

Introduction of Software for Data Generation Model

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Agenda

- Overview of the DGM Software
 - Release Package
 - Interfaces
 - Procedures of Using Software
 - File Organization
- Input Data Definitions and Structures
- Output Data Structures
- Database
- Discussion on the DGM model

Release Package

✓ DGMOutput_SM

✓ Input Data

.dropbox

✓ CTC Technical Report v1.docx

✓ CTC_Release_x86_2018_09_13.zip

✓ CTC_Release_x86_2018_09_16.zip

✓ CTCSimulator_UserManual.pdf

✓ ReleaseNote_2018.docx

AppData: Access File
Doc: User guide

AppData

Doc

CTCSimulatorApp.exe

msvcp120.dll

msvcp140.dll

msvcr120.dll

RNGenerator.dll

vccorlib120.dll

vccorlib140.dll

Vitech.Database.dll

Vitech.Numeric.dll

ZedGraph.dll

File folder

File folder

Application

Application extension

Application extension

Application extension

Application extension

Application extension

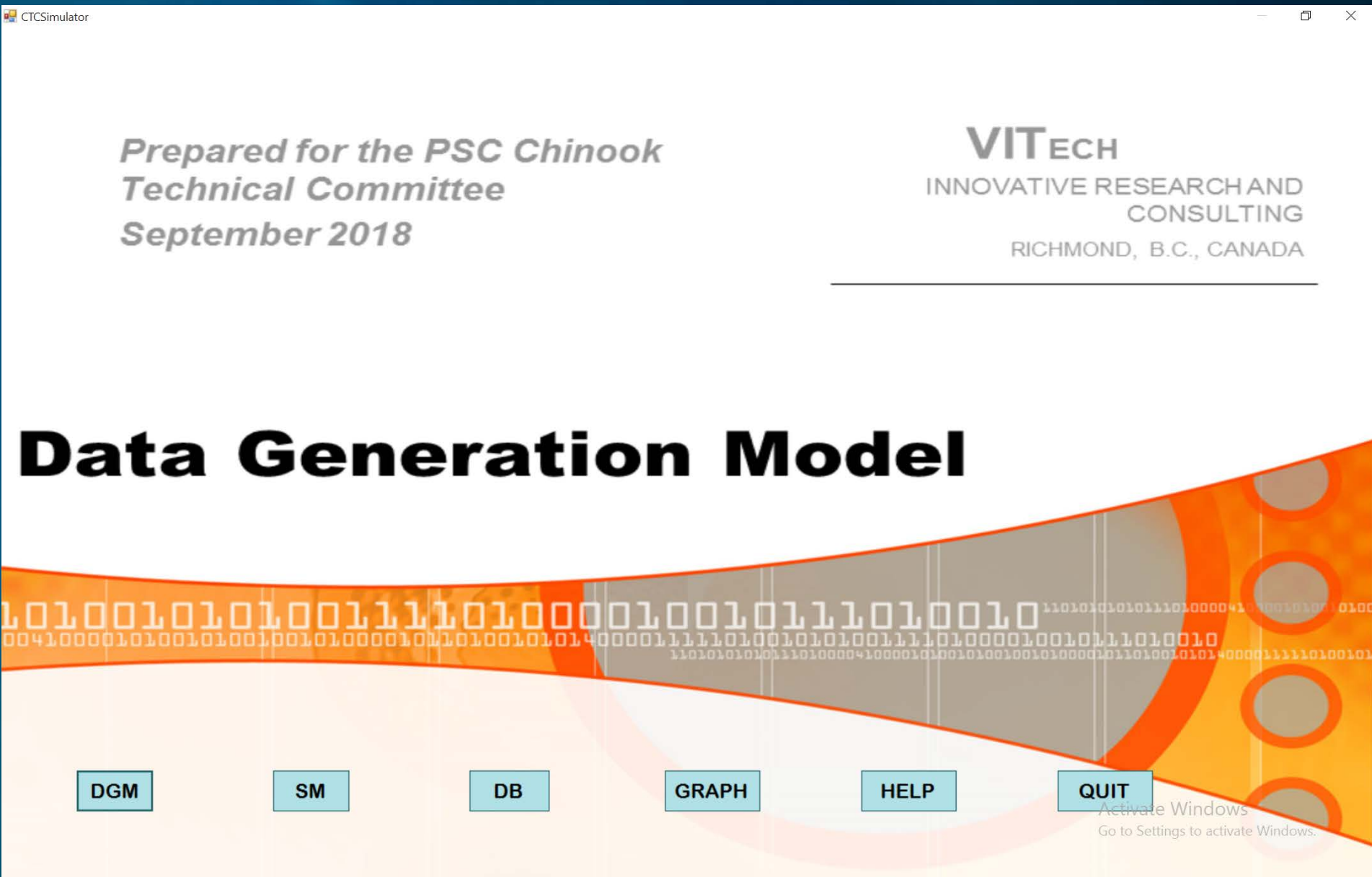
Application extension

Application extension

Application extension

Application extension

DGM Startup Interface



Data Generation Module

CTC Simulator

File Run Help

DGM SM Display DB Update

☒ Use Current Data in DB

☐ Use Data from a Previous Simulation

Select a Simulation ID

☐ Use Data from a Control File

Run Parameters

Enter an ID number for this simulation

Number of DGM runs

(Random number seed is auto-generated)

☐ Enter an integer as RND seed

(Note: POSITIVE integer. Only one simulation will be run)

Num. of Accounting Years (<=31)

Base Year

Number of Time Periods/Year

Distribution Method ☐ Single Pool ☒ Multi Pool

Progress Status

DGM Control File

Data Store Folder

☐ Upload Output Data to DB

Sampling Module

Sampling Rates

Preterminal
Terminal
Escapement

CTC Simulator

File Run Help

DGM SM Display DB Update

Select a DGM ID

Enter an SM ID

Number of SM Runs

Progress Status

```
Sampling Fishery 9
===== Start sampling PT catch: SM Run 4
Start sampling data from DGM Run 1
Sampling Fishery 1
Sampling Fishery 2
Sampling Fishery 3
Sampling Fishery 4
Sampling Fishery 5
Sampling Fishery 6
Sampling Fishery 7
Sampling Fishery 8
Sampling Fishery 9
===== Start sampling PT catch: SM Run 5
Start sampling data from DGM Run 1
Sampling Fishery 1
Sampling Fishery 2
Sampling Fishery 3
Sampling Fishery 4
Sampling Fishery 5
Sampling Fishery 6
Sampling Fishery 7
Sampling Fishery 8
Sampling Fishery 9
All jobs done
```

Load a sampling rate file from File Menu

Sampling Rate File

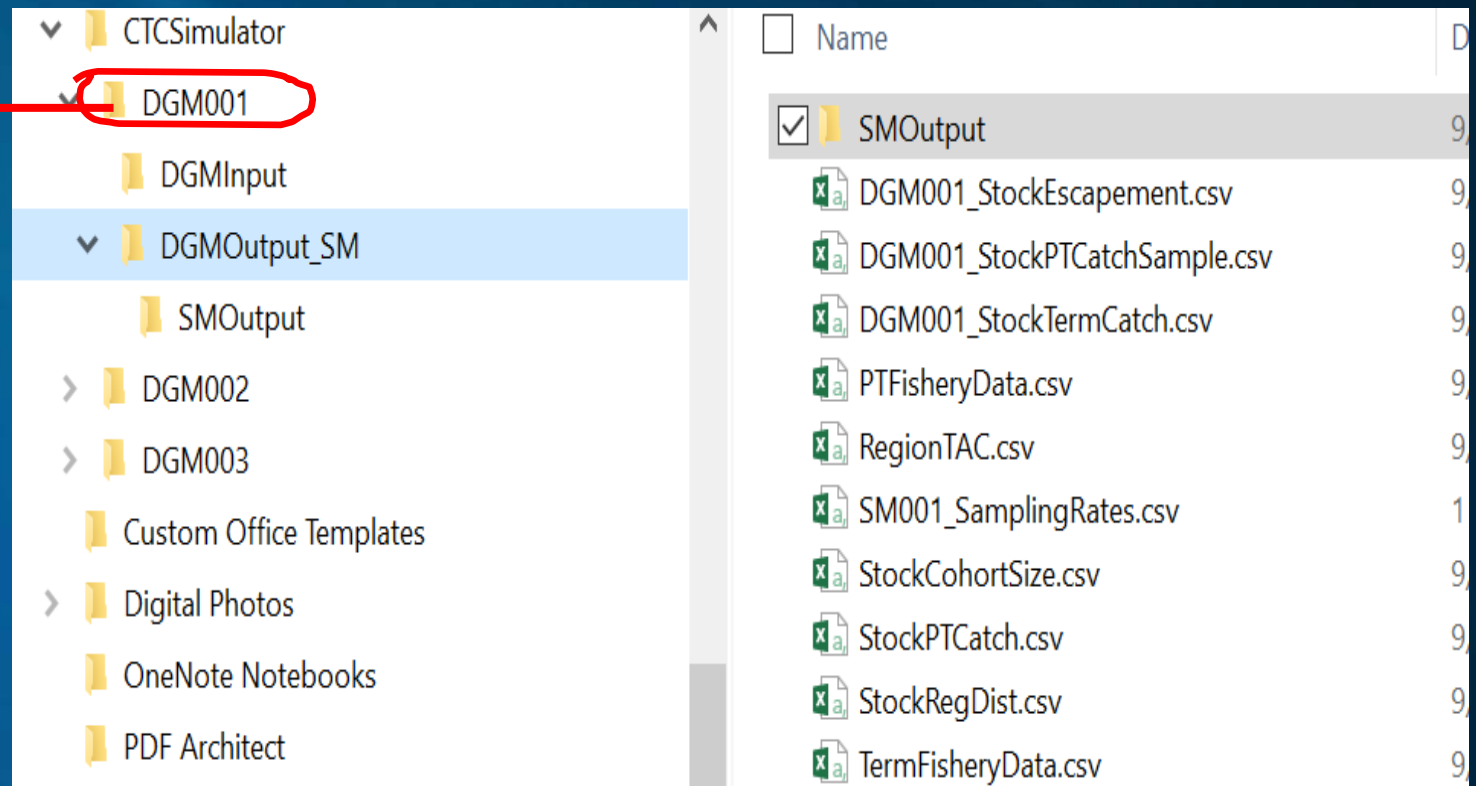
Output Folder

Procedure

- Choose a method to provide input
 - Use a control file
 - Use input files used in a previous run
 - Use current data in DB
- Select a data store folder
- Enter a simulation ID
- Select a method for providing random number seeds
- Select run parameters
- Select a method for stock regional distribution
- Provide a specific lookup table for the conversion of abundance index (AI) to TAC in AABM fisheries (Optional)

File Organization

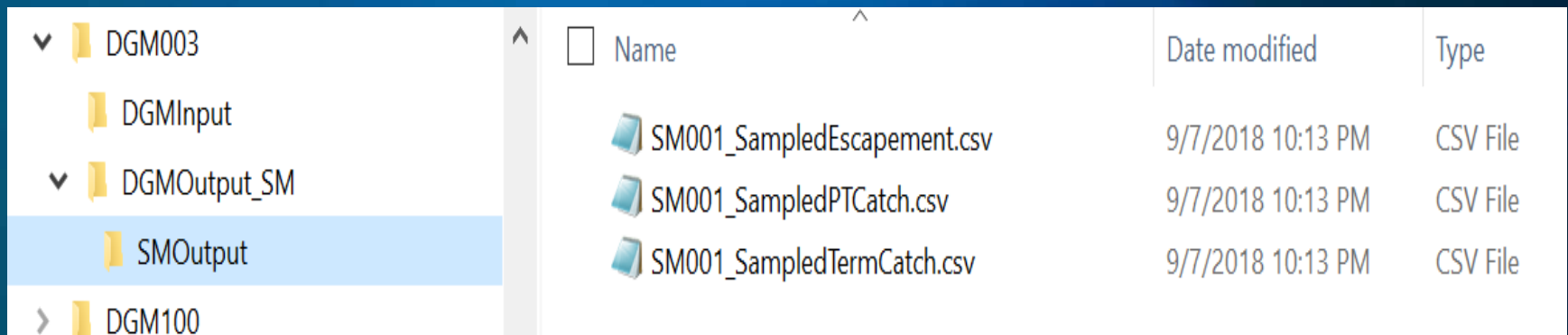
Project code
Or RunID



CTCSimulator

- DGM001**
- DGMInput
- DGMOutput_SM
 - SMOutput
- DGM002
- DGM003
- Custom Office Templates
- Digital Photos
- OneNote Notebooks
- PDF Architect

Name	
SMOutput	9
DGM001_StockEscapement.csv	9
DGM001_StockPTCatchSample.csv	9
DGM001_StockTermCatch.csv	9
PTFisheryData.csv	9
RegionTAC.csv	9
SM001_SamplingRates.csv	1
StockCohortSize.csv	9
StockPTCatch.csv	9
StockRegDist.csv	9
TermFisheryData.csv	9



DGM003

- DGMInput
- DGMOutput_SM
 - SMOutput
- DGM100

Name	Date modified	Type
SM001_SampledEscapement.csv	9/7/2018 10:13 PM	CSV File
SM001_SampledPTCatch.csv	9/7/2018 10:13 PM	CSV File
SM001_SampledTermCatch.csv	9/7/2018 10:13 PM	CSV File

Input Data Definitions and Structures

CTCSimInputControl.ctrl: fixed item list and order

CTCStock.csv	Definition of stocks			
CohortSize_Age.csv	Cohort size at different ages			
CohortRegionDist_MultiPool.csv	Cohort size distribution over regions:multi pool			
CohortRegionDist_SinglePool.csv	Cohort size distribution over regions:single pool			
GroupSurvival.csv	Survival rates of stocks as a group			
Stock_Age_Size.csv	Stock size (length) at different ages			
Stock_MatRate.csv	Stock year specific maturation rates			
Stock_PrespawnMort.csv	Stock prespawn mortality			
CTCFisheries.csv	Definition of fisheries			
Fishery_Dist_Period.csv	Fish allocation over time periods			
Fishery_HrScalar.csv	Fishery specific harvest rate scale			
Fishery_MarkedRetention.csv	Fishery specific marked retention data			
Fishery_Mortality.csv	Fishery specif mortality rates			
Fishery_SizeLimit.csv	Fishery specific size limit			
Region_Sector_Alloc.csv	Regional sector allocation			
BasePeriod_ER.csv	Base period exploitation rates			
Stock_TermHR.csv	Stock terminal harvest rates			
Stock_TermHRScalar.csv	Stock terminal harvest rate scalars			
Stock_TermMortRetention.csv	Stock terminal mortalities and retention data			

Basic Tables

- CTCStock.csv: Defines stocks to simulate. Unique Stock ID. Basic properties provided in this table. Other properties are linked to Stock ID.
 - *Stock ID, Description, Type, Assoc Stock, Ocean/Stream, Maturation Period, Survival Group ID, Corr Coeff, Ricker A, SD Ricker A, Ricker B, SD Ricker B*
- CTCFisheries.csv: Defines fisheries to simulate. Unique Fishery ID. Basic properties provided in this table. Other properties are linked to Fishery ID.
 - *Fishery ID, Name, Region, Sector, Type, IsAIDriver*

Some Important tables

- CohortSize_Age.csv: provides cohort size of a stock at different ages in the base year (1979)
 - Stock ID, Age, Abundance, Unmarked(U), Unmarked+CWT (U+), Marked(M), Marked+CWT(M+)
- Fishery_MarkedRetention.csv: provides preterminal fishery specific marked retention data.
 - *Fishery ID, Name, Year, ..., Max_Unmarked Fish Allowed, IsMSF*
 - *MaxUF = 0 and IsMSF=1 → Straight MSF*
- Stock_TermMortRetention.csv: provides a number of mortality and retention data in terminals.
 - *StockID,Year,FisheryID,Sector, ..., Max_Unmarked Fish Allowed, IsMSF*
 - *MaxUF = 0 and IsMSF=1 → Straight MSF*

DGM Output Data → SM Input

- *xxx_StockPTCatch*: contains preterminal catch and mortality data
 - RunID, StockID, Year, Period, Fishery, Age, C_U, C_U+, C_M, C_M+, DM_U, DM_U+, DM_M, DM_M+, RM_U, RM_U+, RM_M, RM_M+
- *xxx_StockTermCatch*: contains terminal catch and mortality data
 - RunID, StockID, Year, Age, C_U, C_U+, C_M, C_M+, DM_U, DM_U+, DM_M, DM_M+, RM_U, RM_U+, RM_M, RM_M+
- *xxx_Escapement*: contains escapement data, which is counts of fish of a stock that escape during a given period.
 - RunID, StockID, Year, Age, U, U+, M, M+

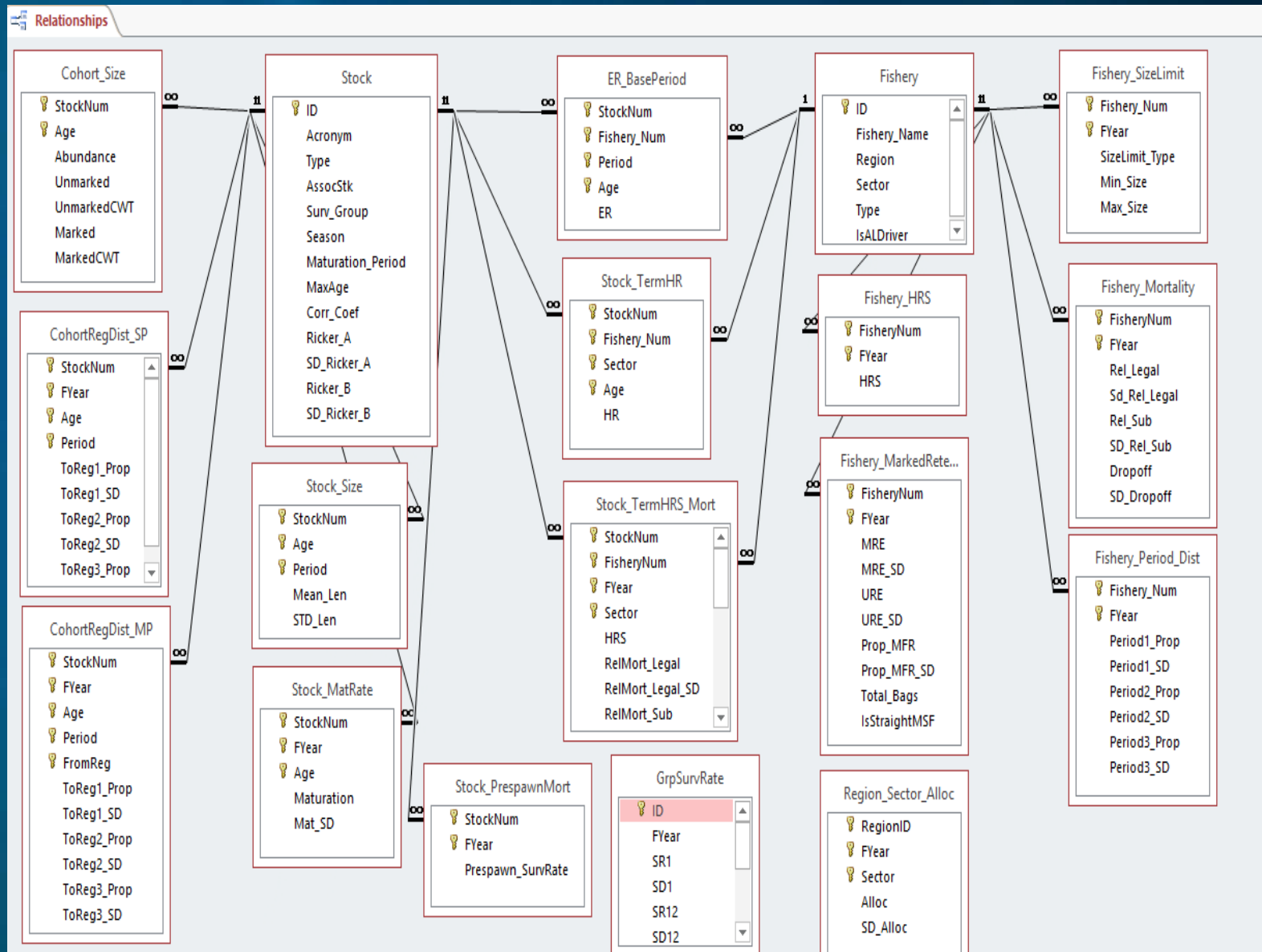
SM Output

- *xxx_SampledPTCatch.csv*
 - SMRunID, DGMRunID, Year,Period, FisheryID, StockID, Age, SampledU, TotalU, SR_U, SampledU+, TotalU+, SR_U+, SampledM, TotalM, SR_M, SampledM+, TotalM+, SR_M+
- *xxx_SampledTermCatch.csv*
 - SMRunID, DGMRunID, Year, FisheryID, StockID, Age, SampledU, TotalU, SR_U, SampledU+, TotalU+, SR_U+, SampledM, TotalM, SR_M, SampledM+, TotalM+, SR_M+
- *xxx_SampledEscapement.csv*
 - SMRunID, DGMRunID, Year, StockID, Age, SampledU, TotalU, SR_U, SampledU+, TotalU+, SR_U+, SampledM, TotalM, SR_M, SampledM+, TotalM+, SR_M+

Database

- Populate tables via control file (fast data entry if empty tables are empty)
- Impose data integrity check (e.g. unique IDs, duplicates)
- Add new stocks and fisheries, or delete old ones more conveniently (otherwise the user will have to go through all the data files and add/delete correctly)
- Create or edit individual items in existing tables

Database Schematic View



Database Update Interface

CTC Simulator

FileRunHelp

DGMSMDB Update

Update From Files

Go to File Menu to load a new control file, or select a control file from existing projects by clicking the Show Projects button on the right

Show Projects

Selected DGM Control File

Progress Status

Update DB

Update Manually

Add, Modify, Delete Stocks

Add, Modify, Delete Fisheries

Modify Base Period ER

Modify Group Survival Rate

Modify Region Sector Allocation

Stock and Fishery Table

CTC Stock Entry

Available Stock IDs

Current Stock

StockID

Description

Type

Associate Stock ID

☒ Ocean ☐ Stream

Maturation Period

Max Age

Survival Group

CorrCoef

Ricker A

SD Ricker A

Ricker B

SD Ricker B

Enter Exit

Enable New Stock Entry

Enter a new stockID. May select an existing stock ID to populate the data fields.

Edit More Stock Data

Delete Current Stock

CTC Fishery Form

Available Fisheries

Current Fishery

Fishery Name

Region

Sector

Type

IsALDriver? ☐ Yes ☒ No

Enter Exit

Disable New Fishery Entry

Enter a new Fishery ID. May select an existing fishery ID to populate the data fields.

Edit Preterminal Fishery Properties

Edit Terminal Fishery Properties

Delete Current Fishery

Example of Stock

Additional Stock Properties

StockID

Initial Cohort Size

Age

Abundance

Unmarked (U)

Unmarked+CWT (U+)

Marked (M)

Marked+CWT (M+)

Update

Mean Length

Age

Period

Mean Size

STD Size

Update

Maturation Rate

Age

Year

Maturation Rate

SD MatRate

Update

Prespawn Mortality

Year

Survival Rate

Update

Enter Dist Parameters
for Single Pool Model

Enter Dist Parameters
for Multi Pool Model

Example of Preterminal Fishery

Additional Fishery Properties

Fishery NameRegion1Sport

Size Limit

Year1979

Typemin

Min560

Max9999

Update

Harvest Rate Scalar

Year1979

HR Scalar

Update

Mortality

Year1979

Release Legal0.25

SD Rel_Legal0.05

Release Sublegal0.35

SD Rel Sublegal0.1

Dropoff0.05

SD Dropoff0.01

Update

Marked Retention

Year1979

MRE

SD MRE

URE

SD URE

Prop. Marked Fish Removed

SD PMR

Total Bags

Max. Unmarked Fish

☐ IsMSF

Update

Distribution Over Period

Year1979

Prop Period 10.1

SD Prop Period 10.1

Prop Period 20.3

SD Prop Period 20.15

Prop Period 30.6

SD Prop Period 30.2

Update

Example of Terminal Fishery

Terminal Stock Properties

Fishery Name

FRNtermnet

StockID

FRN

Harvest Rate

Sector

1

Age

2

HR

0

Update

Marked Retention

Year

1979

Sector

1

Release Mortality Legal

Marked Release Error

Total Bags

SD Rel Mort Legal

SD_MRE

Max. Unmarked Fish

Release Mortality Sub

Unmarked Release Error

☐ IsMSF

SD Rel Mort Sub

SD URE

Size Limit Lower

Dropoff Mortality

Prop. Marked Fish Removed

Size Limit Upper

SD Dropoff Mort

SD PMR

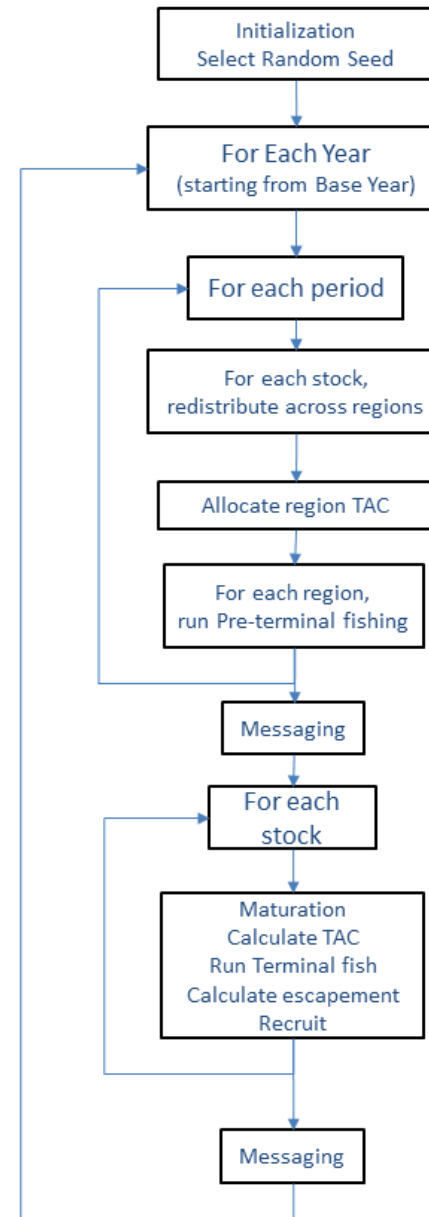
HR Scalar

Update

DGM Model

Discussion

DGM Flow Chart



Some details worth mentioning

➤ Calculation of preterminal TAC

- AABM: Use abundance index (AI) of driver fishery in a region to obtain regional TAC in a lookup table (or a model hard-coded in the program)
- TAC of each individual fishery in an AABM region is then determined by distributing the total regional TAC to individual sectors, according to the parameters specified in `Fishery_Dist_Period.csv` and `Region_Sector_Alloc.csv`
- ISBM: Based on Harvest Rate Scalar

➤ Calculation of the TAC for MSF:

- defined as the abundance of unmarked fish available to fishery times a parameter called the Proportion of unmarked fish removed.
- MSF continues while the unmarked mortalities are less than the MSF TAC or the fishery TAC, whichever is less.

Next Steps?