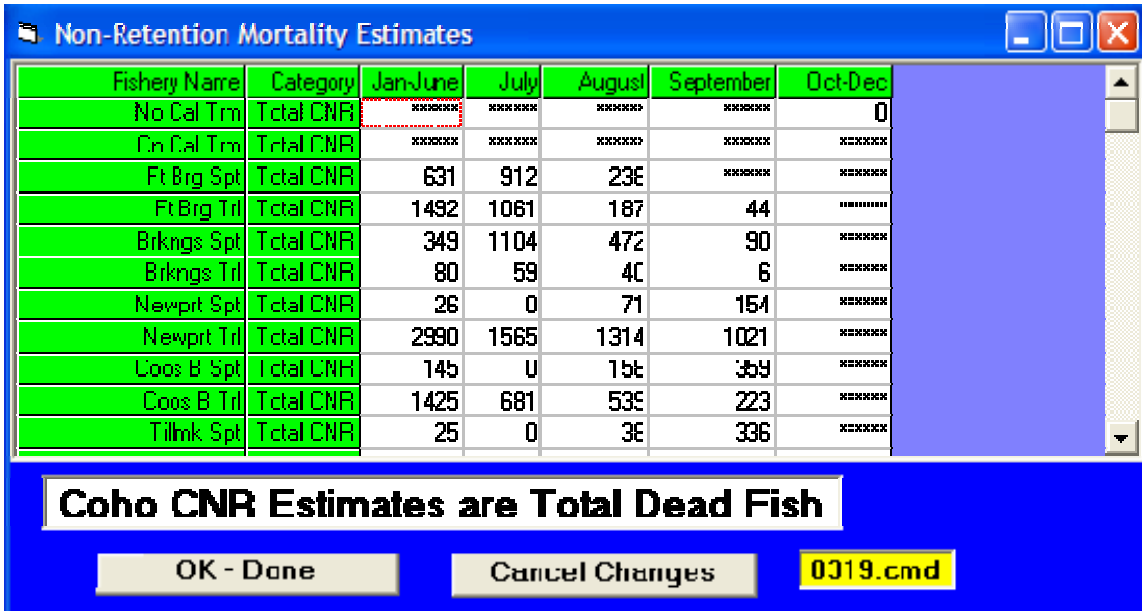


Figure 25. Coho Non-Retention Mortality Estimates screen, for input of total mortality.

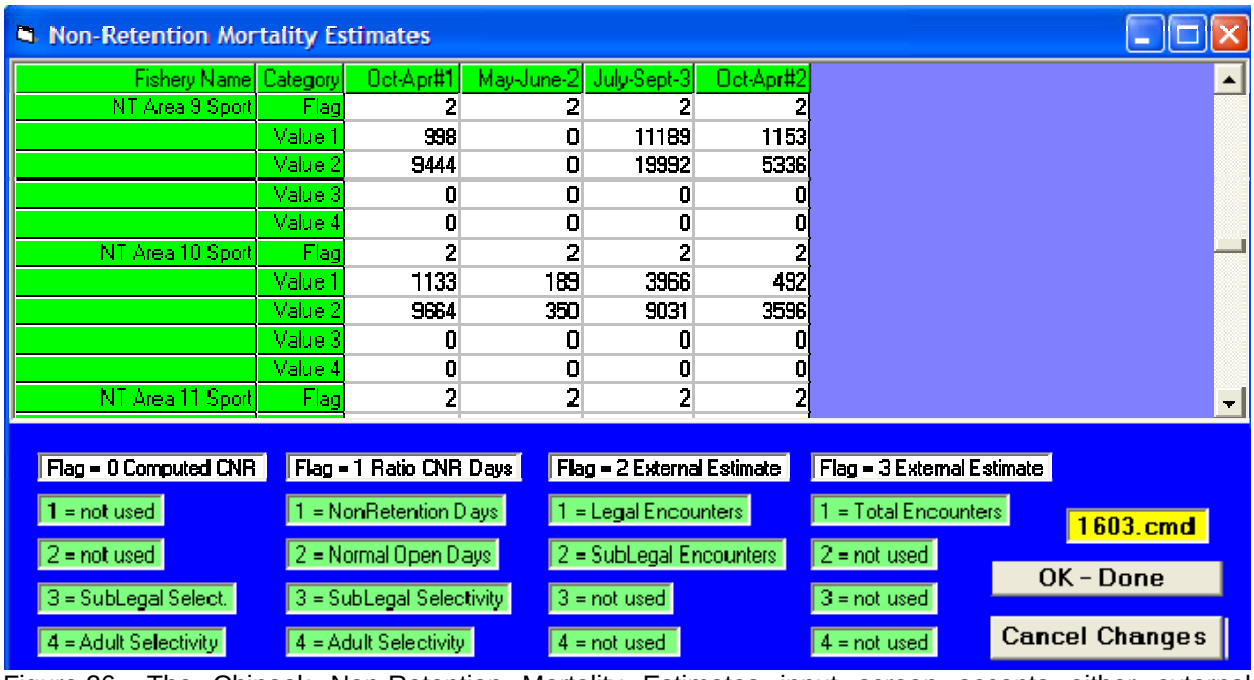


Figure 26. The Chinook Non-Retention Mortality Estimates input screen accepts either external encounter estimates or parameters for calculating encounters.

4.1.6 Command File Import Function

The function of the "Read Canada Coho Input Data" and "Read USA Coho Input Data" buttons (Figure 3) is to allow coho FRAM modelers from each nation to easily share their respective CMD Files. In one step: the recruit scalars, catch controls (including MSF parameters), and non-retention mortality estimates from both nations' stocks and fisheries can be combined into one annual CMD File. Upon selection of either "Input Data" option the standard MS Windows directory/file selection window will appear. Values from the selected CMD File will be imported into the open CMD File, which should then be renamed and saved.

4.2 PRODUCE OUTPUT – Using Previously Created Report Driver Files.

To get a FRAM generated report, Driver Files must be used. These files carry unique instructions for producing preformatted output reports. The model user can create their own Driver Files (see Section 4.3) or they can use standardized Driver Files as discussed in Section 3.4. Drivers can be re-used, moved between directories, or shared with other model users.

NOTE: Driver Files are species-specific. Also, the Driver Files carry base period parameters for number of: stocks, fisheries, time step, and ages classes; thus whenever there are such changes to a base period the Driver Files should be recreated or updated (using a text editor).

Section 3 introduced the "Produce Output" button, in the example of a simple model run, which brings up the Output Report Generation screen (Figure 11). From this screen the user must select the ****MRT file corresponding to the CMD File model run of interest. Then the user can select the report Driver File that carries the instructions to extract the desired model output. An output file name is needed for the resulting text file, which is automatically saved in either a default or user designated directory. The text file report ("prn" suffix) can be printed, edited, or converted into a spreadsheet for additional analysis or report formatting. Each "prn" report carries a header with: species, FRAM version, CMD File name, date and time created, report name, Driver File name, and the CMD File title.

4.3 OUTPUT OPTIONS – Creating Report Driver Files.

The "Output Options" button on the Main Menu will bring up the Output Options Menu (Figure 27). The "Edit OLD Driver File" button is not active in recent versions of FRAM. The "Create NEW Driver File" button brings up the Output Driver File Options screen with 17 report types. Figure 28 shows the 14 active report types currently available. Detailed descriptions of these individual report types follow in Section 5. Figure 17 previously listed these FRAM reports and showed report specific customization options.

To create a Driver File the user simply checks the report types to include (several reports can sequentially be combined into a single report Driver File), and clicks on the "OK – Save Driver File" button to bring up the Save Output Driver File screen (Figure 29). Here a Driver Filename can be assigned (or use the default name) and optional comments entered; and another screen will pop up to designate the Save As directory. Most reports (as shown in Figure 17) will first lead the user through associated report specification, or customization, screens. Many reports require the user to customize their Driver File for either type of mortality (Figure 30), fisheries to include (Figure 31), and/or stocks to include (Figure 32). Only after the required specifications are completed for the selected report will the user regain access to the main Output Driver File Options screen (Figure 28), and can then continue adding other report types to the same Driver File or else proceed to click the "OK - Save Driver File" button. Thus, a Driver File can be unique to one report (perhaps for only one stock), or a Driver File can be custom created to contain

directions to format several report types (perhaps with multiple stocks and fisheries in each report). Place no commas in Driver File comments.

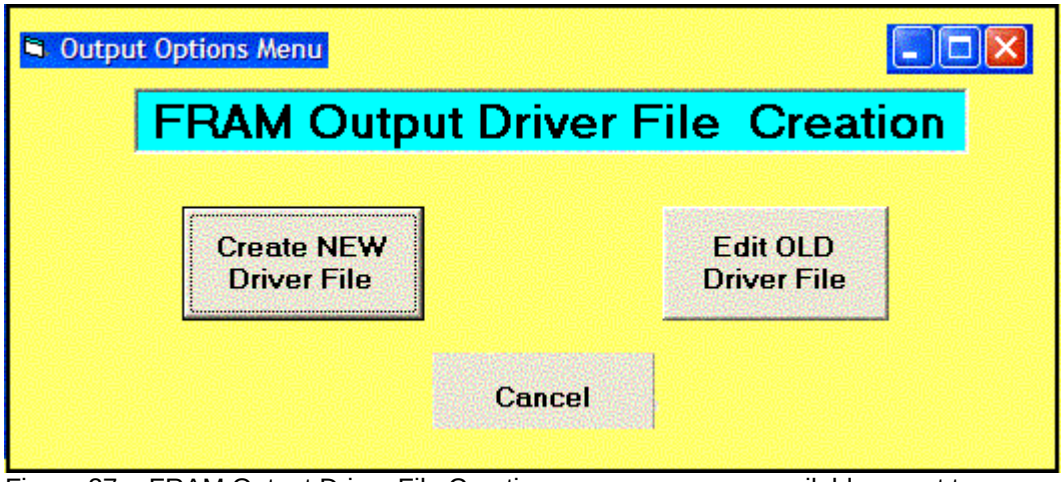


Figure 27. FRAM Output Driver File Creation screen accesses available report types.

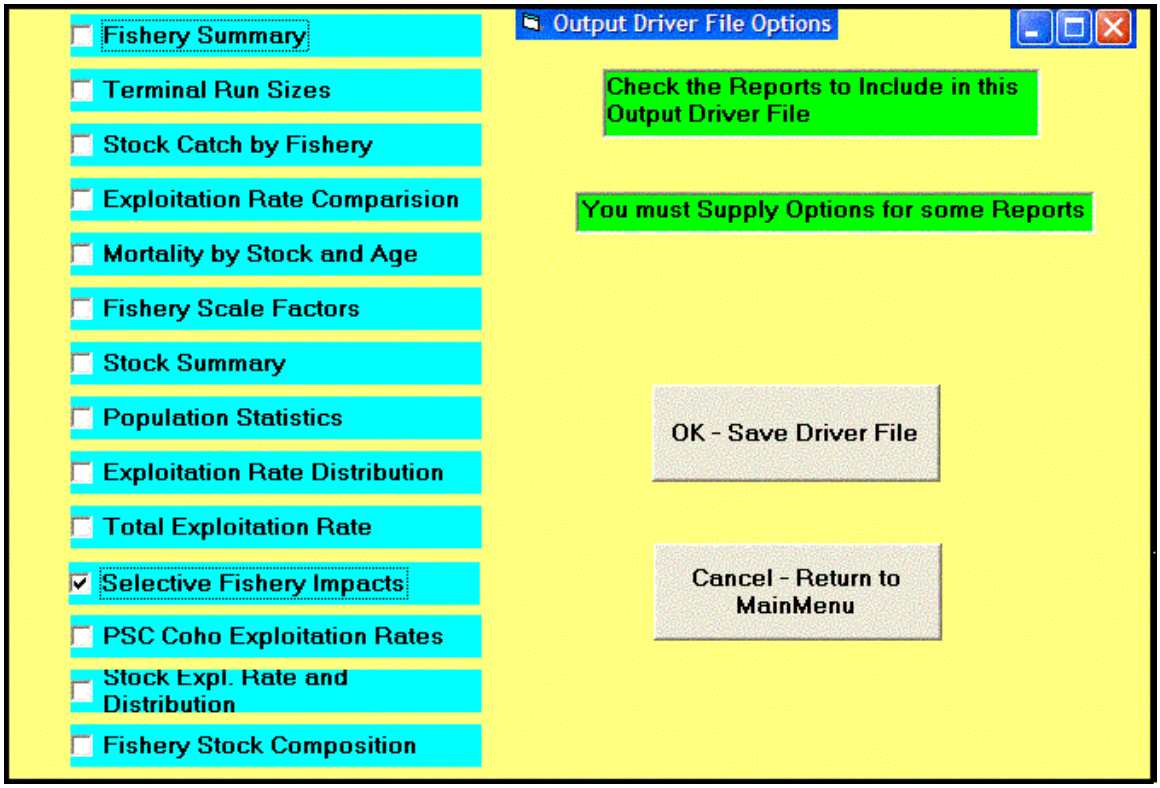


Figure 28. The Output Driver File Options screen shows reports available in FRAM v5.24.

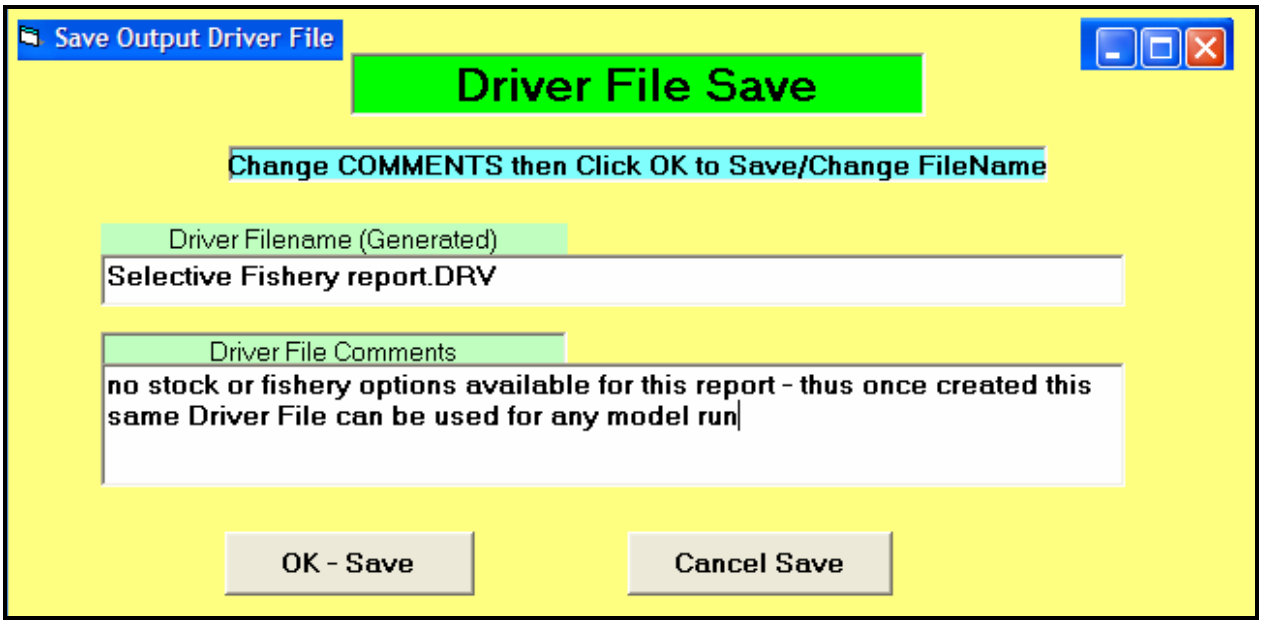


Figure 29. Save Output Driver File screen. In this Save Output Driver File screen the user can name and attach comments to user created Driver files.

5. FRAM REPORTS

The user is hereby CAUTIONED to carefully consider the focus of each report and to confirm that their interpretation of report output is correct. The various reports were created to answer specific questions, a few of which were very specific to a particular management need at one point in time. As that management need changed, or no longer relies on a particular report, the need for maintenance of the specific report decreased; under those conditions some reports have not been consistently updated to reflect changes in coho and/or Chinook base periods. Whenever there are changes to time steps, stocks, or fisheries, then the FRAM code for data manipulation must be updated. Program design of application screens and output report formats must also be updated. In some cases, rarely used reports may produce erroneous results until someone identifies the problem. In other cases you may notice something like column headings carrying the time step months from an older base period; all calculations were updated but the report format details may have been overlooked. On the other hand, those FRAM reports that are regularly used have been thoroughly scrutinized.

The FRAM user is ENCOURAGED to explore the various reports relevant to their management needs. Make use of customized reports (as produced from customized Driver Files) specific to the issues surrounding the stocks and fisheries of interest, or create your won Driver Files for the report you want to see. Then perhaps go to the next step of confirming the results in a particular report. Depending upon the report being investigated, this could be done with the appropriate combination of the many supportive data pieces, including:

- other FRAM reports;
- FRAM algorithms (MEW 2007a; 2007b);
- CMD File input data: fishery catch, stock abundance, mortality rates, etc.; and
- Outfile parameters: base period stock abundances and time step/fishery exploitation rates, fishery specific mortality rates, stock maturity rates, etc.

As an example of confirming report results, and simultaneously confirming FRAM data processing, the Population Statistics Report will be examined in Section 6.3. This report is regularly used to track

Chinook stock abundance by age through each time step. Listed as FRAM report #8 in Figure 17, the report is presented in Section 5.8

Previously, Section 4.3 referenced "Creating Report Driver Files"; now examples and descriptions of the report types will be provided. Some standard report drivers are available (see Table 2-1 for coho Driver Files), in other cases the FRAM user can design the appropriate report specific Driver File to present the information desired. The process of report specification is similar for all 14 active FRAM report types. Figure 17 shows which reports require/offer specification of either: mortality type, stock selection, fishery selection, or other report specific requirements. The specification screens can vary according to species and the focus of each report type.

Report Mortality Type. There are several types of mortality that a report may include. Specific to a report, the user may have the option of choosing: landed catch, non-retention, shaker release, AEQ total mortality, landed catch plus non-retention mortality, total mortality, escapement, and sometimes combinations of these. The example in Figure 30 shows the Report Mortality Type options for the Chinook Exploitation Rate Distribution Report, where the user can select one of three mortality calculations (or optionally combine them with escapement). Mortality Type screens for other reports may allow the user to choose from another combination of mortality types for those reports offering that specification option. The FRAM Technical Documentation Report (MEW 2007b) supplies descriptions and algorithms for calculations of these various mortality types.

FRAM Fishery Selection. For some reports the user can specify the fisheries of interest. This customization option facilitates comparisons such as regional catch allocations/impacts, user group allocations/impacts, or stock mortality distributions between fisheries. Dependent upon the report, the user may combine, or aggregate, fisheries to produce summary statistics focused on wider geographic areas, or combine gear type specific fisheries. The Fishery Selection screen shown in Figure 31 is an example from a report that allows the user to select fisheries to combine under a group name.

FRAM Stock Selection. Some reports ask for the stocks of interest for which the specified summary statistics would be calculated. A Stock Selection screen is illustrated in Figure 32 for the Exploitation Rate Distribution Report. This particular report does not offer stock grouping. However, for some reports the user can specify multiple stocks to be grouped, under an assigned name, to suit the user's purpose. For example, in those types of reports marked and unmarked stocks from the same hatchery origin can be combined, or all stocks from a given production region can be combined.

Other report specification screens. Other specification screens are only applicable to single report types, and will be described in the following report descriptions.

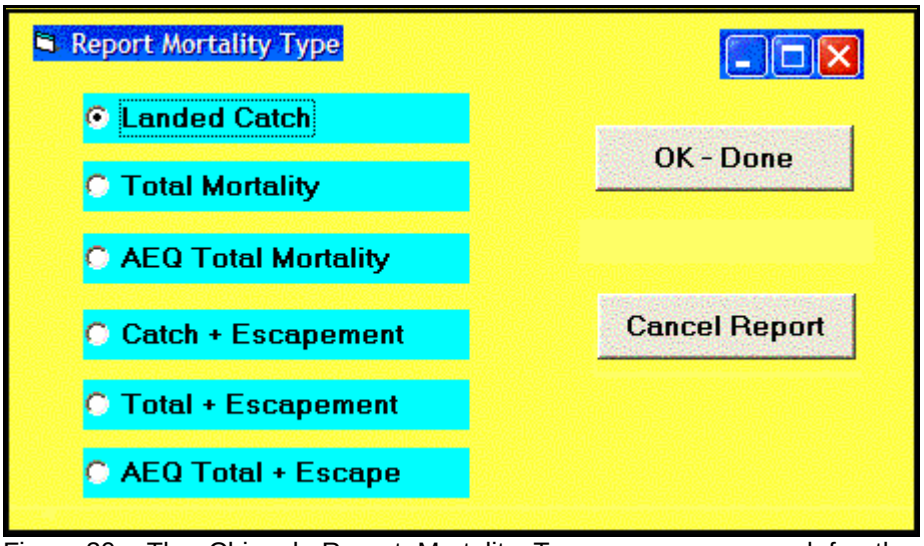


Figure 30. The Chinook Report Mortality Type screen, as used for the Chinook Exploitation Rate Distribution Report.

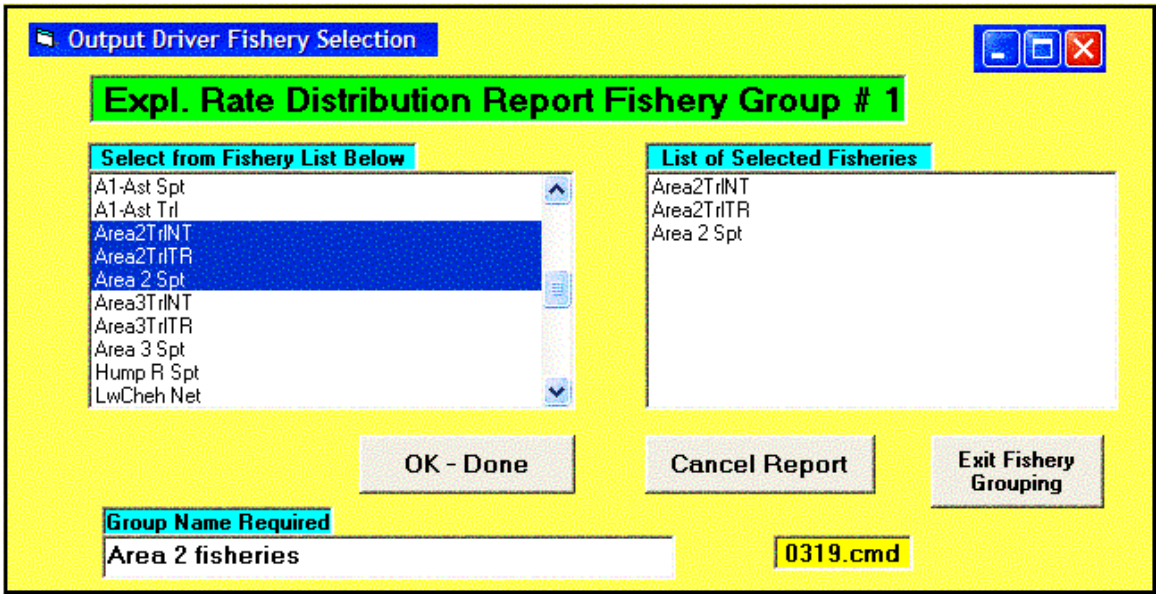


Figure 31. Output Driver Fishery Selection screen. This Output Driver Fishery Selection screen allows the user to combine the FRAM fisheries of interest for a customized report.

Figure 32 The FRAM Stock Selection screen. This screen allows the user to pick the stock(s) to include in a Driver File being created to produce a customized report.

5.1 FISHERY SUMMARY (FRAM report #1, Table 5-1)

The Fishery Summary Report presents mortality by time step for selected fisheries. One or more fisheries can be specified, and the report will present selected mortality types individually for each fishery by time step. A Chinook example is presented in Table 5-1 for the two troll fisheries in ocean Area 2; all five mortality types available for this report are presented. [Note: for Chinook this report includes the catch of non-model stocks; the contribution of model stocks to each fishery is a fixed proportion as seen in Appendix 3]. This is also the report the coho PSCFishSumAll.DRV (Table 2-1) calls up to produce the FishSumAll.prn file needed as input to the coho TAMM spreadsheet. This report is commonly used to confirm that FRAM's mortality outputs are consistent with the results expected from input catch parameters.

5.2 TERMINAL RUN SIZES (FRAM report #2, Table 5-2)

This report provides FRAM's calculated spawner escapement and terminal run size for specified stocks, or stock aggregates. The Terminal Run Size Report is another of the four reports required to populate the coho TAMM, via the customized PSCTRuns.DRV and the resulting TRuns.prn file. Regarding Chinook, the user needs to be aware of FRAM's inability to model Chinook terminal and freshwater fisheries before the user can consider any use of this report's escapement output. For both species, regarding output of the terminal run size; the user needs to understand the difference between an extreme terminal run size (ETRS) and a terminal area abundance (TAA). The ETRS value is the sum of the specified Stock(s) escapement plus the landed catch of that stock in specified terminal fisheries. The TAA type runsize would include all non-specified stocks' (local and non-local) landed catch in those specified fisheries.

Note for this report that landed catch, not total fishery mortality, is being added to escapement; thus for coho this report's terminal run size values will be less than the true terminal run size. True terminal run size would be the sum of total mortality and escapement, as is produced by adding escapement from the coho TAMM's TRunsPRN page to the stock's total mortality in local terminal fisheries, as found on the StockSumPRN page. The difference between true terminal run size and this report's terminal run size values would be any coho drop-out and drop-off mortality in terminal area fisheries.

Table 5-2 shows examples of this report for Chinook and for coho. A Chinook mature terminal run size report includes four age classes. Coho are all of a single brood year and the figures represent mature age-3 fish. The Chinook FRAM does not accept catch inputs for individual freshwater sport and commercial fisheries, so this report's Chinook escapement output cannot be reliable; however, the Chinook terminal run size at age values are useful. Coho FRAM, on the other hand, where individual freshwater fisheries are part of the FRAM fishery set, produces useful estimates of escapement, ETRS, and TAA run sizes.

As shown in Figure 17, this report is structured so terminal run size and escapement can be obtained for many stocks (or stock aggregates) within a single report Driver File. The user specifies the first set of stocks, terminal fisheries, and terminal time steps; then the report cycles back to the beginning screen for the next set of stocks, fisheries, and time steps (i.e., the 2004 PSCTRuns.DRV specified 208 stock aggregates). Note the Terminal Time Step Range option is only available for the Terminal Run Size report, where it allows the user to define which time steps are relevant to terminal returns for the specified stocks. The examples in Table 5-2 indicate that for a spring Chinook stock the terminal time steps for mature fish would be time steps 1 through 2, while for a fall coho the time steps would be 4 through 5.

5.3 STOCK CATCH BY FISHERY (FRAM report #3, Table 5-3)

This report is also used to create one of the four FRAM output reports required by the coho TAMM spreadsheet. The PSCTable2.DRV (Table 2-1) generates the form of this report needed by coho TAMM. The CRAEQcat66.DRV generates the form of this report needed for the Coweeman Chinook Index spreadsheet (see Section 8.1), although since all age classes are combined in this report it is not ideal for all Chinook uses. This report has similarities to the two previously described FRAM reports. However, in contrast to the Fishery Summary Report, these impacts by fishery and time step are stock specific. When creating a Driver File for this report, Figure 17 indicates that the user first specifies mortality type. The coho Table2.prn report only contains total mortality, but, as seen in the report example presented in Table 5-3 there are five mortality types available. Note that the mortality type choices will not necessarily be the same between coho and Chinook reports, as the AEQ adjustment is not done for coho. After selecting mortality type the user next selects the fisheries of interest, and last the stocks are selected. As in the Terminal Run Sizes Report, the menu will continue to cycle through the Stock Selection screen allowing the user to specify multiple stocks, or stock aggregates, to include in the Driver File being created.

The many potential outputs from this report can serve to illustrate one reason why the user was cautioned to confirm their interpretation of report output. The FRAM application's Window Screens and multiple output formats have not been consistently updated through the many base period and FRAM coding changes. The mortality choices shown, when creating driver files for this report, are:

- Landed Catch mortality,
- Shaker Release mortality,
- Non-Retention mortality,
- Landed Catch + NonRet mortality (mis-labeled, actually produces AEQ Total Mortality)
- Total Mortality, and
- All Mortality Reports

However, for this report, the "Landed Catch + NonRet" mortality option will produce "AEQ Total Mortality" output. This is an example of where the labeling on an application window screen was not updated when the report format changed.

Similarly, shaker release mortality is a little misleading. For Chinook the mortality on released sub-legal fish is shown/included under this label, but also included is drop-off mortality for legal sized Chinook and coho. The "Non-Retention" output includes mortality from a species non-retention regulation and also

includes the release mortality of the unmarked cohort during any MSF. The combining of a few different sources of mortality under standardized category headings may be justified in the name of economy. As the regulations modeled with FRAM increased in complexity the additional types of mortality were often logically assigned to pre-existing report output formats, rather than increasing the complexity of generating and maintaining the FRAM instructions for formatting the additional mortality outputs.

5.4 EXPLOITATION RATE COMPARISON (FRAM report #4, Table 5-4)

The Exploitation Rate Comparison Report (Chinook only) allows annual predicted stock and age specific exploitation rates (for selected fisheries) to be compared to base period impact levels. Table 5-4 shows an example of this report's output as created by the SRFI04.DRV file. Base period and predicted exploitation rates are calculated for each fishery by age class, along with their age specific ratio and combined ages ratio. For specified fishery aggregates the ratio of their cumulative exploitation rates is also calculated. These ratios are used as indexes. This report was created to obtain the ratios needed for calculation of the Snake River Falls Harvest Index as used in the "yyyy PFMC SRFI.xls" spreadsheet (see Section 8.2)

To construct a report Driver File the user will step through the menus indicated in Figure 17. First the stock(s) is selected. The next screen will be to select those fisheries which will be directly compared to the same set of base period fisheries. Included age classes are specified next. Then the user has the option to form sub-groups of fishery aggregates; for example the aggregation of the NOF and the SOF fisheries as seen in Table 5-4 (note the cumulative impact index ratios of 1.19 and 0.36, respectively). The last menu screen will request initial base period cohort abundance, by stock and selected age class, and will also request base period AEQ mortality for each selected fishery (again by age class).

5.5 MORTALITY BY STOCK AND AGE (FRAM report #5, Table 5-5)

This is another Chinook only report. The output format is: stock specific (no stock aggregate option) mortality by individual FRAM fisheries over all time steps and by age class. Table 5-5 shows an example report as generated for two selected stocks, in four selected fisheries, with the user specified AEQ Total Mortality type. The report Driver File generation menus (Figure 17) lead to a unique Report Mortality Type screen providing three choices: Landed Catch, Total Mortality, or AEQ Total Mortality.

5.6 FISHERY SCALE FACTORS (FRAM report #6, Table 5-6)

This report presents "Exploitation Rate Scale Factors" for selected fisheries, for all time steps; these essentially are fishery scale factors as calculated by FRAM. Figure 17 indicates the user will have to specify the fisheries of interest when creating the Driver File. Table 5-6 presents a Chinook report example for the selected Washington and Oregon ocean fisheries. Externally calculated fishery scale factors can be input directly to the FRAM Fishery Catch Control screen (Figure 4), but if the catch input is a "quota" number then FRAM will calculate the scale factor needed to obtain that input catch level)given the annual stock abundances and base period fixed fishery-stock-age specific exploitation rates). The FRAM Overview (MEW 2007a) and The FRAM Technical Documentation (MEW 2007b) discuss, and present the algorithms used to calculate, these fishery scale factors.

5.7 STOCK SUMMARY (FRAM report #7, Table 5-7)

This Stock Summary is the final of the four FRAM reports used to create the set of output reports required by the coho TAMM spreadsheet. The PSCStkSum.DRV file (referenced in Table 2-1) creates the StockSum.prn output file, which subsequently is imported by the coho spreadsheet. There are no user specified parameters for this report, as seen in Figure 17. The first part of the report simply provides the

annual total mortality for each FRAM stock in each FRAM fishery. The second part of the report provides for each stock the percent of its total mortality in each fishery. Note that for Chinook (Table 5-7 example) as for coho, the total mortalities in this report are not AEQ adjusted.

5.8 POPULATION STATISTICS (FRAM report #8, Table 5-8)

The Population Statistics report provides time step progression of abundances for every FRAM stock by age class. There are no user specified customizations for this report. The report statistics for Chinook stocks (as seen in Table 5-8), by time step, are:

- starting cohort by age class;
- cohort after natural mortality;
- cohort after pre-terminal fisheries;
- mature cohort (resulting from stock specific maturity at age parameters);
- "escapement" (mature cohort remaining after FRAM's set of terminal fisheries); and
- immature cohort after maturation, shown as next older age class (Time Step 4).

For coho this report is considerably shorter. All coho are the same age, so there is only one column per stock. For all stocks, maturation occurs only in the final time step, thus all fish remaining after the pre-terminal fisheries will mature. The provided time step statistics for coho stocks are:

- starting cohort;
- cohort after natural mortality;
- cohort after pre-terminal fisheries;
- mature cohort (Time Step 5 only); and
- escapement (mature cohort remaining after terminal and freshwater fisheries, i.e. spawner escapement).

The FRAM Overview (MEW 2007a) and The FRAM Technical Documentation (MEW 2007b) discuss and present the natural mortality rates (time step and age class specific), along with the algorithms used to calculate the changing cohort sizes. Chinook aging between Time Steps 3 and 4 is illustrated in Table 5-8. The Time Step 3 abundance remaining after natural mortality, pre-terminal fisheries, and maturation becomes the starting cohort size of the next older age class in Time Step 4.

5.9 EXPLOITATION RATE DISTRIBUTION (FRAM report #9, Table 5-9)

This report provides the distribution (in terms of proportions summing to 1.0) of stock specific annual mortality among the selected groups of fisheries. As shown in Figure 17, the user first picks the type of mortality, then the stocks of interest are specified. Fisheries, or fishery components of user defined aggregates, are specified one at a time via the Output Driver Fishery Selection screen (Figure 31) in which the user is required to assign a name for each fishery/aggregate. After entering a name, click the "OK Done" button to save those fisheries under the assigned name and to move on to a blank screen to specify another fishery/aggregate. After repeating these steps to create all needed fisheries/aggregates, and when again looking at the blank screen, the user must click the "Exit Fishery Groupings" button to return to the Ouput Driver File Options screen. Here you can save and then name that newly created Driver File.

The three types of mortality for this report are: landed catch, total mortality, and AEQ total morality. A total of six choices exist when each of these is combined with a category called "Escapement." For this report "escapement" is a catch-all category that adds actual escapement to any fishery related mortality not part of the specified fisheries. For example, the stock examples in Table 5-9 have mortality proportions that sum to 1.0 although the significant freshwater fisheries are not listed. Another feature of

this report, peculiar to Chinook, is that AEQ mortality types are summed over Time Steps 1, 2, and 3, while landed catch and total mortality types are summed over Time Steps 2, 3, and 4.

5.10 TOTAL EXPLOITATION RATE (FRAM report #10, Table 5-10)

For the user specified stocks and fisheries, this report (Chinook only) calculates two very different types of stock "exploitation rates," depending on which mortality type the user chooses. There are four types of mortality as options for this report:

- Landed Catch;
- Total Mortality;
- AEQ Total Morality; and
- Chinook Selected AEQ.

Choosing any of the first three mortality types will lead to a very customized calculation of "total exploitation rate" that combines the selected FRAM pre-terminal set of fisheries with in-river impacts (based upon user input of in-river age specific stock harvest rates) to sum a uniquely calculated "total exploitation rate" (Table 5-10 part I). Since the Chinook FRAM fisheries do not include specific freshwater and extreme terminal fisheries this report may have been designed to allow the user to input the stock specific impact levels for Chinook non-FRAM terminal fisheries. However, at this time the in-river calculations for this report do not appear to be functioning correctly. Also note that these exploitation rate calculations for this particular report use the stock age-2 abundance at the start of Time Step 3 as the denominator. Thus the FRAM fisheries "exploitation rate" calculated for the selected stock is not the exploitation rate we generally utilize. The value of this report may be that the age-2 abundance in Time Step 3 will function as a consistent denominator for comparisons between model runs and between years, thus the marine "exploitation rate" produced from this report has served as a relative index to compare fishery specific impacts upon a stock between years.

If the fourth type of mortality, Chinook selected AEQ, is selected then the exploitation rate will be calculated in the traditional manner using total fishery mortality (over Time Steps 2 through 4) plus escapement as the denominator. As seen in Table 5-10 part II, the stock ERs are presented for the selected fisheries by time step. Also shown is each stock's total exploitation rate, as FRAM calculates it using limited terminal fishery information.

5.11 SELECTIVE FISHERY IMPACTS (FRAM report #14, Table 5-11)

This is a detailed report of adults handled and all fishery related mortalities (by time step and age class) resulting from the implementation of MSF. All stocks and all selective fisheries are included by default. The Chinook report example in Table 5-11 has columns for:

- Unmarked Handled;
- Unmarked Catch Mortality;
- Unmarked Non-Retention Mortality;
- Unmarked Drop-off Mortality; and
- Unmarked SubLegal Mortality.

These same columns are repeated for the marked stock component. The values produced by this report can be duplicated by following the algorithms and relevant rates (mark misidentification, unmarked misidentification, release mortality, and drop-off mortality rates) presented in The FRAM Overview (MEW 2007a) and Technical Documentation (MEW 2007b). For example, Marked Handled equates to the sum of marked catch plus marked (legal size fish) released due to mark recognition error rate. As only a fraction of released fish die, the sum of adult mortality is not the same as number of fish handled.

Note that drop-off mortality fish are not handled. Sublegal mortality is presented, but is not part of the handled adult quantity.

The same report can be generated for coho, but would not have the Sublegal columns.

5.12 PSC COHO EXPLOITATION RATE (FRAM report #15, Table 5-12)

Exploitation rates of key coho stocks, in the Pacific Salmon Commission (PSC) management sphere are tracked in this report. The total allowable exploitation rate, by stock, is entered into the CMD File via the Stock Data Input Menu (Figure 20) and then the Maximum PSC Exploitation Rate screen (Figure 19); there are no other user specified parameters for this report. This report (Table 5-12) then shows the FRAM results of total ER for U. S. fisheries and the total for Canadian fisheries. The difference between the Total Allowable ER and the expected ER from the modeled suite of fisheries is shown as the remaining ER; also shown is the remaining Canadian portion based upon an assumed 50% sharing of total ER.

5.13 STOCK EXPLOITATION RATE AND DISTRIBUTION (report #16, Table 5-13)

This three part report (Table 5-13) provides focused results of how all modeled fisheries impact individual Chinook or coho stocks (or stock aggregates). All fisheries are included by default. When creating the report Driver File, the model user must specify the stocks of focus. Stock aggregation options are almost unlimited, but examples would include:

- a single stock (e.g., Baker Hatchery marked coho);
- a single hatchery (e.g., Baker Hatchery coho, marked and unmarked);
- a region (e.g., Bellingham Bay coho, select stocks #1 through #16); or
- obtain all of the above within a single report Driver File by assigning unique names to each group of stock selections.

The individual parts of this report are:

1. Percent distribution of estimated total mortality by fishery for age and time step.
2. Total mortality impacts per 1000 fish.
3. Estimated AEQ mortality by fishery for age and time step.

Part 1 of this report presents the percent distribution of stock impacts in several ways. The first presentation is how 100% of impacts distribute over all individual fishery/age/time step cells. The next presentation is how impacts distribute over fishery/age cells (all time steps combined). Continuing with distribution over age/time step cells (all fisheries combined), and then by age only. Finally the total, non AEQ, stock aggregate mortality for the season is shown

Part 2 is the often referred to “catch per 1000” report. This report shows the stock aggregate contribution (in numbers of non AEQ fish) to a hypothetical total mortality of 1,000 in each fishery/time step cell.

Part 3 first shows ERs calculated by stock aggregate AEQ mortality. Note these are exploitation rate values and not a percent of total exploitation rate. The presentation follows the format of Part 1 by commencing with values for each fishery/age/time step cell and then summing over time steps, fisheries, and ages to eventually show total stock aggregate AEQ type ER. Following this are sections for number of fish (by age and time step) escapement, AEQ mortality, and total mortality.

The coho version of this report would lack the age classes and AEQ calculations. Thus for coho in Part 1, percent distribution of ER would be based upon the same ER values shown in Part 3, in contrast to Chinook where the percent distribution is based upon total mortality while the shown ER values are based upon AEQ mortality.

Peculiar to Chinook and this report, the percent distribution of mortalities and AEQ exploitation rates are calculated over all four time steps. These time steps sum to 19 months. Generally, ER is calculated over Time Steps 2, 3, and 4 to simulate a single regulation year (12 months).

5.14 FISHERY STOCK COMPOSITION (FRAM report #17, Table 5-14)

The Fishery Stock Composition Report (Table 5-14) is a compliment to the previously described Stock ER and Distribution Report. The previous report focused on stocks, while this report focuses upon coho or Chinook fisheries, implementing a similar format. All stocks are included by default. During the creation of a report Driver File, all the fisheries of interest are specified at one time; there is no option to aggregate fisheries. The report tables are generated successively for all selected stocks.

For Chinook there are three individual parts of this report:

1. Estimated total stock mortality by fishery and age and time step.
2. Estimated total stock mortality by fishery and time step.
3. Fishery percent stock composition by individual time step.

For coho the age perspective is not relevant, so only part 2 and part 3 are produced.

Part 1 of this report first presents stock specific age mortality in each fishery/time step cell. Then time step mortalities are summed by age over all model stocks, and then summed again over all ages by time step. For Chinook, these two sets of mortality summation over all stocks are shown again but this time includes mortalities attributed to non-model stocks. Remember that FRAM Chinook stocks do not compose 100% of the catch in most of the ocean fisheries (see Appendix 4 for Chinook fisheries model-stock proportion).

Part 2 is an abridged version of part one; it excludes the age perspective. Total mortality for every stock is shown by time step for the selected individual fisheries.

For each of the selected fisheries, Part 3 presents percent stock composition for each time step and then fishery percent stock composition for the sum of catch over all time steps.

Table 5-1. Fishery Summary Report (FRAM report # 1). This example is for the two selected Chinook fisheries: Non-treaty and Treaty troll in Area 2.

Species: CHINOOK Version# 5.20 CMD File: 1603.cmd Date: 11/17/2004
Report : Fishery Summary Report DRV File: Gen Fishery Summary.DRV Time: 11:27:25 AM
Title : Final 2003 PFMC

LANDED CATCH BY FISHERY

Fishery	Oct-Apr #1	May-June	July-Sept	Oct-Apr #2	GrandTot(1-4)	SuTotal(2-4)
NT Area 2 Troll	0	15165	8969	0	24134	24134
T Area 2 Troll	0	5588	4820	0	10408	10408

SHAKER MORTALITY BY FISHERY

Fishery	Oct-Apr #1	May-June	July-Sept	Oct-Apr #2	GrandTot(1-4)	SuTotal(2-4)
NT Area 2 Troll	0	2492	4404	0	6897	6897
T Area 2 Troll	0	494	1078	0	1572	1572

CNR (NON-RETENTION) MORTALITYBY FISHERY

Fishery	Oct-Apr #1	May-June	July-Sept	Oct-Apr #2	GrandTot(1-4)	SuTotal(2-4)
NT Area 2 Troll	0	0	0	0	0	0
T Area 2 Troll	0	0	0	0	0	0

CATCH + CNR MORTALITY BY FISHERY

Fishery	Oct-Apr #1	May-June	July-Sept	Oct-Apr #2	GrandTot(1-4)	SuTotal(2-4)
NT Area 2 Troll	0	15165	8969	0	24134	24134
T Area 2 Troll	0	5588	4820	0	10408	10408

TOTAL MORTALITY (CATCH + SHAKER + CNR) MORTALITY BY FISHERY

Fishery	Oct-Apr #1	May-June	July-Sept	Oct-Apr #2	GrandTot(1-4)	SuTotal(2-4)
NT Area 2 Troll	0	17657	13373	0	31031	31031
T Area 2 Troll	0	6082	5898	0	11980	11980

Table 5-2. Terminal Run Sizes Report (FRAM report # 2). The two examples below are for 'Cowlitz Spring' Chinook and for 'Queets' coho, during user specified time steps. These examples also illustrate the difference between an Extreme Terminal Run Size (ETRS) and a Terminal Area Abundance (TAA). Including catch for only the specified stocks in the user selected "terminal" fisheries (Flag=OFF) produces a ETRS type runsize, while including catch of all stocks present (Flag=ON) will produce a TAA runsize. The user defined (at creation of Driver file) "terminal run" fisheries are listed at the bottom of this report, with selected time steps in parentheses.

Species:
CHINOOK Version# 5.20 CMD File: 1603.cmd Date: 11/17/2004
Report : Terminal Run Report DRV File: Gen Terminal Run Sizes.DRV Time: 10:22 A.M.
Title : Final 2003 PFMC

Stock	Age 2	Age 3	Age 4	Age 5	Adult Run	Total Run	Jack Esc	Adult Esc.
Cowlitz Spring	0	1926	6890	2860	11676	11676	0	7770
Cowlitz Spring plus all stocks catch	0	2206	12363	48007	53271	53271	0	7770

TERMINAL RUN FISHERIES FOR COMBINED STOCKS LISTED ABOVE

Cowlitz Spring

Flag=OFF Catch of LOCAL Stocks WITHOUT True-To-Model Adjustment for Adlt & Total Run

1- Columbia River Net{1-2} 2- Buoy 10 Sport{1-2}
3- Freshwater Sport{1-2} 4- Freshwater Net{1-2}

Cowlitz Spring plus all stocks catch

Flag=ON Catch of ALL Stocks with True-To-Model Adjustment for Adlt & Total Run

1- Columbia River Net{1-2} 2- Buoy 10 Sport{1-2}
3- Freshwater Sport{1-2} 4- Freshwater Net{1-2}

Species: NEW
COHO Version# 5.22 CMD File: 0519.cmd Date: 05/19/2005
Report : Terminal Run Report DRV File: Queets TRun ETRS & TAA.DRV Time: 14:22 P.M.
Title : PFMC3 April 5 NT 145K T 50k

Stock	Terminal Run	Escapement
All Queets stocks ETRS	29536	15210
All Queets stocks TAA	34287	15210

TERMINAL RUN FISHERIES FOR COMBINED STOCKS LISTED ABOVE

All Queets stocks ETRS

Flag=OFF Catch of LOCAL Stocks WITHOUT True-To-Model Adjustment for Adlt & Total Run

1- Queets Net{4-5} 2- Queets C&S{4-5} 3- Queets Sport {4-5}

All Queets stocks TAA

Flag=ON Catch of ALL Stocks with True-To-Model Adjustment for Adlt & Total Run

1- Queets Net{4-5} 2- Queets C&S{4-5} 3- Queets Sport {4-5}

Table 5-3. Stock Catch by Fishery Report (FRAM report # 3). This example of a Stock Catch by Fishery Report is for user selected 'White River Spring Chinook' stocks in selected Area 10 and Area 11 sport fisheries.

Species: CHINOOK Version#:5.20 CMD File: 1603.cmd Date: 11/17/2004
Report : Stock Catch Report DRV File: Gen Stock Catch by Fishery.DRV Time: 14:40:35

Title : Final 2003 PFMC
Stock : White Spr Fing + Year

LANDED CATCH BY FISHERY

	LANDED CATCH By Time Step for All Age Classes					
Fishery	Oct-Apr #1	May-June	July-Sept	Oct-Apr #2	Total	SubTotal 2-4
NT Area 10 Sport	21	0	0	16	37	16
NT Area 11 Sport	68	10	29	38	145	77

SHAKER MORTALITY BY FISHERY

	SHAKER MORTALITY By Time Step for All Age Classes					
Fishery	Oct-Apr #1	May-June	July-Sept	Oct-Apr #2	Total	SubTotal 2-4
NT Area 10 Sport	11	0	0	7	18	7
NT Area 11 Sport	39	5	18	20	81	43

NON_RETENTION MORTALITY BY FISHERY

	NON_RETENTION MORTALITY By Time Step for All Age Classes					
Fishery	Oct-Apr #1	May-June	July-Sept	Oct-Apr #2	Total	SubTotal 2-4
NT Area 10 Sport	6	0	6	3	15	8
NT Area 11 Sport	0	0	0	0	0	0

AEQ TOTAL MORTALITY BY FISHERY

	AEQ TOTAL MORTALITY By Time Step for All Age Classes					
Fishery	Oct-Apr #1	May-June	July-Sept	Oct-Apr #2	Total	SubTotal 2-4
NT Area 10 Sport	23	0	3	22	46	25
NT Area 11 Sport	65	10	29	48	146	87

TOTAL MORTALITY (CATCH+SHAKERS+CNR) BY FISHERY

	TOTAL MORTALITY (CATCH+SHAKERS+CNR) By Time Step for All Age Classes					
Fishery	Oct-Apr #1	May-June	July-Sept	Oct-Apr #2	Total	SubTotal 2-4
NT Area 10 Sport	38	0	6	26	70	32
NT Area 11 Sport	107	15	47	58	226	119

Table 5-4. Exploitation Rate Comparison Report (FRAM report # 4). This is an example of a report customized for a very specific management purpose. During the pre-season fishery planning process this report is used to generate annual PFMC relative impacts on Snake River Fall Chinook, as compared to a historical level of impacts. Then, within the annual SRFI.xls spreadsheet (Table 8-1), the NOF and SOF (1.19 and 0.36 respectively, from this 2004 output report) values are combined with Northern Fishery values from the PSC Chinook Model to derive the 'Snake River Fall' Index.

Title: NT 90K and Treaty 50K heavy to July, w half Jun open Area 11 and Area 13
Stock: U-Snake River Fall
Age%: 3,4,
Date: 04-02-2004 Time: 15:02:08
CMD File: 10m2.cmd DRV File: SRFI04.DRV

COMPARISON OF BASE AND PREDICTED EXPLOITATION RATES

	--------- Age 3 --------			-------- Age 4 -------				
Fishery	Base	Predicted	Ratio	Base	Predicted	Ratio	All Ages	Cum
NT Area 3:4:4B Troll	0.0027	0.0038	1.41	0.0159	0.0107	0.67	0.78	
T Area 3:4:4B Troll	0.0161	0.0240	1.48	0.0301	0.0268	0.89	1.09	
NT Area 3:4 Sport	0.0018	0.0024	1.29	0	0	NA	1.29	
NT Area 2 Troll	0.0018	0.0018	0.95	0.0071	0.0016	0.22	0.38	
T Area 2 Troll	0.0015	0.0010	0.64	0	0.0001	1.64	0.70	
NT Area 2 Sport	0.0112	0.0209	1.86	0.0075	0.0196	2.58	2.15	
Area 1 Troll	0.0018	0.0017	0.94	0.0008	0.0009	1.14	1.00	
Area 1 Sport	0.0018	0.0026	1.46	0.0024	0.0050	2.04	1.80	**1.19**
Central OR Troll	0.0179	0.0046	0.25	0.0257	0.0102	0.39	0.34	
Central OR Sport	0.0005	0.0005	0.90	0.0011	0.0010	0.85	0.87	
KMZ Troll	0.0004	0.0003	0.67	0.0006	0.0004	0.79	0.74	
KMZ Sport	0.0009	0.0007	0.76	0.001	0.0006	0.69	0.72	
S. Calif. Troll	0.0009	0.0004	0.45	0.0025	0.0012	0.47	0.47	
S. Calif.Sport	0.0053	0.0003	0.06	0	0	NA	0.06	**0.36**
T JDF Troll	0	0	NA	0	0	NA	NA	
NT Area 5-6 Sport	0	0	NA	0	0	NA	NA	NA
PFMC Total							0.89	
Total	0.0654	0.0655	1	0.0953	0.0787	0.82	0.89	

Table 5-5. Mortality by Stock and Age Report (FRAM report # 5). This example is for selected 'Lower Columbia River Wild' Chinook stocks in selected Oregon marine area fisheries. Note that "AEQ Total Mortality" was specified for this report. This type of mortality is used to calculate Chinook exploitation rates over Time Step 2 through Time Step 4 fisheries, thus Time Step 1 mortality is not included in this AEQ type report. If simply "Total Mortality" was requested, then Time Step 1 mortalities would be included in this report.

Species: CHINOOK Version#:5.20 CMD File: 1603.cmd Date: 11-18-2004
Report : Mortality by Age Report DRV File: Gen Mort by Stock & Age.DRV Time: 09:40:20
Title : Final 2003 PFMC

Stock : U-Lower Col River Wild

AEQ TOTAL MORTALITY BY FISHERY, TIME, AND AGE

	---- Age 2 Time Steps ----					---- Age 3 Time Steps ----					---- Age 4Time Steps ----					---- Age 5 Time Steps ----				
	1	2	3	4	Total	1	2	3	4	Total	1	2	3	4	Total	1	2	3	4	Total
Area 1 Troll	0	4	56	0	60	0	33	207	0	240	0	1	3	0	4	0	0	0	0	0
Area 1 Sport	0	0	8	0	8	0	0	55	0	55	0	4	64	0	68	0	7	0	0	7
Central OR Troll	0	3	2	0	5	0	2	2	0	4	0	135	10	0	145	0	0	0	0	0
Central OR Sport	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0

Stock : M-Lower Col River Wild

AEQ TOTAL MORTALITY BY FISHERY, TIME, AND AGE

	---- Age 2 Time Steps ----					---- Age 3 Time Steps ----					---- Age 4Time Steps ----					---- Age 5 Time Steps ----				
	1	2	3	4	Total	1	2	3	4	Total	1	2	3	4	Total	1	2	3	4	Total
Area 1 Troll	0	0	1	0	1	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0
Area 1 Sport	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0
Central OR Troll	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0
Central OR Sport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 5-6. Fishery Scale Factors Report (FRAM report # 6). This example of a Fishery Scale Factors Report is for selected Washington and Oregon marine area Chinook fisheries.

Species: CHINOOK Version#:5.20 CMD File: 1603.cmd Date: 11-18-2004
Report : Exploitation Rate Scale Report DRV File: Gen Fishery Scale Factors.DRV
Time: 16:45:52

Title : Final 2003 PFMC

EXPLOITATION RATE SCALE FACTORS BY FISHERY

	---------- Scale Factor By Time Step ---------			
Fishery	Oct-Apr #1	May-June	July-Sept	Oct-Apr #2
NT Area 3:4:4B Troll	0.0000	3.5337	0.4274	0.0000
T Area 3:4:4B Troll	0.0221	20.6619	7.4682	0.0232
NT Area 3:4 Sport	0.0000	0.7534	3.0468	0.0000
NT Area 2 Troll	0.0000	0.8984	0.3974	0.0000
T Area 2 Troll	0.0000	11.3382	6.3063	0.0000
NT Area 2 Sport	0.0000	0.0793	1.7708	0.0000
Area 1 Troll	0.0000	0.2056	4.7162	0.0000
Area 1 Sport	0.0000	0.0543	1.1845	0.0000
Central OR Troll	2.9119	1.077	0.1459	2.9119
Central OR Sport	0.0000	0.1700	0.4339	0.0000

Table 5-7. Stock Summary Report (FRAM report # 7). This is a truncated example of a Chinook Stock Summary Report, which by default is generated for all stocks over all fisheries (time steps combined). First part reports stock total mortality, and Fishery totals for modeled stocks, while the second part reports each stocks percent contribution to total fishery mortality (model plus non-model stocks). No user-specified parameters required.

Species: CHINOOK Version#:5.20 CMD File: 1603.cmd Date: 11-18-2004
Report : Stock Summary Report DRV File: Stock Summary Report.DRV Time: 16:56:45
Title : Final 2003 PFMC

Total Mortality by Fishery by Stock for Time Steps 2-4 and ALL Ages Page 7

Fishery	U-Fraser Er	M-Fraser Er	U-LwrGeo St	M-LwrGeo St	U-WhtSPYr	M-WhtSPYr	Total
SEAK Troll	11983	243	3297	137	3	0	286896
SEAK Net	229	5	350	15	0	0	4446
SEAK Sport	278	5	1353	56	0	0	31141
N/C BC Net	116	3	1422	59	0	0	9682
WCVI Net	0	0	0	0	0	0	0
GS Net	131	2	355	14	0	0	946
Canada JDF Net	5	0	2	0	0	0	441
Outside BC Sport	728	15	22033	917	0	0	59741
N/C BC Troll	2952	62	5671	234	0	0	53522
WCVI Troll	905	18	4035	168	0	0	82320
WCVI Sport	972	19	470	20	0	0	39458
----- and report continues for all Fisheries							
---------- TOTAL ---	54526	1120	67136	2796	85	0	1351885

Percent Total Mortality by Fishery by Stock for Time Steps 2-4 and ALL Ages Page 7

Fishery	U-Fraser Er	M-Fraser Er	U-LwrGeo St	M-LwrGeo St	U-WhtSPYr	M-WhtSPYr
SEAK Troll	2.00%	0.00%	0.50%	0.00%	0.00%	-----
SEAK Net	1.00%	0.00%	1.50%	0.00%	------	-----
SEAK Sport	0.20%	0.00%	1.10%	0.00%	------	-----
N/C BC Net	0.70%	0.00%	8.90%	0.30%	------	-----
WCVI Net	------	------	------	-------	------	-----
GS Net	11.50%	0.10%	31.10%	1.20%	------	-----
Canada JDF Net	1.10%	------	0.40%	-------	------	-----
Outside BC Sport	1.00%	0.00%	32.20%	1.30%	------	-----
----- and report continues for all Fisheries						

Table 5-8. Population Statistics Report (FRAM report # 8). By default this report is generated for all stocks over all ages, by time steps. This is an example of a truncated Chinook Population Statistics Report, showing report output for only two Chinook stocks. No user-specified parameters required.

Species : CHINOOK Version#:5.20 CMD File: 1603.cmd Date: 11-23-2004
Report : Population Statistics Report DRV File: pop stats.DRV Time: 17:47:15
Title : Final 2003 PFMC

POPULATION STATISTICS

	U-Nk/Sm Fall				M-Nk/Sm Fall			
Time Step 1	Age 2	Age 3	Age 4	Age 5	Age 2	Age 3	Age 4	Age 5
Starting Cohort	19342	9120	17870	4104	282444	160404	46112	106
After Nat. Mort	14357	7407	15688	3859	209658	130280	40482	100
After PreTerminal	14327	7352	15213	3782	209214	129309	39258	98
Mature Cohort	0	0	0	0	0	0	0	0
Escapement	0	0	0	0	0	0	0	0
Time Step 2	Age 2	Age 3	Age 4	Age 5	Age 2	Age 3	Age 4	Age 5
Starting Cohort	14327	7352	15213	3782	209214	129309	39258	98
After Nat. Mort	13158	6928	14658	3717	192142	121848	37825	96
After PreTerminal	13147	6872	13330	3617	191986	120860	34398	93
Mature Cohort	0	0	0	0	0	0	0	0
Escapement	0	0	0	0	0	0	0	0
Time Step 3	Age 2	Age 3	Age 4	Age 5	Age 2	Age 3	Age 4	Age 5
Starting Cohort	13147	6872	13330	3617	191986	120860	34398	93
After Nat. Mort	11571	6286	12606	3523	168967	110551	32530	91
After PreTerminal	11511	6073	11770	3251	168094	106516	29940	82
Mature Cohort	48	511	10077	3251	707	8970	25632	82
Escapement	38	170	2829	220	553	2976	7196	6
Time Step 4	Age 2	Age 3	Age 4	Age 5	Age 2	Age 3	Age 4	Age 5
Starting Cohort	19342	11463	5562	1694	282444	167387	97547	4308
After Nat. Mort	14357	9310	4882	1593	209658	135952	85636	4051
After PreTerminal	14336	9260	4746	1536	209343	135223	83244	3907
Mature Cohort	0	0	0	0	0	0	0	0
Escapement	0	0	0	0	0	0	0	0

Table 5-9. Exploitation Rate Distribution Report (FRAM report # 9). This example of the report is for four selected Chinook FRAM stocks, showing distribution of the selected type of mortality over the user specified groupings of fisheries. Notes:
The proportions are only calculated between the user defined groups of selected fisheries and will always sum to 1.0.
If the **Escapement** category is part of the selected mortality type, then any mortality not included in the specified fishery groups will be added to that **Escapement** when the proportions are calculated.

Species: CHINOOK Version#:5.2 Date: 11-29-2004
Report : Distribution Report CMD File: 1603.cmd Time: 11:44:23
Title : Final 2003 PFMC DRV File: Gen Expl Rate Dist.DRV

PROPORTION OF TOTAL MORTALITY AND ESCAPEMENT BY FISHERY

Fishery	U-MiPS FF	M-MiPS FF	U-SPSo FF	M-SPSo FF
Alaska fisheries	0.008	0.007	0.009	0.010
Canadian net	0.003	0.003	0.002	0.002
Canadian troll	0.087	0.111	0.038	0.037
Canadian sport	0.082	0.106	0.039	0.037
Washington troll	0.069	0.066	0.086	0.096
Washington coastal net	0.000	0.000	0.000	0.000
Washington ocean sport	0.002	0.003	0.003	0.003
Oregon & California ocean	0.000	0.000	0.000	0.000
Puget Sound marine sport	0.096	0.153	0.251	0.292
Puget Sound marine net	0.169	0.114	0.051	0.046
Puget Sound terminal marine sport	0.060	0.041	0.006	0.008
** Escapement **	0.425	0.395	0.517	0.470

Table 5-10. Total Exploitation Rate Report (FRAM report # 10). This Chinook only report has two options (dependent upon mortality type selected) for exploitation rate type calculations. Option 1 requires user input of stocks and fisheries, but doesn't list the selected fisheries on the report. Option 2 report generates traditional exploitation rates for every Chinook stock impacted in the user specified aggregate of fisheries.

Option 1 report:

Species: CHINOOK Version#:5.24 Date: 04-25-2006
Report : Total Exploitation Rate Report Time: 15:59:38
Title : April PFMC Option CMD File: 2405.cmd
Driver File: Rep 10 AEQ Select Snake fall Treaty troll.DRV

Stock	Marine-ER	InRiver-ER	Total-ER
U-Snake River Fall	0.018181	0	0.018181
M-Snake River Fall	0.018181	0	0.018181

Option 2 report: (truncated example)**:**

Species: CHINOOK Version#:5.24 Date: 04-24-2006
Report : Selected AEQ Expl.Rate CMD File:2405.cmd Time: 14:15:47
Title : April PFMC Option Report DRV File: Rep 10 Treaty Troll.DRV

Fisheries Selected =T Area 3:4:4B Troll, T Area 2 Troll

Stock	2=May-June	3=Jul-Sept	4=Oct-Apr	2-4 Total	Total AEQ ER
U-Nk/Sm Fall	0.015816	0.006965	0.003141	0.025922	0.793097
M-Nk/Sm Fall	0.013417	0.006851	0.004996	0.025263	0.801422
U-NF Nook Spr	0.007910	0.000729	0.002988	0.011627	0.273108
M-NF Nook Spr	0.007991	0.000953	0.004348	0.013292	0.352003
U-Stil Fall Fing	0.005272	0.002067	0.010184	0.017524	0.256626
M-Stil Fall Fing	0.001200	0.004557	0.016309	0.022067	0.345317
U-Tula Fall Fing	0.010524	0.033892	0.025904	0.070320	1.023630
M-Tula Fall Fing	0.010799	0.031535	0.024013	0.066347	1.013461
U-Mid PS Fall Fing	0.013058	0.008787	0.009476	0.031321	0.635084
M-Mid PS Fall Fing	0.011192	0.009487	0.012722	0.033401	0.643981

NOTE: All model stocks impacted in the selected fisheries are listed in this report; this example is abridged.

U-Snake River Fall	0.014104	0.024589	0.000728	0.039421	0.477344
M-Snake River Fall	0.014104	0.024589	0.000728	0.039421	0.477344

Table 5-11. Selective Fishery Report (FRAM report # 14). This is a truncated example of a Chinook Selective Fishery Report, which by default is generated for all stocks and all Mark Selective designated fisheries (by time step). Note that at the bottom of the report the impacts to all FRAM stocks are summed and shown with total fishery related mortalities (model plus non-model stocks). No user-specified parameters required.

Species: CHINOOK Version#:5.20 CMD File 1603.cmd Date: 11-29-2004
Report : Selective Fishery Report DRV File: Gen Selective Fish Impacts report.DRV Time: 10:41:47
Title : Final2003 PFMC

Fishery:NT Area 5-6 Sport TimeStep: July-Sept

Stock Name	Age	UnMark Handled	UnMark Catch	UnMark NonRete	UnMark Drop-off	UnMark SubLegl	Marked Handled	Marked Catch	Marked NonRete	Marked Drop-off	Marked SubLegl
NkSm FF	2	0	0	0	0	7	0	0	0	0	100
NkSm FF	3	18	1	2	1	1	319	300	2	16	18
NkSm FF	4	183	15	17	9	0	473	444	3	24	0
NkSm FF	5	92	7	8	5	0	2	2	0	0	0
SFNK SP	3	4	0	0	0	0	0	0	0	0	0
Skag FF	2	0	0	0	0	12	0	0	0	0	0
Skag FF	3	64	5	6	3	3	1	1	0	0	0
"	"	"	"	"	"	"	"	"	"	"	"
complete Stock list includes every FRAM Stock unit encounter during a Mark Selective Fisheries											
"	"	"	"	"	"	"	"	"	"	"	"
Fraser Lt	2	0	0	0	0	80	0	0	0	0	2
Fraser Lt	3	930	74	86	47	11	19	18	0	1	0
Fraser Lt	4	130	10	12	6	0	3	2	0	0	0
Fraser Er	2	0	0	0	0	51	0	0	0	0	1
Fraser Er	3	26	2	2	1	0	1	1	0	0	0
Fraser Er	4	787	63	72	39	0	16	15	0	1	0
LwrGeo St	2	39	3	4	2	13	2	2	0	0	1
LwrGeo St	4	99	8	9	5	0	4	4	0	0	0
FRAM Stocks		7048	564	648	352	810	2691	2529	16	135	497
All Stocks		7976	638	734	399	917	3045	2862	18	152	563

Table 5-12. PSC Coho Exploitation Rates Report (FRAM report # 15). Example of the coho specific PSC Coho Exploitation Rates Report, for stocks of interest to the Pacific Salmon Commission. No user-specified parameters required, other than Command File inputs of "PSC Maximum ER" for these stocks. The "ER Limit" column shows half the total input ER Limit, and the "Rem ER Limit" column shows the difference between the "ER Limit" and "Canadian ER".

Upper Fraser Counts
Esc- 30103 US- 3622 Can- 785

Date: 12-01-2004
Species: NEWCOHO Version#:5.20 CMD File: 0418.Cmd Time: 13:34:48
Report : PSC Coho Exploitation Rate Report DRV File: Gen PSC Coho Exploitation Rates report.DRV

Stock	U.S.ER	Canada ER	Total ER	Remain ER	ER Limit	Rem ER Limit
Skagit	0.34159	0.00843	0.35006	0.14997	0.25	0.2416
Stillaguamish	0.37930	0.01077	0.39002	0.10992	0.25	0.2392
Snohomish	0.33949	0.01078	0.35023	0.14971	0.25	0.2392
Hood Canal	0.32918	0.01796	0.34715	0.15285	0.25	0.2320
US Strait JDF	0.11606	0.01292	0.12898	0.37101	0.25	0.2371
Quillayute	0.38524	0.00898	0.39423	0.10576	0.25	0.2410
Hoh	0.45454	0.01149	0.46603	0.03396	0.25	0.2385
Queets	0.32952	0.00973	0.33925	0.16074	0.25	0.2403
Grays Harbor	0.48670	0.01146	0.49816	0.00183	0.25	0.2385
Lower Fraser	0.09261	0.03170	0.12432	0.37567	0.25	0.1574
Upper Fraser	0.10494	0.02273	0.12768	0.37231	0.25	0.1451
Georgia Mainland	0.05953	0.06030	0.11984	0.38015	0.25	0.1905
Georgia Vanc Isl	0.02228	0.05050	0.07278	0.42721	0.25	0.2277

Table 5-13. Stock Exploitation Rate and Distribution Report (FRAM report # 16).

This is a truncated example of a Chinook Stock Exploitation Rate and Distribution Report, which is generated for all user selected stocks (by Age and time step) over all fisheries and time steps. There are three parts to this report output:

- **I.** PERCENT DISTRIBUTION OF ESTIMATED TOTAL MORTALITY BY FISHERY FOR AGE AND TIME STEP
- **II.** TOTAL MORTALITY IMPACTS PER 1000 FISH (by fishery and time step)
- **III.** DISTRIBUTION OF ESTIMATED AEQ MORTALITY BY FISHERY FOR AGE AND TIME STEP; THEN ALSO (by age and time step): ESTIMATED: ESCAPEMENT, TOTAL AEQ MORTALITY, AND TOTAL MORTALITY

Note that this report calculates the percent stock impacts over all four time steps, thus at the bottom of report the percents sum to 100% over all four time steps. For most purposes exploitation rate is calculated over the fishing year, Time Step 2-4 only.

Species: CHINOOK					Date: 12-22-2004	
CMD File: 1603.cmd					Time: 10:33:14	
Title : Final 2003 PFMC						
Stocks : U-Skag Su/Fl Fing						
M-Skag Su/Fl Fing						
TOTAL MORTALITY (CATCH+SHAKER+CNR) BY FISHERY						
Distribution of Impacts (Percent) = --- Not AEQ !!!!						
Fishery	Age	Oct-April	May-June	July-Sept	Oct-April	Total
" ----- " indicates No Fishery		' ***** " indicates No Stock Impact in Fishery				
N/C BC Troll	2	0.01	0.23	0.15	0.00	0.39
	3	0.01	0.66	0.46	0.00	1.13
	4	0.00	0.57	0.05	0.00	0.62
	5	0.00	0.10	0.00	0.00	0.10
WCVI Troll	2	0.06	0.09	0.11	0.05	0.31
	3	23.32	4.83	0.93	13.22	42.30
	4	0.38	0.18	0.08	1.71	2.35
	5	0.00	0.45	0.00	0.00	0.45
WCVI Sport	2	-----	-----	0.08	-----	0.08
	3	-----	-----	2.09	-----	2.09
	4	-----	-----	0.13	-----	0.13
	5	-----	-----	0.00	-----	0.00
NOTE: All model fisheries are listed in this report; this example is abridged to save space.						
Monthly Total	2	1.17	1.05	2.45	0.83	5.51
	3	25.19	9.66	17.33	13.95	66.13
	4	0.57	3.28	6.13	2.01	12.00
	5	0.00	0.83	15.53	0.00	16.36
SumTotStkMort =	21746.62					

Table 5-13.Stock Exploitation Rate and Distribution Report continued for Part II.

Stocks : U-Skag Su/Fl Fing
M-Skag Su/Fl Fing

TOTAL MORTALITY (CATCH+SHAKER+CNR) BY FISHERY
Impacts Per 1000 Fish --- Not AEQ Values!!!!

Fishery	Oct-Apr	May-Jun	July-Sept	Oct-Apr	Total
" ----- " indicates No Fishery		' ***** " indicates No Stock Impact in Fishery			
SEAK Troll	0.58	2.56	4.73	0.61	3.51
SEAK Net	-----	55.43	11.52	-----	14.92
SEAK Sport	2.05	3.39	16.23	2.48	10.34
N/C BC Net	-----	105.88	43.88	-----	67.76
WCVI Net	-----	-----	-----	-----	-----
GS Net	16.19	-----	16.38	-----	16.21
Canada JDF Net	-----	-----	15.21	-----	15.21
Outside BC Sport	-----	31.65	23.94	-----	27.12
N/C BC Troll	9.53	9.00	9.29	7.23	9.08
WCVI Troll	159.23	46.53	11.12	94.30	86.02
WCVI Sport	-----	-----	12.68	-----	12.68
GS Troll	11.00	-----	3.04	-----	5.28
No GS Sport	2.17	1.51	1.89	6.04	1.72
So GS Sport	22.05	4.93	9.77	59.50	7.70
BC JDF Sport	15.61	6.76	5.76	34.86	6.63
NT Area 3:4:4B Troll	-----	*****	*****	-----	*****
T Area 3:4:4B Troll	*****	*****	*****	*****	*****
NT Area 3:4 Sport	-----	0.49	6.26	-----	5.80
N Wash. Coastal N	-----	-----	*****	-----	*****
NT Area 2 Troll	-----	*****	*****	-----	*****
T Area 2 Troll	-----	*****	*****	-----	*****
NT Area 2 Sport	-----	*****	*****	-----	*****

NOTE: All model fisheries are listed in this report; this example is abridged to save space.

Table 5-13. Stock Exploitation Rate and Distribution Report continued for Part III.
Note that this report calculates the AEQ total mortality exploitation rates over all four time steps. Generally exploitation rate is calculated for the fishing year which would include mortalities in Time Step 2, 3, and 4 only.

Stocks : U-Skag Su/Fl Fing
M-Skag Su/Fl Fing

ESTIMATED AEQ-TOTAL MORTALITY EXPLOITATION RATE BY FISHERY-TIME STEP
Distribution of AEQ Exploitaion Rate (Note: Actual ER not Percent of ER)

Fishery	Age	Oct-April	May-June	July-Sept	Oct-April	Total
----- No Fishery		***** No Stock Impact in Fishery				
N/C BC Troll	2	0.00	0.07	0.05	0.00	0.12
	3	0.00	0.36	0.28	0.00	0.64
	4	0.00	0.46	0.04	0.00	0.50
	5	0.00	0.09	0.00	0.00	0.10
WCVI Troll	2	0.02	0.03	0.04	0.02	0.10
	3	12.04	2.64	0.56	10.16	25.39
	4	0.29	0.14	0.07	1.56	2.06
	5	0.00	0.41	0.00	0.00	0.41
WCVI Sport	2	-----	-----	0.03	-----	0.03
	3	-----	-----	1.25	-----	1.25
	4	-----	-----	0.11	-----	0.11
	5	-----	-----	0.00	-----	0.00
NOTE: All model fisheries are listed in this report; this example is abridged to save space.						
TimeStep Total	2	0.32	0.32	0.84	0.43	1.91
	3	13.00	5.29	11.87	10.71	40.87
	4	0.44	2.62	5.73	1.83	10.61
	5	0.00	0.77	14.75	0.00	15.52
TimeStep Total	ALL	13.76	9.00	33.18	12.97	68.91
Escapement	2	0	0	641	0	635
Escapement	3	0	3	2977	0	2943
Escapement	4	0	2	2503	0	2474
Escapement	5	0	0	1079	0	1067
Total AEQ Mort	2	74	73	192	99	437
Total AEQ Mort	3	2977	1211	2717	2453	9359
Total AEQ Mort	4	100	599	1311	419	2429
Total AEQ Mort	5	0	177	3377	0	3554
Total Stk Mort	2	253	229	534	182	1198
Total Stk Mort	3	5478	2101	3768	3034	14381
Total Stk Mort	4	124	714	1334	437	2609
Total Stk Mort	5	0	181	3377	0	3559

Table 5-14. Fishery Stock Composition Report (FRAM report # 17).

This is a truncated example of a Chinook Fishery Stock Composition Report, which is generated for user selected fisheries (by time step). There are three parts to this report output:

I. ESTIMATED TOTAL MORTALITY BY STOCK AND AGE FOR FISHERY TIME STEP

II. ESTIMATED TOTAL MORTALITY BY STOCK FOR FISHERY TIME STEP

III. STOCK COMPOSITION (Percent) by TIME STEP and TOTALS Summed For ALL Ages

Note that at the bottom of report Part I and Part II the impacts to all FRAM stocks are summed and shown with total fishery related mortalities (model plus non-model stocks).

Species: CHINOOK						Date: 12-01-2004	
CMD File: 1603.cmd						Time: 13:34:48	
Title : Final 2003 PFMC							
Fishery : T Area 3:4:4B Troll							
ESTIMATED TOTAL MORTALITY BY STOCK AND AGE FOR FISHERY TIME STEP							
Model Stock Name	Age	OctApr1	May-Jun	Jul-Sep	OctApr2	Sub 2-4	Total
***** No Stock/Age Impact in Fishery							
U-SPS Fall Year	2	*****	0	0	*****	0	0
	3	0	0	0	0	0	0
	4	0	0	12	0	12	12
	5	0	0	0	0	0	0
M-SPS Fall Year	2	*****	1	4	*****	5	5
	3	0	0	2	0	2	2
	4	0	0	26	1	28	28
	5	0	0	0	0	0	0
NOTE: All model stocks impacted in the Fishery are listed in this report; this example is abridged to save space.							
Model Stock Time Step Total Age	2	28	309	2654	29	2992	3020
Model Stock Time Step Total Age	3	127	9562	14972	169	24703	24830
Model Stock Time Step Total Age	4	105	9538	5713	227	15479	15584
Model Stock Time Step Total Age	5	24	630	105	30	766	790
Model Stock Time Step Total		284	20039	23445	456	43940	44224
ALL Stock Time Step Total Age	2	37	403	3466	39	3908	3945
ALL Stock Time Step Total Age	3	166	12490	19556	221	32267	32433
ALL Stock Time Step Total Age	4	137	12459	7463	297	20218	20355
ALL Stock Time Step Total Age	5	31	823	137	40	1000	1031
ALL Stock Time Step Total		371	26174	30623	596	57393	57764

Table 5-14. Fishery Stock Composition Report continued for Part II and Part III.

Fishery : T Area 3:4:4B Troll						
ESTIMATED TOTAL MORTALITY BY STOCK FOR FISHERY TIME STEP						
Model Stock Name	OctApr1	May-Jun	Jul-Sep	OctApr2	Sub 2-4	Total
U-SPS Fall Fing	5	41	93	14	148	154
M-SPS Fall Fing	18	187	444	53	684	703
U-SPS Fall Year	0	0	13	0	13	13
M-SPS Fall Year	0	1	33	1	35	35
U- White Spr Fing	0	9	5	0	15	15
U-HC Fall Fing	14	361	696	21	1078	1091
M-HC Fall Fing	0	12	24	1	37	37
U-HC Fall Year	0	138	14	0	152	152
U-JDF Tribs. Fall	0	0	17	0	18	18
M-JDF Tribs. Fall	0	0	2	0	2	2
NOTE: All model stocks impacted in the Fishery are listed in report; this example is abridged to save space.						
Model Stock Time Step Total	284	20039	23445	456	43940	44224
ALL Stock Time Step Total	371	26174	30623	596	57393	57764
Fishery : T Area 3:4:4B Troll						
STOCK COMPOSITION (Percent) by TIME STEP and TOTALS Summed For ALL Ages						
Model Stock Name	OctApr1	May-Jun	Jul-Sep	OctApr2	Sub 2-4	Total
U-SPS Fall Fing	1.88	0.21	0.4	3.04	0.34	0.35
M-SPS Fall Fing	6.52	0.93	1.89	11.7	1.56	1.59
U-SPS Fall Year	0.05	0	0.05	0.02	0.03	0.03
M-SPS Fall Year	0.12	0	0.14	0.26	0.08	0.08
U- White Spr Fing	0.16	0.04	0.02	0.1	0.03	0.03
U-HC Fall Fing	4.9	1.8	2.97	4.62	2.45	2.47
M-HC Fall Fing	0.17	0.06	0.1	0.19	0.08	0.08
U-HC Fall Year	0	0.69	0.06	0	0.35	0.34
U-JDF Tribs. Fall	0.11	0	0.07	0.05	0.04	0.04
M-JDF Tribs. Fall	0.01	0	0.01	0	0	0
NOTE: All model stocks impacted in the fishery are listed in report; this example is abridged to save space. Within each time step column the Stock Composition Percents will sum to 100%.						

6. INTERPRETATION OF FRAM REPORT RESULTS

In theory the model user should be able to independently reproduce the model results [as seen in FRAM reports] of fishery, time step, and stock interactions. In practice this can be as easy as applying a natural mortality rate to an initial stock abundance at the beginning of a time step; here a calculator will suffice to obtain a stock's abundance that will be subject to that time step's subsequent fishery impacts. Or, it can become very challenging as model inputs of individual fishery impacts are proportioned by historical (base period) stock distribution patterns to existing stock abundance levels of legal and sub-legal sized Chinook. One option is to cross reference FRAM reports to verify the results presented in the report of interest. Another option would be the construction of a spreadsheet that duplicates the FRAM calculations of values, which fill a particular report. This would require pulling relevant base period parameters (from the Outfile), relevant input values (from the CMD File), and using the appropriate FRAM algorithms (as presented in MEW 2007b). Identifying the components (input and/or model calculated values) that are manipulated to produce a particular model report is essential to a complete understanding of that report. The extra time put into such an effort may confirm assumptions regarding a report's content, or the investigator may learn they did not fully understand that report or the process producing those results. On the other hand, such an investigation may raise additional questions of either model inputs or model manipulations that should be brought to the attention of FRAM programmers.

6.1 SPECIES-SPECIFIC BASE PERIOD OUTFILES, Structure and Content

An understanding of the content and structure of the species-specific Outfiles is needed to effectively understand the output of a FRAM report. It is the Outfile (required FRAM support file introduced in Section 2) that contains the model parameters that FRAM will use to evaluate how annual fishery levels (CMD File) impact annual stock abundances (CMD File). The development of the coho Outfile is described in MEW 2007c and MEW 2007d describes the creation of the Chinook Outfile. The file structures and representative examples of the parameters in the coho and Chinook Outfiles (as used for FRAM modeling in 2006) are presented in Table 6-1 and Tables 6-2 respectively. The species-specific Outfiles are basically structured the same, but the Chinook file is expanded with sections addressing the multiple age class complications as stocks exhibit different age specific rates for growth, maturity, and exploitation by fishery at time step. The first part of both Outfiles present values that apply for the entire model year (program parameters, initial base period cohort abundances, "other" mortality rates by fishery, adult equivalent rates, etc.). The second part of each Outfile presents time step specific parameters (natural mortality rates, stock exploitation rates by fishery, etc.). Putting the effort into studying the contents of the Outfile (we suggest the use of a good text editor) is required to evaluate the content of FRAM reports. These are large files but consistent structure and column titles facilitate user review. Note that the structure and content of each species Outfile are meant to remain fixed, only changing during model calibrations (MEW 2007c; 2007d). However, the annual model preparation team can edit an Outfile for identified "glitches."

Notes:
1) Outfiles change when the base period is re-calibrated. The annual CMD Files reference and require a specific Outfile. When running CMD Files from past seasons, the appropriate Outfile is required.
2) FRAM over-writes Time Step 4 values in Chinook Outfile with Time Step 1 values, so coded to address a problem in the Chinook calibration output structure.

Table 6-1. Coho Outfile file structure and examples of model parameters (cohoBase87917.out).

Out-File Row #	Coho Out-File Content Examples by Section
	Program Parameters Specific to Coho Base Period
1	246 Number of Model Stocks
2	198 Number of Model Fisheries
3	5 Number of Model Time Steps
4	3 Maximum Age
5	2 Maximum Age Enc. Rate Adj.
	Initial Cohort Abundances Split Between Marked and Unmarked
	Initial Abundance / Stock ID # / Age / Stock Name
7	0 Stock 1 Age 2 nkskrw UnMarked
through	15824 Stock 1 Age 3 nkskrw UnMarked
498	0 Stock 2 Age 2 nkskrw Marked
	15824 Stock 2 Age 3 nkskrw Marked
	Other Mortality (drop-out and drop-off mortality rates
	Rate / Fishery ID # / Fishery Name
500 through	0.02 Fish 50 GryHbr Net
697	0.05 Fish 51 Hump R Spt
Time Step Specific Natural Mortality and Stock/Fishery Base Exploitation Rates	
	Step 1 Natural Mortality Rates By Age (January – June)
699	0.377654 Age 2 Time 1
	0.117504 Age 3 Time 1
	Step 1 Exploitation Rates
	7260 Number of Exploitaion Rate Stock/Fishery Cells
	Stock ID # / Age / Fishery ID # / Expl. Rate / Stock Name / Fishery Name
704	165 3 3 0.0002224575 colreh UnMarked Ft Brg Spt
	166 3 3 0.0002224575 colreh Marked Ft Brg Spt
	167 3 3 0.0004206125 youngh UnMarked Ft Brg Spt
	168 3 3 0.0004206125 youngh Marked Ft Brg Spt
through	
	243 3 198 0.0017601800 siakhw UnMarked Alaska Net
	244 3 198 0.0017601800 siakhw Marked Alaska Net
	245 3 198 0.0003605600 soakhw UnMarked Alaska Net
7963	246 3 198 0.0003605600 soakhw Marked Alaska Net
7965	**Step 2 Natural Mortality Rates By Age** (July)
7970 – 17711	**Step 2 Exploitation Rates**
17713	**Step 3 Natural Mortality Rates By Age** (August)
17718 -27371	**Step 3 Exploitation Rates**
27373	**Step 4 Natural Mortality Rates By Age** (September)
27378 - 37735	**Step 4 Exploitation Rates**
37737	**Step 5 Natural Mortality Rates By Age** (October-December)
37742 - 43321	**Step 5 Exploitation Rates**

Table 6-2A. Chinook Outfile file structure and examples of model parameters (stk062sfm05encrate.out). This Outfile was used pre-season 2006.

Out-File Row #	Chinook Out-File Content Examples by Section (part 1 of 2) Sections with Annual Values
	Program Parameters Specific to Chinook Base Period
1	66 Number of Model Stocks
2	73 Number of Model Fisheries
3	4 Number of Model Time Steps
4	5 Maximum Age
5	4 Maximum Age Enc. Rate Adj.
	Adult Equivalent Rates by Stock, Age, and Time Step
	0.95705235 Stock 1 Age 5 Time 4
	1.00000000 Stock 1 Age 5 Time 3
	0.97399998 Stock 1 Age 5 Time 2
7	0.95705235 Stock 1 Age 5 Time 1
through	**0.81289758** Stock 1 Age 4 Time 4
1062	0.89213529 Stock 1 Age 4 Time 3
	0.84369233 Stock 1 Age 4 Time 2
	0.81289758 Stock 1 Age 4 Time 1
	0.54605092 Stock 1 Age 3 Time 4
	0.63352718 Stock 1 Age 3 Time 3
	0.57948733 Stock 1 Age 3 Time 2
	0.54605092 Stock 1 Age 3 Time 1
	0.29142044 Stock 1 Age 2 Time 4
	Growth Parameters
	982.100 ,LMAX Stock 1 Mat 0
	2.830 ,T0 Stock 1 Mat 0
1064	0.029 ,K Stock 1 Mat 0
through	0.110 ,CV Stock 1 Age 2 Mat 0
1991	0.120 ,CV Stock 1 Age 3 Mat 0
	0.090 ,CV Stock 1 Age 4 Mat 0
	0.090 ,CV Stock 1 Age 5 Mat 0
	1 Midpoint month of Time Step 1
	5.5 Midpoint month of Time Step 2
	8 Midpoint month of Time Step 3
	1 Midpoint month of Time Step 4
1993	Flags for inclusion of Stock in shaker computations (Stock by Fishery matrix)
through	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2065	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	Initial Cohort Abundance By Age, Split Between Marked and Unmarked
	373663.0 Stock 1 Age 2
2067	213021.5 Stock 1 Age 3
through	97914.0 Stock 1 Age 4
2330	5682.5 Stock 1 Age 5
	373663.0 Stock 2 Age 2
	213021.5 Stock 2 Age 3
2332	Recovery Adjustment Factor and Proportion of Catch Included by Model Stocks
through	0.8178 Fishery 10
2404	1 Fishery 11
	Other Mortality by Fishery
2406	0.0690 Fishery 15
through	0.0500 Fishery 18
2478	0.0300 Fishery 19

Table 6-2B. Chinook Outfile file structure: continued for time step specific sections.

Out-File Row #	Chinook Out-File Content Examples by Section (part 2 of 2) Sections with Time Step Values
2480 through 2483	Step 1 Natural Mortality By Age 0.2577 Age 2 0.1878 Age 3 0.1221 Age 4 0.0596 Age 5
2485 through 2557	Step 1 Shaker Mortality By Age 0.255 Fishery 1 0.300 Fishery 2 0.123 Fishery 3
2559 through 2631	Step 1 Encounter Rate Adjustment Factors By Age 1 1 1 Fishery 1 1 1 1 Fishery 2
2633 through 2705	Step 1 Terminal Fishery Flags (0=Preterminal; 1=Terminal) 0 Fishery 27 1 Fishery 28 0 Fishery 29
2707 2709 through 2720	Step 1 Natural Mortality By Age 12 Number of Maturity Rates in Time Step Stock Age Mat.Rate 49 3 0.0794963 49 4 0.5008179 49 5 1.0000000
2722 2724 through 6727	Step 1 Fishery Exploitation Rates By Stock and Age 4004 Number of Exploitation Rates in Time Step Stock Age Fishery Expl.Rate Shaker 1 2 53 0.00000000 0.00445400 1 3 53 0.00554457 0.00445452 1 4 53 0.00496450 0.00445392 1 5 53 0.00322917 0.00000000
6729 --- 6734 --- 6708 --- 6882 --- 6956 --- 6977 ---	Step 2 Natural Mortality By Age Step 2 Shaker Mortality By Age Step 2 Encounter Rate Adjustment Factors Step 2 Terminal Fishery Flags (0=Preterminal; 1=Terminal) Step 2 Maturity Rates in Time Step and Rates By Age Step 2 Fishery Exploitation Rates in Time Step By Stock and Age
11350 --- 11355 --- 11429 --- 11503 --- 11577 --- 11832 ---	Step 3 Natural Mortality By Age Step 3 Shaker Mortality By Age Step 3 Encounter Rate Adjustment Factors Step 3 Terminal Fishery Flags (0=Preterminal; 1=Terminal) Step 3 Maturity Rates in Time Step and Rates By Age Step 3 Fishery Exploitation Rates in Time Step By Stock and Age
18271 --- 18276 --- 18350 --- 18424 --- 18498 --- 18513 ---	Step 4 Natural Mortality By Age Step 4 Shaker Mortality By Age Step 4 Encounter Rate Adjustment Factors Step 4 Terminal Fishery Flags (0=Preterminal; 1=Terminal) Step 4 Maturity Rates in Time Step and Rates By Age Step 4 Fishery Exploitation Rates in Time Step By Stock and Age

6.2 SPECIES-SPECIFIC COMMAND FILES, Structure and Content

CMD Files were introduced in Section 2 as required for FRAM modeling. It is the content of individual CMD Files that are being modeled. Thus, in contrast to the constant Outfiles, the content of CMD Files will change annually (stock recruit scalars) and with every model run (fishery parameter inputs). Table 6.3 (coho example) and Table 6.4 (Chinook example) present the structure and representative content of the individual species CMD Files. The basic structure remains constant, but the overall size of the files (and the row numbers) will change in response to the user input. For example, the more CNR fisheries are input, the larger the files get, and text file row numbers will shift correspondingly.

Section 4 described the FRAM user interface screens. Section 4.1 focused upon screens for input to CMD Files; descriptions of these input parameters were provided as the data input screens were presented. Figure 16 presented the "tree structure" which a model user would move through when accessing the screens to input data for a model run. Those inputs will reside in the following sections of a CMD File (same structure for coho and Chinook):

- Model Run Description (rows 1-10);
- Stock Recruit Scale Factors;
- Minimum Size Limits, by fishery (Time Step specific values);
- Quotas and Scale Factor, by fishery (Time Step specific values);
- CNR Data, by fishery (Time Step specific values);
- Stock Specific Expoitation Rate Scalars, by fishery (Time Step specific values), and;
- In addition Coho CMD Files have a section for PSC maximum ER values.

The CMD File text files are not designed for easy reading, as illustrated with the "Quota and Scale Factors" input presented in Tables 6.3 and 6.4. It is suggested the model user use FRAM's input screens (Section 4.1) to review/obtain parameters entered for any particular model run.

Table 6-3. Structure of a coho Command File (0619.cmd). This example CMD File provided input parameters for coho modeling in 2006.

Row #	**Coho Command File, example input values and file structure** (from '0619.cmd')
1	NEWCOHO , **Species**
2	PFMC 2 Final Run 80K NT 37.5K TT 3K 4B & 20K SOF **Title**
3	4 **Number Lines of Comments**
4-7	PFMC 2 FINAL RUN April 6. NT coho TAC 80K with 6K trade. TT TAC 37.5K. 4B add-on 3K. SOF 20K sel. with troll from Newport north, Buoy 10 8.3K selective. 2006 Canadian abundances AND Fishery scalars from post 2005 Canadian catch.
8	CohoBase87917.Out **Name of Calibration File**
9	0619 **Prefix for Save Files**
10	1 **Number of Years**
11 through 503	**Stock Recruit Scale Factors** 0.0000 UnMarked Kendall Creek Hatchery,U-kendlh 0.0278 Age 3 0.0000 Marked Kendall Creek Hatchery,M-kendlh 0.1385 Age 3
504 through 702	**Time: 1** **Minimum Size Limits** (section repeated for Time Steps 2-5) 10 Ft Brg Spt 10 Ft Brg Trl
703 through 1099	**Time: 1** **Quotas and Scale Factors** (section repeated for Time Steps 2-5) 9 15, Brkngs Spt 1 133.0 0 0.1400 0.0600 0.0200 0.0500, Selective 1 136 , Ar 13 Spt 379.0, Quota 0 189 , BC JDF Spt 0.12290, Scale Factor 9 190, WC VI Spt 0 3.0543 0 0.0500 0.0300 0.0600 0.0500, Selective
1100 through 1257	**Time: 1** **CNR Data** (section repeated for Time Steps 2-5) 26 Number of CNR Fisheries 3, Ft Brg Spt 4, Flag for Type of Input 492, Field #1 0, Field #2 0, Field #3 0, Field #4
1258 1259	**Time: 1** **Stock Specific Exploitation Rate Scalars** (section repeated for Time Steps 2-5) 0 Number of Stock Specific Fishery Scale Factors
1260 through 4013	**Repeat above Time Step 1 inputs for Time Steps 2 through 5**
4014 through 4027	**PSC Maximum ER Values** (input for 13 pre-established Stocks) 0.4321 Lower Fraser 0.5432 Upper Fraser

Table 6-4. Structure of a Chinook Command File (3006.cmd). This CMD File was used in 2006 for preseason modeling, representative input parameters are shown.

Row #	**Chinook Command File, example input values and file structure** (from '3006.cmd')
1	CHINOOK **Species**
2	Final April PFMC Apr 7 am; NT 65K; T 42.2K **Title**
3	4 **Number of Lines of Comments**
4-7	Central O R troll at 2.3 ER scalar per Cowlitz CWT NOF:SOF troll profile.Actual t reaty troll TS1; fixed area 10 by reinserting 2004 A 10 adjustment; revised KOHM and redistributed NT NOF; 600 addition T
8	stk062sfm05encrate.out **Name of Calibration File**
9	3006 **Prefix for Save Files**
10	1 **Number of Years**
11 through 275	**Stock Recruit Scale Factors** 0.0261 U-Nk/Sm Fall,U-NkSm FF 0.0400 Age 3 0.0171 Age 4 0.0189 Age 5 0.3039 M-Nk/Sm Fall,M-NkSm FF 0.2843 Age 3 0.2439 Age 4 0.2699 Age 5
276 through 349	**Time: 1** **Minimum Size Limits** (section repeated for Time Steps 2-4) 670 SEAK Troll 100 SEAK Net
350 through 496	**Time: 1** **Quotas and Scale Factors** (section repeated for Time Steps 2-4) 0 1 , SEAK Troll 0.47900, Scale Factor 1 15 , BC JDF Sport 3986.0, Quota 9 45 , NT Area 8-1 Sport 0 2.7737 0 0.1000 0.0600 0.0800 0.0500,Selective
497 through 546	**Time: 1** **CNR Data** (section repeated for Time Steps 2-4) 8 Number of CNR Fisheries 36, NT Area 7 Sport 2, Flag for Type of Input 178, Field #1 1403, Field #2 0, Field #3 0, Field #4
547 through 556	**Time: 1** **Stock Specific Exploitation Rate Scalars** (section repeated for Time Steps 2-4) 8 Number of Stock Specific Fishery Scale Factors 39 30 0.735000 Scale Factor 40 30 0.735000 Scale Factor 53 30 0.483000 Scale Factor 54 30 0.483000 Scale Factor
1260 through 4013	**Repeat above Time Step 1 inputs for Time Steps 2 through 4**

6.3 DISSECTION OF A FRAM REPORT, Example of FRAM Report #8

The Chinook Population Statistics Report was chosen for this example because it reflects all the core FRAM processes on an individual stock abundance (at age) through all time steps. The model user can strengthen their understanding of model processes while confirming the results in this report.

The report statistics for Chinook stocks (as seen in Table 5-8), by time step, are:

- starting cohort by age class;
- cohort after natural mortality;
- cohort after pre-terminal fisheries;
- mature cohort (resulting from stock specific maturity at age parameters);
- escapement (mature cohort remaining after terminal and freshwater fisheries), and;
- immature cohort after maturation, shown in next time step.

Most values seen in this report can be duplicated by using abundance scalars and various rates from the appropriate CMD File and Outfile. The exception would be stock age specific total fishery mortality by time step. These values will have to be taken from another FRAM report. Table 6-5 lays out the operations which will duplicate a set of results from the "Pop Stat" report.

It is up to the reader to complete this exercise. The numbers in the example were created at a past point in time with the stock abundances and fishery inputs that existed then. The old CMD file and Outfile are still available, but dated. Even the version of the FRAM program has changed since the values reported in this User Manual were put into a draft document. As an exercise, it is suggested that the model user make an up-to-date Chinook model run (Section 3.2), create a FRAM report driver file (Section 4.3) for the Population Statistics Report. Then use that driver file to produce the output report (Section 4.2). Then open that Chinook Pop Stat "prn" file as either a text file or from within Excel using Excel's import file features. Pick a set of abundance values for a stock at age, over all four time steps (as seen in Table 5-8), and use the operations outlined in Table 6-5 to duplicate the values seen in the report generated. It is essential that the same Outfile that was used during the model run be again referenced for base period values (Time Step 1 base period abundance, time step and age specific natural mortality rates, time step stock at age maturation rates); and that the same CMD file be referenced for annual values (recruit scalar for stock at age). Reference Table 6-2 for the location of values you need from the Chinook Outfile. This exercise is dependent upon another FRAM report to confirm total time step fishery related mortalities for the stock and age of interest. To complete this exercise the user must also create a driver file for FRAM Report #5 (Mortality by Stock and Age, choosing the Total Mortality option when creating the driver file and, when prompted, specifying the stock of focus and then selecting All Fisheries). Continue by using that stock specific Report #5 driver file to generate the report, and then open it in Excel to sum all the individual fishery mortalities for the stock and age you have chosen to confirm. Subtract those time step total mortalities (keeping pre-terminal, and terminal fishery totals separate) from the cohort after natural mortality or from the mature cohort, as indicated in Table 6-5.

The above instructions for this exercise may seem complicated, but once the model user grasps the flow of information through the model processes, and becomes comfortable generating FRAM reports, this exercise will become straightforward.

Table 6-5. Example of dissecting and duplicating the results of a FRAM report. The values in this table are from the Chinook Population Statistics Report (see Table 5-8), the 2003 abundances of Unmarked Nooksack/Samish Fall Chinook at age-3. Abridged notation indicates the operation a model user could use to confirm or duplicate the values in the much used "Pop Stat" report.

Example from a Chinook POPULATION STATISTICS Report (FRAM Report #8)

Time Step 1	**Term**	**Age 3**	**Operation to duplicate reported results**
Starting Cohort	**"A"**	9120	B.P. Stock Age abundance (Outfile) **x** Stock Age recruit scalar (Cmd file)
After Nat. Mor.	**"B"**	7407	**A –** (**A x** Natural mortality rate (at Age and Time Step from Outfile))
After PreTermnl.	**"C"**	7352	**B –** Stock Age morts in preterminal Fisheries (summed from Report #5)
Mature Cohort		0	No maturation for this Stock in this Time Step
Escapement		0	No maturation so no escapement
=========	===	=====	
Time Step 2	**Term**	**Age 3**	**Operation to duplicate reported results**
Starting Cohort	**"D"**	7352	**C**; Cohort remaining after Fisheries and maturation in previous Time Step
After Nat. Mor.	**"E"**	6928	**D –** (**D x** Natural mortality rate (at Age and Time Step from Outfile))
After PreTermnl.	**"F"**	6872	**E** – Stock Age morts in preterminal Fisheries (summed from Report #5)
Mature Cohort		0	No Time Step maturation for this Stock
Escapement		0	No Stock maturation so no escapement
==========	===	=====	
Time Step 3	**Term**	**Age 3**	**Operation to duplicate reported results**
Starting Cohort	**"G"**	6872	**F**; Cohort remaining after Fisheries and maturation in previous Time Step
After Nat. Mor.	**"H"**	6286	**G** – (**G x** Natural mortality rate (at Age and Time Step from Outfile))
After PreTermnl.	**"I"**	6073	**H** – Stock Age morts in preterminal Fisheries (summed from Report #5)
Mature Cohort	**"J"**	511	**I x** Stock Age maturation rate (Outfile)
Escapement	**"K"**	170	**J** – Stock mortality in terminal Fisheries (summed from Report #5)
==========	===	=====	====
Time Step 4	**Term**		**Age 4** **Operation to duplicate reported results**
Starting Cohort	**"L"**	Cohorts advance to next age in Time Step 4	5562 **I** – **J**; Cohort after Fisheries and maturation in previous T.S.
After Nat. Mor.	**"M"**		4882 **L** – (**L x** Natural mortality rate (at Age and T.S. from Outfile))
After PreTermnl.	**"N"**		4746 **M** – Stock Age morts in preterminal Fisheries (sum from Rep. #5)
Mature Cohort	**"O"**		0 No maturation for this Stock in this Time Step
Escapement	**"P"**		0 No maturation so no escapement

7. PUGET SOUND TERMINAL AREA MANAGEMENT MODULES (TAMMS)

Two species-specific Excel spreadsheet programs exist to augment the modeling and/or reporting of fishery mortalities impacting coho and Puget Sound Chinook stocks. As spreadsheets, the TAMMs offer the user transparency and flexibility. Calculations and reports can easily be customized to reflect changing management needs. Other MEW documents should be referred to for general background (MEW 2007a) or for a technical perspective (MEW 2007b) of FRAM/TAMM iterative modeling of terminal area harvest rates. This Users Manual focuses on the mechanics of data flow between the FRAM model and TAMM spreadsheets, the fishery modeling within TAMMs, and also presents the standard North of Falcon TAMM style reports.

The TAMMs have supported the management of regional Puget Sound stocks and fisheries at a finer resolution than possible with FRAM stock and fishery units. Regional areas of Puget Sound each have their own page in the TAMMs and have used the spreadsheet to model and produce reports that reflect regional management perspectives. Table 7-1 presents these regions, which each have many stocks and fisheries that are sub-units of FRAM stocks. FRAM coho stock units and coho fisheries have, relatively recently, been made consistent with TAMM units. However, Chinook FRAM stocks and fisheries often are aggregations of the terminal TAMM stock and fishery units (see Appendix 6 and Appendix 7 respectively) Puget Sound fishery managers focus upon. This basic difference has contributed to the divergence in how the two TAMMs perform the basic TAMM type functions. Those functions are:

- provide Puget Sound fishery input to FRAM;
- receive FRAM output;
- perform terminal fishery modeling, and;
- produce output reports used by fishery managers.

Table 7-1. Puget Sound Terminal Management Regions.

Nooksack-Samish	Skagit
Stillaguamish-Snohomish	South Sound
Hood Canal	Strait of Juan de Fuca

These TAMM spreadsheets contain a lot of historical information, including outdated tables. Over the years not only have the units of fisheries, stocks, and time steps changed, but so have management perspectives. For example, at one time a major driving force in fisheries structuring for some Puget Sound regions was treaty/non-treaty harvest sharing (or allocation). That perspective has diminished from consideration in recent years, yet the allocation type tables are found as part of every regional spreadsheet page. The maintenance and updating of allocation tables (as stocks, fisheries, time steps, and other inputs have changed) varies widely by regional TAMM page, dependent upon regional management needs and perspectives over time. As another example, new updated spreadsheet pages have been incorporated while the old page remains unused in the spreadsheet. There has been an on-going debate regarding “clean-up” of these spreadsheets. The prevailing viewpoint has been to use these spreadsheets to carry historical approaches (in case they are needed again) and thus leave the old tables in the spreadsheets and add new, or updated, tables as needed. The novice will not know which pages, tables (and macros) are maintained, or even necessary to maintain, as model base period parameters change. For most people, the obtaining of the standard TAMM reports (via spreadsheet print macros) may suffice. For others, within the spreadsheets it is possible to track how active TAMM inputs and FRAM outputs are combined to generate the reports in use today (see Section 7.4).

7.1 TAMM USER INPUTS, TYPES AND MECHANICS

At this time coho TAMM inputs are limited to fishery levels, while Chinook TAMM inputs also include pre-season forecast abundance levels of Puget Sound stocks and their mark rates. Many user fishery inputs to the TAMMs subsequently are provided as TAMM inputs to FRAM.

7.1.1 Coho TAMM Inputs

Annual harvest levels (net and sport fisheries) are entered into the "Input_Harvestnew" page of the spreadsheet. As seen in the spreadsheet, these fishery inputs can be in terms of: catch, fishery scalars, TAA harvest rates, or ETRS harvest rates. The "TAMI" page references these inputs to format a TAMI report that will be provided to FRAM via a Macro called up by FRAM during a model run (see Section 3.1.3).

The TAMI page (Table 7-2) lists all Puget Sound coho fisheries (by FRAM number and name) and potentially contains fishery inputs for both September (4) and October-December (5) time steps. Note that some fishery/time step cells are blocked out on the TAMI page. These cells have no base period fishery support data, i.e., cannot be modeled. Other cells carry a value of "-99"; this is a flag telling FRAM to use direct FRAM input to model that fishery. The "-99" flag is generally seen with Puget Sound marine sport fisheries. If the fishery is not flagged with a "-99," then FRAM will use the value from the spreadsheet (blank = 0) even though the active CMD File has other catch input for that fishery. Whether to provide fishery "catch" or "scalar" input via the TAMM or the FRAM route is a matter of user convenience or habit; however, harvest rate fishery input can only be provided via the TAMM route. Remember, input must be flagged as to type (Table 7-2).

When fishery managers provide harvest rate input for modeling, they also must provide a fishery specific definition of how they calculated that rate, so that FRAM will apply it correctly. The definitions are numbered and the ID number is entered in the TAMI page, where it is seen associated with the fishery in Table 7-2, "Abundance Definitions" columns. These definitions tell FRAM what stock escapements and fishery catches were in the denominator when fishery and time step specific harvest rates were calculated. The definitions are compiled by a model preparation team and provided to FRAM (Section 2.4.1) via the "TAAETRSnum.txt" file (Appendix 5). The first value in a row is the definition number; next is the number of stocks followed by that many FRAM stock ID numbers (Appendix Table 1); then the number of fisheries in the calculation is given followed by FRAM's fishery ID numbers (Appendix Table 3). The definition is specified for use in both Time Steps 4 and 5; followed by flags signaling FRAM to carry out TAA ("01") or ETRS ("00") type calculations. Finally, a comment field identifies the fishery by name.

The TAA rates differ from ETRS rates in that the TAA rates are calculated with total catch while the ETRS rates only include catch of local stocks. Section 7, "Terminal Area Management Module (TAMM)" in the FRAM Technical Documentation (MEW 2007b), has additional details on how FRAM iteratively models the interactions of simultaneous terminal area fisheries that are targeting local stocks while having various levels of impact upon non-local stocks.

7.1.2 Chinook TAMM Inputs

There are more user inputs to the Chinook TAMM than for coho TAMM. In addition to fishery levels, the terminal run size forecasts for Puget Sound stocks (Appendix 6) and their adipose clip mark rates are required. Again, this is because Chinook TAMM will model interactions of stock and fishery units that are sub-sets of FRAM units.

User Puget Sound inputs to Chinook TAMM are made on several pages:

- INPUT _StockData page – for pre-season terminal run size forecasts;
- INPUT_MkRt page – for stock ad-clip mark rates;
- INPUT_Harvest page – for terminal net fishery impacts (TAA only);
- INPUT_ETSport page - for terminal sport fishery impacts, and;
- JDF Regional page - for Juan de Fuca terminal net and sport fishery inputs.

TAMM inputs for terminal net fishery impacts may be in terms of expected catch, direction to calculate treaty/non-treaty shares, or harvest rates. In contrast to coho, harvest rates that will be sent to FRAM are only of the TAA type; however, ETRS rates can be used internally by the TAMM. A scrutiny of the "INPUT_ Harvest" page is recommended; note that specific fisheries require unique types of input. For example, for some fisheries a total impact level is proportioned over time steps, while other marine area fisheries have a catch number entered by time step. These inputs are used by the TAMM and also are passed to FRAM via the TAMI Page. The TAMI Page flags the type of input (rates versus target catch) for FRAM. Regardless of how the net inputs are provided, before the TAMI Page passes those inputs to FRAM, the Regional Pages will reconfigure those inputs into rates or targets to be consistent with the TAMI page flagging as to the type of input.

In the recent past, for some Puget Sound Regions, an input of "1" would tell FRAM to calculate harvestable shares. This is no longer in practice. The model user is warned not to use "1" as a catch input.

There are several functional Puget Sound net fishery/time step cells in the Chinook base period that do not have active net fisheries. In some cases these cells are being used to model a sport terminal area fishery (TAF) which is targeting mature returning Chinook. Specifically, FRAM Fishery 51 (NT Tulalip Bay Net Area 8D), Fishery 60 (NT Area 10A Net), and Fishery 62 (NT Area 10E Net) have been provided input (via the TAMM) for anticipated sport catch in those sub-areas of the larger FRAM sport fishery areas. The assumption is that these TAF sport and net fisheries would be targeting a mature population with the same stock composition. This requires changing the fishery specific "other mortality rate" (5% for sport versus 2% for net) in the Chinook Outfile (Table 6-2A; see section for rows 2406 through 2478). Note that all Puget Sound marine area net fisheries in the July-September time step are executed upon the mature terminal run size, while May-June and October-April fisheries act upon the immature ocean abundance.

All freshwater fisheries (net and sport) act upon the mature run size. As mark selective sport fisheries are implemented in various rivers, or sections of a river (perhaps for only a period of time versus the whole season), there have been unique approaches to modeling these in the Chinook TAMM. As seen in the "INPUT_ETSport" page, these inputs generally focus on estimates of encounters and mortality rates. In some cases the encounters input may be by marked and unmarked fish, or in other cases for total Chinook with a link to mark rates. The nature of the available data, along with the temporal and geographic boundaries of the MSF, will dictate the specifics of the TAMM input for TAMM modeling; however in all cases freshwater sport catch is a parameter that will be sent to FRAM (via TAMI) for adjustment of terminal run size.

The TAMM will aggregate Puget Sound fishery impacts into FRAM fishery units (Appendix Table 7) and time steps. The results are sent to the TAMI page of the spreadsheet, as seen in Table 7-3.

Table 7-2. Representative section from the TAMI page of the coho TAMM. Fisheries in solid block cells can't be modeled.

Tami: Terminal Area Management Module COHO FRAM Inputs

FRAM Run Number: 0619

FRAM Fishery		Sept. Time Step:		Oct-Dec Time Step:		Abundance Definitions:	
Number	Fishery Name	Scalar/Quota	**Flag**	Scalar/Quota	**Flag**	TAA	ETRS
80	A4B6CNetNT	-99.0000	-99	-99.0000	-99	0	0
81	A4B6CNetTR	-99.0000	-99	-99.0000	-99	0	0
82	Ar6D NetNT	0.0422	3	0.0940	3	39	0
83	Ar6D NetTR	0.0652	3	0.1070	3	20	0
84	Elwha Net			0.3145	3	21	0
85	WJDF T Net			0.0005	3	22	0
86	EJDF T Net			0.0000	3	19	0
87	A6-7ANetNT	-99.0000	-99	-99.0000	-99	0	0
88	A6-7ANetTR	-99.0000	-99	-99.0000	-99	0	0
89	EJDF FWSpt						
90	WJDF FWSpt			0.0000	1	9	0
91	Area 5 Spt	-99.0000	-99	-99.0000	-99	0	0
92	Area 6 Spt	-99.0000	-99	-99.0000	-99	0	0
93	Area 7 Spt	-99.0000	-99	-99.0000	-99	0	0
94	Dung R Spt			2301.0000	1	9	0
95	ElwhaR Spt			568.0000	1	9	0
96	A7BCDNetNT	0.0625	3	0.0244	3	41	0
97	A7BCDNetTR	0.1575	3	0.1281	3	41	0
98	Nook R Net			0.1516	3	18	0
99	Nook R Spt			2416.0000	1	8	0
100	Samh R Spt			1026.0000	1	8	0

Flags:

-99 use FRAM cmd file for input

1 as catch

2 as Effort Scalar

3 as %TAA

4 as % ETRS (stock specific)

Note: EJDF FW sport has no BasePeriod ERs

The route to provide this input, via a TAMI file, to FRAM is different than described earlier for coho. A TAMM spreadsheet macro is accessed via the Toolbar by successively clicking Tools-Macro- Macros to access the "Write_tami" macro. Highlight this macro and then click on "Run." With the 2007 spreadsheet an updated macro makes this a straightforward operation; follow the on-screen instructions. The created "cktiXXXX.tam" file can be loaded into FRAM as described in Section 3.2.3.

Prior year spreadsheets have a different version of the Write_tami macro. If it is necessary to re-run an older spreadsheet, proceed to highlight the macro and then click on "Run". A pop-up screen (Figure 33) will then ask the user to name the TAMI text file. Replace the "XXXX" with a unique filename; usually the four digit FRAM command file name (from FRAM fisheries to be paired with this set of TAMM fisheries) is used. Note that there is a message on the pop-up screen that says "Click 'NO' when asked to SAVE". After clicking on the button to write a TAMI file, click on "No" when the next pop-up screen asks if you want to save the changes you made to the just created 'cktiXXXX.tam' file. The file was made and was automatically saved. If you clicked on the "Yes-save" button an error message may have appeared and the spreadsheet closed down. Computers machines running Windows 2000 or earlier operating systems will have the ckti****.tam file placed in the same directory containing the active TAMM spreadsheet. Machines running Windows XP or more recent operating systems have the macro created ckti****.tam file placed in either the "My Documents" file folder, the same folder containing the active spreadsheet, or a folder most recently used to save an Excel file. A File Search to find the file location may be required; for convenience move the TAMI file into the folder containing the appropriate CMD files you want to pair with that set of TAMM inputs. Now the TAMI file is ready for a FRAM model run, and can be loaded into FRAM as described in Section 3.2.3.

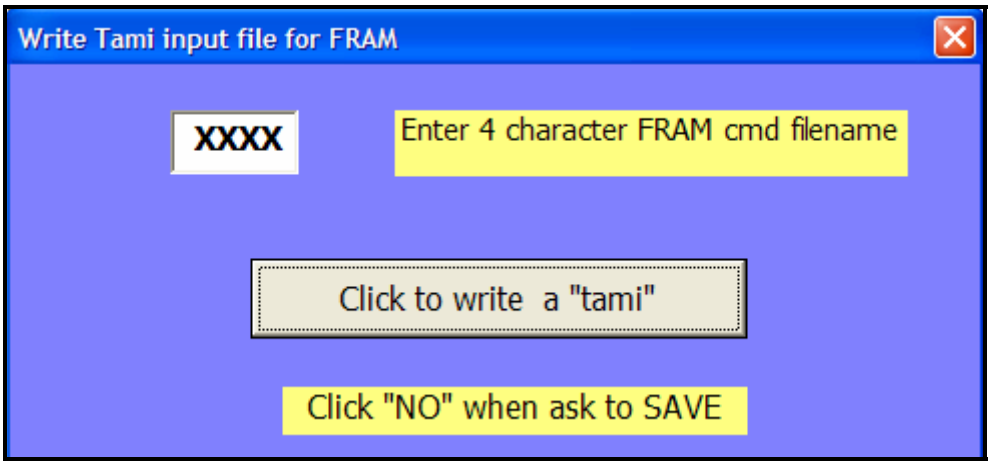


Figure 33. The Chinook TAMM pop-up screen for naming the TAMI file, from 2006 and earlier spreadsheets.

7.2 FRAM OUPUTS FOR TAMM MODELING AND TAMM REPORTING

The modeling of fishery impacts upon Puget Sound Chinook stock units is not completed until the Chinook TAMM reprocesses FRAM output and then produces fishery impact reports for the Puget Sound Chinook stock units. This also applies for coho TAMM in regard to Washington Coastal and Columbia River coho stocks, but in general coho TAMM serves primarily as a report generator.

In most cases a TAMM spreadsheet should be renamed (usually incorporating the CMD File run number). The model "run number", and a "run description" need to be manually entered into cells B3 and B4 of the coho TAMM's "Input_Harvestnew" page to appear in the header of coho TAMM reports. The

Chinook TAMM automatically loads the run number and run description as entered into "Load TAMX_Files" macro (Section 7.2.2).

7.2.1 FRAM Outputs for Coho TAMM

The process of using FRAM driver files to generate the four ****.PRN files needed to up-load FRAM output reports into the coho TAMM was covered in Section 3.1.3. Table 7-4 summarizes coho driver file information: name, PRN file name, FRAM report references, and where to find additional report details in this User's Manual (Section 5). [Note: Modifications to these Driver Files may also require corresponding reconfigurations in the coho TAMM (and vice-versa), thus you should use the Driver Files as provided by the annual model preparation team.]

These four ****.PRN files created by the driver files and loaded into coho TAMM are very large files. Representative examples of these FRAM reports are found in Section 5, but it is suggested the reader open up a coho TAMM spreadsheet and examine the four ****PRN pages, which are loaded with the FRAM "****.prn" reports. Three of the four reports are generated to include all stocks and all fisheries; only the PSCTRuns.prn report is customized with stock specific descriptions. The point is that coho TAMM's practical functionality as a report generating tool has extended beyond Puget Sound stocks and fisheries.

Table 7-3. Representative TAMI page from Chinook TAMM.

TAMI: Terminal Area Management Module CHINOOK FRAM Inputs

FRAM Run Number: 3006 Version: 5.24

Run Description: 2006 Final PFMC NT 65K; Trty 42.2K

Fishery parameters for Input to FRAM:

Fishery	Parameter: \1	MAY-JUN	JUL-SEP	OCT-APR	NT=FWspt T =TEST	MAR SPT	%FW NET	ESC RATE
7B,C,D Ntrty	T-R-T	0	0.3550	101	2959	0	0.0484	0.2872
7B,C,D Trty	T-R-T	0	0.3550	170				
Skagit Bay (8) NTrty	R-R-T	0.00	0.0000	45	20	0		
Skagit Bay (8) Trty	R-R-T	0.00	0.0027	22				
Area 8A NTrty	T-R-T	0	0.000	45	18	0		
Area 8A Trty	T-R-T	0	0.0192	7				
Area 8D NTrty	T-TorR-T	0	4.0019	2				
Area 8D Trty	T-R-T	50	1.0000	5				
HdCnl NTrty	T-R-T	0	0.0003	43	3169			
HdCnl Trty	T-R-T	0	0.0279	104				
Area 10/11 NTrty	T-T-T	0	65	404	983			
Area 10/11 Trty	T-T-T	0	148	80				
Area 10A NTrty	T-T-T	0	3000	0	26			
Area 10A Trty	T-T-T	0	3901	60				
Area 10E NTrty	T-T-T	0	763	0	0			
Area 10E Trty	T-T-T	0	4950	0				
Deep SPS NTrty	T-T-T	0	0	0	1235			
Deep SPS Trty	T-T-T	0	2273	39				
Area 13A NTrty	T-T-T	0	0	0	0			
Area 13A Trty	T-T-T	0	2178	76				
NookErly NTrty	0-R-0	0	0.0000	0				
NookErly Trty	T-R-0	0	0.0192	0				
WRSpCk NTrty	0-R-0	0	0.0000	0				
WRSpCk Trty	0-R-0	0	0.0000	0				

1/ Parameter Codes: T=Target; R=Harvest Rate; S=Use sharing computations if value = 1

Note: Nook Na Ck: 7B,C,D JUL-SEP inputs are H.R. on Nooksack Native Chin (%TRSNookNa)

For 7B,C,D row: Rate is %TAABham; if value = 1, sharing formula for JUL-SEP catches.

Area 8 Trty Row: Last value is Expected Area 8 Test catch.

Area 8 harvest rates are % of S/F TAA entering area 8.

Area 8A harvest rates are % of S/F TAA entering Area 8A.

Area 8D harvest rates are % of S/F TAA entering Area 8A.

NookErly inputs are either expected catch or harvest rate

Table 7-4. Summary of information for moving FRAM output into CohoTAMM.

Driver File	****.PRN File	FRAM Report		User Manual Section
		Name	No.	
PSCFishSumAll.DRV	PSCFishSumAll.prn	Fishery Summary	#1	Section 5.1
PSCTRuns.DRV	PSCTRuns.prn	Terminal Run Sizes	#2	Section 5.2
PSCTable2.DRV	PSCTable2.prn	Stock Catch By Fishery	#3	Section 5.3
PSCStkSum.DRV	PSCStkSum.prn	Stock Summary	#7	Section 5.7

7.2.2 FRAM Outputs for Chinook TAMM

In Section 3.2.5 the User Manual briefly outlined the steps to load Chinook FRAM output into a Chinook TAMM; this section will provide greater detail. A FRAM run will model FRAM fishery impacts upon FRAM stock units, and create a set of output files as listed in Table 3-1. The three "CKT*****.TAM" output files are created specifically to send the results back to TAMM for subsequent modeling of TAMM fishery (Appendix 7) effects upon Chinook TAMM stock units (Appendix 6). These files are commonly referred to the "TAMX" files and can collectively be viewed on the TAMX page of any Chinook TAMM spreadsheet.

FRAM is internally coded with customized report procedures to create the Chinook TAMX set of files. This is in contrast to coho where standard FRAM reports (with specifications as carried in Driver Files) are used to provide FRAM's input for the coho TAMM. The Chinook TAMX files are versions of FRAM reports with customizations to best fit the stock/fishery/time step configurations as used in the Chinook TAMM. For example, although FRAM has unique fisheries for Area 10 Sport and Area 11 Sport, prior to 2007 the TAMX report generated for Chinook TAMM had these two fisheries combined as Area 10:11 Sport because that was how TAMM was configured. Starting with 2007 the newer spreadsheet was re-structured to receive the separate inputs for these two fisheries. Now the modeler must toggle FRAM (at the time a CMD File is opened) to combine the two sport fisheries (for older spreadsheets). Another example of the customization of the TAMX files would be the three Canadian sport fisheries combined into the TAMM's GS/JDF/JS Sport.

Information carried in the three TAMX files is summarized in Table 7-5. The "CKTX****.TAM" file contains information as could be produced from FRAM's Terminal Run Sizes Report (Table 5-2). The differences here include how the FRAM output is formatted into six columns and how it is summarized over ages.

The "CKTT****.TAM" and "CKTL****.TAM" files each carry output analogous to FRAM's Fishery Summary Report (Table 5-1) and Stock Catch by Fishery Report (Table 5-3). One difference is that these two TAMX reports do not include catch or mortality for Time Step 1 because those fishery impacts occur prior to the fishery management year the TAMM is focused upon. Correspondingly, the "Total" column of Stock Catch by Fishery Report is excluded from these TAMX reports. Note the Fishery Summary Report output, as internally customized for the Chinook TAMX page, has mortality and catch statistics by unmarked and marked stock aggregates. That option is not available for the Fishery Summary Report via the general FRAM application. For non-modeled stocks FRAM assumes the same overall fishery mark rate as calculated for the modeled FRAM stocks.

Table 7-5. Summary of information carried in the Chinook "TAMX" set of three files.

TAMX File Name	Analogous FRAM Report	Stocks Included Unmarked & Marked Stock Units	Specifications
CKT**X******.TAM	Terminal Run Sizes	By Puget Sound stocks and/or aggregations	TRS/TAA, ETRS (Age 2), and ETRS (Age 3-5)
CKT**T******.TAM			
Part One	Fishery Summary, customized for Marked & Unmarked	Combined model and non-model stocks	Total fishery related mortality
Part Two	Stock Catch by Fishery	Individual Puget Sound stocks	AEQ mortality
CKT**L******.TAM			
Part One	Fishery Summary, customized for Marked & Unmarked	Combined model and non-model stocks	Total landed mortality
Part Two	Stock Catch by Fishery	Individual Puget Sound stocks	Total landed mortality

The Chinook TAMM macro that imports the set of TAMX files into the spreadsheet was revised for 2007. If you are using an older Chinook TAMM, the procedure for Chinook is similar to the older procedure presented for coho in Section 3.1.5. However, the macro will bring up the Chinook pop-up window (Figure 34) where the user will select Load_TAMX_Files. This macro will then produce a window (Figure 35) where the user must specify the file directory containing the TAMX files, and the four digit CMD File name that FRAM attached to the TAMX files. Also, the name of the TAMM spreadsheet to receive the TAMX input must be entered; providing a brief run description is optional but recommended. As with the coho TAMM, it may be necessary to manually close the temporary files created by the load macro.

The 2007 revised Chinook Load_TAMX_Files macro was streamlined; simply follow the on-screen instructions consisting of entering an optional Run Description and then selecting the name of the CMD File (standard Windows "Open" file screen, Figure 7), which produced the needed set of FRAM's TAMX output files. This macro will load the active TAMM spreadsheet and will automatically close the text-to-Excel transition files. Note that this macro assumes the three TAMX files will be in the same file directory as the selected CMD File.

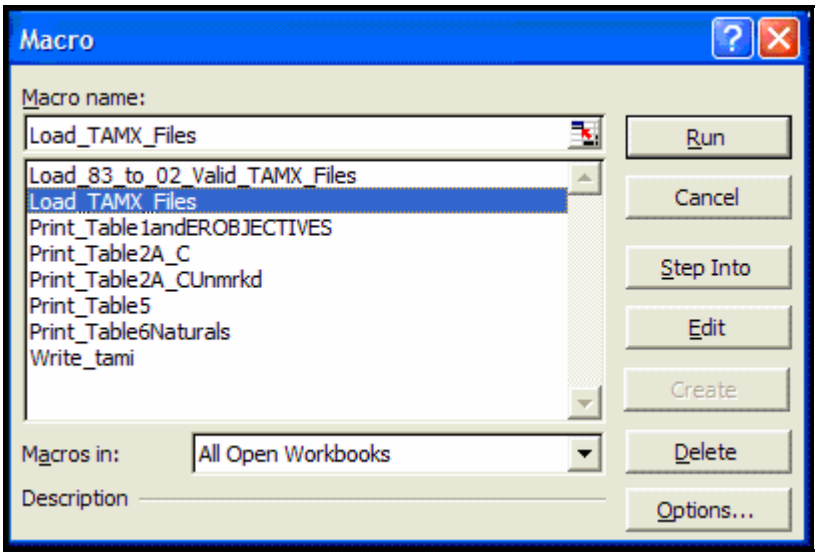


Figure 34. The Chinook TAMM spreadsheet pop-up screen with available macros.

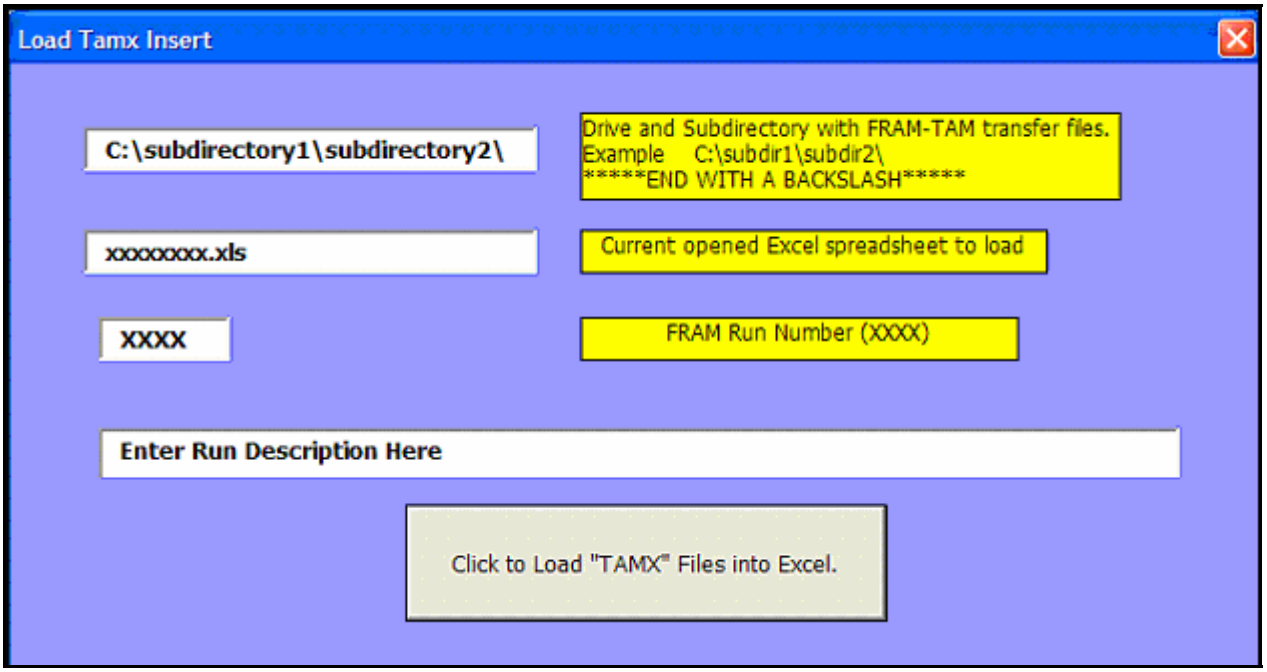


Figure 35. A Chinook TAMM pop-up screen (old style) for loading FRAM's TAMX output. The "Load_TAMX_Files" Chinook TAMM spreadsheet macro brings up a pop-up screen for entry of TAMX file location and FRAM run number (CMD File).

7.3 TAMM MODELING OF TERMINAL AREA FISHERIES

The TAMM spreadsheets perform two basic types of modeling functions:

1. Partition FRAM's calculated stock specific terminal run sizes and fishery mortalities into TAMM stock units (Chinook only).

2. Work with TAMM units of stocks and/or fisheries and/or time steps (that are subsets of FRAM units), to calculate individual TAMM fishery and cumulative FRAM plus TAMM fishery impacts upon TAMM stocks.

7.3.1 Coho TAMM Modeling

With the current coho FRAM base period stocks and fisheries matching TAMM stocks and fisheries, there is less need for further modeling within the TAMM. Potentially the TAMM could be used to model the impact of smaller extreme terminal area fishery units than in FRAM. For example, stock impacts from a mark selective fishery in a part (geographic or temporal) of a freshwater river system could easily be added to the TAMM. The coho TAMM generally does not need to partition FRAM stock impacts into sub-stocks. An exception exists for Washington coastal stocks and fisheries, where FRAM's catch composition of local stocks in a terminal fishery may be inconsistent with the stock catch composition derived with regional harvest management planning models.

In the case of Washington coastal coho the TAMM has a modeling function that prepares input for FRAM and reprocesses FRAM output before generating TAMM reports for those stocks. This takes place in the "WACoastTerminal" page of the spreadsheet. The additional modeling was necessary because of time step inconsistencies between FRAM and individual regional harvest management models. In some regions the local stocks differ in their return timing and this is reflected in the weekly time steps of the regional models. Depending upon annually determined weekly fishing schedules, the local stock composition in these regional terminal fisheries will vary. In contrast, within FRAM the entire terminal fishery happens in one time step and the terminal fishery will always have the same local stock composition (by percent contribution) as reflected in the Outfile from base period data (for a given set of annual stock abundance levels). The situation is complicated by the observation that coastal coho "dip-in" to other coastal estuaries, as shown by the level of non-local stock CWT recoveries through-out the coastal terminal area net fisheries. Given a catch input for a terminal fishery, FRAM will calculate the non-local stock and local stock contributions. For a non-local stock with significant "dip-in" to a particular foreign estuary, the catch of that non-local stock in a single terminal area fishery will change the abundance of that stock available to all other terminal fisheries, and thus change the stock contribution profile in all those fisheries. This same phenomenon exists within Puget Sound terminal fisheries, but the iteration processing has been coded to occur within FRAM modeling.

The WACoastTerminal TAMM page functions to reconcile FRAM results with regional terminal area harvest management models. At the present time, the stock specific harvest rates (for each terminal fishery) from regional harvest management models are input to the TAMM spreadsheet. These rates are applied against the stock's terminal run size from FRAM output. The FRAM ratio (from the most recent FRAM run) of local stock to non-local stock is used to then determine a total catch (local plus non-local fish) for each terminal fishery. These catches are then manually re-entered into the FRAM fisheries, producing a new/updated CMD File which is then rerun. Three manual iterations between coho TAMM and FRAM may be needed to stabilize the stock contributions through-out the coastal terminal areas every time a new set of total catch input is provided to FRAM for any of these fisheries.

7.3.2 Chinook TAMM Modeling

Beyond entering TAMM input data (Section 7.1.2) and FRAM output (Section 7.2.2), the casual user of Chinook TAMM does not have to be involved in any TAMM modeling processes; remaining functions occur automatically The spreadsheet can be dissected at the reader's discression.

An active user of Chinook TAMM may need to modify the TAMM to model newly proposed TAMM terminal area fisheries. For example, in recent years Chinook mark-selective river sport fisheries have been proposed and added to TAMM's modeling functions. Fishery inputs are entered into the INPUT_Harvest page (net fisheries) or into the INPUT_ETSport page (generally freshwater sport fisheries). These inputs are read by the individual regional (Table 7-1) spreadsheet pages where TAMM stock impacts are calculated. When new or modified types of fishery inputs come into play, then the TAMM modelers have to make the corresponding changes to the calculation pages and report pages. Fishery calculations occur on all regional pages for marked, unmarked, and combined local stocks.

As was addressed in Section 7.1.2, Chinook TAMM processes user fishery inputs prior to passing fishery input to FRAM (via the TAMI file), and then TAMM re-processes that input again after receiving FRAM output (via the TAMX files). This is because any FRAM model run could potentially change the terminal run sizes of stocks returning to TAMM fisheries.

The major function of the Chinook TAMM now begins. This is to dis-aggregate the catch and escapement from FRAM fisheries on FRAM stock units into TAMM stock units. For this, TAMM uses the pre-season terminal run size forecasts (INPUT_StockData page) and mark rates (INPUT_MrRt page) that were input by the user (usually during the model set-up phase of the pre-season planning process). The terminal run sizes of FRAM stocks, and their mortality in FRAM fisheries, were loaded into TAMM via TAMX; the partitioning into TAMM stocks occurs in the spreadsheet "2D_F***" pages. Terminal fisheries that are both FRAM and TAMM fisheries have their total mortality reassigned in the regional area pages (Table 7-1), and the mortality by TAMM stock results are then read into the "2D_F***" pages. The "2A_C***" pages read these TAMM stock mortalities, and also read TAMM stock escapement values (as calculated in the regional pages) to derive a total AEQ abundance for each TAMM stock. These TAMM calculated total AEQ abundances are used to generate TAMM stock exploitation rates, which are then reported by fishery aggregates. These final calculations take place in the "5***" pages, are detailed in the "6***" pages of the spreadsheet, and ultimately reported in "Table 2" along with associated TAMM stock natural escapements (see Section 7.4.2). Note that MSF can change the preseason stock mark rates, thus for some regions/stocks a new mark rate is calculated from the TAMX terminal run size information.

7.4 TAMM REPORTS

There are two categories of coho and Chinook TAMM reports, Regional Reports and North of Falcon Reports. As stated at the beginning of Section 7 there have been a lot of changes in stock units, fishery units, and management perspectives since the use of TAMM spreadsheets began. The regional responses to these changes have varied through the years, thus the Regional Reports have diverged from the original standardized formats. The Skagit Region and the Stilliguamish/Snohomish Region have chosen to maintain a subset of those original tables that showed fishery catch distribution and escapements of their local stocks. The Hood Canal Region has chosen to move the focus from the original sets of tables (which remain in the spreadsheets largely for historical reference) and has constructed a single new table that presents the harvest distribution and escapement of their local stocks, as needed for their regional harvest managers. The Strait of Juan de Fuca Region maintains their original tables while adding a new table similar in design and function to the Hood Canal table. While the Nooksack/Samish Region and the South Sound Region have partially updated those regional tables that show stock harvest distribution and stock escapement, they have had to move away from their original management approach based upon the

sharing of harvestable fish. With the management shift toward not exceeding exploitation rate caps, versus a historical focus on harvesting down to escapement goals, it has become difficult to determine how "harvestable surplus" could be calculated. All regions now depend more upon jointly shared and developed sets of North of Falcon tables for much of the management information they need. The common North of Falcon Tables are maintained and heavily relied upon during the pre-season planning process. Coho and Chinook NOF Reports are addressed in the following Sections.

The easiest way to obtain North of Falcon Reports from the TAMMs is to use the print macros, via the Tools icon in the Tool Bar. In recent years the functionality of individual macros has varied in response to the level of attention the individual reports have been receiving. The print macros for reports used during the North of Falcon process have worked very well.

All the print macros were recently updated; however, older TAMM spreadsheets contain nonfunctional print macros for some Regional reports. As management parameters evolve the task of spreadsheet and macro maintenance follows, but not always at the same pace. Table 7-6 lists all coho and Chinook print macros and comments on their usefulness as of the date this User Manual was drafted.

Table 7-6. Coho and Chinook TAMM macros for printing reports, and macro/report status. The macros with the bold font will print the tables commonly referenced during the NOF process.

Coho TAMM macros (Figure 12)	**Works?**	**Comments**
Print_All_Stocks_by_Time	No	Table not used for a few years
Print_ColOCNRogueTables	Yes	Part of NOF set (Tables C and OR below)
Print_D_Tables	Yes	Variable maintenance of these tables
Print_InputHarvestTables	Yes	Useful as summary of inputs
Print_NOF_Tables	Yes	**Large NOF set of various KEY tables;** producing 10 pages of reports (Appendix 8)
Print_TAMM_OutputTables	Yes	Mixed maintained and non-maintained tables; producing 11 pages of mixed value reports
Print_Thompson	Yes	KEY table, included in NOF set (Table T below)
Chinook TAMM macros (Figure 34)	**Works?**	**Comments**
Print_Table1andEROBJECTIVES	Yes	**KEY tables used during NOF process**
Print_Table2A_C	Yes	Catch & Esc for TAMM key stock units
Print_Table2A_CUnmrkd	Yes	Catch & Esc for unmarked TAMM stock units
Print_Table5	No	Table 5 feeds Table 6
Print_Table6Naturals	Yes	Exploitation Distribution of Key TAMM stocks

7.4.1 Coho NORTH OF FALCON STYLE TAMM Reports

A representative set of coho TAMM tables, which are printed out as part of the North of Falcon report package, are attached as Appendix 8. These tables include:

- Table 1: DESCRIPTION OF FISHERY REGULATIONS AND SUMMARY OF COHO CATCH TARGETS. – Summary of total fishery related mortality for those fisheries having the most impact upon Washington and Oregon coho stocks. Included are comments on fishery regulations &/or harvest caps.

- Table 2 (series A through D): COHO FISHERY IMPACT SUMMARY HIGHLIGHTS. – Total fishery related mortality, by fishery, is presented for Puget Sound and Washington coastal coho stocks or stock aggregates. Presentation is by "Wild", "Marked", and "Unmarked" components. To help evaluate stock impact levels various statistics are calculated and compared to management guidelines. Depending upon stock and regional management approaches; these might include projected ocean escapement, projected spawning escapement, projected marine exploitation rate, projected total exploitation rate, and exploitation rate ceiling.

- Table 4: SUMMARY OF COHO EXPLOITATION RATES BY FISHERY AGGREGATE. – This table is focused upon the key Puget Sound and Washington wild stocks. It presents predicted spawning (for Puget Sound stocks) or ocean (for WA Coastal stocks) escapement, a run reconstruction of catches and escapement, and resulting exploitation rate distribution among fishery aggregates.

- Table 7: COHO RUN SIZES FOR SALMON TECHNICAL TEAM REFERENCE. –Run size summations for, various coho stocks, are provided for use of the PFMC's Salmon Technical Team (STT) as they prepare sets of reports for Council use.

- Table C: COLUMBIA RIVER COHO FISHERY IMPACTS SUMMARY. – Similar to the Table 2 series for Puget Sound stocks, this table presents total preterminal fishery related mortality for Columbia Early Run and Columbia Late Run stock aggregates, as well as the resulting ocean escapement and ocean exploitation rate values (after Buoy 10 sport fishery).

- Table OR. Total mortality and exploitation rates for Oregon Coastal Natural and Rogue/Klamath. – The distribution of fishery mortality and resulting exploitation rates is shown for Oregon Coastal Natural coho and for Unmarked combined hatchery plus wild Rogue/Klamath stocks.

- Table T: THOMPSON AND UPPER FRASER COHO FISHERY IMPACT SUMMARY. – The standard distribution of fishery mortality is presented along with fishery exploitation rates. Of particular importance in this report is the total exploitation rate in U.S. fisheries.

7.4.2 Chinook NORTH OF FALCON STYLE TAMM Reports

There is not a Chinook TAMM macro specifically named as the "print NOF reports" macro. Instead the "Print_Table1andEROBJECTIVES" macro will produce the two tables most commonly referenced during North of Falcon discussions (Tables 1 and 2 described below). When managers are seeking a more detailed presentation of fishery impacts on key stocks, the series of three "Table 6 Naturals" reports is provided (see below). A set of these five Chinook TAMM tables are attached as Appendix 9, which includes:

- Table 1: DESCRIPTION OF FISHERY REGULATIONS AND SUMMARY OF CHINOOK CATCH TARGETS. – Summary of total fishery related morality for Southern U.S. fisheries and those Canadian fisheries having the most impact upon Puget Sound and Columbia River Chinook stocks. Included are comments on fishery regulations &/or harvest caps.

- Table 2. Exploitation rates and natural escapement of selected Puget Sound Chinook stocks (MSF compatible). – The key Puget Sound natural Chinook stocks are listed along with predicted exploitation rates and TAMM stock escapement estimates. These are compared to the various management criteria being used to evaluate impacts levels imposed by the modeled set of fisheries.

Values entered for the SRFI (Snake River Fall Index) and the Coweeman Exploitation Rate are in the lower right corner of Table 2. These stocks are key stocks for the PFMC process and therefore also influence the level of several NOF fisheries. The SRFI index value and the Coweeman ER value are not calculated/produced within the TAMM. These values are produced from dedicated spreadsheets where FRAM output is entered as part of the equation. Generally, the Council's STT is responsible for providing these two values that are then simply typed into the TAMM spreadsheet.

- Table 6A. Guidelines And Predicted Exploitation Rates For KEY NATURAL PUGET SOUND Chinook Stocks, and Proportion of the total AEQ Mortality Occurring in Each Fishery Aggregate. Stocks list include: Skagit Summer/Fall, Stillaguamish Summer/Fall, Snohomish Summer/Fall, Nooksack Early, Skagit Spring, and White River Spring.

- Table 6B. Guidelines And Predicted Exploitation Rates For OTHER PUGET SOUND Natural/Hatchery Aggregate Chinook Stocks, and Proportion of the total AEQ Mortality Occurring in Each Fishery Aggregate. Stocks list include: Hood Canal Unmarked Summer/Fall Aggregate, Mid-Hood Canal Natural, Skokomish Natural, and Juan de Fuca Tributary (Dungeness) Summer/Fall.

- Table 6C. . Guidelines And Predicted Exploitation Rates For SOUTH PUGET SOUND Chinook Stocks, and Proportion of the total AEQ Mortality Occurring in Each Fishery Aggregate. stocks list include: Lake Washington Natural Summer/Fall, Green River Natural Summer/Fall, Puyallup River Natural Summer/Fall, and Nisqually River Natural Summer/Fall.

8. MISCELANOUS USES OF FRAM AND FRAM OUTPUTS

FRAM operates upon defined stock, fishery, and time step units; centered upon a geographic region with less precision moving south, north, or into freshwater. When fishery managers require stock impact estimates outside of FRAM's optimum boundaries, then FRAM output may become input for other models and/or FRAM may receive input from other models. Examples of this have already been presented:

- Washington coastal coho regional models use FRAM output of local stock ocean escapements entering terminal area fisheries. The regional models have a finer resolution (often weekly) of terminal area harvest rates for local stocks. Fishing levels can be "fine tuned" in response to the relative abundance levels of the different local stocks, and the refined total catch returned as input for another iteration of FRAM coho modeling (Section 7.3.1).

- Puget Sound Chinook TAMM uses FRAM output but then separates the FRAM stock aggregates and adds a layer of freshwater fisheries (Section 7.3.2).

Other examples include the PSC's Chinook Model, which provides values used for fishery inputs to FRAM's West Coast Vancouver Island Troll fishery. Below, in Section 8.1 and 8.2, are two calculations performed outside of FRAM/TAMM, which a PFMC Chinook modeler must be able to do.

The FRAM is considered a pre-season fishery planning model, but it also has a limited use in an in-season mode (Section 8.3) and a post-season mode (Section 8.4).

8.1. COWEEMAN EXPLOITATION RATE CALCULATION

An annual CoweemanYYYY.xls spreadsheet (see Appendix 10) is used to calculate the total AEQ stock exploitation rate, needed to insure compliance with NMFS ESA guidance. The principle and function is similar to the Puget Sound Chinook TAMM spreadsheet. Chinook FRAM does not model freshwater fisheries and thus can not provide estimates of total ER nor spawning escapement. These calculations must be done in a spreadsheet combining FRAM estimates of ocean impacts with external input of freshwater impacts. Washington Lower Columbia River Hatchery (LRH) stock (marked plus unmarked) is being used to represent the lower river natural fall tule stock (designated as Coweeman). Fishery AEQ Total Mortality from FRAM ocean fisheries (Time Steps 1-3) on tule stock is loaded into the spreadsheet, along with the stock's escapement (ages 3-5) from FRAM ocean fisheries. A spreadsheet macro (not active in older versions) will load the two PRN files produced by the two required DRV files. The spreadsheet also requires an external estimate of Columbia River non-Indian (i.e., below Bonneville Dam) freshwater stock harvest rate, to calculate total stock AEQ exploitation rate. Note, these Driver Files and the spreadsheet are designed to also produce total exploitation rate on eight other Columbia River Chinook stocks as well.

The additional files required for this calculation are:

- CoweemanYYYY.xls
- CRAEQcat66.DRV
- ColRtrun66all.DRV

Following a Chinook FRAM run, from the application's Main Menu (Figure 2), use the Produce Output feature (and the above DRV files) to individually produce CRAEQcat66.prn and ColRtrun66all.prn. It is recommended that the CMD File name be added to the beginning of these prn file names.

Open the CoweemanYYYY.xls and enable macros when asked to do so (older versions of this spreadsheet lacked the macro and driver file outputs needed to be manually pasted into spreadsheet). Run the "PastePRNfiles" macro. Be sure to obtain the non-Indian freshwater harvest rate from the appropriate Columbia River harvest manager and enter it into cell 'V35' of spreadsheet. Cell 'T49' will display the calculated total ER. See Appendix 10 for a more technical presentation.

8.2 SNAKE RIVER FALLS INDEX CALCULATION

For the Snake River fall Chinook stock, a harvest index is used to evaluate if the annual sets of planned fisheries are within the maximum allowed impacts. This index compares current impacts to a historical level of impacts. For this stock an exploitation rate calculation is precluded by lack of good annual abundance forecasts. Compliance with NMFS Endangered Species Act consultation standard harvest index of 0.70 is evaluated within the annual "yyyy PFMC SRFI.xls" spreadsheet, as seen in Table 8-1 below. Calculating the individual parts of this spreadsheet requires two models to provide input to the spreadsheet: The PSC Chinook Technical Committee's Chinook model provides annual ratio values for the SEAK, NCBC, WCVI, and Other Canadian fisheries (1.135, 0.622, 0.482, and 0.445 in Table 8-1); while the Council's Chinook FRAM provides the PFMC North of Falcon and PFMC South of Falcon ratio values (0.9 & 1.1 in Table 8-1). These values are then multiplied by the corresponding average proportion of Age-3 and -4 AEQ Mort during 88-93, which are constant for a given base period. The resulting "SRFI Values" are summed to get the "Total SRFI" value (0.685 in Table 8-1).

Appendix 11 provides a more complete technical description of the components contributing to the calculation of this index. The casual FRAM user must have the Srfiyyyy.drv file to obtain the two ratios of planned fishery impacts to the average 1988-93 impacts. Table 5-4 presents a representative output from this driver file (for 2004), with the two inputs to the "yyyy PFMC SRFI.xls" shown in bold font. The same driver file can be used year to year, unless changes to the base years (1988-1993) data are needed. The values required from the PSC model should be available from a member of the CTC modeling team.

8.3 IN-SEASON FRAM MODEL RUNS

FRAM can be run in an "in-season" mode in order to assess impacts on key stocks as the current fishing season progresses, and may be of interest for several reasons. The catch patterns in a fishery (or set of fisheries) may differ significantly in-season from the anticipated pre-season FRAM catch inputs. In such cases, FRAM can be used to help evaluate if deviations from the pre-season fishery plan may be allowed or warranted. In most cases of in-season FRAM runs, actual catches (or their projected end-of-season total catches) replace the catches in the preseason planning "Final" PFMC CMD File. Occasionally other in-season estimates are available, such as non-retention mortality, which can also be updated. Stock abundances are rarely changed because in-season updates are seldom available.

FRAM in-season model runs are relatively straightforward modifications to the input Catch screen (Section 3), and the Non-Retention screen (Section 4.1.5) of the pre-season planning "Final PFMC" CMD File. Abundance levels remain as defined by pre-season Recruit Scalars.

8.4 POST-SEASON FRAM MODELING

Post-season FRAM modeling serves two primary purposes: evaluation of FRAM's ability to estimate fishery and stock parameters in preseason fishery planning and evaluation of how well the management system is able to achieve/comply with fishery and stock management objectives. Post-season FRAM modeling can vary in complexity depending on the availability of post-season estimates of catch, non-landed mortality, and stock abundances. For most post-season FRAM modeling, fishery and stock estimates are calculated external to the model and then inserted into the CMD File using the normal input

screens in the model. In the simplest type of post-season FRAM run, updated actual catches are modeled while continuing to use preseason estimates for non-landed mortality and stock abundances. The most comprehensive forms of post-season FRAM runs include the "Chinook Validation" runs (MEW 2007d) and the runs resulting from the cohort reconstructions for coho using the MSM-VB program (see Mixed Stock Model in MEW2007c).

Table 8-1. A 2007 example of the "yyyy PFMC SRFI.xls" spreadsheet used annually to calculate the Snake River fall Chinook harvest index.

April 5 PFMC Option 3807: NT 32.5K; Trty 35K (3807.cmd)				
	Prop of Age 3/4 AEQ Mort During 88-93	*SRFI From PSC Prelim clb0604 calibration*		SRFI Values
SEAK abundance index 1.73 TAC = 355K	5.9%	1.135		**0.07**
Total SEAK	5.9%	**SEAK Index**	===>	1.14
NCBC	9.0%	0.622		**0.06**
WCVI total catch	53.5%	0.482		**0.26**
Other Canada	0.7%	0.445		**0.00**
Total Canada	63.2%	**CAN Index**	===>	0.50
PSC Fisheries	69.1%	**PSC Index**	===>	0.56
		PFMC SRFI from FRAM		
PFMC N Falcon	19.6%	0.900		**0.18**
PFMC S Falcon	11.3%	1.100		**0.12**
PFMC TOTAL	30.9%	**PFMC Index**	===>	0.97
		Total SRFI (<=.70)	===>	***0.685***
		Total SRFI wo BC (<= .5)	===>	1.00

8.4.1 INTRODUCTION TO COHO "Backward FRAM"

The coho "Backwards FRAM" is a relatively new procedure added to recent versions of FRAM. This post-season procedure is used to calculate stock abundance scalars based upon observed escapement and landed catch estimates. The procedure creates a FRAM CMD File containing the new stock scalar estimates. This CMD File can be used to evaluate exploitation rate estimates by stock or to create surrogate CWT recoveries for stocks without CWT tagging. The exploitation rate estimates are used annually by the PSC Coho Technical Committee to evaluate compliance with Pacific Salmon Treaty obligations. The surrogate CWT recoveries are used by the MSM-VB program (see Mixed Stock Model in MEW 2007c) to calculate the base years' cohort analyses.

The “Backwards FRAM” procedure uses an iterative method to solve for the most likely stock scalars given the escapement and catch numbers. Escapements are carried in a new section added at the end of the CMD File, thus all previous CMD File formatting (and functions) remains unaffected. The stocks are flagged to determine which escapements will be used in the iterative process. These flags are typically used in analyses for the most current years because escapement estimates may not yet be available for all stocks. The analyses for base period years generally include escapement estimates for all stocks. For each of the 100 iterations the estimated difference in starting cohort abundance is calculated from the difference between modeled and observed escapement for each flagged stock. The entire set of FRAM calculations is repeated with each iteration.

From the Main Menu, the “PostSeasonFRAM” button will lead to a screen with the options of editing/creating “Target Escapements” (contents of the new CMD File’s section for post-season escapements), or to “Start Iterations”. Note that the CMD File being updated for this post-season procedure may not yet have the required escapement section. As a first step, select the “Target Escapement” option; which if needed, will create an escapement section at the end of the CMD File.

Then proceed to enter, or update, the annual stock escapements with observed values. Not all stocks will have post-season escapement estimates available; thus the screen for entering escapements allows the user to flag stocks to be used in the iteration process (Flag = 1) or not (Flag = 0). When the “Done” button is selected you will be returned to the previous screen. Note: In the present version of Backwards FRAM, to “Save” any escapement editing work it is necessary to run the program through the iteration procedure.

The “Start Iterations” button will initiate the “Backwards FRAM” iterative process. It takes several minutes for the program to run the 100 iterations. When done, a screen appears with the options of saving a CMD File with the new stock scalars (and any modifications to the target escapement data), or creating a stock specific CWT Recovery File specific for use with the MSM program (this version assumes a Production Expansion Factor (PEF) of “10” for these surrogate CWTs). It is advisable to save the new CMD File before running the CWT Creation procedure, because there is no option to save the CMD File after the CWT Creation. After saving the CMD File to preserve any escapement entries, it is necessary exit the FRAM application and then reopen it to access the newly saved CMD File. To then finally run the CWT Creation procedure, the user will still have to step through the iteration step again to reach the CWT Creation option.

The CMD File, as saved with the newly created stock scalars, can be used to produce this type of a post-season coho FRAM run.

9. FRAM APPLICATION TROUBLE SHOOTING TIPS

Potential problem when emailing files used for FRAM modeling:

The email filters designed to stop harmful files from reaching our computers are sometimes set to block the passage of executable type of files. Some filters might strip the "harmful" attachments, some might provide the email recipient a notice that an incoming file was quarantined, while in some cases the email can disappear without any notice provided to the sender or receiver. These filters are looking for files with specific types of extensions. Among the blocked file extension are "****.exe" and "****.cmd". Therefore, when emailing the FRAM executable program or command files it is necessary to rename them. For example, if you receive a file named "****.cmdfile", simply rename to "****.cmd". Some filters don't allow "zip" files. Be aware; and confirm that email sharing of FRAM files has been successful.

Potential problems during FRAM data entry:

When entering data into FRAM input screens - be sure to click off the modified cell before selecting the "OK-Done" button as FRAM will not recognize changes to highlighted cells.

If any input screen cells are left blank, then FRAM will fill them with a zero value.

FRAM will assume you have made a CMD File change when any Input Screen has been opened. If no changes were made to an Input Screen, simply click "Cancel" or "Cancel Changes" (depending on the screen). However, if you clicked on "Done" (actual changes or not) you will eventually be routed to a Command File Save screen (Figure 6). You can decide to not save the "changes" at any of two points: the "Cancel Changes" button in the Commnd File Save screen, or the "Cancel" button in the "Save As" screen (Figure 7). A "Cancel" in the "Save As" screen will return you to the Command File Save screen where you will have to cancel again, this time returning you to the Main Menu. At this point you are working with a CMD File that potentially has been changed, but has not been saved. If you click on Input Options, FRAM will inform you of this and ask if you want to save the previous set of assumed inputs. Or you can click End Program and be done. However, **be warned**, at this point it is also possible to click on "Run Model" and produce output; but those results will be from a non-saved CMD File and thus difficult to link back to a known set of inputs. This is not recommended. If at any point there is confusion regarding any recent inputs, simply leave; use the "End Program" button in the Main Menu and start over.

Potential problems when saving a FRAM Command File:

An exactly four character name is required for the CMD File

NOTE: never put a comma in a Command File Title!

If a CMD File has been modified (and renamed) using a text editor be aware that the CMD File's "Prefix for Save Files", as seen below the Outfile name (Table 6-3), should also be edited accordingly.

Potential problems during FRAM model runs:

"Base Period File not found …." error message indicates the Outfile, as specifically named in the active CMD File, is not in the same directory as that CMD File. Move, or copy, that Outfile to the CMD File's directory.

FRAM won't open a particular CMD File? Potential causes include:

- A comma in the CMD File Title. To retrieve this CMD File you must open the file in a text editor and delete the offending comma.

When using pre-2007 TAMM spreadsheets: Starting a Chinook model run and can't find the "TAMI" file you just created? At creation, it may have been placed in one of several file folders. Look in folders: "My Documents", folder containing source TAMM spreadsheet, or another folder Excel recently had been accessing. Then move the "TAMI" file to the directory you are working in.

Trouble duplicating someone else's (or historic or even expected) modeling results? Confirm the same version of FRAM is being used. Confirm same versions of supporting files: CMD File, Outfile, TAMM files, and Driver Files used for report generation.

FRAM "crashes" during a model run, maybe providing a "run-time error" type message? Potential causes include:

- A zero value in any parameter cell of the Selective Fishery Parameters input screen (Figure 5).
- A comma in the CMD File Title.

Potential problems working with FRAM outputs:

FRAM "crashes" when directed to produce an output report? Potential causes:

- An outdated Driver File, with numbers of base period stocks and/or fisheries that are incompatible with the Outfile used for that model run.
- A comma in a Driver File's title will abort report writing.

After using the four driver files to create the coho TAMM required four "prn" files - it is a good idea to check the file creation dates and times through Windows Explorer to be sure all four coho "prn" files were produced from the same model run.

Remember that FRAM does not use the Chinook Outfile Time Step 4 values. Those values are over-written with Time Step 1 values; thus naturally mortality rates, maturation rates, sublegal mortality rates, fishery exploitation rates by stock and age, etc. are modeled as identical between TS 1 and TS 4. The TS 4 values as created by the Chinook calibration program are not used, other than to retain a required file structure.

Potential TAMM or Excel problems:

For TAMM spreadsheets in use prior to 2007 season: When using the coho TAMM macro to import FRAM "prn" files - the first field is for the path to the directory holding the four "prn" files. As instructed on the screen, end the path with a backslash.

Macros won't run? Spreadsheet macro security level may be too high. From the Excel Toolbar, click Tools-Macros-Security and select medium.

Excel's automatic feature of asking to "Save File" at program closing, may be deactivated when the FRAM program has been running. If you are working on any Excel files while (or before) running the FRAM program, be sure to save the Excel file manually and do not depend upon Excel asking if you want to Save your work.

10. LITERATURE CITED

Conrad and Gutmann. 1996. Conversion Equations Between Fork Length and Total Length for Chinook Salmon (*Oncorhynchus Tshawytscha*). Northwest Fishery Resource Bulletin, Project Report Series No.5. Northwest Indian Fisheries Commission. Olympia, Washington.

Model Evaluation Workgroup (MEW). 2007a. Fishery Regulation Assessment Model (FRAM) – An OVERVIEW for CHINOOK and COHO (Document prepared for the Council and its advisory entities.) Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 101, Portland, Oregon 97220-1384.

MEW. 2007b. Fishery Regulation Assessment Model (FRAM) – Technical Documentation for Chinook and Coho (Document prepared for the Council and its advisory entities.) Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 101, Portland, Oregon 97220-1384.

MEW. 2007c. Coho FRAM Base Data Development (draft report). Pacific Fishery Management Council. Portland, Oregon.

MEW. 2007d. Chinook FRAM Base Data Development, Auxiliary Report to FRAM Technical Documentation (Document prepared for the Council and its advisory entities.) Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 101, Portland, Oregon 97220-1384.

Pacific Fishery Management Council. *Preseason Report I Stock Abundance Analysis for 2005 Ocean Salmon Fisheries*. (Document prepared for the Council and its advisory entities.) Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 101, Portland, Oregon 97220-1384.

Pacific Marine Fisheries Council (PMFC) Annual Report 1970

11. APPENDICES

Appendix 1. Coho FRAM Stocks.

Production Region	Unmarked Stock #	Abbreviated Name	Coho Stock Name
NOOKSM	1	nkskrw	Nooksack River Wild
NOOKSM	3	kendlh	Kendall Creek Hatchery
NOOKSM	5	skokmh	Skookum Creek Hatchery
NOOKSM	7	lumpdh	Lummi Ponds Hatchery
NOOKSM	9	bhambh	Bellingham Bay Net Pens
NOOKSM	11	samshw	Samish River Wild
NOOKSM	13	ar77aw	Area 7/7A Independent Wild
NOOKSM	15	whatch	Whatcom Creek Hatchery
SKAGIT	17	skagtw	Skagit River Wild
SKAGIT	19	skagth	Skagit River Hatchery
SKAGIT	21	skgbkh	Baker (Skagit) Hatchery
SKAGIT	23	skgbkw	Baker (Skagit) Wild
SKAGIT	25	swinch	Swinomish Channel Hatchery
SKAGIT	27	oakhbh	Oak Harbor Net Pens
STILSN	29	stillw	Stillaguamish River Wild
STILSN	31	stillh	Stillaguamish River Hatchery
STILSN	33	tuliph	Tulalip Hatchery
STILSN	35	snohow	Snohomish River Wild
STILSN	37	snohoh	Snohomish River Hatchery
STILSN	39	ar8anh	Area 8A Net Pens
HOODCL	41	ptgamh	Port Gamble Net Pens
HOODCL	43	ptgamw	Port Gamble Bay Wild
HOODCL	45	ar12bw	Area 12/12B Wild
HOODCL	47	qlcnbh	Quilcene Hatchery
HOODCL	49	qlcenh	Quilcene Bay Net Pens
HOODCL	51	ar12aw	Area 12A Wild
HOODCL	53	hoodsh	Hoodsport Hatchery
HOODCL	55	ar12dw	Area 12C/12D Wild
HOODCL	57	gadamh	George Adams Hatchery
HOODCL	59	skokrw	Skokomish River Wild
SPGSND	61	ar13bw	Area 13B Misc. Wild
SPGSND	63	deschw	Deschutes R. (WA) Wild
SPGSND	65	ssdnph	South Puget Sound Net Pens
SPGSND	67	nisqlh	Nisqually River Hatchery
SPGSND	69	nisqlw	Nisqually River Wild
SPGSND	71	foxish	Fox Island Net Pens
SPGSND	73	mintch	Minter Creek Hatchery
SPGSND	75	ar13mw	Area 13 Miscellaneous Wild
SPGSND	77	chambh	Chambers Creek Hatchery

Appendix 1. Coho FRAM Stocks (continued).

Production Region	Unmarked Stock #	Abbreviated Name	Coho Stock Name
SPGSND	79	ar13mh	Area 13 Misc. Hatchery
SPGSND	81	ar13aw	Area 13A Miscellaneous Wild
SPGSND	83	puyalh	Puyallup River Hatchery
SPGSND	85	puyalw	Puyallup River Wild
SPGSND	87	are11h	Area 11 Hatchery
SPGSND	89	ar11mw	Area 11 Miscellaneous Wild
SPGSND	91	ar10eh	Area 10E Hatchery
SPGSND	93	ar10ew	Area 10E Miscellaneous Wild
SPGSND	95	greenh	Green River Hatchery
SPGSND	97	greenw	Green River Wild
SPGSND	99	lakwah	Lake Washington Hatchery
SPGSND	101	lakwaw	Lake Washington Wild
SPGSND	103	are10h	Area 10 H inc. Ebay,SeaAq NP
SPGSND	105	ar10mw	Area 10 Miscellaneous Wild
SJDFCA	107	dungew	Dungeness River Wild
SJDFCA	109	dungeh	Dungeness Hatchery
SJDFCA	111	elwhaw	Elwha River Wild
SJDFCA	113	elwhah	Elwha Hatchery
SJDFCA	115	ejdfmw	East JDF Miscellaneous Wild
SJDFCA	117	wjdfmw	West JDF Miscellaneous Wild
SJDFCA	119	ptangh	Port Angeles Net Pens
SJDFCA	121	area9w	Area 9 Miscellaneous Wild
MAKAHC	123	makahw	Makah Coastal Wild
MAKAHC	125	makahh	Makah Coastal Hatchery
QUILUT	127	quilsw	Quillayute R Summer Natural
QUILUT	129	quilsh	Quillayute R Summer Hatchery
QUILUT	131	quilfw	Quillayute River Fall Natural
QUILUT	133	quilfh	Quillayute River Fall Hatchery
HOHRIV	135	hohrvw	Hoh River Wild
HOHRIV	137	hohrvh	Hoh River Hatchery
QUEETS	139	quetfw	Queets River Fall Natural
QUEETS	141	quetfh	Queets River Fall Hatchery
QUEETS	143	quetph	Queets R Supplemental Hat.
QUINLT	145	quinfw	Quinault River Fall Natural
QUINLT	147	quinfh	Quinault River Fall Hatchery
GRAYHB	149	chehlw	Chehalis River Wild
GRAYHB	151	chehlh	Chehalis River (Bingham) Hat.
GRAYHB	153	humptw	Humptulips River Wild
GRAYHB	155	humpth	Humptulips River Hatchery

Appendix 1. Coho FRAM Stocks (continued).

Production Region	Unmarked Stock #	Abbreviated Name	Coho Stock Name
GRAYHB	157	gryhmw	Grays Harbor Misc. Wild
GRAYHB	159	gryhbh	Grays Harbor Net Pens
WILLAPA	161	willaw	Willapa Bay Natural
WILLAPA	163	willah	Willapa Bay Hatchery
COLRIV	165	colreh	Columbia River Early Hatchery
COLRIV	167	youngh	Youngs Bay Hatchery
COLRIV	169	sandew	Sandy Early Wild
COLRIV	171	clakew	Clackamas Early Wild
COLRIV	173	claklw	Clackamas Late Wild
COLRIV	175	colrlh	Columbia River Late Hatchery
OREGON	177	orenoh	Oregon North Coastal Hat.
OREGON	179	orenow	Oregon North Coastal Wild
OREGON	181	orenmh	Oregon No. Mid Coastal Hat.
OREGON	183	orenmw	Oregon No. Mid Coastal Wild
OREGON	185	oresmh	Oregon So. Mid Coastal Hat.
OREGON	187	oresmw	Oregon So. Mid Coastal Wild
OREGON	189	oranah	Oregon Anadromous Hatchery
OREGON	191	oraqah	Oregon Aqua-Foods Hatchery
ORECAL	193	oresoh	Oregon South Coastal Hat.
ORECAL	195	oresow	Oregon South Coastal Wild
ORECAL	197	calnoh	California North Coastal Hatch
ORECAL	199	calnow	California North Coastal Wild
ORECAL	201	calcnh	California Central Coastal Hat.
ORECAL	203	calcnw	California Central Coastal Wild
GSMLND	205	gsmndh	Georgia Strait Mainland Hat.
GSMLND	207	gsmndw	Georgia Strait Mainland Wild
GSVNCI	209	gsvcih	Georgia Strait Vanc. Is. Hat.
GSVNCI	211	gsvciw	Georgia Strait Vanc. Is. Wild
JNSTRT	213	jnstrh	Johnstone Strait Hatchery
JNSTRT	215	jnstrw	Johnstone Strait Wild
SWVNCI	217	swvcih	SW Vancouver Island Hat.
SWVNCI	219	swvciw	SW Vancouver Island Wild
NWVNCI	221	nwvcih	NW Vancouver Island Hatchery
NWVNCI	223	nwvciw	NW Vancouver Island Wild
FRSLOW	225	frslwh	Lower Fraser River Hatchery
FRSLOW	227	frslww	Lower Fraser River Wild
FRSUPP	229	frsuph	Upper Fraser River Hatchery
FRSUPP	231	frsupw	Upper Fraser River Wild

Appendix 1. Coho FRAM Stocks (continued).

Production Region	Unmarked Stock #	Abbreviated Name	Coho Stock Name
BCCNTL	233	bccnhw	BC Central Coast Hat./Wild
BCNCST	235	bcnchw	BC North Coast Hatchery/Wild
TRANAC	237	tranhw	Trans Boundary Hatchery/Wild
NIASKA	239	niakhw	Alaska No. Inside Hat./Wild
NOASKA	241	noakhw	Alaska No. Outside Hat./Wild
SIASKA	243	siakhw	Alaska So. Inside Hat./Wild
SOASKA	245	soakhw	Alaska So. Outside Hat./Wild

Appendix 2. Chinook FRAM Stocks.

Unmarked Stock #	Stock Name	Abbreviated Name	CWT Broods Included*
1	Nooksack-Samish summer/fall	NkSm FlFi	77,79
3	North Fork Nooksack early (spring)	NFNK Sprg	OOB - 84,88 (N. Fk.)
5	South Fork Nooksack early (spring)	SFNK Sprg	OOB - 84,88 (N. Fk.)
7	Skagit summer/fall fingerling	Skag FlFi	76,77
9	Skagit summer/fall yearling	Skag FlYr	76
11	Skagit spring yearling	Skag SpYr	OOB - 85, 86, 87,90
13	Snohomish summer/fall fingerling	Snoh FlFi	OOB - 86, 87, 88
15	Snohomish summer/fall yearling	Snoh FlYr	76
17	Stillaguamish summer/fall fingerling	Stil FlFi	OOB - 86, 87, 88,89,90
19	Tulalip summer/fall fingerling	Tula FlFi	OOB - 86, 87, 88
21	Mid S. Puget Sound fall fingerling	USPS FlFi	78,79
23	UW Accelerated fall fingerling	UW-A FlFi	77-79
25	Deep S. Puget Sound fall fingerling	DSPS FlFi	78,79
27	South Puget Sound fall yearling	SPSo FlYr	78,79
29	White River spring fingerling	Whte SpFi	OOB – 91-93
31	Hood Canal fall fingerling	HdCl FlFi	78,79
33	Hood Canal fall yearling	HdCl FlYr	78,79
35	Juan de Fuca Tribs. fall fingerling	SJDF FlFi	78,79
37	Oregon Lower Columbia River Hatchery	Oregn LRH	78,79
39	Wash. Lower Columbia River Hatchery	Washn LRH	77,79
41	Lower Columbia River Wild	Low CR Wi	77-78
43	Bonneville Pool Hatchery tule	BP H Tule	76-79
45	Columbia Upriver summer	Upp CR Su	76,77
47	Columbia Upriver bright	Col R Brt	75-77
49	Washington Lower River spring	WaLR Sprg	77
51	Willamette spring	Will Sprg	76-78
53	Snake River fall	SnakeR Fl	OOB - 84, 85, 86
55	Oregon North Migrating fall	Ore No Fl	76-78
57	WCVI Total	WCVI Totl	74-77
59	Fraser Late	Fraser Lt	OOB - 81,82,83
61	Fraser Early	Fraser Er	78,79; OOB -, 86
63	Lower Georgia Strait fall	Lwr Geo St	77,78
65	White River spring yearling	Whte SpYr	OOB – 91-93

*OOB = Out of Base

Appendix 3. Coho FRAM Fisheries.

Fishery Abbreviation	Fishery Number	Coho FRAM Fishery Long Name
No Cal Trm	1	North California Coast Terminal Catch
Cn Cal Trm	2	Central California Coast Terminal Catch
Ft Brg Spt	3	Fort Bragg Sport
Ft Brg Trl	4	Fort Bragg Troll
Ca KMZ Spt	5	KMZ Sport (Klamath Management Zone)
Ca KMZ Trl	6	KMZ Troll (Klamath Management Zone)
So Cal Spt	7	Southern California Sport
So Cal Trl	8	Southern California Troll
So Ore Trm	9	South Oregon Coast Terminal Catch
Or Prv Trm	10	Oregon Private Hatchery Terminal Catch
SMi Or Trm	11	South-Mid Oregon Coast Terminal Catch
NMi Or Trm	12	North-Mid Oregon Coast Terminal Catch
No Ore Trm	13	North Oregon Coast Terminal Catch
Or Cst Trm	14	Mid-North Oregon Coast Terminal Catch
Brkngs Spt	15	Brookings Sport
Brkngs Trl	16	Brookings Troll
Newprt Spt	17	Newport Sport
Newprt Trl	18	Newport Troll
Coos B Spt	19	Coos Bay Sport
Coos B Trl	20	Coos Bay Troll
Tillmk Spt	21	Tillamook Sport
Tillmk Trl	22	Tillamook Troll
Buoy10 Spt	23	Buoy 10 Sport (Columbia River Estuary)
L ColR Spt	24	Lower Columbia River Mainstem Sport
L ColR Net	25	Lower Columbia River Net (Excl Youngs Bay)
Yngs B Net	26	Youngs Bay Net
LCROrT Spt	27	Below Bonneville Oregon Tributary Sport
Clackm Spt	28	Clackamas River Sport
SandyR Spt	29	Sandy River Sport
LCRWaT Spt	30	Below Bonneville Washington Tributary Sport
UpColR Spt	31	Above Bonneville Sport
UpColR Net	32	Above Bonneville Net
A1-Ast Spt	33	Area 1 (Illwaco) & Astoria Sport
A1-Ast Trl	34	Area 1 (Illwaco) & Astoria Troll
Area2TrlNT	35	Area 2 Troll Non-treaty (Westport)
Area2TrlTR	36	Area 2 Troll Treaty (Westport)
Area 2 Spt	37	Area 2 Sport (Westport)
Area3TrlNT	38	Area 3 Troll Non-treaty (LaPush)
Area3TrlTR	39	Area 3 Troll Treaty (LaPush)
Area 3 Spt	40	Area 3 Sport (LaPush)

Appendix 3. Coho FRAM Fisheries (continued).

Fishery Abbreviation	Fishery Number	Coho FRAM Fishery Long Name
Area 4 Spt	41	Area 4 Sport (Neah Bay)
A4/4BTrlNT	42	Area 4/4B (Neah Bay PFMC Regs) Troll Non-treaty
A4/4BTrlTR	43	Area 4/4B (Neah Bay PFMC Regs) Troll Treaty
A 5-6C Trl	44	Area 5, 6, 6C Troll (Strait of Juan de Fuca)
Willpa Spt	45	Willapa Bay (Area 2.1) Sport
Wlp Tb Spt	46	Willapa Tributary Sport
WlpaBT Net	47	Willapa Bay & FW Trib Net
GryHbr Spt	48	Grays Harbor (Area 2.2) Sport
SGryHb Spt	49	South Grays Harbor Sport (Westport Boat Basin)
GryHbr Net	50	Grays Harbor Estuary Net
Hump R Spt	51	Humptulips River Sport
LwCheh Net	52	Lower Chehalis River Net
Hump R C&S	53	Humptulips River Ceremonial & Subsistence
Chehal Spt	54	Chehalis River Sport
Hump R Net	55	Humptulips River Net
UpCheh Net	56	Upper Chehalis River Net
Chehal C&S	57	Chehalis River Ceremonial & Subsistence
Wynoch Spt	58	Wynochee River Sport
Hoquam Spt	59	Hoquiam River Sport
Wishkh Spt	60	Wishkah River Sport
Satsop Spt	61	Satsop River Sport
Quin R Spt	62	Quinault River Sport
Quin R Net	63	Quinault River Net
Quin R C&S	64	Quinault River Ceremonial & Subsistence
Queets Spt	65	Queets River Sport
Clrwtr Spt	66	Clearwater River Sport
Salm R Spt	67	Salmon River (Queets) Sport
Queets Net	68	Queets River Net
Queets C&S	69	Queets River Ceremonial & Subsistence
Quilly Spt	70	Quillayute River Sport
Quilly Net	71	Quillayute River Net
Quilly C&S	72	Quillayute River Ceremonial & Subsistence
Hoh R Spt	73	Hoh River Sport
Hoh R Net	74	Hoh River Net
Hoh R C&S	75	Hoh River Ceremonial & Subsistence
Mak FW Spt	76	Makah Tributary Sport
Mak FW Net	77	Makah Freshwater Net
Makah C&S	78	Makah Ceremonial & Subsistence
A 4-4A Net	79	Area 4, 4A Net (Neah Bay)
A4B6CNetNT	80	Area 4B, 5, 6C Net Nontreaty (Strait of JDF)

Appendix 3. Coho FRAM Fisheries (continued).

Fishery Abbreviation	Fishery Number	Coho FRAM Fishery Long Name
A4B6CNetTR	81	Area 4B, 5, 6C Net Treaty (Strait of JDF)
Ar6D NetNT	82	Area 6D Dungeness Bay/River Net Nontreaty
Ar6D NetTR	83	Area 6D Dungeness Bay/River Net Treaty
Elwha Net	84	Elwha River Net
WJDF T Net	85	West JDF Straits Tributary Net
EJDF T Net	86	East JDF Straits Tributary Net
A6-7ANetNT	87	Area 7, 7A Net Nontreaty (San Juan Islands)
A6-7ANetTR	88	Area 7, 7A Net Treaty (San Juan Islands)
EJDF FWSpt	89	East JDF Straits Tributary Sport
WJDF FWSpt	90	West JDF Straits Tributary Sport
Area 5 Spt	91	Area 5 Marine Sport (Sekiu)
Area 6 Spt	92	Area 6 Marine Sport (Port Angeles)
Area 7 Spt	93	Area 7 Marine Sport (San Juan Islands)
Dung R Spt	94	Dungeness River Sport
ElwhaR Spt	95	Elwha River Sport
A7BCDNetNT	96	Area 7B-7C-7D Net Nontreaty (Bellingham Bay)
A7BCDNetTR	97	Area 7B-7C-7D Net Treaty (Bellingham Bay)
Nook R Net	98	Nooksack River Net
Nook R Spt	99	Nooksack River Sport
Samh R Spt	100	Samish River Sport
Ar 8 NetNT	101	Area 8 Skagit Marine Net Nontreaty
Ar 8 NetTR	102	Area 8 Skagit Marine Net Treaty
Skag R Net	103	Skagit River Net
SkgR TsNet	104	Skagit River Test Net
SwinCh Net	105	Swinomish Channel Net
Ar 8-1 Spt	106	Area 8.1 Marine Sport
Area 9 Spt	107	Area 9 Marine Sport (Admiralty Inlet)
Skag R Spt	108	Skagit River Sport
Ar8A NetNT	109	Area 8A Stillaguamish/Snohomish Net Nontreaty
Ar8A NetTR	110	Area 8A Stillaguamish/Snohomish Net Treaty
Ar8D NetNT	111	Area 8D Tulalip Bay Net Nontreaty
Ar8D NetTR	112	Area 8D Tulalip Bay Net Treaty
Stil R Net	113	Stillaguamish River Net
Snoh R Net	114	Snohomish River Net
Ar 8-2 Spt	115	Area 8.2 Marine Sport
Stil R Spt	116	Stillaguamish River Sport
Snoh R Spt	117	Snohomish River Sport
Ar 10 Spt	118	Area 10 Marine Sport (Seattle)
Ar10 NetNT	119	Area 10 Net Nontreaty (Seattle)
Ar10 NetTR	120	Area 10 Net Treaty (Seattle)

Appendix 3. Coho FRAM Fisheries (continued).

Fishery Abbreviation	Fishery Number	Coho FRAM Fishery Long Name
Ar10ANetNT	121	Area 10A Net Nontreaty (Elliott Bay)
Ar10ANetTR	122	Area 10A Net Treaty (Elliott Bay)
Ar10ENetNT	123	Area 10E Net Nontreaty (East Kitsap)
Ar10EnetTR	124	Area 10E Net Treaty (East Kitsap)
10F-G Net	125	Area 10F-G Ship Canal/Lake Washington Net Treaty
Duwm R Net	126	Green/Duwamish River Net
Duwm R Spt	127	Green/Duwamish River Sport
L WaSm Spt	128	Lake Washington-Lake Sammamish Tributary Sport
Ar 11 Spt	129	Area 11 Marine Sport (Tacoma)
Ar11 NetNT	130	Area 11 Net Nontreaty (Tacoma)
Ar11 NetTR	131	Area 11 Net Treaty (Tacoma)
Ar11ANetNT	132	Area 11A Net Nontreaty (Commencement Bay)
Ar11ANetTR	133	Area 11A Net Treaty (Commencement Bay)
Puyl R Net	134	Puyallup River Net
Puyl R Spt	135	Puyallup River Sport
Ar 13 Spt	136	Area 13 Marine Sport (South Puget Sound)
Ar13 NetNT	137	Area 13 Net Nontreaty (South Puget Sound)
Ar13 NetTR	138	Area 13 Net Treaty (South Puget Sound)
Ar13CNetNT	139	Area 13C Net Nontreaty (Chambers Bay)
Ar13CNetTR	140	Area 13C Net Treaty (Chambers Bay)
Ar13ANetNT	141	Area 13A Net Nontreaty (Carr Inlet)
Ar13ANetTR	142	Area 13A Net Treaty (Carr Inlet)
Ar13DNetNT	143	Area 13D Net Nontreaty (South Puget Sound)
Ar13DNetTR	144	Area 13D Net Treaty (South Puget Sound)
A13FKNetNT	145	Area 13F-13K Net Nontreaty (South PS Inlets)
A13FKNetTR	146	Area 13F-13K Net Treaty (South PS Inlets)
Nisq R Net	147	Nisqually River Net
McAlls Net	148	McAllister Creek Net
13D-K TSpt	149	13D-13K Tributary Sport (South PS Inlets)
Nisq R Spt	150	Nisqually River Sport
Desc R Spt	151	Deschutes River Sport (Olympia)
Ar 12 Spt	152	Area 12 Marine Sport (Hood Canal)
1212BNetNT	153	Area 12-12B Net Nontreaty (Upper Hood Canal)
1212BNetTR	154	Area 12-12B Net Treaty (Upper Hood Canal)
Ar9A NetNT	155	Area 9A Net Nontreaty (Port Gamble)
Ar9A NetTR	156	Area 9-9A Net Treaty (Port Gamble/On Reservation)
Ar12ANetNT	157	12A Net Nontreaty (Quilcene Bay)
Ar12ANetTR	158	12A Net Treaty (Quilcene Bay)
A12CDNetNT	159	12C-12D Net Nontreaty (Lower Hood Canal)

Appendix 3. Coho FRAM Fisheries (continued).

Fishery Abbreviation	Fishery Number	Coho FRAM Fishery Long Name
A12CDNetTR	160	12C-12D Net Treaty (Lower Hood Canal)
Skok R Net	161	Skokomish River Net
Quilcn Net	162	Quilcene River Net
1212B TSpt	163	12-12B Tributary FW Sport
Quilcn Spt	164	12A Tributary FW Sport (Quilcene River)
12C-D TSpt	165	12C-12D Tributary FW Sport
Skok R Spt	166	Skokomish River Sport
FRSLOW Trm	167	Lower Fraser River Stock Terminal Catch
FRSUPP Trm	168	Upper Fraser River Stock Terminal Catch
Fraser Spt	169	Fraser River/Estuary Sport
JStrBC Trl	170	Johnstone Straits Troll
No BC Trl	171	Northern British Columbia Troll
NoC BC Trl	172	North Central British Columbia Troll
SoC BC Trl	173	South Central British Columbia Troll
NW VI Trl	174	NW Vancouver Island Troll
SW VI Trl	175	SW Vancouver Island Troll
GeoStr Trl	176	Georgia Straits Troll
BC JDF Trl	177	British Columbia Juan de Fuca Troll
No BC Net	178	Northern British Columbia Net
Cen BC Net	179	Central British Columbia Net
NW VI Net	180	NW Vancouver Island Net
SW VI Net	181	SW Vancouver Island Net
Johnst Net	182	Johnstone Straits Net
GeoStr Net	183	Georgia Straits Net
Fraser Net	184	Fraser River Gill Net
BC JDF Net	185	British Columbia Juan de Fuca Net
JStrBC Spt	186	Johstone Strait Sport
No BC Spt	187	Northern British Columbia Sport
Cen BC Spt	188	Central British Columbia Sport
BC JDF Spt	189	British Columbia Juan de Fuca Sport
WC VI Spt	190	West Coast Vancouver Island Sport
NGaStr Spt	191	North Georgia Straits Sport
SGaStr Spt	192	South Georgia Straits Sport
Albern Spt	193	Alberni Canal Sport
SW AK Trl	194	Southwest Alaska Troll
SE AK Trl	195	Southeast Alaska Troll
NW AK Trl	196	Northwest Alaska Troll
NE AK Trl	197	Northeast Alaska Troll
Alaska Net	198	Alaska Net (Areas 182:183:185:192)

Appendix 4. Chinook FRAM Fisheries, with 2005 Calibration's model-stock proportions (stk062sfm05encrate.out)

#	Fishery Name	% Model Stocks	#	Fishery Name	% Model Stocks
1	Southeast Alaska Troll	0.5017	38	T San Juan Net (Area 6A,7,7A)	1.0000
2	Southeast Alaska Net	0.2061	39	NT Nooksack-Samish Net	1.0000
3	Southeast Alaska Sport	0.2746	40	T Nooksack-Samish Net	1.0000
4	North/Central British Columbia Net	0.5541	41	T Juan de Fuca Troll (Area 5,6,7)	1.0000
5	West Coast Vancouver Island Net	0.5399	42	Area 5/6 Sport	0.8723
6	Strait of Georgia Net	0.6767	43	NT Juan de Fuca Net (Area 4B,5,6,6C)	1.0000
7	Canada Juan de Fuca Net (Area 20)	0.9131	44	T Juan de Fuca Net (Area 4B,5,6,6C)	0.8837
8	North/Central British Columbia Sport	0.8459	45	Area 8 Sport [a]	1.0000
9	North/Central British Columbia Troll	0.5600	46	NT Skagit Net (Area 8)	1.0000
10	West Coast Vancouver Island Troll	0.8178	47	T Skagit Net (Area 8)	1.0000
11	West Coast Vancouver Island Sport	1.0000	48	Area 8D Sport	1.0000
12	Strait of Georgia Troll	0.6209	49	NT Stilly-Snohomish Net (Area 8A)	1.0000
13	North Strait of Georgia Sport	1.0000	50	T Stilly-Snohomish Net (Area 8A)	1.0000
14	South Strait of Georgia Sport	1.0000	51	NT Tulalip Bay Net (Area 8D)	1.0000
15	BC Juan de Fuca Sport	0.8596	52	T Tulalip Bay Net (Area 8D)	1.0000
16	NT Cape Flattery-Quillayute Troll (Area 3-4)	0.9192	53	Area 9 Sport	1.0000
17	T Cape Flattery-Quillayute Troll (Area 3-4)	0.8164	54	NT Area 6B/9 Net [b]	1.0000
18	Cape Flattery-Quillayute Sport (Area 3-4)	0.8343	55	T Area 6B/9 Net	1.0000
19	Cape Flattery-Quillayute Net (Area 3-4)	1.000	56	Area 10 Sport	1.0000
20	NT Grays Harbor Troll (Area 2)	0.8926	57	Area 11 Sport	1.0000
21	T Grays Harbor Troll (Area 2)	0.4774	58	NT Area 10/11 Net	1.0000
22	Grays Harbor Sport (Area 2)	0.6961	59	T Area 10/11 Net	1.0000
23	NT Grays Harbor Net	0.1243	60	NT Area 10A Net	1.0000
24	T Grays Harbor Net	0.0305	61	T Area 10A Net	1.0000
25	Willapa Net	0.1641	62	NT Area 10E Net	1.0000
26	NT Columbia River Troll (Area 1)	1.0000	63	T Area 10E Net	1.0000
27	Columbia River Sport (Area 1)	0.6846	64	Area 12 Sport	1.0000
28	Columbia River Net	2.0698	65	NT Hood Canal Net (Area 12,12B,12C)	1.0000
29	Buoy 10 Sport	1.0000	66	T Hood Canal Net (Area 12,12B,12C)	1.0000
30	Orford Reef-Cape Falcon Troll (Central OR)	0.1606	67	Area 13 Sport	1.0000
31	Orford Reef-Cape Falcon Sport (Central OR)	0.2150	68	NT Deep S. Puget Sound Net (13,13D-K)	1.0000
32	Horse Mountain-Orford Reef Troll (KMZ)	0.0059	69	T Deep S. Puget Sound Net (13,13D-K)	1.0000
33	Horse Mountain-Orford Reef Sport (KMZ)	0.0756	70	NT Area 13A Net	1.0000
34	Southern California Troll	0.0006	71	T Area 13A Net	1.0000
35	Southern California Sport	0.0001	72	Freshwater Sport	1.0000
36	Area 7 Sport	1.0000	73	Freshwater Net [c]	1.0000
37	NT San Juan Net (Area 6A,7,7A)	1.0000			

Notes: * (T = Treaty; NT = Non-treaty)

[a] Sport areas 8-1 and 8-2 were combined and input into Fishery 45.

[b] With split of Area 5/6 sport, Fishery 42 remains as Area 5 only while Fishery 54 used to model Area 6 sport.

[c] In Puget Sound, Fishery 73 combines Area 11A with Puyallup River; Areas 9A, 12A, 12D with Hood Canal; Area 13C with Chambers Creek.

Appendix 5. Coho TAAETRSnum.txt file, with FRAM Stock and Fishery ID numbers for calculation of Puget Sound fishery's TAA and ETRS abundance levels.

1, 12,*17,18,19,20,21,22,23,24,25,26,27,28*,05,101,102,103,104,105,04,05,01 "Skagit NT TAA"
2, 10,*29,30,31,32,33,34,35,36,37,38*,06,109,110,111,112,113,114,04,05,01 "Stilly-Snoh TAA"
3, 20,*41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60*,15,152,153,154,155,156,157,158,159,160,161,162,163,164,165,166,04,05,01 "Hood Canal T TAA"
4,46,*61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106*,25,
119,120,121,122,123,124,125,126,130,131,132,133,134,137,138,139,140,141,142,143,144,145,146,147,148,04,05,01 "SPS TAA"
5, 16,*91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106*,08,119,120,121,122,123,124,125,126,04,05,01 "SPS Ar 10 TAA"
6, 8,*83,84,85,86,87,88,89,90*,05,130,131,132,133,134,04,05,01 "SPS Ar 11 TAA"
7, 22,*61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82*,16,136,137,138,139,140,141,142,143,144,145,146,147,148,149,150,151,04,05,01 "SPS Ar 13 TAA"
8, 16,*01,02,03,04,05,06,07,08,09,10,11,12,13,14,15,16*,03,96,97,98,04,05,01 "Nook/Sam TAA"
9, 16,*107,108,109,110,111,112,113,114,115,116,117,118,119,120,121,122*,09,82,83,84,85,86,89,90,94,95,04,05,01 "Straits TAA"
10, 4,*17,18,23,24*,04,103,104,105,108,04,05,00 "Skagit Wild ETRS"
11, 12,*17,18,19,20,21,22,23,24,25,26,27,28*,04,103,104,105,108,04,05,00 "Skagit ETRS"
12, 4,*29,30,31,32*,01,113,04,05,01 "Stilly TAA"
13, 4,*35,36,37,38*,02,114,117,04,05,00 "Snoh ETRS"
14, 2,*33,34*,02,111,112,04,05,01 "Tulalip H TAA"
15, 6,*45,46,55,56,59,60*,10,155,156,157,158,161,162,163,164,165,166,04,05,00 "HC Wld (no 9A,12A) ETRS"
16, 4,*67,68,69,70*,03,147,148,150,04,05,01 "SPS Nisq H&W TAA"
17, 4,*41,42,43,44*,02,155,156,04,05,00 "HC 9A H&W ETRS"
18, 6,*01,02,03,04,05,06*,02,98,99,04,05,01 "Nooksack TAA no sport"
19, 4,*115,116,121,122*,02,86,89,04,05,01 "E JDF TAA"
20, 4,*107,108,109,110*,03,82,83,94,04,05,01 "Dung Bay T TAA"
21, 4,*111,112,113,114*,02,84,95,04,05,01 "Elwha TAA"
22, 2,*117,118*,02,85,90,04,05,01 "W. JDF TAA"
23, 4,*41,42,43,44*,02,155,156,04,05,01 "HC 9A H&W TAA"
24, 6,*47,48,49,50,51,52*,04,157,158,162,164,04,05,01 "Quil Bay 12A TAA"
25, 2,*53,54*,00,04,05,00 "Hdspt Hatchery ETRS"
26, 4,*57,58,59,60*,02,161,166,04,05,01 "Skokomish R TAA"
27, 4,*99,100,101,102*,02,125,128,04,05,01 "TAA LaWA"
28, 6,*95,96,97,98,103,104*,02,126,127,04,05,01 "TAA DuwamGrn"
29, 2,*65,66*,01,144,04,05,01 "TAA So Sound Net Pens only"
30, 4,*83,84,85,86*,02,134,135,04,05,01 "TAA Puyallup"
31, 4,*73,74,81,82*,02,141,142,04,05,01 "TAA Ar 13A H&W"
32, 2,*65,66*,00,04,05,00 "ETRS So Sound Net Pens"
33, 12,*17,18,19,20,21,22,23,24,25,26,27,28*,06,101,102,103,104,105,108,04,05,01 "Skagit T TAA"
34, 8,*53,54,55,56,57,58,59,60*,05,159,160,161,165,166,04,05,01 "HC 12CD TAA"

Appendix 5. Coho TAAETRSnum.txt file, with FRAM Stock and Fishery ID numbers for calculation of Puget Sound fishery's TAA and ETRS abundance levels (continued).

35, 20,*41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60*,10,153,154,155,156,157,158,159,160,161,162,04,05,01 "Hood Canal NT TAA"
36, 4,*91,92,93,94*,02,123,124,04,05,01 "Area 10E TAA"
37, 4,*83,84,85,86*,04,132,133,134,135,04,05,01 "Area 11A TAA"
38, 6,*61,62,63,64,65,66*,06,143,144,145,146,149,151,04,05,01 "Deep SPS TAA"
39, 4,*107,108,109,110*,02,82,83,04,05,01 "Dung Bay NT TAA"
40, 6,*47,48,49,50,51,52*,02,162,164,04,05,01 "Quil R TAA"
41, 16,*01,02,03,04,05,06,07,08,09,10,11,12,13,14,15,16*,05,96,97,98,99,100,04,05,01 "Nook/Sam TAA with sport"

Appendix 6. Puget Sound FRAM and TAMM Chinook Stocks.

Unmarked Stock #	FRAM Puget Sound Stock Names	TAMM Puget Sound stock components (per 2005 Planning Cycle)
1	Nooksack-Samish summer/fall	Nooksack R & Samish R: composite of all hatchery & natural
		Glenwood Springs Hatchery
3	North Fork Nooksack early (spring)	Nooksack R spring hatchery & natural stocks
5	South Fork Nooksack early (spring)	
7	Skagit summer/fall fingerling	Skagit River summer/fall fingerling hatchery & natural
9	Skagit summer/fall yearling	Skagit River summer/fall yearling hatchery & natural
11	Skagit spring yearling	Skagit River spring hatchery & natural
13	Snohomish summer/fall fingerling	Snohomish R summer/fall fingerling hatchery & natural
15	Snohomish summer/fall yearling	Snohomish R summer/fall yearling hatchery & natural
		Skykomish R natural as percent of Snohomish R natural
17	Stillaguamish summer/fall fingerling	Stillaguamish River summer/fall natural
19	Tulalip summer/fall fingerling	Tulalip Hatchery
21	Mid S. Puget Sound fall fingerling	Gorst Ck Hatchery
		Grovers Ck Hatchery
		Lake Washington hatchery and natural (Cedar River)
		Green River, hatchery & natural
		Puyallup River, hatchery & natural
23	UW Accelerated fall fingerling	University of Washington Hatchery
25	Deep S. Puget Sound fall fingerling	McAllister Creek Hatchery
		Nisqually River, hatchery & natural
		Minter Creek Hatchery
		Chambers Creek Hatchery
		Deschutes River & Capital Lake hatchery
		Coulter Creek & Misc Area 13D-K hatchery
27	South Puget Sound fall yearling	Contribution amount from each South Sound hatchery
29	White River spring fingerling	White River spring hatchery & natural
31	Hood Canal fall fingerling	Area 12C-D natural
		Skokomish R, hatchery & natural
		Area 12B, mid-Hood Canal natural
		Hoodsport Hatchery
33	Hood Canal fall yearling	Hood Canal fall yearling
35	Juan de Fuca Tribs. fall fingerling	Hoko R, hatchery & natural
		Dungeness early, hatchery & natural
		Elwha, composite hatchery & natural
65	White River spring yearling	Not modeled in TAMM

Appendix 7. Puget Sound FRAM and TAMM Chinook Fisheries.

FRAM Fishery #	FRAM Puget Sound Fisheries	TAMM Fishery Components of FRAM Fisheries.
36	Area 7 Sport	Area 7 Sport
37	NT San Juan Net (Area 6A,7,7A)	NT San Juan Net (Area 6A,7,7A)
38	T San Juan Net (Area 6A,7,7A)	T San Juan Net (Area 6A,7,7A)
39	NT Nooksack-Samish Net	NT Nooksack-Samish Net
40	T Nooksack-Samish Net	T Nooksack-Samish Marine Net
		T Nooksack-Samish Freshwater Net
41	T Juan de Fuca Troll (Area 5,6,7)	T Juan de Fuca Troll (Area 5,6,7)
42	Area 5/6 Sport	Area 5/6 Sport
43	NT Juan de Fuca Net (Area 4B,5,6,6C)	NT Juan de Fuca Net (Area 4B,5,6,6C)
44	T Juan de Fuca Net (Area 4B,5,6,6C)	T Juan de Fuca Net (Area 4B,5,6,6C)
45	Area 8 Sport [1]	Area 8 Sport [1]
46	NT Skagit Net (Area 8)	NT-Pink, and NT-Chum
47	T Skagit Net (Area 8)	T Marine: Chinook, Pink, Coho, Chum,
		and Steelhead directed.
		T Coho Evaluation, and T Bay Test Fishery
48	Area 8D Sport	Area 8D Sport
49	NT Stilly-Snohomish Net (Area 8A)	NT 8A pink, NT 8A coho, and NT 8A chum
50	T Stilly-Snohomish Net (Area 8A)	T 8A Chinook, T 8A pink, T 8A coho directed,
		T 8A chum and steelhead, and 8A test fishery
51	NT Tulalip Bay Net (Area 8D)	NT Tulalip Bay Net (Area 8D)
52	T Tulalip Bay Net (Area 8D)	T Tulalip Bay Net (Area 8D)
53	Area 9 Sport	Area 9 Sport
54	NT Area 6B/9 Net	NT Area 6B/9 Net
55	T Area 6B/9 Net	T Area 6B/9 Net
56	Area 10 Sport	Area 10 Sport
57	Area 11 Sport	Area 11 Sport
58	NT Area 10/11 Net	NT Area 10/11 Net
59	T Area 10/11 Net	T Area 10/11 Net, and Area 10/11 test fisheries
60	NT Area 10A Net	NT Area 10A Sport
61	T Area 10A Net	T Area 10A Net, and Area 10A test fishery
62	NT Area 10E Net	NT Area 10E Sport
63	T Area 10E Net	T Area 10E Net
64	Area 12 Sport	Area 12 Sport
65	NT Hood Canal Net (Area 12,12B,12C)	NT Marine: Chinook, coho, & chum
		NT 9A, 12A: coho, & chum

Appendix 7 Chinook Puget Sound FRAM and TAMM Fisheries (continued).

FRAM Fishery #	FRAM Puget Sound Fisheries	TAMM Fishery Components of FRAM Fisheries.
66	T Hood Canal Net (Area 12,12B,12C)	T Marine: Chinook, coho, & chum
		T 9A, 12A: Chinook, coho, & chum
67	Area 13 Sport	Area 13 Sport
68	NT Deep South Puget Sound Net	NT Deep S. Puget Sound Net (Area 13,13D-K)
69	T Deep South. Puget Sound Net	T Deep S. Puget Sound Net (Area 13,13D-K)
70	NT Area 13A Net	NT Area 13A Net
71	T Area 13A Net	T Area 13A Net
72	Freshwater Sport	Freshwater sport fisheries modeled in TAMM include:
		Aggregated Bellingham Bay tributaries (Nooksack, Samish, etc),
		Skagit R, Stillaguamish R., Snohomish R., Lake Washington,
		Lake Sammamish, Duwamish-Green R., Puyallup R., Carbon R.,
		Nisqually R., McAllister Ck., Chambers Ck., Minter Ck.,
		DeschutesR/Capital Lake, Kennedy/Johns/misc. “13B” Creeks,
		Skokomish R., Misc. Area 12B tributaries, Quilcene R.,
		Misc. Area 12C/D tribs, Dungeness R., Elwha R., and Hoko R.
		Mark Selective FW sport fisheries have included:
		Carbon R., Puyallup R., Skykomish R., and Nooksack R.
73	Freshwater Net	Freshwater net fisheries modeled in TAMM include: [2]
		T Skagit R: Chinook, Pink, Coho, Chum, Steelhead;
		T Skagit R Coho Evaluation, Skagit R Test Fishery;
		T Swinomish Channel;
		T Stillaguamish R: Chinook, pink, coho, chum;
		T Snohomish R commercial, Snohomish R test;
		T Skokomish R: Chinook, coho, and chum;
		T Hoodsport Hatchery Seine:
		T Lake Washington, T Lake Sammamish; T Duwamish/Green R;
		Puyallup R test fishery, T Puyallup R; T Minter Ck;
		White R Springs impacts: 11A/Puyallup R net, C&S in White R;
		T McAllister Ck; T Nisqually R; T Chambers (13C & 83H)

Notes:
* (T = Treaty; NT = Nontreaty)
1 Sport areas 8-1 and 8-2 were combined and input into Fishery 45 as Area 8 Sport.
2 Puget Sound TAMM includes: Area 11A with Puyallup River; Area 13C with Chambers Creek.

Appendix 8. Coho "North of Falcon" TAMM Reports.

TABLE 1: DESCRIPTION OF FISHERY REGULATIONS AND SUMMARY OF COHO CATCH TARGETS							
Fishery Regulation Assessment Model Run Numb	0619						08/02/06
Run Description:	FINAL PFMC 80K NT, 37.5K TT; SOF 20K						11:06 AM
Impacts expressed as total fishery-related mortality, including landed catch, non-retention mortality, and other							
fishery-related mortality; except where noted.							
Fishery			Catch + Mortality	Comments			
CANADIAN (B.C.) FISHERIES:							
WCVI Troll			1,843	Incidental			
Area 20 Net			179	Incidental			
Georgia St. Sport			9,346	Selective fishery			
Georgia St. Troll			0	Assumes no Gulf troll fishery			
SOUTH OF CAPE FALCON:			34,590	Sport TAC 20K selective			
NORTH OF CAPE FALCON OCEAN:							
Treaty Ocean Troll			40,138	TAC 37.5K coho			
NT Ocean Troll			13,005	Troll TAC 6,800 selective			
NT Ocean Sport			91,912	Sport TAC 73,200 coho, selective			
NT North-of-Falc. total:			104,917				
4B Add-on			3,000	3K 4B Add-on fishery			
Canadian License catch			50	(For Areas 4 and 4B) Landed catch only			
Buoy 10			9,879	Total Mortality			
PUGET SOUND SPORT & TROLL:							
Treaty Strait Troll		914		Source data for treaty troll are from 1996-2005.			
P.S. Sport:	Area 5	43,137	5/1-6/30 clsd; 7/1-8/31 or quota 3.5K ch MSF, expt ch NR east of Ediz, cm NR; '7/1-9/30, 2 bag, co MSF, cm NR;				
			A 5: 10/1-10/31 Closed except Dung Bay; 11/1-11/30 2/1 bag; A6: 10/1-10/31 2/1, 11/1-11/30 clsd;				
			Both areas clsd 12/1-2/15 clsd; 2/16-4/10 1 bag; 4/11-4/30 clsd; Dung Bay				
			10/1-10/31, 2 bag, co only; Kydak,FWBy,PA Har, DiscBy, SeqBy time closures				
	Area 6	9,605	SAME AS AREA 5 DESCRIPTION				
	Area 7	3,325	5/1-6/30 clsd; 7/1-7/31, 2/1 bag; 8/1-9/30, 2/1 bag, co MSF, cm NR; 10/1-10/31 2/1 bag;				
			11/1-11/30 2 bag ch NR; 12/1-1/31 clsd; 2/1-3/31 1 bag; 4/1-4/30 clsd; B'Bay, 8/16-10/31, 4/2 bag;				
			S. Rosario, E. JDF clsd 7/1-9/30; B Bay - clsd 7/1 thru 8/15; Samish Bay - clsd 7/1-10/15.				
	Area 8-1	1,792	5/1-7/31 clsd; 8/1-9/30, 2 bag, ch NR; 10/1-4/30, 2 bag, ch MSF.				
	Area 8-2	9,623	5/1-7/31 clsd; 8/1-9/30, 2 bag, ch NR; 10/1-4/30, 2 bag, ch MSF;Tul. Term Area, 6/2-9/25, Fri - 12p Mon, except closed 6/17?, 2 bag.				
	Area 9	21,711	5/1-7/15 clsd; 7/16-9/30, 2 bag, ch NR, cm NR 8/1-9/30; 10/1-10/31, 2 bag, ch NR;				
			11/1-11/30 2/1 bag; 12/1-1/31 closed; 2/1-4/15, 1 bag; 4/16 - 4/30 closed.				
	Area 10	20,958	5/1-6/15, closed; 6/1-6/30 C&R; 7/1-9/30, 2 bag, ch NR, cm NR 8/1-9/15; 10/1-10/15, 2 bag, ch NR;				
			10/16-11/30, 2/1 bag; 12/1-1/31, bag 1; 2/1-4/30 closed; Elliott Bay and Inner Bay Closed:7/1-8/31;				
			Agate Closed 1/1-3/31; Shilshole closed 7/1-8/31; E' Bay: 7/14-8/20, Fri - Sun, bag 2, cm NR 8/1-9/15;				
			Sinc TAF, 7/1-9/30, 2 bag, cm NR 8/1-9/15				
	Area 11	7,737	5/1-5/31 closed; 6/1 - 6/30, 2 bag; 7/1-9/30, 2 bag; 10/1 - 10/31, 2 bag; 11/1-12/31, 2/1 bag;				
			1/1-2/15 clsd; 2/16-4/10, 1 bag; 4/11-4/30 Closed. Commencement Bay closure: 6/1-8/11;				
			Piers Yr-Round: Dash Pt, Pt Def., Les Davis, Des Moines, & Redondo, 2/1 bag.				
	Area 13	1,952	5/1-6/31, 2 bag; 7/1-10/31, 2 bag, co MSF; 11/1-12/31, 2/1 bag; 1/1-1/31, bag-1; 2/1-2/31 clsd; 3/1-4/30 bag-1;				
			Carr Inlet Closure: 4/16-7/31; 'Minter closed 7/1-9/30; Budd closures 7/16-10/31				
	Area 12	2,626	Entire Area: 5/1-6/30 clsd; So. Ayock 7/1-10/15, 4/2 bag cm NR; No. Ayock 7/1-8/31 clsd; 9/1-10/15, 4 co only;				
			Entire Area continued: 10/16-12/31, bag - 4/1; 1/1-2/15 clsd; 2/16-4/10, 1 bag; 4/11-4/30 clsd.				
			Hoodsport: 7/1-12/31, bag-4/2, cm NR 7/1-10/15; Quilcene Bay: 8/16-8/31, bag - 4 coho only.				
PUGET SOUND NET:		JUL	AUG	SEP	OCT-DEC	TOTAL	
JDF 4B/5/6C Net NTrty		0	0	0	0	0	
Trty		918	3,162	1,479	1,785	7,344	
SJI 6/7/7A Net NTrty		6	2,509	738	2,160	5,413	
Trty		16	197	0	8,812	9,025	
JDF Sockeye/Pink:		Trty (GN): wb 7/16 - wb 8/11, 6-6-6-6-6					
JDF Coho:		Trty (GN): wb 9/3 - wb 10/1, 5-5-5-5-5					
JDF Chum:		Trty (GN): wb 10/8 - wb 11/5, 6-6-6-6-6					
SJI Coho:		Ntrty (RN): wb 7/30 - wb 9/24, at end Panel control, selective through wb 9/24, ck NR, cm NR through 9/30.					
SJI Sockeye/Pink:		Ntrty (GN/PS/RN): wb7/30 - wb8/20, 1-4-4-3 , PS coho NR					
		Trty (GN/PS): wb 7/30 -wb 8/20					
SJI Chum:		Ntrty (RN): wb10/1 - wb11/5; (GN/PS): wb10/8 - wb11/5, 3-3-3-3-3, PS coho NR					
		Trty (GN/PS): wb 10/8 - wb 11/05					

Appendix 8 Coho "North of Falcon" TAMM reports (continued).

TABLE 2A: COHO FISHERY IMPACT SUMMARY HIGHLIGH

Estimated fishery impacts from regulations described by the following FRAM — 08/02/06
FRAM Run Number: 0619 — 01:51 PM
Run Description: FINAL PFMC 80K NT, 37.5K TT; SOF 20K
Impacts are expressed as total fishery-related mortality, incl. landed catch, non-retention mort., and other fishery-related mort.

	ALL STOCKS MORTALITY			SKAGIT				STILLY	SNOHOM	STILLAGUAMISH/SNOHOMISH		
FISHERY	Marked	UnMarked	Total	Wild	Marked	UnMarked	Total	Wild	Wild	Marked	UnMarked	Total
Projected Spawning Escapement				68,645	10,179	70,785	80,964	27,091	86,090	9,130	132,602	141,732
Spawning Escapement Breakpoint				25,000				10,000	50,000			
Projected Exploitation Rate (all fisheries)				36%				40%	39%			
Exploitation Rate Ceiling				60%				50%	60%			
Exploitation in Southern U.S. Fisheries				34%				38%	36%			
CANADIAN	72,763	553,890	626,653	1,069	1,216	1,110	2,326	721	2,241	2,325	4,038	6,363
ALASKA	55,043	96,139	151,182	1	0	1	1	0	0	0	0	0
S. of Falcon Troll	1,646	1,723	3,369	19	3	19	22	12	40	6	72	78
S. of Falcon Sport	23,444	7,778	31,222	40	27	41	68	31	93	63	169	232
NORTH OF CAPE FALCON OCEAN:												
Treaty Troll	16,460	23,679	40,139	2,151	301	2,205	2,506	1,340	4,159	731	7,512	8,243
NT Troll N. Leadbttr	4,747	3,229	7,976	161	65	166	231	149	461	164	833	997
NT Troll S. Leadbttr	3,883	1,147	5,030	38	13	39	52	31	96	29	173	202
Sport: Area 1	38,469	3,949	42,418	40	26	41	67	31	96	72	174	246
Buoy 10	8,717	1,161	9,878	13	11	13	24	4	14	9	25	34
Area 2	28,822	4,837	33,659	188	161	195	356	91	284	266	513	779
Area 3	2,004	549	2,553	30	21	31	52	23	72	56	131	187
Area 4 *	10,386	2,896	13,282	357	277	367	644	174	539	480	973	1,453
PUGET SOUND:												
Treaty Troll	303	610	913	88	12	91	103	51	158	23	284	307
Sport: Area 5	32,051	11,086	43,137	1,300	985	1,338	2,323	738	2,292	2,394	4,142	6,536
Area 6	4,977	4,628	9,605	592	184	609	793	333	1,030	448	1,753	2,201
Area 7	1,807	1,518	3,325	66	28	68	96	75	233	73	402	475
Area 8-1,2	2,068	9,349	11,417	2,416	408	2,478	2,886	1,085	3,959	298	6,027	6,325
Area 9	7,696	14,014	21,710	2,242	336	2,302	2,638	1,232	3,822	664	6,856	7,520
Area 12	1,045	1,581	2,626	4	1	5	6	0	1	0	2	2
Area 10	11,084	9,874	20,958	882	138	904	1,042	295	917	175	1,656	1,831
Area 11	5,099	2,638	7,737	95	14	97	111	28	87	13	156	169
Area 13	1,455	497	1,952	33	7	33	40	3	8	12	14	26
Freshwater Sport	n/a	n/a	n/a	3,784	n/a	n/a	5,306	960	5,789	171	7,281	7,452
Pre-terminal net:												
6/7/7A NTrty	2,780	2,634	5,414	200	46	206	252	64	198	73	352	425
6/7/7A Trty	4,576	4,449	9,025	273	39	281	320	64	202	121	344	465
4B/5/6C NTrty	0	0	0	0	0	0	0	0	0	0	0	0
4B/5/6C Trty	2,550	4,794	7,344	434	70	448	518	327	1,016	155	1,819	1,974
6B/9 NTrty	0	0	0	0	0	0	0	0	0	0	0	0
6B/9 Trty	0	0	0	0	0	0	0	0	0	0	0	0
Terminal net:												
Skagit Bay (8) NTrty	11	48	59	45	9	46	55	0	0	1	1	2
Skagit Bay (8) Trty	423	1,999	2,422	1,812	347	1,885	2,232	15	48	29	86	115
Area 8A Ntrty	575	2,065	2,640	242	44	249	293	265	877	168	1,773	1,941
Area 8A Trty	3,859	25,802	29,661	2,551	459	2,638	3,097	3,179	10,622	2,458	22,539	24,997
Hood Canal NTrty	1,367	2,254	3,621	7	1	7	8	11	36	5	63	68
Hood Canal Trty	6,234	7,013	13,247	5	1	5	6	19	61	8	108	116
South Pgt Snd NTrty	849	609	1,458	24	4	24	28	20	62	16	107	123
South Pgt Snd Trty	46,059	15,516	61,575	421	77	436	513	337	1,047	273	1,862	2,135
B'ham Bay(7B) Ntrty	5,336	1,920	7,256	36	5		5	16	48	7	86	93
B'ham Bay(7B) Trty	17,538	6,301	23,839	133	21	137	158	49	150	21	263	284
Local Extreme Terminal Net:												
Nontreaty	Refer to TAMMs for			0	0	0	0	167	515	299	1,819	2,118
Treaty	individual stocks			15,379	2,152	15,860	18,012	6,293	13,171	7,973	48,557	56,530
Test				1,297	235	1,351	1,586	n/a	n/a			

* Area 4 Sport numbers include 4B add-on, if any, and a number of fish caught on Canadian licenses in areas 4 and 4B.
FRAM assumes that there are no changes in the relative exploitation rates of model stocks estimated from the base period (1986-91). The possibility exists that with the changes to the structure of a fishery the relative exploitation rates of the stock may change as well, though an anlysis of the data has yet to be done.

RECAPITULATION OF IMPACTS ACCOUNTING:				WILD			TOTAL	WILD	WILD			TOTAL
Nontreaty Total Wild Impacts:				12,854			17,398	5,838	21,569			41,515
Treaty Total Wild Impacts:				23,247			27,465	11,674	30,634			95,166
Amt NT above (or below) T:				(10,393)			(10,067)	(5,836)	(9,065)			(53,651)
Nontreaty Wild Impacts w/o SOF:				12,795			17,308	5,795	21,436			41,205
Treaty Wild Impacts w/o SOF:				23,247			27,465	11,674	30,634			95,166
Amt NT above (or below) T w/o SOF:				(10,452)			(10,157)	(5,879)	(9,198)			(53,961)

Appendix 8 Coho "North of Falcon" TAMM reports (continued).

TABLE 2B: COHO FISHERY IMPACT SUMMARY HIGHLIGHTS 08/02/06

Estimated fishery impacts from regulations described by the following FRAM run: 02:08 PM

FRAM Run Number: 0619

Run Description: FINAL PFMC 80K NT, 37.5K TT; SOF 20K

Impacts are expressed as total fishery-related mortality, incl. landed catch, non-retention mort., and other fishery-related mort.

	HOOD CANAL				JUAN DE FUCA TRIBUTARIES			
FISHERY	Wild	Marked	UnMarked	Total	Wild	Marked	UnMarked	Total
Projected Spawning Escapement	37,597	14,096	40,219	54,315	23,148	5,280	26,325	31,605
Spawning Escapement Breakpoint	14,350			54,315	11,000			31,605
Projected Exploitation Rate (all fisheries)	37%				11%			
Exploitation Rate Ceiling	65%				40%			
Exploitation in Southern U.S. Fisheries	33%				8%			
CANADIAN	1,467	2,474	1,550	4,024	426	442	535	977
ALASKA	0	3	0	3	6	3	7	10
S. of Falcon Troll	18	13	20	33	18	9	22	31
S. of Falcon Sport	24	72	26	98	62	70	79	149
NORTH OF CAPE FALCON OCEAN:								
Treaty Troll	937	1,396	1,109	2,505	533	251	671	922
NT Troll N. Leadbttr	177	353	204	557	48	61	61	122
NT Troll S. Leadbttr	34	58	38	96	13	17	17	34
Sport: Area 1	27	171	32	203	30	76	38	114
Buoy 10	2	7	2	9	1	1	1	2
Area 2	100	378	110	488	49	121	62	183
Area 3	45	87	48	135	3	9	4	13
Area 4 *	259	1,038	289	1,327	13	35	16	51
PUGET SOUND:								
Treaty Troll	51	49	59	108	7	4	9	13
Sport: Areas 5	1,307	5,300	1,457	6,757	809	1,982	1,016	2,998
Area 6	927	1,280	1,029	2,309	231	208	295	503
Area 7	0	92	5	97	0	0	0	0
Area 8	74	114	92	206	0	0	0	0
Area 9	1,671	1,632	1,913	3,545	30	17	36	53
Area 12	1,394	991	1,555	2,546	0	0	0	0
Area 10	654	720	752	1,472	26	14	33	47
Area 11	121	126	140	266	0	0	0	0
Area 13	18	18	21	39	0	0	0	0
Freshwater Sport	1,501	9,274	2,887	12,161	5	1,833	1,179	3,012
Pre-terminal net:								
6/7/7A NTrty	78	109	91	200	9	12	12	24
6/7/7A Trty	7	42	13	55	23	18	29	47
4B/5/6C NTrty	0	0	0	0	0	0	0	0
4B/5/6C Trty	535	498	610	1,108	417	178	525	703
6B/9 NTrty	0	0	0	0	0	0	0	0
6B/9 Trty	0	0	0	0	0	0	0	0
Terminal net:								
Skagit Bay (8) NTrty	0	0	0	0	0	0	0	0
Skagit Bay (8) Trty	4	3	5	8	0	0	0	0
Area 8A Ntrty	5	12	7	19	1	0	1	1
Area 8A Trty	100	122	120	242	3	2	4	6
Hood Canal NTrty	1,321	504	1,403	1,907	12	8	15	23
Hood Canal Trty	4,227	1,415	4,516	5,931	17	12	22	34
South Pgt Snd NTrty	119	104	135	239	3	2	4	6
South Pgt Snd Trty	1,787	1,575	2,025	3,600	33	23	41	64
B'ham Bay(7B) Ntrty	8	6	9	15	0	0	0	0
B'ham Bay(7B) Trty	29	20	33	53	0	0	0	0
Local Extreme Terminal Net:								
Nontreaty	539	645	631	1,276	0	1048	580	1,628
Treaty	2,645	6,839	3,699	10,538	10	1900	1189	3,089
Test	n/a			n/a	n/a			n/a
Total	22212			64175	2838			14859

* Area 4 Sport numbers include 4B add-on, if any, and a number of fish caught on Canadian licenses in areas 4 and 4B.

RECAPITULATION OF IMPACTS ACCOUNTI	WILD			TOTAL	WILD			TOTAL
Nontreaty Total Wild Impacts:	10,423			36,000	1,363			8,994
Treaty Total Wild Impacts:	10,322			24,148	1,043			4,878
Amt NT above (or below) T:	101			11,852	320			4,116
Nontreaty Wild Impacts w/o SOF:	10,381			35,869	1,283			8,814
Treaty Wild Impacts w/o SOF:	10,322			24,148	1,043			4,878
Amt NT above (or below) T w/o SOF:	59			11,721	240			3,936

Appendix 8 Coho "North of Falcon" TAMM reports (continued).

TABLE 2C: COHO FISHERY IMPACT SUMMARY HIGHLIGHTS

Estimated fishery impacts from regulations described by the following FRAM run: 08/02/06 2:08:14 PM

FRAM Run Number: 0619

Run Description: FINAL PFMC 80K NT, 37.5K TT; SOF 20K

Impacts are expressed as total fishery-related mortality, incl. landed catch, non-retention mort., and other fishery-related mort. Trty/NonTrty splits are NOT based on CWT recovery data.

FISHERY	QUIL FALL Wild	HOH Wild	QUILLAYUTE FALL H&W Marked	QUILLAYUTE FALL H&W UnMarked	QUILLAYUTE FALL H&W Total	QUEETS Wild	QUEETS Suppl.	QUEETS Hatchery	QUEETS Marked	QUEETS UnMarked	QUEETS Total	GRAYS HARBOR Wild	GRAYS HARBOR Marked	GRAYS HARBOR UnMarked	GRAYS HARBOR Total
Projected Ocean Escapement	13,032	5,559	7,054	14,273	21,327	7,121	0	9,953	1,245	15,869	17,114	60,301	43,541	61,575	105,116
Spawning Escapement Objective	6,300	2,000				5,800						35,400			
Projected Marine Exploitation Rate	9%	12%				11%						7%			
Projected Exploitation Rate (all fisheries)	57%	45%				29%						45%			
Exploitation in Southern U.S. marine Fisheries	7%	9%				8%						5%			
CANADIAN	255	190	257	279	536	190	0	342	112	419	531	1,611	2,766	1,643	4,409
ALASKA	8	0	5	9	14	1	0	2	0	3	3	47	40	47	87
S. of Falcon Troll	29	8	17	32	49	15	0	22	3	35	38	50	30	52	82
S. of Falcon Sport	47	15	125	52	177	40	0	78	30	88	118	127	252	129	381
NORTH OF CAPE FALCON OCEAN:															
Treaty Troll	477	317	281	523	804	248	0	348	47	549	596	1,774	1,080	1,799	2,879
NT Troll N. Leadbttr	126	44	157	139	296	78	0	120	25	173	198	127	185	129	314
NT Troll S. Leadbttr	26	14	37	28	65	21	0	35	10	46	56	97	160	98	258
Coastal terminal area "dip-ins"	181	62	104	199	303	371	0	481	56	775	831	522	335	531	866
Sport: Area 1	48	14	138	52	190	40	0	86	38	88	126	149	489	151	640
Buoy 10	7	3	18	8	26	7	0	14	5	16	21	29	80	29	109
Area 2	121	67	347	132	479	95	0	204	89	210	299	458	1,481	466	1,947
Area 3	22	11	63	24	87	11	0	24	10	25	35	13	34	14	48
Area 4 *	34	18	99	38	137	27	0	58	26	59	85	46	136	46	182
PUGET SOUND CATCHES:															
Treaty Troll	0	0	0	0	0	0	0	0	0	0	0	4	1	4	5
Sport: Areas 5	91	26	268	99	367	24	0	53	23	54	77	92	293	93	386
Area 6	1	11	3	1	4	3	0	4	1	5	6	1	3	1	4
Areas 7-13	6	0	18	7	25	7	0	9	1	14	15	0	0	0	0
Nontreaty Net	0	0	0	0	0	7	0	9	1	15	16	9	6	9	15
Treaty Net	32	10	18	35	53	27	0	36	4	58	62	88	48	89	137
LOCAL TERMINAL															
Nontreaty Net	--	--	--	--	--	--	--	--	--	--	--	6892	------>>	------>>	12339
Treaty Net	5091	1714	------>>	------>>	8332	861	0	5873	------>>	------>>	6734	11816	------>>	------>>	20300
Sport	1738	334	------>>	------>>	2844	354	0	494	------>>	------>>	848	5392	------>>	------>>	8947

Appendix 8 Coho "North of Falcon" TAMM reports (continued).

TABLE 2D: COHO FISHERY IMPACT SUMMARY HIGHLIGHTS								
Estimated fishery impacts from regulations described by the following FRAM run:								08/02/06
FRAM Run Number:	0619							02:08 PM
Run Description:	FINAL PFMC 80K NT, 37.5K TT; SOF 20K							
Impacts are expressed as total fishery-related mortality, incl. landed catch, non-retention mort., and other fishery-related mort.								
		SOUTH PUGET SOUND				NOOKSACK-SAMISH			
FISHERY	Wild	Marked	UnMarked	Total	Wild	Marked	UnMarked	Total
Projected Spawning Escapement	20,079	51,527	37,389	88,916	8,479	33,451	10,557	44,008
Spawning Escapement Objective	n/a			88,915	n/a			
Projected Exploitation Rate (all fisheries)	56%				54%			
Exploitation in Southern U.S. Fisheries	54%				52%			
CANADIAN	400	8,802	919	9,721	306	5,049	376	5,425
ALASKA	0	0	0	0	0	1	0	1
S. of Falcon Troll	11	45	25	70	3	11	4	15
S. of Falcon Sport	18	310	41	351	9	129	10	139
NORTH OF CAPE FALCON OCEAN:								
Treaty Troll	900	3,846	2043	5,889	420	1,593	519	2,112
NT Troll N. Leadbttr	95	897	214	1,111	25	226	31	257
NT Troll S. Leadbttr	22	205	49	254	3	28	4	32
Sport: Area 1	19	381	44	425	8	144	9	153
Buoy 10	2	33	5	38	1	17	1	18
Area 2	78	1,512	175	1,687	25	461	30	491
Area 3	13	289	31	320	5	87	6	93
Area 4 *	171	3,619	391	4,010	64	1,211	79	1,290
PUGET SOUND: Treaty Troll	34	137	78	215	3	10	3	13
Sport: Areas 5	669	13,437	1518	14,955	157	3,117	195	3,312
Area 6	243	2,005	570	2,575	86	586	106	692
Area 7	26	279	59	338	95	720	117	837
Area 8	57	1,024	628	1,652	4	13	5	18
Area 9	1,258	4,942	2850	7,792	19	68	23	91
Area 12	2	6	5	11	13	47	16	63
Area 10	3,062	9,899	1799	11,698	17	62	21	83
Area 11	1,035	4,932	6395	11,327	0	0	0	0
Area 13	263	1,418	429	1,847	0	0	0	0
Freshwater Sport	1,589	10,114	3551	13,665	1,583	1,865	1,749	3,614
Pre-terminal net: 6/7/7A NTrty	40	336	90	426	225	1,125	279	1,404
6/7/7A Trty	33	122	79	201	543	1,898	672	2,570
4B/5/6C NTrty	0	0	0	0	0	0	0	0
4B/5/6C Trty	259	1,043	592	1,635	47	176	58	234
6B/9 NTrty	0	0	0	0	0	0	0	0
6B/9 Trty	0	0	0	0	0	0	0	0
Terminal net: Skagit Bay (8) NTrty	0	0	0	0	0	1	0	1
Skagit Bay (8) Trty	2	7	5	12	9	32	11	43
Area 8A Ntrty	14	50	32	82	1	2	1	3
Area 8A Trty	207	794	471	1,265	6	21	7	28
Hood Canal NTrty	54	195	127	322	2	8	3	11
Hood Canal Trty	88	328	206	534	2	8	3	11
South Pgt Snd NTrty	143	709	327	1,036	3	11	4	15
South Pgt Snd Trty	4,174	43,879	10976	54,855	55	198	69	267
B'ham Bay(7B) Ntrty	19	66	42	108	1,284	5,179	1,614	6,793
B'ham Bay(7B) Trty	52	182	117	299	4,264	17,066	5,358	22,424
Local Extreme Terminal Net: Nontreaty	n/a			n/a	n/a			n/a
Treaty	10,315	33919	31361	65,280	739	2997	989	3,986
Test	94				n/a			n/a
* Area 4 Sport numbers include 4B add-on, if any, and a number of fish caught on Canadian licenses in areas 4 and 4B.								
RECAPITULATION OF WILD IMPACTS ACCOUNTING:								
Nontreaty Total Wild Impacts:	8,903			76,100	3,632			19,425
Treaty Total Wild Impacts:	16,064			130,185	6,088			31,688
Amt NT above (or below) T:	(7,161)			(54,085)	(2,456)			(12,263)
Nontreaty Wild Impacts w/o SOF:	8,874			75,679	3,620			19,271
Treaty Wild Impacts w/o SOF:	16,064			130,185	6,088			31,688
Amt NT above (or below) T w/o SOF:	(7,190)			(54,506)	(2,468)			(12,417)

Appendix 8 Coho "North of Falcon" TAMM reports (continued).

TABLE 4: SUMMARY OF COHO EXPLOITATION RATES

Predicted Exploitation Rates for Total Fishery-Related Mortality

FRAM Run Number: 0619 — 8/2/2006

Run Description: FINAL PFMC 80K NT, 37.5K TT; SOF 20K — 2:50:17 PM

NOTE: Landed catch plus all fishery-related mortality - Not AEQ Expl. Rate!!!

STOCK->		Skagit Wild	Stilly Wild	Snohom Wild	HdCnl Wild /1	JDF Tribs Wild /2	South Sound Wild	Nooksack Wild	Quillayute Fall Wild	Hoh Wild	Queets Wild	Grys Hbr Wild
Predicted Spawning Escape.		68,645	27,091	86,090	37,597	23,148	20,079	8,479	n/a	n/a	n/a	n/a
Ocean Escapement *		n/a	n/a	n/a	n/a	n/a	n/a	n/a	13,032	5,559	7,121	60,301
RUN RECONSTRUCTION:												
Ocean/Pre-term. Marine Catch /1		12,732	6,902	22,018	9,927	2,754	8,710	2,078	1,330	748	841	4,722
Nonlocal Mixed-terminal Catch		3,419	467	1,452	2,052	69	436	78	181	62	371	522
Local Mixed Terminal Marine Catch		1,857	3,444	11,499	5,548	0	4,317	5,548	n/a	n/a	n/a	n/a
Extreme Terminal & F'W /2 NTRTY		3,784	1,127	6,304	2,040	5	1,589	1,583	n/a	n/a	n/a	n/a
Extreme Terminal & F'W /2 TRTY		15,379	6,293	13,171	2,645	10	10,315	739	n/a	n/a	n/a	n/a
Extr. Term. TEST /2		1,297	0	0	0	0	94	-	n/a	n/a	n/a	n/a
Escapement /2		68,645	27,091	86,090	37,597	23,148	20,079	8,479	13,032	5,559	7,121	60,301
TOTAL ABUNDANCE /3		107,113	45,324	140,534	59,809	25,986	45,540	18,505	14,362	6,307	7,962	65,023
TOTAL Predicted E.R.	/4	36%	40%	39%	37%	11%	56%	54%	9%	12%	11%	7%
Canada		1.0%	1.6%	1.6%	2.5%	1.6%	0.9%	1.7%	1.8%	3.0%	2.4%	2.5%
Alaska		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.1%
Southern U.S. E.R.	/5	34%	38%	36%	33%	8%	54.5%	52.1%	7.4%	9%	8%	5%
S. Of Falcon Ocean		0.1%	0.1%	0.1%	0.1%	0.3%	0.1%	0.1%	0.5%	0.4%	0.7%	0.3%
NOF Ocean Troll: Ntrty		0.2%	0.4%	0.4%	0.4%	0.2%	0.3%	0.2%	1.1%	0.9%	1.2%	0.3%
Trty		2.0%	3.0%	3.0%	1.6%	2.1%	2.0%	2.3%	3.3%	5.0%	3.1%	2.7%
Ntrty NOF Ocean & Buoy10 Spt		0.6%	0.7%	0.7%	0.7%	0.4%	0.6%	0.6%	1.6%	1.8%	2.3%	1.1%
Pgt Snd 5,6C Troll: Trty		0.1%	0.1%	0.1%	0.1%	0.0%	0.1%	0.0%	All Puget Sound Combined:			
Pgt Snd 5,6 Sport		1.2%	1.6%	1.6%	2.2%	3.1%	1.5%	0.8%				
Pgt Snd 7 Sport		0.1%	0.2%	0.2%	0.0%	0.0%	0.1%	0.5%				
Pgt Snd 8 Sport		2.3%	2.4%	2.8%	0.1%	0.0%	0.1%	0.0%				
Pgt Snd 9 Sport		2.1%	2.7%	2.7%	2.8%	0.1%	2.8%	0.1%				
Pgt Snd 10,11,13		0.9%	0.7%	0.7%	1.3%	0.1%	9.6%	0.1%				
Pgt Snd 12 Sport		0.0%	0.0%	0.0%	2.3%	0.0%	0.0%	0.1%				
Pgt Snd Extr. Term. & F'W Sport		3.5%	2.1%	4.1%	2.5%	0.0%	3.5%	8.6%				
PS Preterminal Net**: Ntrty		0.2%	0.1%	0.1%	0.1%	0.0%	0.1%	1.2%				
Trty		0.7%	0.9%	0.9%	0.9%	1.7%	0.6%	3.2%				
Nonlocal Term. Net: Ntrty		0.3%	0.1%	0.1%	0.2%	0.1%	0.2%	0.0%				
Trty		2.9%	0.9%	0.9%	3.2%	0.2%	0.8%	0.4%				
Local Terminal Net: Ntrty		0.0%	0.6%	0.6%	2.2%	--	0.3%	6.9%				
Trty		1.7%	7.0%	7.6%	7.1%	--	9.2%	23.0%				
Extreme Term. Net: Ntrty		0.0%	0.4%	0.4%	0.9%	0.0%	0.0%	0.0%				
Trty		14.4%	13.9%	9.4%	4.4%	0.0%	22.7%	4.0%				
TEST		1.2%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%				

* Model-predicted Escapement for Washington Coastal stock aggregates represents run entering the rivers or "Ocean Escapement," and does not represent all exploitation for coastal stocks!

** Puget Sound Area 6B/9 Net is apportioned using agreed Run Reconstruction apportionment rather than FRAM CWT-based projections of stock impacts

Footnotes:

/1 From TAMM Tables 2; excludes freshwater sport

/2 Puget Sound Stocks From TAMM (includes freshwater sport); Coastal stocks escapement = "run entering river" from FRAM

/3 "Total Fishery-related Mortality Plus Escapement" (does not include natural mortality) or
For Coastal Stocks: Pre-River Mortality Plus Run Entering River (does not include natural escapement)

/4 This is NOT AEQ Exploitation Rate because natural mortality is not included! See Table 2 for all-fishery ERs for coastal stocks.

/5 Sum of exploitation rates for Southern U.S. only: SoF, OCean 1-4, Col. R., coastal harbors, Puget Sound

TABLE 7: COHO RUN SIZES FOR SALMON TECHNICAL TEAM REFERENCE

FRAM Run Number: 0619 — 08/02/06
Run Description: FINAL PFMC 80K NT, 37.5K TT; SOF 20K — 03:33 PM
Includes landed catch plus all fishery-related mortality

PUGET SOUND COHO RUN SIZES:

Stock	Hat +Wld Run Entering Area 4B Net \1	Hat + Wld Terminal Area Abundance	Hat + Wld Escape-ment	Wild Run Entering Area 4B Net	Wild Run Entering USJDF-PS	Wild Escape-ment
Skagit		104,140	80,964	87,816	103,006	68,645
Stillag.-Snohomish		230,604	141,732			
Stilly:				32,658	42,717	27,091
Snohom:				97,951	132,439	86,090
Hood Canal		74,701	54,315	46,420	56,719	37,597
South Puget Sound		214,709	88,915	33,616	43,811	20,079
Nooksack-Samish		81,843	44,007	15,286	17,636	8,479
Strait Tributaries		39,098	31,605	23,541	24,784	23,148

\1 Note: 4B Run sizes differ from exact Status Report frame of reference because Area 6B/9 impacts are accounted for as per FRAM CWT-based stock impacts.

OTHER WA-CA RUNSIZES: all Truns values

Terminal Area	Ocean Escapement All w/ dip lns	Local Wild	Local Hatchery
Quillayute	25,800	13,973	11,398
Hoh	6,287	5,559	0
Queets	20,730	7,121	9,953
Quinault	50,539	23,989	25,930
Grays Harbor	105,888	60,301	44,815
Willapa Bay	60,077	27,850	31,509

Stock/Area	Ocean Escapement
Quillayute Summer Hatchery	3,103
Quillayute Summer Natural	941
Columbia Early (after B10)	182,687
Columbia Late (after B10)	64,742
Total	247,429
Oregon N. Coast Natural	10,672
Oregon N. Mid Coast Nat.	19,938
Oregon S. Mid Coast Nat.	25,204
Total	55,814

Appendix 8. Coho "North of Falcon" TAMM reports (continued).

TABLE C: COLUMBIA RIVER COHO FISHERY IMPACT SUMMARY

Estimated fishery impacts from regulations described by the following FRAM run:
FRAM Run Number: 0619
Run Description: FINAL PFMC 80K NT, 37.5K TT; SOF 20K
Impacts are expressed as total fishery-related mortality, incl. landed catch, non-retention mort., and other fishery-related mort.

	Columbia Early			Columbia Late			Combined		
FISHERY	Marked	UnMarked	Total	Marked	UnMarked	Total	Marked	UnMarked	Total
Projected Ocean Escapement (after B10)	119,963	62,724	182,687	46,597	18,145	64,742	166,560	80,869	247,429
Projected Marine Exploitation Rate	31.1%	9.7%	25.0%	49.5%	16.6%	43.2%	37.5%	11.3%	30.8%
Projected Marine Exp. Rate to Col R (before B10)	27%	9%	22%	48%	16%	42%	34%	10.4%	28%
PFMC Ocean Fisheries Exploitation Rate							33%	9.9%	27%
Exploitation in Southern U.S. marine Fisheries	31%	10%	25%	49%	16%	43%	37%	11.2%	30%
CANADIAN	774	75	849	580	38	618	1,354	113	1,467
ALASKA	0	0	0	0	0	0	0	0	0
S. of Falcon Troll	906	377	1283	342	85	427	1,248	462	1,710
S. of Falcon Sport	14433	1700	16133	5206	352	5558	19,639	2,052	21,691
NORTH OF CAPE FALCON OCEAN:									
Treaty Troll	1779	831	2610	2359	771	3130	4,138	1,602	5,740
NT Troll N. Leadbttr	772	139	911	798	103	901	1,570	242	1,812
NT Troll S. Leadbttr	1449	242	1691	1606	179	1785	3,055	421	3,476
Sport: Area 1	15744	1411	17155	19409	1065	20474	35,153	2,476	37,629
Buoy 10	6453	723	7176	1799	149	1948	8,252	872	9,124
Area 2	10015	940	10955	10865	666	11531	20,880	1,606	22,486
Area 3	428	38	466	432	25	457	860	63	923
Area 4 *	699	61	760	1467	75	1542	2,166	136	2,302
PUGET SOUND CATCHES:									
Treaty Troll	3	1	4	34	9	43	37	10	47
Sport: Areas 5-13	567	59	626	654	53	707	1,221	112	1,333
Nontreaty Net	3	1	4	4	1	5	7	2	9
Treaty Net	20	9	29	21	6	27	41	15	56
COASTAL CATCHES:									
Bay Sport	196	97	293	87	31	118	283	128	411
Nontreaty Net	17	9	26	28	10	38	45	19	64
Treaty Net	9	5	14	0	0	0	9	5	14
MAINSTEM LOWER COLUMBIA:									
River Sport									
Nontreaty Net									
Total Abundance	174,230	69,442	243,672	92,288	21,763	114,051	266,518	91,205	357,723

Appendix 8. Coho "North of Falcon" TAMM reports (continued).

Table OR. Total mortality and exploitation rates for OCN and Rogue/Klamath

Estimated fishery impacts from regulations described by the following FRAM run:

FRAM Run Number: 0619

Run Description: FINAL PFMC 80K NT, 37.5K TT; SOF 20K

		OR Coastal Natural			Rogue/Klam. H Unmrkd	
Fishery	Area	Total Mort	Exp. Rt.		Total Mort	Exp. Rt.
Alaska	all	0	0.0%		0	0.0%
BC	all	197	0.3%		41	0.2%
Puget Sound/Straits		63	0.1%		0	0.0%
North of Falcon:						
Troll:	Treaty	368	0.6%		0	0.0%
	Nontreaty	163	0.3%		1	0.0%
Sport:		649	1.1%		5	0.0%
Buoy 10		100	0.2%		0	0.0%
South of Falcon:						
Troll:	Tillmk	42	0.1%		0	0.0%
	Newprt	143	0.2%		3	0.0%
	Coos B	0	0.0%		0	0.0%
	Brookngs	0	0.0%		0	0.0%
	CaKMZ	0	0.0%		0	0.0%
	Ft Bragg	8	0.0%		4	0.0%
	So. Calif	365	0.6%		137	0.6%
Sport:	Tillmk	264	0.4%		6	0.0%
	Newprt	607	1.0%		6	0.0%
	Coos B	1017	1.7%		36	0.2%
	Brookngs	84	0.1%		36	0.2%
	CaKMZ	279	0.5%		251	1.1%
	Ft Bragg	375	0.6%		316	1.4%
	So. Calif	489	0.8%		295	1.3%
Freshwater		661	1.1%		46	0.2%
AK to CA total		5874	9.6%		1183	5.2%
Escapement		55155			21587	

Appendix 8. Coho "North of Falcon" TAMM reports (continued).

TABLE T: THOMPSON AND UPPER FRASER COHO FISHERY IMPACT SUMMARY

Estimated fishery impacts from regulations described by the following FRAM run:

FRAM Run Number: 0619

Run Description: FINAL PFMC 80K NT, 37.5K TT; SOF 20K

Impacts are expressed as total fishery-related mortality, incl. landed catch, non-retention mort, and other fishery-related mortality.

==========

FISHERY	Upper Fraser Wild	
Projected Escapement	16,093	
Projected Pre-Terminal Exploitation Rate	12.0%	
Exploitation in U.S. Fisheries	**9.2%**	
----------	Mortality	Expl. Rate
CANADIAN (marine)	510	2.8%
ALASKA	4	0.0%
SOUTH OF FALCON & COL R	14	0.1%
NORTH OF CAPE FALCON OCEAN:		
Treaty Troll Area 2	7	0.0%
Treaty Troll Area 3	1	0.0%
Treaty Troll Area 4	472	2.6%
NT Troll Area 1	3	0.0%
NT Troll Area 2	12	0.1%
NT Troll Area 3	10	0.1%
NT Troll Area 4	10	0.1%
NT Sport Buoy 10 & Area 1	15	0.1%
NT Sport Area 2	25	0.1%
NT Sport Area 3	3	0.0%
NT Sport Area 4*	47	0.3%
PUGET SOUND:		
JDF Troll and Net	30	0.2%
SJI 6/7/7A NT Net	109	0.6%
SJI 6/7/7A T Net	295	1.6%
Sport: Area 5	199	1.1%
Area 6	59	0.3%
Area 7	147	0.8%
Area 8-13	25	0.1%
Puget Sound Terminal net	202	1.1%
WA Extreme Terminal Net & FW Sport	0	0.0%
Total:	2199	12.0%

* Area 4 Sport numbers include 4B add-on, if any, and a number of fish caught on Canadian licenses in areas 4 and 4B.

Appendix 9. Chinook "North of Falcon" TAMM Reports.

TABLE 1: DESCRIPTION OF FISHERY REGULATIONS AND SUMMARY OF CHINOOK CATCH TARGETS

CHINOOK FRAM Run Number: 2706 Version: 5.24 08/02/06

Run Description: April 5 PFMC NT 65K T 41.6K; run 2606 for PS fisheries 4:17:36 PM

Impacts are expressed as total fishery-related mortality, which includes landed catch, non-retention mortality, and other fishery-related mortality; not to be used for allocation computations.

Fishery	Fishery-related Mortality		Fishery Description and/or Comments:						
CANADIAN (B.C.) FISHERIES:									
WCVI Troll/Sport	178,789		2006 PSC fishing levels						
Area 20 Net	0		2005 post season						
Georgia St./JDF Troll	0		Incidental mortality						
Georgia St./JDF Sport	58,697		2005 post season						
SOUTH OF CAPE FALCON:			March PFMC						
NORTH OF CAPE FALCON OCEAN:									
Treaty Ocean Troll:	46,473		TAC 41,600 chinook						
NT Ocean Troll	41,920		TAC 32,500 chinook						
NT Ocean Sport	36,924		TAC 32,500 chinook						
NT NOF Impacts:	78,844								
4B Add-on			Included with Area 4						
Canadian License catch	0		(For Areas 4 and 4B)						
Buoy 10	>>>>		see In-River models						
PUGET SOUND SPORT & TROLL:									
Trty Strait&Winter Troll	10,771		2005 preseason; 8500 for winter troll; 500 JDF summer troll						
Puget Sound Sport (landed + non-retention mortality):									
Area 5,6	8,262	Area 5/6	5/1-6/30 clsd; 7/1-8/31 or quota 3.5K ch MSF, expt ch NR east of Ediz, cm NR;						
			7/1-9/30, 2 bag, co MSF, cm NR; A 5: 10/1-10/31 Closed except Dung Bay;						
			11/1-11/30 2/1 bag; A6: 10/1-10/31 2/1, 11/1-11/30 clsd						
			both areas clsd 12/1-2/15 clsd; 2/16-4/10 1 bag; 4/11-4/30 clsd; Dung Bay						
			10/1-10/31, 2 bag, co only; Kydak,FWby,PA Har, DiscBy, SeqBy time closures						
Area 7	5,004	Area 7	5/1-6/30 clsd; 7/1-7/31, 2/1 bag, 8/1-9/30, 2/1 bag , co MSF, cm NR;						
			10/1-10/31 2/1 bag; 11/1-11/30 2 bag ch NR; 12/1-1/31 clsd; 2/1-3/31 1 bag;						
			4/1-4/30 clsd; B'Bay, 8/16-10/31, 4/2 bag;						
			S. Rosario & E. JDF clsd 7/1-9/30; B Bay - clsd 7/1 thru 8/15; Samish - clsd 7/1-10/15;						
Areas 8-13:	44,491	Area 8-1	5/1-7/31 clsd; 8/1-9/30, 2 bag, ch NR; 10/1-4/30, 2 bag, ch MSF;						
		Area 8-2	5/1-7/31 clsd; 8/1-9/30, 2 bag, ch NR; 10/1-4/30, 2 bag, ch MSF;						
(Does not include			Tul. Term Area, 6/2-9/25, Fri - 12p Mon, except closed 6/17?, 2 bag						
Freshwater Sport)		Area 9	5/1-7/15 clsd; 7/16-9/30, 2 bag, ch NR, cm NR 8/1-9/30; 10/1-10/31, 2 bag, ch NR;						
			11/1-11/30 2/1 bag; 12/1-1/31 closed; 2/1-4/15, 1 bag; 4/16-4/30 closed						
		Area 10	5/1-6/15, closed; 6/1-6/30 C&R; 7/1-9/30, 2 bag, ch NR, cm NR 8/1-9/15;						
			10/1-10/15, 2 bag, ch NR; 10/16-11/30, 2/1 bag; 12/1-1/31, bag 1; 2/1-4/30 closed						
			Elliott Bay Closure: 7/1-8/31; Inner Bay Closure: 7/1-8/31; Agate Closed 1/1-3/31;						
			Shilshole closed 7/1-8/31; E' Bay: 7/14-8/20, Fri - Sun,						
			bag 2, cm NR 8/1-9/15; Sinc TAF, 7/1-9/30, 2 bag, cm NR 8/1-9/15						
		Area 11	5/1-5/31 closed; 6/1-6/30, 2 bag; 7/1-9/30, 2 bag; 10/1-10/31, 2 bag; 11/1-12/31, 2/1 bag;						
			1/1-2/15 clsd; 2/16-4/10, 1 bag; 4/11-4/30 Closed. Commencement Bay closure: 6/1-8/11						
			Piers Yr-Round: Dash Pt, Pt Def., Les Davis, Des Moines, & Redondo, 2/1 bag						
		Area 12	Entire Area: 5/1-6/30 clsd; So. Ayock 7/1-10/15, 4/2 bag cmNR; No. Ayock 7/1-8/31 clsd;						
			9/1-10/15, 4 co only; Entire Area: 10/16-12/31, bag - 4/1; 1/1-2/15 clsd; 2/16-4/10, 1 bag;						
			4/11-4/30 clsd; Hoodsport: 7/1-12/31, bag-4/2, cm NR 7/1-10/15;						
			Quilcene: 8/16-8/31, bag - 4 coho only						
		Area 13	5/1-6/31, 2 bag; 7/1-10/31, 2 bag, co MSF; 11/1-12/31, 2/1 bag						
			1/1-1/31, bag - 1; 2/1-2/31 clsd; 3/1-4/30 bag-1; Carr Inlet Closure: 4/16-7/31,						
			Minter closed 7/1-9/30; Budd closures 7/16-10/31						

PUGET SOUND NET:		JUL-SEP		OCT-APR	TOTAL	
JDF Net (4B/5/6C/6)	NTrty	0		0	0	
	Trty	978		0	978	
SJI Net (7/7A)	Ntrty	1,104		46	1,150	DN
	Trty	2,915		101	3,016	
6B/9 Net		0		0	0	
	Trty	0		0	0	

JDF Sockeye/Pink:	Trty (GN): wb 7/16 - wb 8/11, 6-6-6-6-6	
JDF Coho:	Trty (GN): wb 9/3 - wb 10/1, 5-5-5-5-5	
JDF Chum:	Trty (GN): wb 10/8 - wb 11/5, 6-6-6-6-6	
SJI Coho:	NT reefnet: wb 7/30 - wb 9/24, at end Panel control, selective through wb 9/24, ck NR, cm NR through 9/30.	
SJI Sockeye/Pink:	Ntrty (GN/PS/RN): wb7/30 - wb8/20, 1-4-4-3 , PS coho NR	
	Trty (GN/PS): wb 7/30 -wb 8/20	
SJI Chum:	Ntrty: RN: wb10/1 - wb11/5; GN/PS (PS coho NR): wb10/8 - wb11/5, 3-3-3-3-3	
	Trty (GN/PS): wb 10/8 - wb 11/5	

Appendix 9. Chinook "North of Falcon" TAMM reports (continued).

Table 2. Exploitation rates and natural escapement of selected Puget Sound chinook stocks (MSF compatible).

FRAM Description:	**April 5 PFMC NT 65K T 41.6K; run 2606 for PS fisheries**
FRAM Run Number:	**2706**

Stock	**Model Prediction**				**Management Criteria**	
	Total ER	**So. U.S. ER**	**So. U.S. Preterm. ER**	**Natural Escapement**	**RER or CERC**	**Low Abundance Threshold (nat. esc.)**
Spring/Early:						
Nooksack (n)	24.1%	3.58%	1.9%	682	4.0% SUS base reg.	2000 spawners
Skagit (n)	18.4%	9.39%	6.8%	1662	38% Total	576 spawners
White	19.7%	17.55%	5.8%	2327	20% Total	200 spawners
Dungeness	28.1%	2.09%	2.1%	844	<10% So. U.S.	500 spawners
Summer/Fall:						
Skagit	30.3%	10.34%	4.1%	22231	50% Total	4800 spawners
Stillaguamish (n)	26.7%	12.21%	10.5%	872	25% Total; 15% SUS	500 spawners
Snohomish (n)	33.1%	14.64%	13.2%	6525	21% Total; 15% SUS	2800 spawners
Lake Wa. (Cedar R.) (n)	38.5%	16.58%	10.3%	580	15% Preterm So. U.S.	200 spawners b/
Green	49.6%	27.72%	10.3%	13543	15% Preterm So. U.S.	1800 spawners
Puyallup	49.92%	28.02%	10.3%	1857	50% Total	500 spawners
Nisqually	64.7%	50.74%	20.8%	1753	Under development	500 spawners
Western Strait-Hoko	28.4%	2.45%	2.4%	704	<10% So. U.S	500 spawners
Elwha	28.2%	2.17%	2.0%	2758	<10% So. U.S	1000 spawners
Mid-Hood Canal tribs. (n)	30.4%	10.29%	8.9%	104	10.4% PT SUS base reg.	400 spawners
Skokomish	57.3%	37.44%	8.9%	1231	15% Preterm So. U.S.	800 natural spawners

a/ Cedar River portion of Lake Washington.

SRFI = 0.649 (0.70 ceiling)
Coweeman ER = 0.474 (0.49 ceiling)

TABLE 6A. Guidelines And Predicted Exploitation Rates For KEY NATURAL PUGET SOUND Chinook Stocks,

FRAM Run Number: 2706 Version: 5.24 08/03/06 10:27 AM
Run Description: April 5 PFMC NT 65K T 41.6K; run 2606 for PS fisheries

STOCK->		SKAGIT Summer/Fall		STILLAGUAMISH Summer/Fall		SNOHOMISH Summer/Fall		NOOKSACK \2 Early		SKAGIT Spring		WHITE RIVER \3 Spring	
Exploitation Rate Objective \a		**No Crit**	**50%**	**SUS ER**	**15%**	**SUS ER**	**15%**	**SUS CERC**	**7%**	**No Crit**	**38%**		**20%**
Predicted ER - All Fisheries			30.3%		26.7%		33.1%		24.1%		18.4%		19.7%
Predicted ER - So. U.S. Fisheries (SUS)			10.3%		12.2%		14.6%		3.6%		9.4%		17.6%
Predicted ER - Preterm So. U.S. Fisheries			4.1%		10.5%		13.2%		1.9%		6.8%		5.8%
FISHERY AGGREGATE		% MORT	ExplRate	% MORT	ExplRate	% MORT	ExplRate	% MORT	ExplRate	% MORT	ExplRate	% MORT	ExplRate
Alaska		5%	1.6%	1%	0.3%	1%	0.4%	16%	3.8%	1%	0.2%	0%	0.0%
Canada:		61%	18.3%	53%	14.1%	54%	18.0%	69%	16.6%	48%	8.8%	11%	2.2%
S. Of Falcon Ocean		0%	0.0%	0%	0.0%	0%	0.0%	0%	0.0%	0%	0.0%	0%	0.0%
NOF Ocean Troll:	Nontreaty	0%	0.1%	1%	0.3%	2%	0.5%	1%	0.2%	1%	0.2%	1%	0.2%
	Treaty	1%	0.2%	5%	1.3%	4%	1.3%	3%	0.7%	5%	0.8%	3%	0.7%
Ntrty NOF Ocean & Buoy10 Spt		0%	0.0%	0%	0.1%	0%	0.1%	0%	0.0%	0%	0.0%	0%	0.0%
Pgt Snd Trty Troll		0%	0.0%	5%	1.4%	4%	1.3%	1%	0.2%	1%	0.2%	2%	0.4%
Pgt Snd 5,6 Sport		0%	0.1%	2%	0.5%	1%	0.5%	0%	0.0%	1%	0.2%	1%	0.2%
Pgt Snd 7 Sport		6%	1.7%	4%	1.2%	4%	1.4%	2%	0.4%	3%	0.5%	1%	0.2%
Pgt Snd 8-13 Sport		4%	1.2%	16%	4.3%	19%	6.3%	0%	0.1%	17%	3.1%	17%	3.4%
Out-of-Region \1 Net:	Nontreaty	1%	0.3%	1%	0.3%	2%	0.6%	0%	0.1%	3%	0.6%	2%	0.3%
	Treaty	2%	0.5%	4%	1.2%	4%	1.3%	1%	0.2%	6%	1.1%	2%	0.5%
Local Terminal Net:	Nontreaty	0%	0.0%	0%	0.0%	0%	0.0%	0%	0.0%	0%	0.0%	0%	0.0%
	Treaty	0%	0.1%	1%	0.3%	2%	0.8%	6%	1.5%	0%	0.0%	0%	0.0%
Freshwater Sport:	Nontreaty	0%	0.1%	2%	0.5%	2%	0.6%	0%	0.0%	7%	1.4%	0%	0.0%
Freshwater Net:	Treaty	20%	6.0%	4%	1.0%	0%	0.0%	1%	0.1%	7%	1.2%	59%	11.7%

This table presents the proportion (in percent) of the total (landed + nonlanded) mortality for this stock occurring in the indicated fishery.
"Exploitation Rate" refers to the proportion of the population (defined as the sum of AEQ fishery-related mortality plus spawning escapement) killed in the specified fishery or groups of fisheries.
"AEQ" = "Adult Equivalent": Figures in this table are adjusted so they are comparable across age classes, and represent fish that would have contributed to escapement if they had not been caught.

\1 "Out-of-Region" means all net fishery catches outside the local "region of origin", including pre-terminal and nonlocal terminal.
\2 "Nooksack Early" stock comprises an aggregation of North Fork and South Fork Early ("Spring" or "Native") stocks.
\3 "White River Spring" stock is represented by fingerlings originating from the White River.

a\ Total exploitation rate unless noted otherwise.

Appendix 9. Chinook "North of Falcon" TAMM reports (continued).

TABLE 6B. Guidelines And Predicted Exploitation Rates For OTHER PUGET SOUND Natural/Hatchery Aggregate Chinook Stocks,
And Proportion of the total AEQ Mortality Occurring in Each Fishery Aggregate.

08/03/06
FRAM Run Number: 2706 Version: 5.24 10:27 AM
Run Descr April 5 PFMC NT 65K T 41.6K; run 2606 for PS fisheries

STOCK->		Total Mortality All Stocks	NOOKSACK N&H Summer/Fall		TULALIP H Summer/Fall		HC Unmrkd Summer/Fall Aggregate		MID-HOOD CANAL Natural			SKOKOMISH Natural		JDF TRIBS (Dungeness) Summer/Fall	
Exploitation Rate Objective				**n/a**		**n/a**	PT SUS ER	**15%**	PT SUS CERC	**12%**	**b**	PT SUS ER	**15%**	SUS ER	**10%**
Predicted ER - All Fisheries				80.5%		100.1%		67.5%		30.4%			57.3%		28.1%
Predicted ER - So. U.S. Fisheries				58.2%		91.6%		47.8%		10.3%			37.4%		2.1%
Predicted ER - Preterm So. U.S. Fisheries								9.6%		8.9%			8.9%		2.1%
FISHERY AGGREGATE:			% MORT	ExplRate	% MORT	ExplRate	% MORT	ExplRate	% MORT	ExplRate		% MORT	ExplRate	% MORT	ExplRate
Alaska		433,536	0.2%	0%	0.7%	1%	0%	0.0%	0%	0.0%		0%	0.0%	17%	4.8%
Canada		546,889	21.6%	21%	6.8%	7%	29%	19.7%	66%	20.1%		35%	19.8%	76%	21.2%
S. Of Falcon Ocean		1,077,562	0.1%	0%	0.2%	0%	0%	0.1%	0%	0.1%		0%	0.1%	0%	0.0%
NOF Ocean Troll:	Nontreaty	41,920	2.1%	1%	0.9%	1%	2%	1.1%	4%	1.1%		2%	1.1%	0%	0.1%
	Treaty	46,474	3.2%	2%	4.8%	5%	3%	2.1%	7%	2.1%		4%	2.1%	1%	0.3%
Ntrty NOF Ocean & Buoy10 Spt		36,924	0.5%	0%	0.0%	0%	1%	0.8%	3%	0.8%		1%	0.8%	0%	0.0%
Pgt Snd Trty Troll		10,771	1.0%	1%	2.6%	3%	1%	0.7%	2%	0.7%		1%	0.7%	1%	0.2%
Pgt Snd 5,6 Sport		8,262	2.1%	1%	0.8%	1%	1%	0.3%	1%	0.3%		1%	0.3%	2%	0.5%
Pgt Snd 7 Sport							2%	1.0%	3%	1.0%		2%	1.0%	0%	0.1%
Pgt Snd 8-13 Sport		41,431	1.1%	1%	3.3%	3%	4%	2.4%	5%	1.6%		3%	1.8%	2%	0.4%
Out-of-Region \1 Net:	Nontreaty	1,150	0.5%	0%	0.5%	0%	0%	0.2%	1%	0.2%		0%	0.2%	0%	0.1%
	Treaty	3,994	1.2%	1%	0.7%	1%	1%	0.9%	3%	0.9%		2%	0.9%	2%	0.4%
Local Terminal Net:	Nontreaty	na	25.5%	20%	0.1%	0%	0%	0.0%	0%	0.1%		0%	0.0%	0%	0.0%
	Treaty	na	25.2%	20%	77.4%	77%	2%	1.3%	0%	0.0%		2%	1.3%	0%	0.0%
Freshwater Sport: \2	Nontreaty	na	13.1%	8%	0.0%	0%	10%	6.9%	4%	1.3%		27%	15.6%	0%	0.0%
Freshwater Net: \2	Treaty	na	1.8%	1%	0.0%	0%	44%	30.0%	0%	0.0%		20%	11.5%	0%	0.0%

This table presents the proportion (in percent) of the total (landed + nonlanded) mortality for this stock occurring in the indicated fishery.
"Exploitation Rate" refers to the proportion of the population (defined as the sum of AEQ fishery-related mortality plus spawning escapement) killed in the specified fishery or groups of fisheries.
"AEQ" = "Adult Equivalent": figures are adjusted so they are comparable across age classes, and represent fish that would have contributed to escapement if they had not been caught
\1 "Out-of-Region" means all net fishery catches outside the local "region of origin", including pre-terminal and nonlocal terminal.
\2 Note that "freshwater sport" and "freshwater net" categories include Marine Area 9A and 12A net catches for both treaty and nontreaty in Hood Canal.

a\ Preterminal So. U.S. Rate in Puget Sound Comprehensive Chinook Management Plan.
b\ Preterminal Southern US Fishery Exploitation Rate.

TABLE 6C. Guidelines And Predicted Exploitation Rates For SOUTH PUGET SOUND Chinook Stocks,
And Proportion of the total AEQ Mortality Occurring in Each Fishery Aggregate.

FRAM Run Number: 2706 Version: 5.24 08/03/06
Run Description: April 5 PFMC NT 65K T 41.6K; run 2606 for PS fisheries 10:27:42 AM

STOCK->		LAKE WASHINGTON Nat. Summer/Fall		GREEN RIVER Nat. Summer/Fall		PUYALLUP RIVER Nat. Summer/Fall		NISQUALLY RIVER Nat. Summer/Fall	
Exploitation Rate Objective		PT SUS ER	**15%**	PT SUS ER	**15%**		**50%**		**n/a**
Predicted ER - All Fisheries			38.5%		49.6%		49.9%		64.7%
Predicted ER - So. U.S. Fisheries			16.6%		27.7%		28.0%		50.7%
Predicted ER - Preterm So. U.S. Fisheries			10.3%		10.3%		10.3%		20.8%
FISHERY AGGREGATE:		% MORT	ExplRate	% MORT	ExplRate	% MORT	ExplRate	% MORT	ExplRate
Alaska		1%	0.3%	1%	0.3%	1%	0.3%	1%	0.5%
Canada		56%	21.6%	44%	21.6%	43%	21.6%	21%	13.5%
S. Of Falcon Ocean		0%	0.0%	0%	0.0%	0%	0.0%	0%	0.0%
NOF Ocean Troll:	Nontreaty	4%	1.7%	3%	1.7%	3%	1.7%	5%	2.9%
	Treaty	7%	2.6%	5%	2.6%	5%	2.6%	1%	0.7%
Ntrty NOF Ocean & Buoy10 Spt		0%	0.2%	0%	0.2%	0%	0.2%	0%	0.2%
Pgt Snd Trty Troll		4%	1.5%	3%	1.5%	3%	1.5%	4%	2.3%
Pgt Snd 5,6 Sport		1%	0.5%	1%	0.5%	1%	0.5%	2%	1.0%
Pgt Snd 7 Sport		2%	0.6%	1%	0.6%	1%	0.6%	0%	0.3%
Pgt Snd 8-13 Sport		7%	2.8%	6%	2.8%	6%	2.8%	18%	11.8%
Out-of-Region \1 Net:	Nontreaty	0%	0.2%	0%	0.2%	0%	0.2%	0%	0.3%
	Treaty	1%	0.4%	1%	0.4%	1%	0.4%	2%	1.2%
Local Terminal \2 Net:	Nontreaty	2%	0.9%	7%	3.7%	0%	0.2%	0%	0.2%
	Treaty	5%	1.9%	11%	5.3%	2%	0.7%	3%	1.9%
Freshwater Sport:	Nontreaty	0%	0.1%	0%	0.1%	4%	1.9%	0%	0.2%
Freshwater Net:	Treaty	9%	3.4%	17%	8.3%	30%	14.9%	43%	27.6%

This table presents the proportion (in percent) of the total (landed + nonlanded) mortality for this stock occurring in the indicated fishery.
"Exploitation Rate" refers to the proportion of the population (defined as the sum of AEQ fishery-related mortality plus spawning escapement) killed in the specified fishery or groups of fisheries.
"AEQ" = "Adult Equivalent": figures are adjusted so they are comparable across age classes, and represent fish that would have contributed to escapement if they had not been caught
\1 "Out-of-Region" means all net fishery catches outside the local "region of origin", including pre-terminal and nonlocal terminal.
\2 "Local Term." means: AREAS 10/11, 10A, 10E, 13A, 13+, and may include NT SAF fisheries, if so modeled.
Note: Within-South-Puget-Sound stock breakouts are based on CWT recoveries for areas 10A, 10E, 13A fingerlings, PSF proportions for area 13+, UW Acc, and yearlings. Refer to Tables 14D, 14F, & 14H.
a\ Preterminal Southern US Exploitation Rate; Preterminal is defined as all areas outside of Area 10
b\ Total Exploitation Rate

Appendix 10. Coweeman Exploitation Rate Calculation.

The total AEQ stock exploitation rate for Columbia Lower River Hatchery Tules is calculated in the CoweemanYYYY.xls spreadsheet. This is described in Section 8.1. Below are some additional details, an example of the ColRtrun66all.prn file, and an example of the spreadsheet.

These are the steps to get the Coweeman ER:

- Produce FRAM output from CRAEQcat66.DRV and ColRtrun66all.DRV.
- Run the CoweemanYYYY.xls macro to load CRAEQcat66.prn (AEQ total mortality of Washington tule stock in FRAM fisheries, Time Steps 1-3) and ColRtrun66all.prn (Terminal Run Size of Washington tule stock, ages 3-5only).
- Calculate the adult total run (ages 3-5only) from the AEQ total mortality and escapement

$$TotalRun = \sum_f AEQTotMort_f + escapement$$

- The Coweeman Exploitation Rate is the sum of all AEQ total mortality divided by the total run

$$ER = \frac{\sum_f AEQTotMort_f}{TotalRun}$$

Species: CHINOOK Version #5.25 CMD File:3807.cmd Date: 04-05-2007
Report : Terminal Run Report DRV File: ColRtrun66all.DRV Time: 18:39:14
Title : April Tuesday PFMC Option 1 Treaty 32.5K; Option 2 NT 35K; BASE

	Age				Adult	Total	Jack	Adult
Stock	2	3	4	5	Run	Run	Esc	Esc
OR Tule All	317	2991	2324	337	5652	5970	254	3868
WA Tule All	4203	16537	26173	6001	48712	52914	2985	32277
Lower Col Wild All	2153	1621	4037	4361	10020	12173	759	7288
Bonn. Pool Hat All	6712	11844	9077	378	21299	28011	3603	9363
Col R Summer All	13045	13297	13165	39472	65934	78980	10882	65458
Col R URB All	45538	58758	115523	79996	254278	299816	41470	158771
Cowlitz Spring All	0	2771	8033	7363	18167	18167	0	12094
Willamette Sprg All	0	1884	21976	23019	46879	46879	0	29100
Snake Fall All	340	661	1034	343	2038	2378	305	1154
OR NCst Fall All	45269	19613	29551	18206	67370	112640	36210	53913
WCVI All	73476	6819	88944	21572	117334	190811	73476	117175
Fraser Late All	5910	25948	75615	4172	105735	111645	5108	103374
Fraser Early All	10758	43175	66241	29025	138442	149200	10758	105507
Lower Geo. Str. All	6932	15128	18798	917	34843	41775	6932	34843

Example of CoweemanYYYY.xls spreadsheet:

	AEQ TOTAL MORTALITY from FRAM output:							FRAM Ocean	Col R			
			PFMC			Puget	WA Coast	Esc.	Zone 1-5	Zone 6	Zone	Zone
Stock	SEAK	Canada	Total	NonTreaty	SoF Only	Sound	Net	Term Run	non-Indian	tribal	1-5 HR	6 HR
OR Tule All	0	1070	1420	720	152	97	0	5652	1243	0	0.220	0.000
WA Tule All	2309	10640	15686	10847	3886	129	0	48712	3800	0	**0.078**	0.000
Lower Col Wild A	775	694	386	317	86	11	0	10020	2705	0	0.270	0.000
Bonn. Pool Hat.	0	4070	8618	4917	704	485	57	21299	2343	10011	0.110	0.470
Col R Summer All	8020	15361	696	414	400	124	0	65934	173	777	0.003	0.012
Col URB All	48439	35073	5786	3843	747	466	0	254278	29475	58484	0.116	0.230
Cowlitz Spring A	152	710	2712	2017	715	51	0	18167	745	0	0.041	0.000
Willamette Sprng	4031	8422	1217	897	223	147	0	46879	3607	0	0.077	0.000
Snake R Fall All	75	162	285	182	144	4	0	2038	169	469	0.083	0.230
Total	**63801**	**76202**	**36806**	**24154**	**7057**	**1514**	**57**	**472979**	**44260**			

Total mortality adult equivalent exploitation rates (catch/catch + ocean escapement) from retrospective run										
	SEAK	Canada	PFMC			Puget	WA Coast	Col R (sport,		
Stock (Marked +Unmarked)	(all gear)	(all gear)	Total	NonTr. Only	SoF only	Sound	Net	comm., & tribal)	Total	
Oregon Tule	0.000	0.130	0.172	0.087	0.018	0.012	0.000	0.151	0.4649	
Coweeman /Washington Tule	0.030	0.137	0.202	0.140	0.050	0.002	0.000	0.049	**0.4203**	**<--Coweeman**
Lower River Wild	0.065	0.058	0.032	0.027	0.007	0.001	0.000	0.228	0.4185	
Bonneville Pool Hatchery	0.000	0.118	0.250	0.142	0.020	0.014	0.002	0.358	0.9037	
Upriver Summer	0.089	0.170	0.008	0.005	0.004	0.001	0.000	0.011	0.2881	
Upriver Bright	0.141	0.102	0.017	0.011	0.002	0.001	0.000	0.256	0.5299	
Lower River Spring	0.007	0.033	0.124	0.093	0.033	0.002	0.000	0.034	0.3259	
Willamette Spring	0.066	0.139	0.020	0.015	0.004	0.002	0.000	0.059	0.3055	
Snake River Fall	0.029	0.063	0.111	0.071	0.056	0.002	0.000	0.249	0.5811	

Appendix 11. SRFI. Snake River Falls Index; calculation of harvest guideline.

AEQ total mortality index for SEAK and Canada fisheries

Rerun the PSC Chinook Model projection run using a ***.cei*** file with catches reflecting annual abundance indices for SEAK and Canada:

- Replace the *FP control* with *catch* for all fisheries in ***clbyyyy.cei*** file.
- For the AABM fisheries, use this year's Total Allowable Catch and split into troll, sport, and net.
- For all other fisheries, use last year's actual catch as this year's expected catch.
- Increase the number of years to force ceilings for all fisheries.
- Do a new projection run with ChinookModel.exe to produce a new ***.ccc*** file.

Use the program named ***compSRFI.exe*** to read the following data for Lyons Ferry stock from the ***.ccc*** file: ocean abundance, AEQ, catch, shaker mortality, CNR legal mortality, and CNR sublegal mortality; and to perform the following calculations:

- Calculate the annual exploitation rates for four fishery groups: SEAK, NCBC, WCVI, other Canada:

$$ER_{f,y} = \frac{\sum_{a=3}^{4} (catch_{a,f,y} + shaker_{a,f,y} + CNRlegal_{a,f,y} + CNRsublegal_{a,f,y}) \times AEQ_a}{(oceanAbundance_{a,y} \times (1 - naturalMortalityRate_a)) \times AEQ_a}$$

- Calculate the base period average exploitation rates:

$$BaseER_f = \frac{\sum_{y=1988}^{1993} ER_{f,y}}{6}$$

- Calculate the AEQ total mortality index

$$AEQTotMortIndex_{f,y} = \frac{\sum ER_{f,y}}{BaseER_f}$$

- The results are saved in a spreadsheet named ***yyyy_SRFI.xls.***

AEQ total mortality index for PFMC fisheries

- Use the FRAM driver file named SRFI2006.drv to obtain the *PFMC N Falcon* and *PFMC S Falcon* AEQ total mortality index. The same equations are used as above.

Combine AEQ total mortality indices and weight by average base period proportions.

The spreadsheet named *yyyy PFMC SRFI.xls* (Table 8-2) is used to perform the following tasks:

- After each Chinook FRAM Calibration change to the base period: get the Snake River Fall ages 3 and 4 AEQ total mortalities from the FRAM *total mortality by age report* . Note: The FRAM report driver file named SRTMage.drv was written for older version of FRAM before stocks were split into marked and unmarked.

- For the six fishery groups *f*, SEAK, NCBC, WCVI, other Canada, PFMC N of Falcon, and PFMC S of Falcon, calculate the proportion that each fishery group contributes to the total age 3 and 4 AEQ total mortality between the years 1988 and 1993.

$$Prop_{f,y} = \frac{(AEQtotMort_{3,f,y} + AEQtotMort_{4,f,y})}{\sum_{f=1}^{6}(AEQtotMort_{3,f,y} + AEQtotMort_{4,f,y})}$$

For example in 1998,

	AEQ total mortality			
Fishery Group	Age 3	Age 4	Total	Proportion
SEAK	8.28	62.61	70.89	5.2%
NCBC	27.39	52.91	80.30	5.9%
WCVI	187.24	593.48	780.72	57.5%
CA Other	4.46	0.00	4.46	0.3%
PFMC N	76.42	136.69	213.11	15.7%
PFMC S	117.18	90.83	208.01	15.3%
total	420.97	936.52	1357.49	100.0%

- Find the base period average proportions

$$AvgProp_f = \frac{\sum_{y=1988}^{1993} Prop_{f,y}}{6}$$

For example,

Fishery group	Base period average proportion
SEAK	5.9%
NCBC	9.0%
WCVI	53.5%
CA Other	0.7%
PFMC N	19.6%
PFMC S	11.3%
total	100.0%

- The SRFI is the sum of AEQ total mortality index from each fishery group as weighted by its respective base period average proportions. The SEAK and Canada AEQ total mortality indices were from spreadsheet named ***yyyy_SRFI.xls*** and the PFMC values were the *PFMC N Falcon* and *PFMC S Falcon* values from the FRAM output file named *SRFIyyyy.prn*.

$$SRFI = \sum_{f} (AvgProp_f * AEQTotMortIndex_f)$$

The following results are from the 2007 fisheries spreadsheet; note the summary table below contains only the interactions between the key input parameters:

	Average % of age 3 & 4 AEQ total mortality during 1988-93	*AEQ total mortality index*	SRFI
SEAK	5.9%	1.135	0.07
NCBC	9.0%	0.622	0.06
WCVI	53.5%	0.482	0.26
Other Canada	0.7%	0.445	0.00
PFMC N Falcon	19.6%	0.900	0.18
PFMC S Falcon	11.3%	1.100	0.12
total			*0.685*

Appendix 12. FRAM Installation Instructions.

FRAM Installation Program

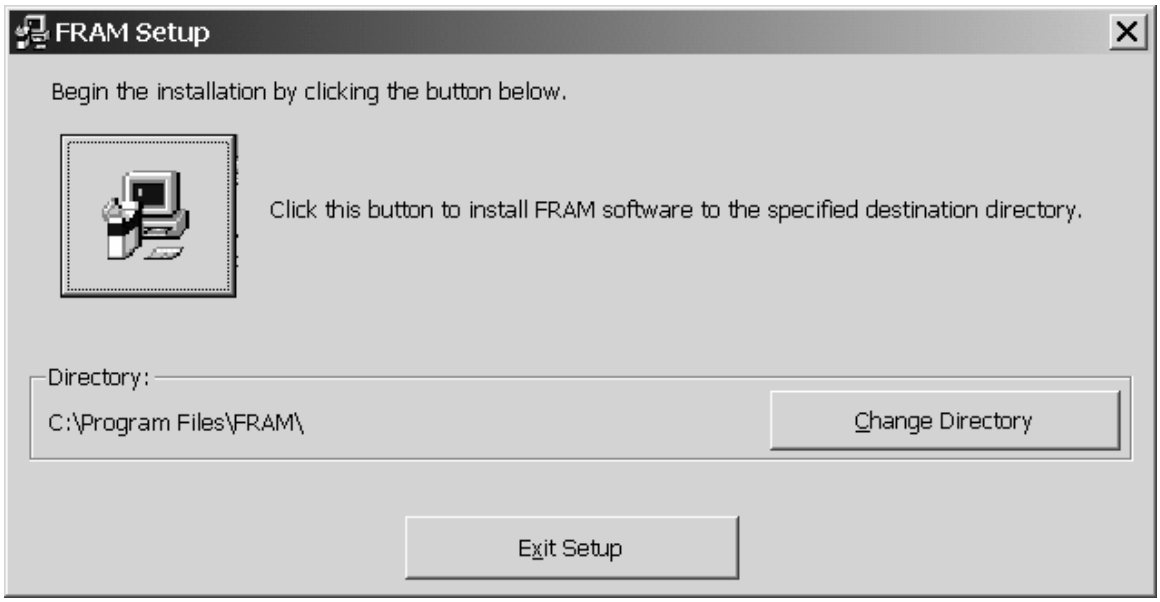
The FRAM program is a Visual Basic 6.0 application and is initially distributed within a specific installation program. The install program copies to your computer the FRAM executable and necessary library files (DLL's), updates the MS-Windows registry, and creates an entry in the Start/Program menu. Once the library files are installed, updates to the program only require a copy of the latest FRAM executable file (Fram.Exe). After installation, the executable file can reside in any convenient directory (or directories). The FRAM installation files and program appears fully compatible with the new MicroSoft MS-Vista operating system.

The installation program and library files are all standard Visual Basic 6.0 options. The installation program is created using the Visual Basic Package and Deployment Wizard. The library files are used for various menu options and connection to the MS-Access database files used by the FRAM application. The FRAM executable and library files are compressed into "cabinet" (*.Cab) files which are distributed along with two "Install" files.

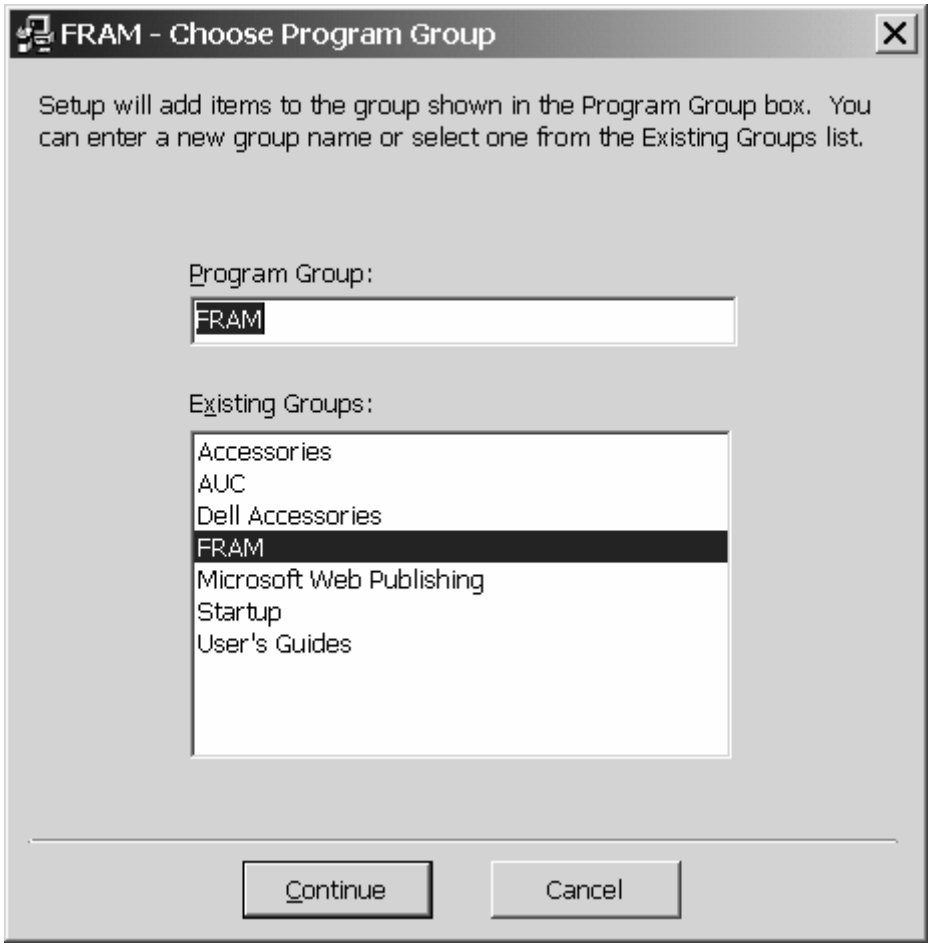
Running the install program should be very straight forward and quick. Extract the "setup.exe", "SETUP.LST", and the "CAB" files from "FRAMSetup.zip" to any temporary location. Then open, or double click, "setup.exe". The program checks for system attributes and existing files. Any problems are reported using the standard MS-Windows error reporting system and codes. Usually the only user input needed is the optional location of the FRAM "Program Group". System or file problems can sometimes be ignored and still result in a successful installation. Other errors may require system changes or consultation.

The figures below show the typical screens displayed for the install program. The large numbers of potential system and file errors are not covered by this document. Figure 1 shows the initial screen where the user is asked to close all other applications. Figure 2 shows the selection screen that allows the user to change the destination directory. Typically the default choice is most preferable. Figure 3 is similar and allows the user to change the "Program Group". The default choice is also best for this option. Figure 4 will display after a successful installation, at which point the initial setup package can be deleted.

Appendix 12-Figure 1. Opening Installation Screen.



Appendix 12-Figure 2. Destination Directory Selection Screen.



Appendix 12-Figure 3. Program Group Selection Screen.

Appendix 12-Figure 4. Final Screen for Successful Installation.

Appendix 13. Glossary.

Adult Equivalent (AEQ) - The potential contribution of fish of a given age to the spawning escapement, in the absence of fishing. Because of natural mortality and unaccounted losses, not all unharvested fish contribute to spawning escapement. For example, a two-year-old Chinook has a lower probability of surviving to spawn, in the absence of fishing, than does a five-year-old, thus these two age classes have different "adult equivalents".

Base Period - A set of brood years from which CWT data are used to estimate exploitation rates, maturation rates, and stock abundances. The years used for the base period differ by species and stock. Brood years are chosen based on consistent coded-wire tagging of stocks, consistent CWT sampling of fisheries, and the relatively consistent execution of fisheries during the return years. Some Chinook stocks in the model were not tagged during the base period; recoveries of these stocks (called "out-of-base" stocks) are adjusted to account for changes in exploitation rates relative to the base period.

Catch Ceiling - A fishery catch limitation expressed in numbers of fish. A ceiling fishery is managed so as not to exceed the ceiling; actual catch is expected to fall somewhere below the ceiling.

Catch Quota - A fishery catch allocation expressed in numbers of fish. A quota fishery is managed to catch the quota; actual catch is expected to be slightly above or below the quota.

Chinook/Coho Nonretention (CNR) – Any salmon (any specie) directed fishery where the retention of Chinook (or coho) salmon is prohibited is designated as a CNR fishery. Examples would include a sport "catch and release" fishery, as well as a salmon directed net fishery requiring the release of non-target species.

Cohort Analysis - A sequential population analysis technique that is used during model calibration to reconstruct the exploited life history of coded-wire tag groups.

Cohort Size (initial) - The total number of fish of a given age and stock at the beginning of the fishing season.

Coded-Wire Tag (CWT) - Coded microwire tags that are implanted in juvenile salmon prior to release. A tagged fish usually has its adipose fin removed to signal tag presence. Fisheries and escapements are sampled for tagged fish. When recovered, the binary code on the tag provides specific information about the tag group (e.g., location and timing of release, special hatchery treatments, etc.).

Dip –In – Catch of non-local stock (generally maturing fish "passing by" on the way to their natal areas) in a Terminal Area fishery that is targeting the returning mature local stocks.

Drop-off Mortality - Mortality of salmon that "drop-off" sport or troll fishing gear before they are landed, and die from their injuries prior to harvest or spawning.

Drop-out Mortality - Mortality of salmon that die in a fishing net and "drop-out" prior to harvest or salmon that disentangle from a net while it is in the water and die from their injuries prior to harvest or spawning.

Extreme Terminal Run Size (ETRS) - The ETRS value is the sum of escapements of specified stocks plus the landed catch of those stocks in specified terminal fisheries.

Exploitation Rate (ER) – Fishing mortality rate, expressed as fishery-related mortalities (total or by fishery) divided by the sum of: all fishery related mortalities plus escapement.

Exploitation Rate Scalar - A multiplier used to adjust fishery stock specific impacts by scaling the base period fishery/stock/time step exploitation rates.

FRAM - The Fishery Regulation Assessment Model is a simulation model developed for use in estimating the impacts of Pacific Coast salmon fisheries on Chinook and coho Stocks of interest to fishery managers.

Harvest Rate (HR) - Catch or total fishing mortality in a fishery expressed as a proportion of the total fish abundance available in a given fishing area at the start of a time step (after natural mortality).

Hooking Mortality - Mortality of salmon that are caught and released by sport or troll hook-and-line gear, and die from their injuries prior to harvest or spawning.

Management System Evaluation - An evaluation of how well the model predicts variables of interest (e.g., terminal runs, catch by stock, and fishery stock composition) when pre-season estimates of abundance and fishery catches are used as input data. In other words, given that the model performs adequately, does our preseason decision making process, based on preseason predictions, result in the anticipated outcome?

Marked Recognition Error - The probability that a marked fish will be inadvertently released.

Model Calibration - Model process involving base period data which (1) scales the coded-wire tag recoveries to represent a stock, (2) allocates non-landed catch mortality to stocks, and (3) reconstructs the cohort in order to compute exploitation rates, maturation rates, and stock abundance.

Model Simulation - Use of the model to vary the calibrated fish population abundance and fishing rates to portray the effects, on the stocks and fisheries, of different sets of sport and commercial fishery regulations.

Non-landed Catch - This category of fishery-related mortality includes hook-and-line drop-off, net gear drop-out, hooking mortality, and other sources of non-landed mortality such as unreported or illegal catch.

Nontreaty Fisheries - Fisheries conducted by fishers who are not members of the twenty-four Belloni or Boldt Case Area Tribes.

Pre-terminal - In FRAM, a "pre-terminal" fishery is one that potentially operates on both mature and immature fish. Generally these are mixed-stock area fisheries.

Salmon Fishery – This term refers to any fishery targeting any species of salmon, not just coho or Chinook directed fisheries. A by-catch of coho and/or Chinook should be anticipated in fisheries targeting chum, pink, or sockeye salmon.

Shaker Mortality – "Shakers" - This term is synonymous with hooking mortality and represents fish that are released from recreational and troll hook and line fisheries, either because they are outside of the regulatory size limits, because the species is not allowed to be kept, or because the individual fisher chooses, for personal or economic reasons, to release the fish.

Terminal - In FRAM, a "terminal" fishery is one that operates only on mature fish. These fisheries tend to be adjacent to a stock's stream of origin and target returning local stock adult fish.

Terminal Area Management Modules (TAMM) - Spreadsheets external to but integrated with FRAM that are used to: (1) provide input for FRAM simulations regarding projected Puget Sound terminal area catches; (2) received output from FRAM modeling runs; (3) compute escapements for Puget Sound stock aggregates; and (4) create output reports that summarize simulated regulations, stock exploitation rates, allocation accounting, and escapement estimates.

Terminal Area Abundance (TAA) - The TAA value is the sum of escapements of specified stocks plus the landed catch of all stocks in specified terminal fisheries. The TAA type runsize would include all non-specified stocks' (local and non-local) landed catch in those specified fisheries

Total Mortality – As used in FRAM terminology, this refers to total fishery related mortality.

Treaty Fisheries - Fisheries conducted by members of the twenty-four Belloni or Boldt Case Area Tribes.

Unmarked Recognition Error (or Retention Error Rate) - the probability that an unmarked fish will be retained inappropriately in a selective fishery (e.g. naturally-occurring marks, fisher fails to identify mark, fisher fails to comply with release requirement).

Validation - An evaluation of how well the model predicts variables of interest (e.g., terminal runs, catch by stock, and fishery stock composition) when post-season estimates of stock abundance and fishery catches are used as input data. Validation is intended to evaluate performance of the model. In other words, does the model yield correct stock-specific impacts using, as inputs, actual stock size and fishery catch information.