

February 2 2006

To: Lower Fraser and BC Interior Area Catch Monitoring Technicians responsible for generation of catch estimates using MERCI 3.0 software system.

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Purpose:

- Summarize key steps for producing confidence limits using MERCI 3.0
- Follow-up notes pursuant one-day training session, Feb 2 2006 at DFO Kamloops
- Topic - MERCI 3.0 confidence interval generation for catch statistics

Overview:

A one-day training course was delivered in Kamloops on February 2 2006 on the generation of bootstrap confidence intervals for lower and mid Fraser River sockeye catch estimates using MERCI 3.0 (contract No. F1943-050015).

The main documentation for this exercise was a Power Point presentation “MERC I 3 BC confidence intervals.ppt”.

This document further summarizes the key steps for producing confidence limits demonstrated during the in-person session.

Caveat / Warning:

The Access queries and VBA code referred to below was not intended to be a client-facing product. The material was developed by ESSA in 2001 for our internal analysis purposes while working up data for several post-season reviews of Fraser River First Nation catch estimates.

The queries and steps below are non-user friendly, as they were never designed to be end-user software features. Further, they assume advanced knowledge of the MERCI 3.0 database design, MS Access query writing and manipulation of Access VBA procedures. Unintended changes to these and other queries or the VBA code may “break” the database in which they reside, and be difficult to trace and repair.

The long-run solution involves “point and click” reporting from within the MERCI software. The historical scope of work has not provided for this feature. Indeed, the reporting features of MERCI were always secondary to basic data entry, management, and catch estimation. MERCI end-user reports would greatly benefit from an overhaul with an eye to simplification.

Steps demonstrated Feb 2 2006, DFO, Kamloops:

1. Use MERCI to produce point estimates, and the *InExcel* tool to generate a catch report (see: “MERCi 3 101 Manual.pdf”);
2. Inspect sample sizes for the areas and weeks for which confidence intervals are to be produced. Ensure these sample sizes are adequate
 - *Rough* guideline is ~ 20+ catch interviews
 - Effort counts 24-hr effort surveys ≥ 8
 - *Confidence limits produced on sample sizes below these levels should generally be considered *hyper-precise*.
3. Turn-off your computer’s screen saver to avoid stalling the generation of bootstrap replicates in step 4.
4. Using a copy of the estimate definition from “1”, generate bootstrap replicates using MERCI (Figure 1);

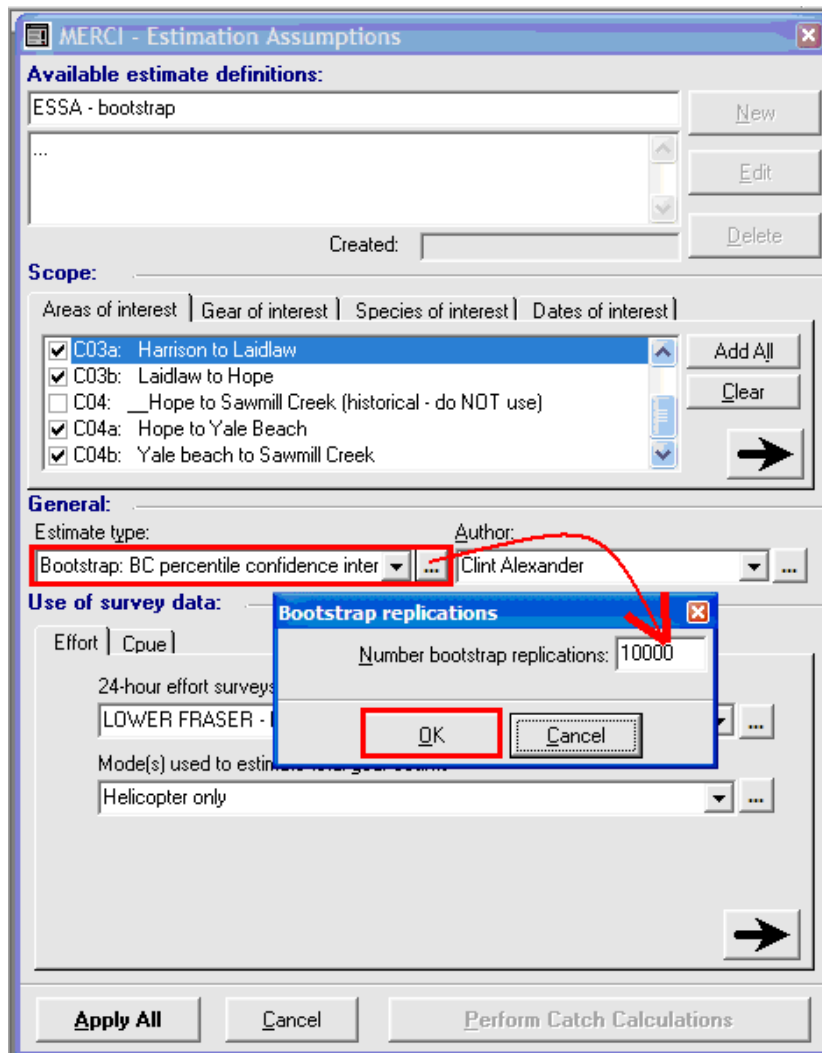


Figure 1: Estimate type feature determines whether bootstrap replicates will be generated.

- Determine 95% confidence limit endpoints for bootstrap replicates. This involves manipulation of source data in the MERCI database table (Figure 2).

EstimateID	BootstrapNumber	Year	Week	ManagementUnitID	GearTypeID	SpeciesID	CATCH
103	0	2005	34	9	1	1	578
103	1	2005	34	9	1	1	359
103	2	2005	34	9	1	1	612
103	3	2005	34	9	1	1	699
103	4	2005	34	9	1	1	808
103	5	2005	34	9	1	1	826
103	6	2005	34	9	1	1	722
103	7	2005	34	9	1	1	685
103	8	2005	34	9	1	1	508
103	9	2005	34	9	1	1	466
103	10	2005	34	9	1	1	331
103	11	2005	34	9	1	1	520
103	12	2005	34	9	1	1	1025
103	13	2005	34	9	1	1	682
103	14	2005	34	9	1	1	596
103	15	2005	34	9	1	1	750
103	16	2005	34	9	1	1	425
103	17	2005	34	9	1	1	425
103	18	2005	34	9	1	1	759
103	19	2005	34	9	1	1	458
103	20	2005	34	9	1	1	494
103	21	2005	34	9	1	1	437
103	22	2005	34	9	1	1	630
103	23	2005	34	9	1	1	721
103	24	2005	34	9	1	1	310
103	25	2005	34	9	1	1	573
103	26	2005	34	9	1	1	516
103	27	2005	34	9	1	1	629
103	28	2005	34	9	1	1	633
103	29	2005	34	9	1	1	888
103	30	2005	34	9	1	1	592
103	31	2005	34	9	1	1	490
103	32	2005	34	9	1	1	689

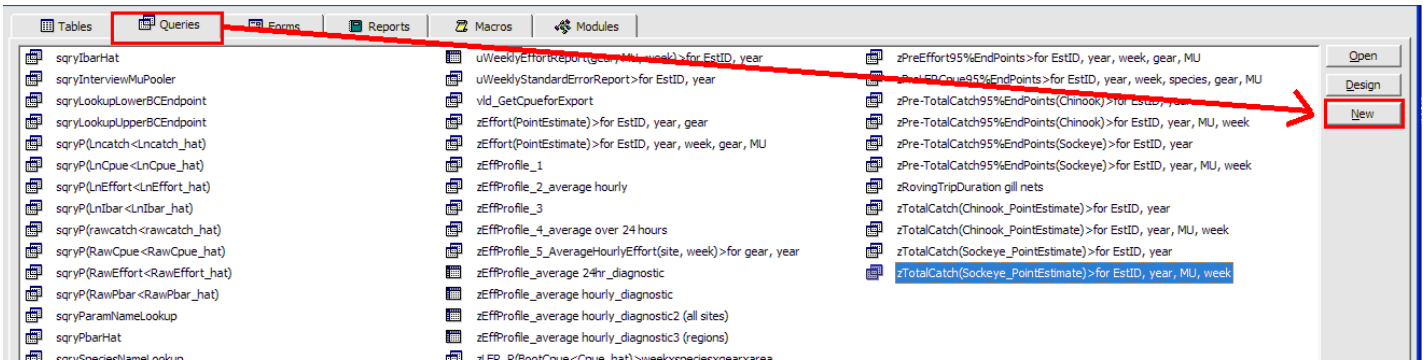
Figure 2: MERCI database, “tblOUTPUT_CATCH” table showing bootstrap catch estimates (BootstrapNumber field has values other than 0). Note: BootstrapNumber = 0 refers to the point estimate.

- Determining endpoints can either be done using (a) simple bootstrap percentile intervals (ok if the bootstrap estimate of bias is small) or (b) bias-corrected intervals (better).

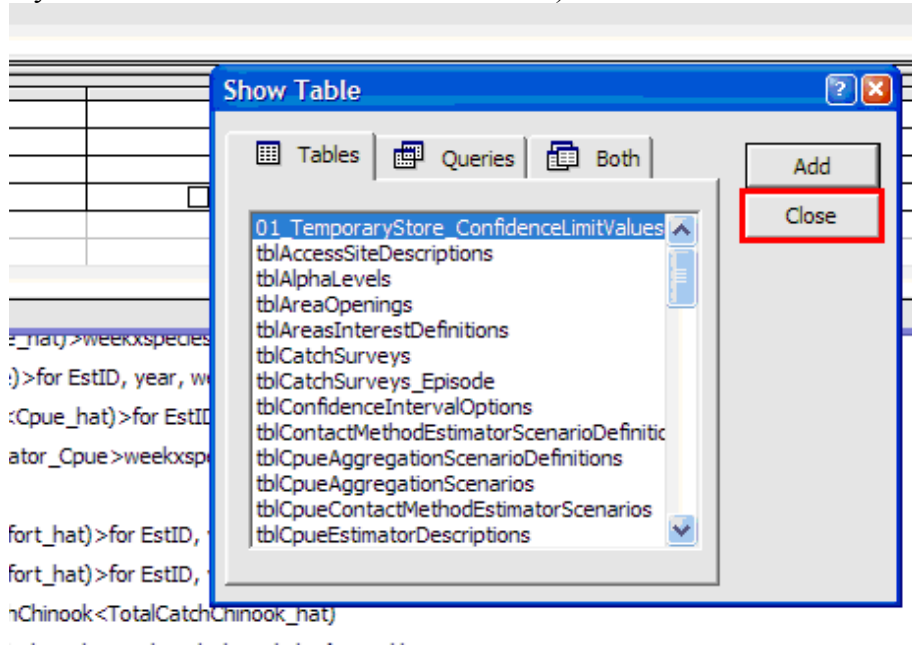
6. Simple percentile intervals:

- Use one of the “sql stubs” provided during the training course. These stubs are also available from: www.essa.com/downloads/merci/downloads.htm
e.g., “sql STUB_basic for area x week boot replicates.txt” or
“sql STUB_basic for all catch x week boot replicates.txt”

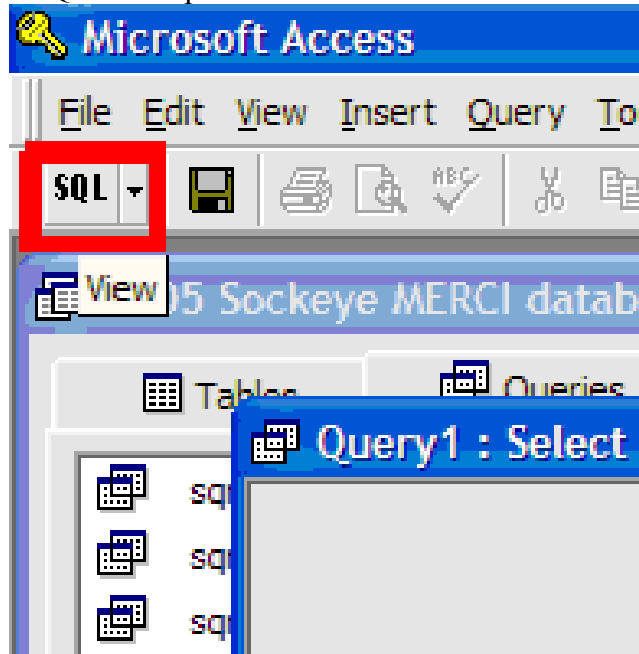
- The example sql in this file must be copied, and pasted as a new query into MS Access. This is done by following the steps and screen images shown below.
- With sql stub copied into memory, select the query tab, and click New:



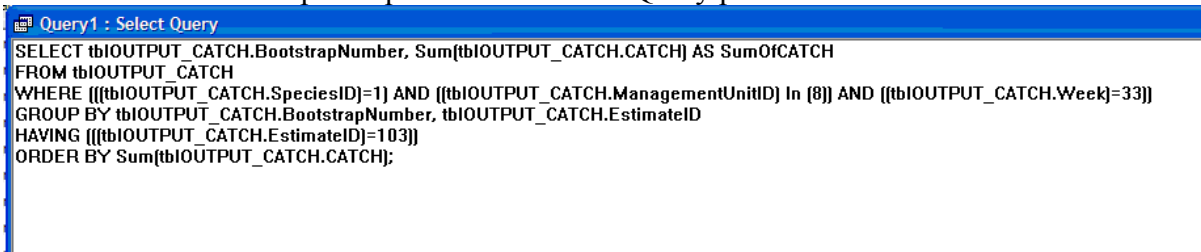
- Then Close the dialogue for selecting tables and queries (you have a stub, so you don't need to build this from scratch):



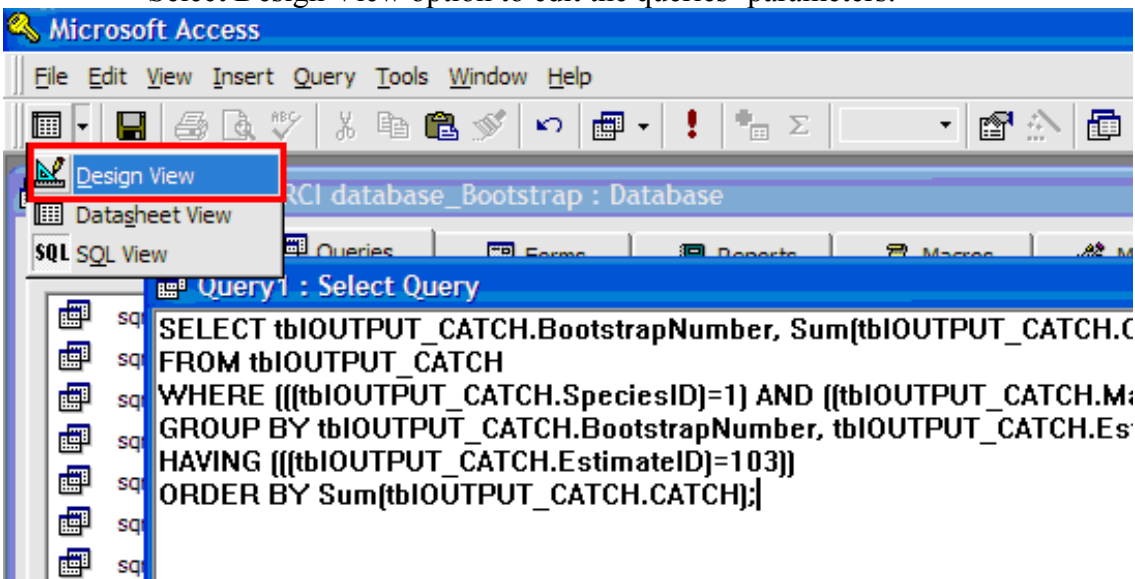
- Select the SQL view option:



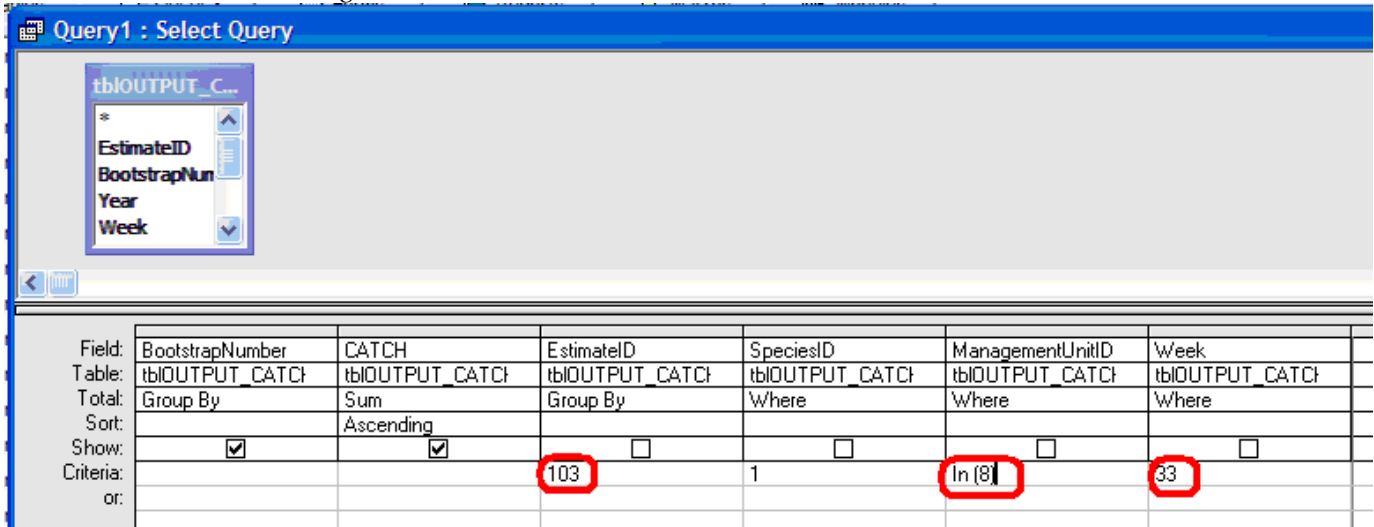
- Paste the copied sql stub text into the Query pane:



- Select Design View option to edit the queries' parameters:

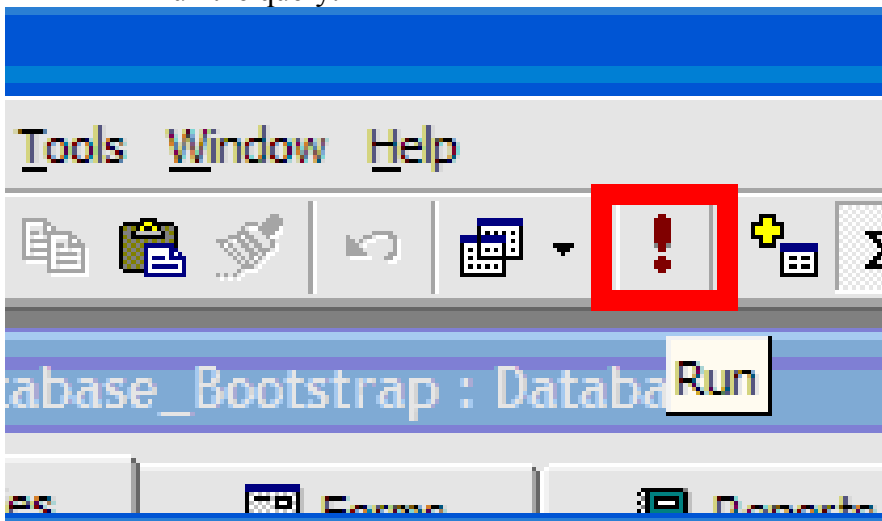


- Depending on the stub chosen, edit the appropriate parameters to match EstimateID associated with your bootstrap run, and choose the appropriate management units and weeks:



The relevant IDs for these queries can be found in the following tables:

- “tblESTIMATE_DEFINITION”
 - “tblManagementUnitDescriptions”
 - Determine statistical weeks using the Calendar tool in MERCI.
- Run the query:



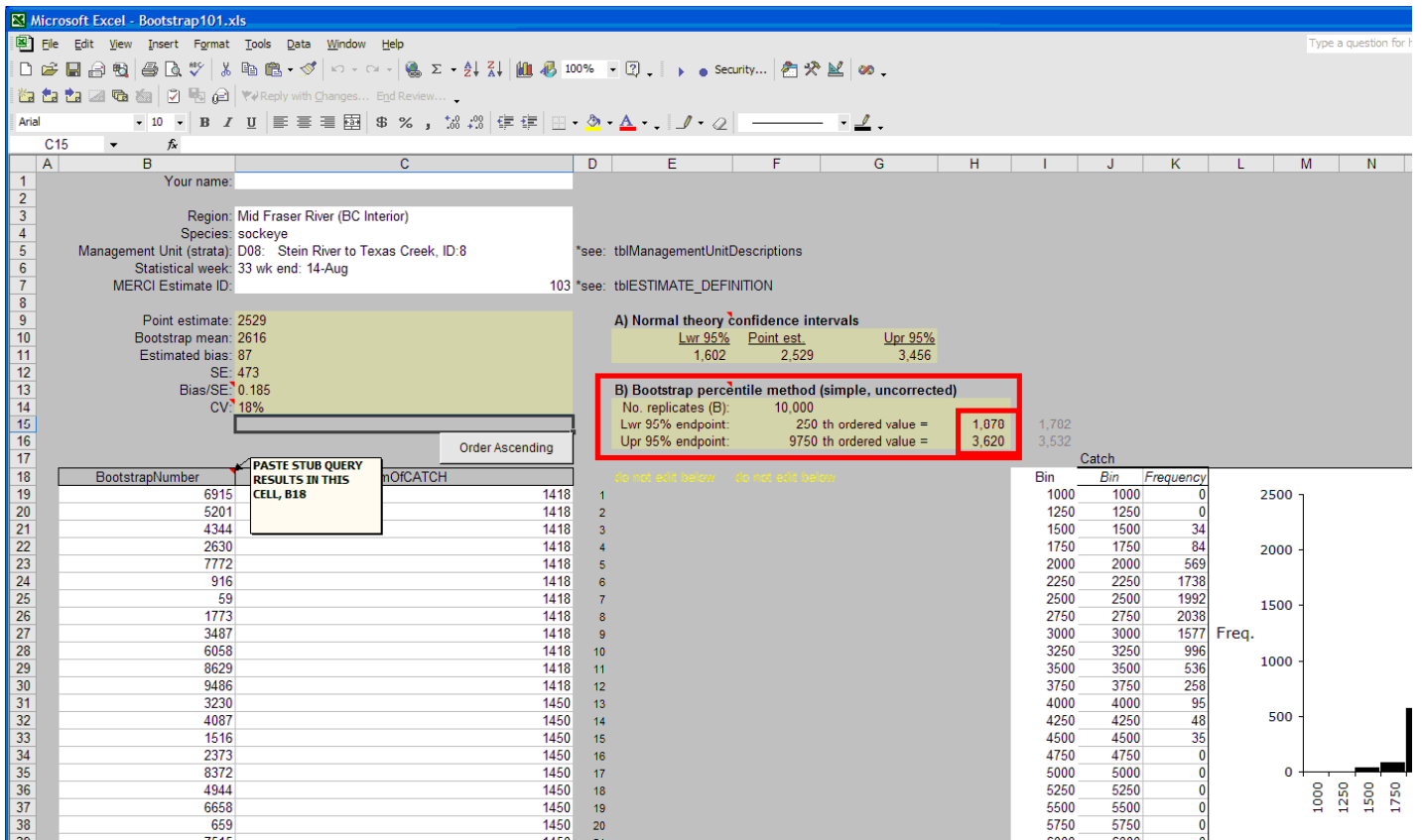
- View results, and copy them and paste (import) them into **Bootstrap101.xls**¹ (or a statistical software package):

¹ Also available from: www.essa.com/downloads/merci/downloads.htm

Query1 : Select Query		
	BootstrapNumber	SumOfCATCH
▶	6915	1418
	5201	1418
	4344	1418
	2630	1418
	7772	1418
	916	1418
	59	1418
	1773	1418
	3487	1418
	6058	1418
	8629	1418
	9486	1418
	3230	1450
	4087	1450
	1516	1450
	2373	1450
	8372	1450
	4944	1450
	6658	1450
	659	1450
	7515	1450
	5801	1450
	9229	1450
	5143	1460
	6857	1460

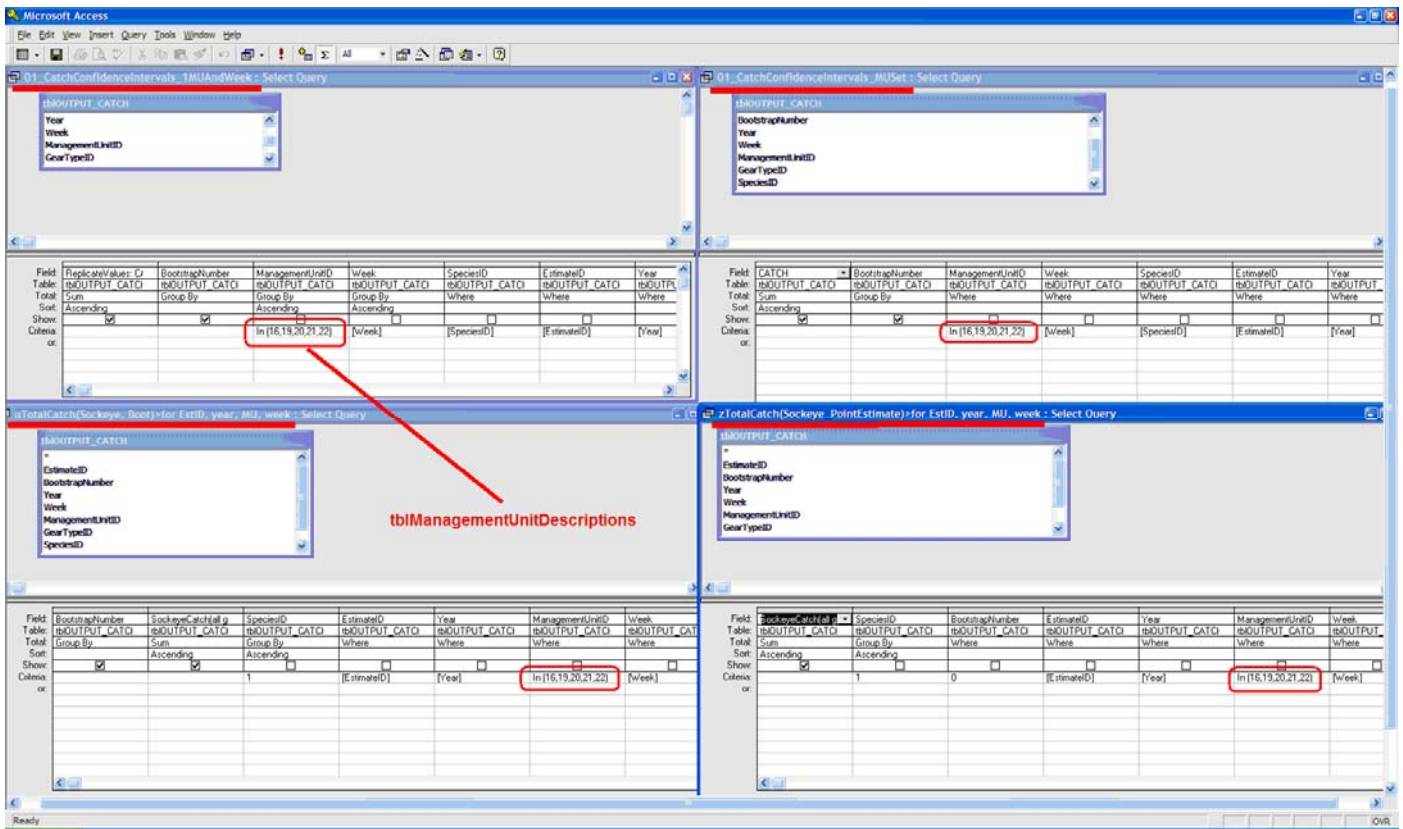
Record: 1 of 10000

- Use **Bootstrap101.xls** to work up the data, and find the basic percentile intervals:

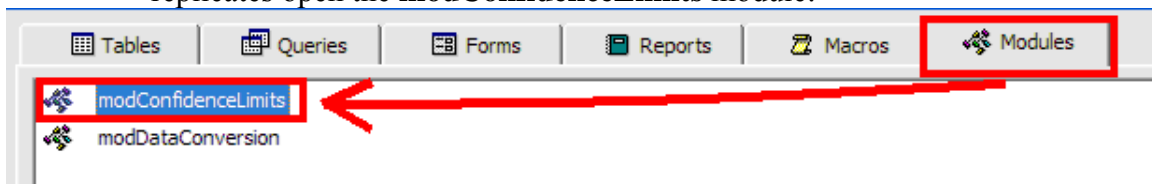


7. Bias-corrected intervals:

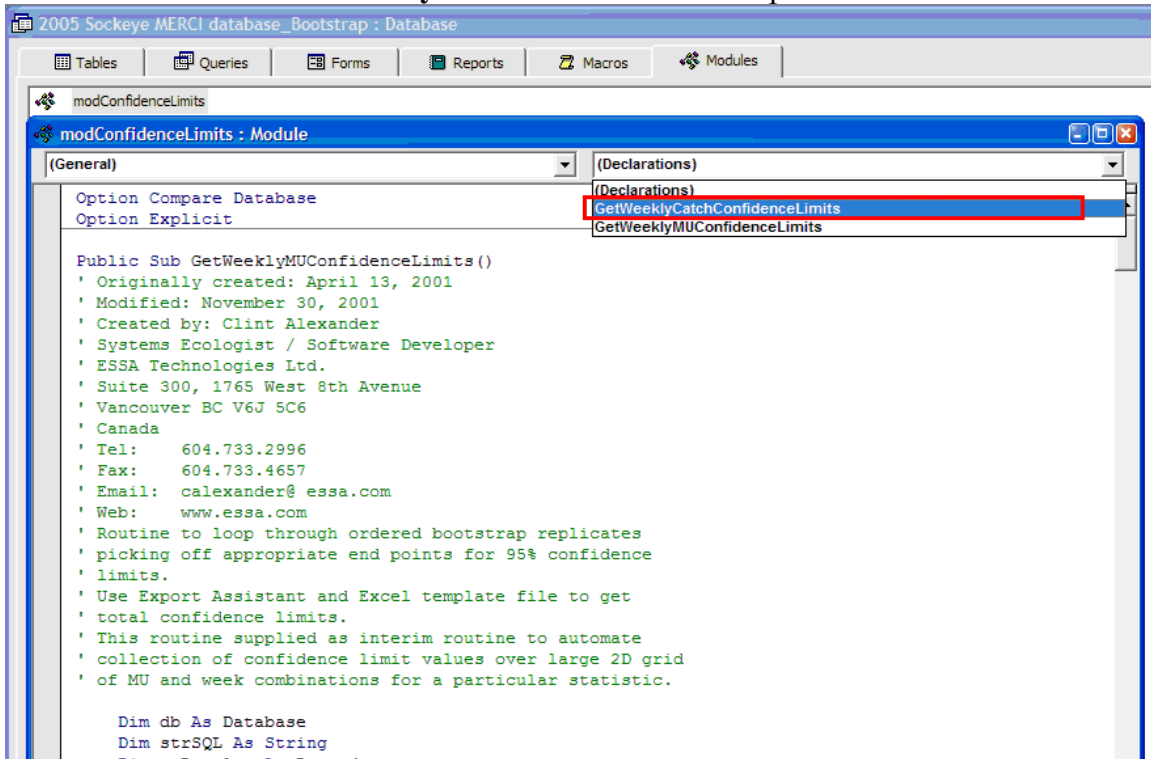
- Bias corrected intervals involve additional calculations. These are performed using a series of compound queries in the MERCI 3.0 database and Access VBA code.
- *Note: this method does not provide raw data, only the actual upper and lower 95% confidence limits by statistical week*
- **The following steps must be performed:**
- Update the ManagementUnitID parameters in the following 4 queries:
 - “01_CatchConfidenceIntervals_1MUAndWeek”
 - “01_CatchConfidenceIntervals_MUSet”
 - “uTotalCatch95%EndPoints(Sockeye)>for EstID, year, MU, week”
 - “zTotalCatch(Sockeye_PointEstimate)>for EstID, year, MU, week”



- From Access 97, in the MERCI 3.0 database containing the bootstrap replicates open the **modConfidenceLimits** module:



- Select the **GetWeeklyCatchConfidenceLimits** procedure:



- Edit the constant values inside the **#####** comment region for the appropriate **EstimateID**, **Year**, **SpeciesID** and **GearTypeID**:

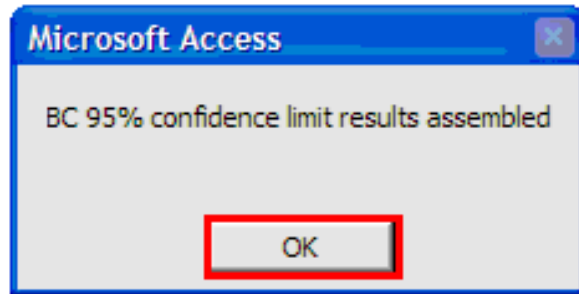
```
#####
'
' Manually edit parameter values below.
' Only one species and gear type can be summarized
' at a time
#####
Const EstimateID = 103
Const Year = 2005
Const SpeciesID = 1 '1= sockeye 2=chinook
Const GearTypeID = 1 '1= gill nets 2 = dip net

' Find and open the following queries:
' uTotalCatch(Sockeye, Boot)>for EstID, year, MU, week '***for sockeye **
' zTotalCatch(Sockeye_PointEstimate)>for EstID, year, MU, week '*** for sockeye **

' uTotalCatch(Chinook, Boot)>for EstID, year, MU, week '***for chinook **
' zTotalCatch(Chinook_PointEstimate)>for EstID, year, MU, week '*** for chinook **

' 01_CatchConfidenceIntervals_1MUAndWeek
' 01_CatchConfidenceIntervals_MUSet
'
' *** Edit all In clauses associated with the field,
' 'ManagementUnitID' to be the same.
'
' Use the table: 'tblManagementUnitDescriptions'
' to identify the appropriate IDs for management units
#####
```

- *If you are attempting to obtain confidence limit values for Chinook salmon, you must update the ManagementUnitID parameters in the



- After clicking OK, navigate to the Tables tab in MS Access, and open the “01_TemporaryStore_ConfidenceLimitValues” table. This contains weekly *bias-corrected 95% confidence intervals* for the species, gear type and regions specified for each week:

01_TemporaryStore_ConfidenceLimitValues : Table

Week	Lower95ConfValue	Upper95ConfValue
32	1032	2731
33	1782	3532
34	1024	2268
35	1336	2881
36	804	3345
37	82	1324
*	0	0

- Copy these values into your chosen summary report.