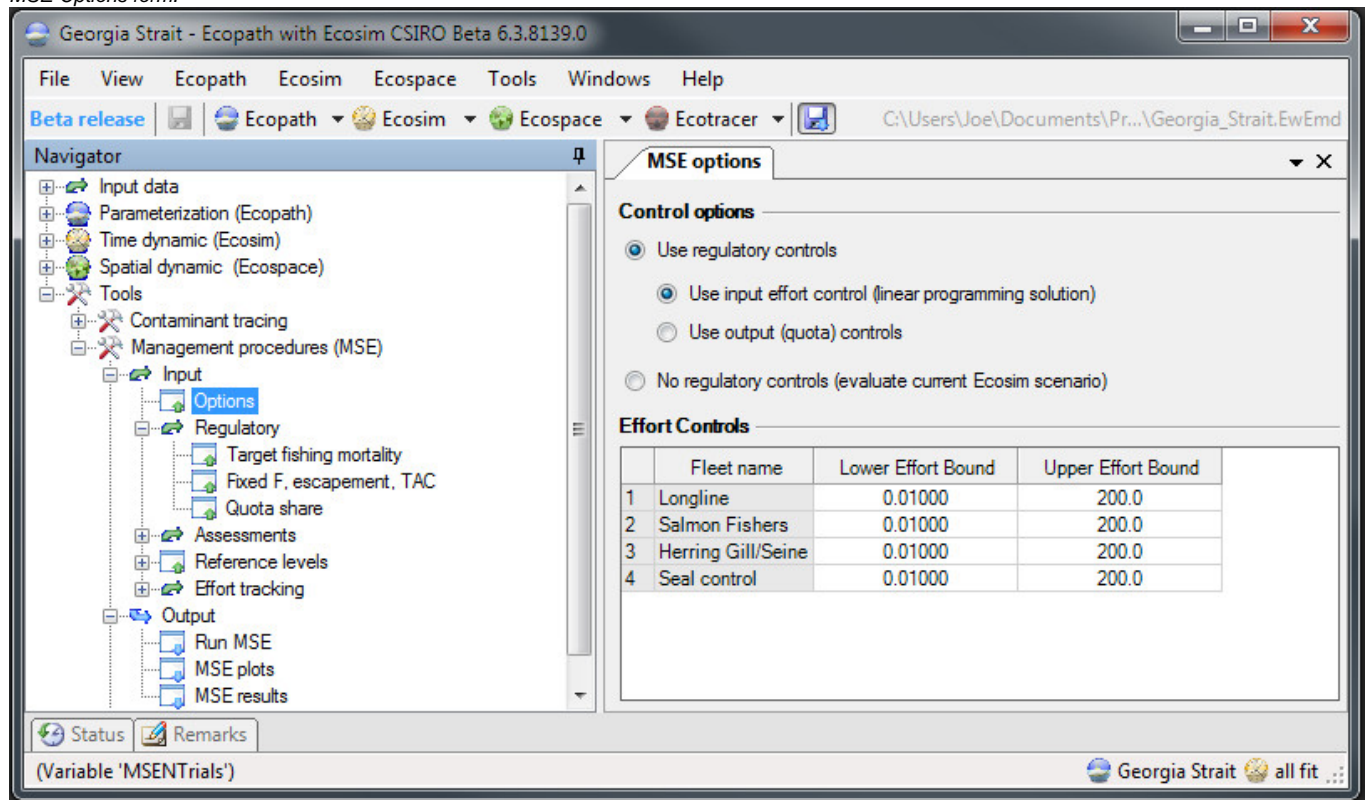


Management Strategy Evaluation = User notes (beta ver. 6.3.8141.0)

Options

MSE Options form.



Control Options:

The MSE module can be used to evaluate a set of regulatory rules i.e. Target fishing mortality, Fixed F, Escapement or TAC via input (fishing effort) or output (quota, fishing mortality) controls or evaluate the currently loaded Ecosim scenario.

Use regulatory controls: evaluate the regulatory rules.

- **Use input effort controls (linear programming solution):** uses a linear programming algorithm to find a fishing effort that meets the fishing mortality constraints and is optimized for the total value of the catch. When this control option is selected you can set the upper and lower fishing effort bounds for each fleet.

MSE LP controls form.

Basic input

MSE options

Control options

Use regulatory controls

Use input effort control (linear programming solution)

Use output (quota) controls

No regulatory controls (evaluate current Ecosim scenario)

Effort Controls

	Fleet name	Lower Effort Bound	Upper Effort Bound
1	Longline	0.01000	200.0
2	Salmon Fishers	0.01000	200.0
3	Herring Gill/Seine	0.01000	200.0
4	Seal control	0.01000	200.0

'Use output (quota) controls:' fishing effort is set to the level required to meet fishing mortalities or quotas set via the regulatory rules i.e. Target fishing mortality, Fixed F, Escapement or TAC. When this option is selected you can set the maximum fishing effort and quota control implementation methods.

MSE Output quota controls form.

Basic input

MSE options

▼ ✕

Control options

Use regulatory controls

Use input effort control (linear programming solution)

Use output (quota) controls

No regulatory controls (evaluate current Ecosim scenario)

Quota controls

Cap effort at: Cap effort at the Ecosim level Predict effort

	Fleet name	No quota	Weakest stock quota + discards quot	Highest value stock quota	Selective fishing quota
1	Longline	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Salmon Fishers	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Herring Gill/Seine	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Seal control	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- **Cap effort at:** caps the effort needed to achieve the fishing mortality or quota.
- **Cap effort at Ecosim level:** fishing effort can never exceed level set by current Ecosim scenario
- **Predict effort:** effort is predicted by the Ecosim Fleet/effort dynamics model then cap so as not to exceed the regulatory rules.
- **No quota:** no regulation will be used for this fleet.
- **Weakest stock quota + discards quota:** effort is regulated if any catch (landings + discards) on a group exceeds its quota.
- **Highest value stock quota:** effort is regulated if landings on the highest value stock exceed the quota. Catches that exceed the quota on a stock are discarded.
- **Selective fishing quota:** Effort is regulated if landings on the strongest stock exceed the quota.

No regulatory controls (evaluate the current Ecosim scenario):Ecosim is run using effort from the current scenario. No attempt is made to regulate the fishing effort. This option is used to evaluate the current Ecosim scenario.

MSE no regulatory controls form.

Basic input

MSE options

Control options

Use regulatory controls

Use input effort control (linear programming solution)

Use output (quota) controls

No regulatory controls (evaluate current Ecosim scenario)

No regulator options

Catch/estimated biomass

Direct exploitation rate

Exact biomass known

Survey vs. biomass power:

- **Catch/estimated biomass:** Fishing mortality is estimated using a perturbed biomass then effort is updated using the varied fishing mortality.
- **Direct exploitation:** Fishing mortality is computed directly from the predicted Ecosim catch
- **Exact biomass known:** Fishing mortality is computed directly from the predicted Ecosim catch and biomass. Effort is then update with the predicted fishing mortalities and perturbed before use.

Regulatory

Target fishing mortality

MSE Target fishing mortality form.

The screenshot shows the 'MSE options' tab in the software. The 'Target fishing mortality' plot shows a green line that rises from 0.0 at biomass 0.00 to 0.6 at biomass 0.08, then remains constant at 0.6 up to biomass 0.35. Below the plot is a table with the following data:

Set to defaults				
	Group name	Biomass limit	Biomass base	F max.
1	Transient Orcas			
2	Dolphins (Res. Orca)			
3	Seals Sealions	0.0400	0.160	0.1000
4	Halibut	0.000400	0.00160	0.250
5	Lingcod	0.559	2.236	0.0488
6	Dogfish Shark			
7	A. Hake			
8	J. Hake			
9	A. Res. Coho	0.0198	0.0792	0.606
10	J. Res. Coho			
11	A. Res. Chinook	0.0330	0.132	0.897
12	J. Res. Chinook			

Target Fishing Mortality parameters are set to default values the first time a model is loaded. Biomass limit = 10% of Ecopath biomass, Biomass base = 40% of Ecopath biomass and F. max = fishing mortality rates calculated from the Ecopath inputs.

- **Biomass limit:** Lower biomass limit of fishing.
- **Biomass base:** Biomass at maximum fishing mortality rate.
- **F max.:** Maximum fishing mortality rate on a group.

Fixed F, escapement, TAC

MSE Fixed F, escapement, TAC form.

Group name	Fixed escapement (t/km2)	Fixed fishing mortality	Total allowable catch
1 Transient Orcas			
2 Dolphins (Res. Orca)			
3 Seals Sealions	0.000	0.000	0.000
4 Halibut	0.000	0.000	0.000
5 Lingcod	0.000	0.000	0.000
6 Dogfish Shark			
7 A. Hake			
8 J. Hake			
9 A. Res. Coho	0.000	0.000	0.000
10 J. Res. Coho			
11 A. Res. Chinook	0.000	0.000	0.000
12 J. Res. Chinook			
13 Demersal Fishes			
14 Sea Birds			
15 Small Pelagics			
16 Eulachon			
17 A. Herring	0.000	0.000	0.000
18 J. Herring			
19 Jellyfish			
20 Predatory Invertebrates			
21 Shellfish			
22 Grazing Invertebrates			
23 C. Zooplankton			
24 H. Zooplankton			
25 Kelp/Sea Grass			
26 Phytoplankton			

- **Fixed escapement(t/km):** If provided then the yearly quotas will be calculated as the biomass greater than the fixed escapement.
- **Fixed fishing mortality:** If provided then a fishing mortality will be fixed for the duration of the run.
- **Total allowable catch:** If provided then a fixed quota will be used.

Assessments

Sets inputs use for the perturbation of variables.

Groups:

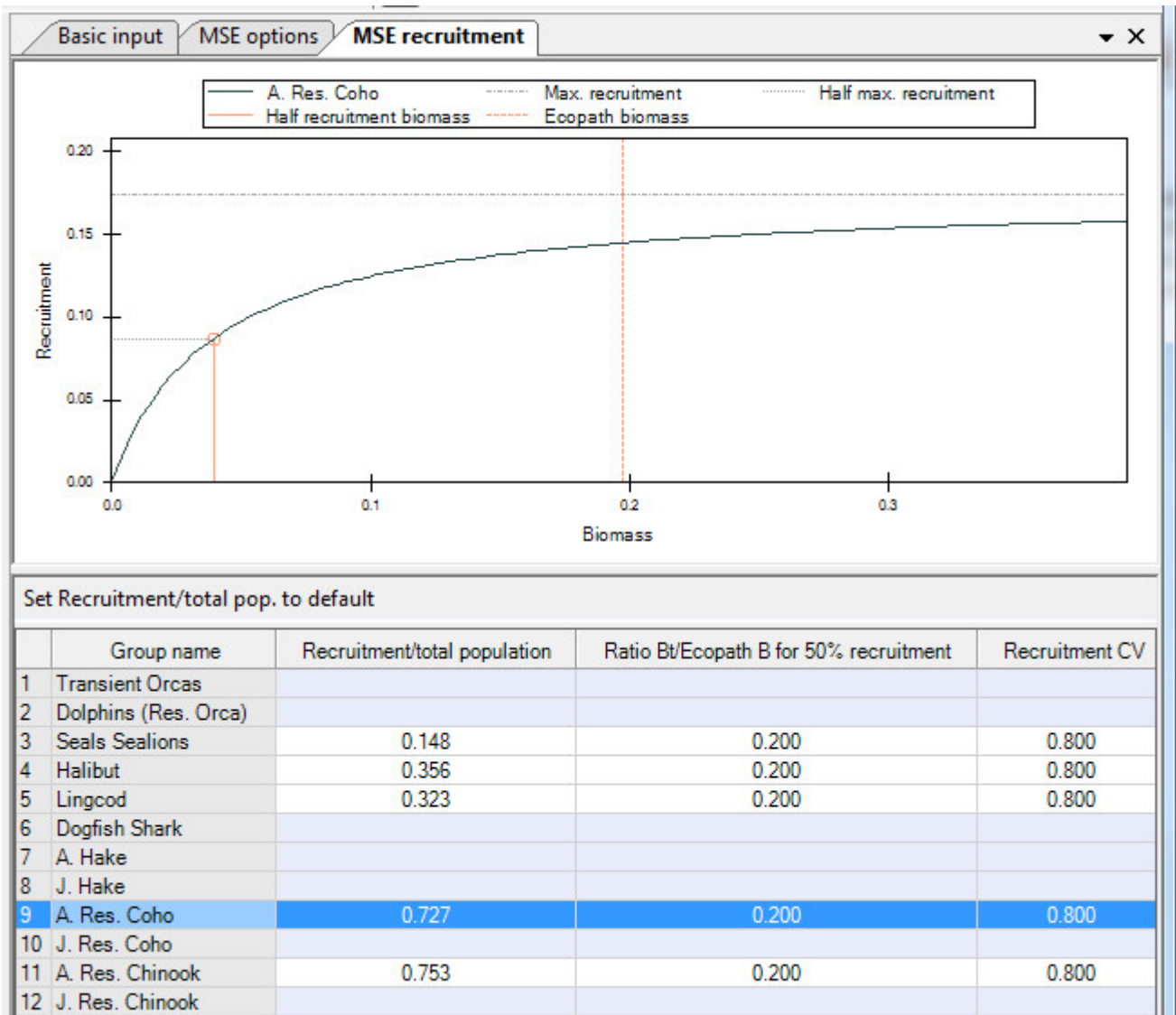
- **CV** Coefficient of variation used for perturbation of biomass.

Fleets:

- **CV** Coefficient of variation used for perturbation of effort.
- **Annual increase in catchability** Amount catchability will increase each year.

Recruitment:

MSE Recruitment form.



- **Recruitment/total population:** Percentage of total population that will recruit.
- **Ratio Bt/Ecopath? B for 50% recruitment:** Ratio of biomass at time to Ecopath base biomass for 50% of recruitment.
- **Recruitment CV:** Coefficient of variation used in the Kalman filter.

Reference levels

Sets reference levels lines that appear on plots and as percentage values above and below reference in the MSE Results grid.

Group Sets reference levels that appear on group plots and in results grids.

- **Biomass lower** Lower biomass limit.
- **Biomass upper** Upper biomass limit
- **Catch lower** Lower catch limit on a group.
- **Catch upper** Upper catch limit on a group.

Fleet Sets reference levels that appear on fleet plots and in results grids.

- **Catch lower** Lower catch limit by a fleet.
- **Catch upper** Upper catch limit by a fleet.
- **Effort lower** Upper effort limit by a fleet.
- **Effort upper** Upper effort limit by a fleet.

Output

Run MSE:

- **No. of trial:** Number of MSE trials to run.
- **Start year:** Years in Ecosim run to start implementation of regulatory rules.
- **Display items:** Select which groups to view on the graph.

MSE plots: View output plots from the last MSE run.

Plot type: Select how the data is to be plotted.

- **Histogram:** Draws a histogram for the selected plot.
- **Values:** Draws a time series graph for the selected plot.
- **Plots:** Select the data to be plotted.
- **Group Biomass:** Biomass for the selected groups.
- **Group catch:** Catch for the selected groups
- **B estimated/B:** Biomass estimated by the stock assessment model / Biomass predicted by Ecosim for the current time step.
- **Value total:** Sum of catch value for all groups.
- **Sensitivity of F target:** Linear programming dual or reduced costs values. The dual or reduced costs values indicate that the objective function will change with the value of the reduced cost if the restriction is changed with 1 unit.
- **Fleet Value:** Value of the catch by fleet.
- **Fleet effort:** Effort set by the MSE model.