TOY BET Management Strategy Evaluation game

3rd IATTC Tropical Tuna MSE Workshop, *by videoconference*, December 08-09, 2022

Learning using trial and error

Real world:
Costly, little or no repetitions

Videogame:
Inexpensive, as many repetitions as wanted

We can use the MSE concepts using simulation

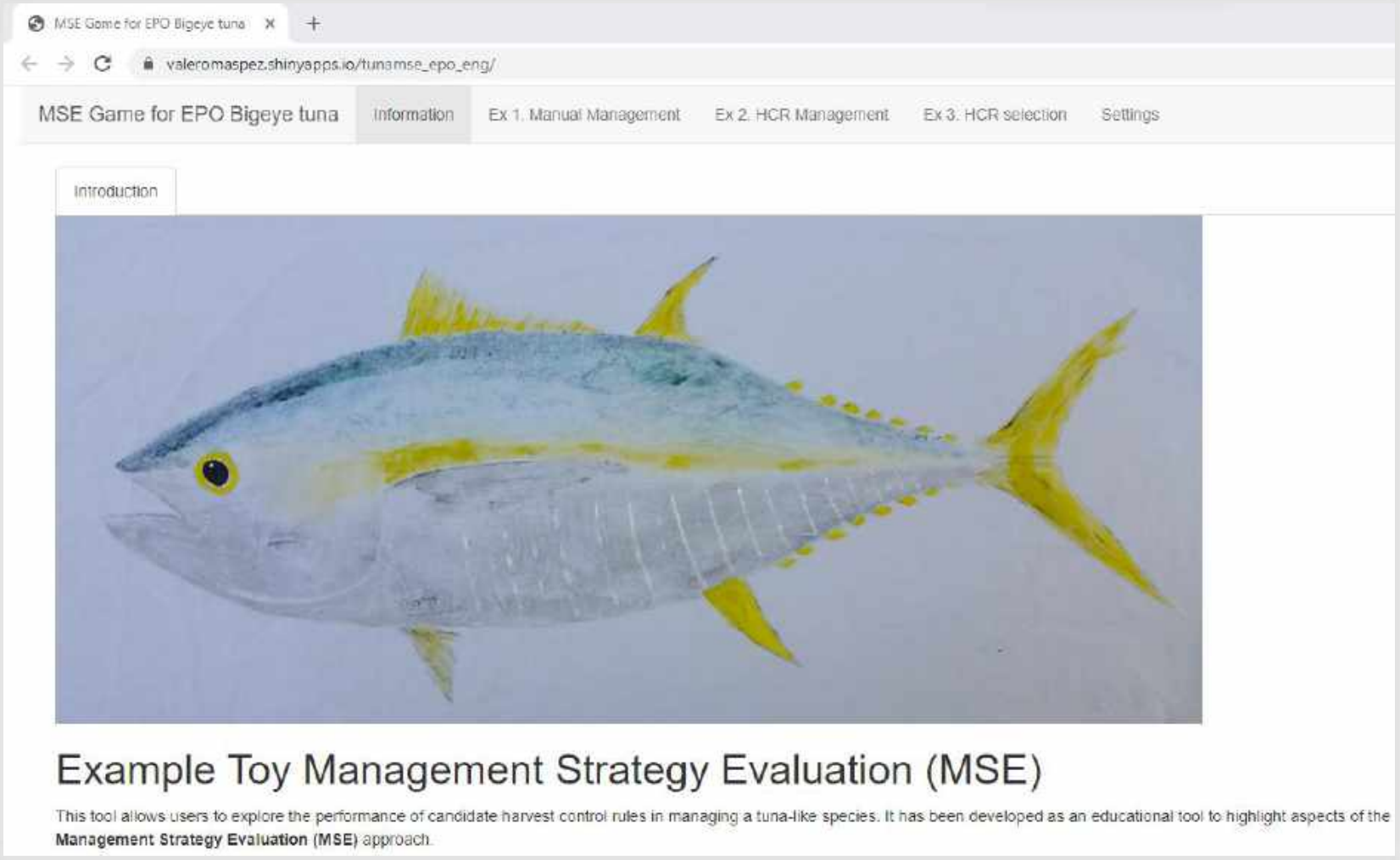
This game is much simpler than a realistic one

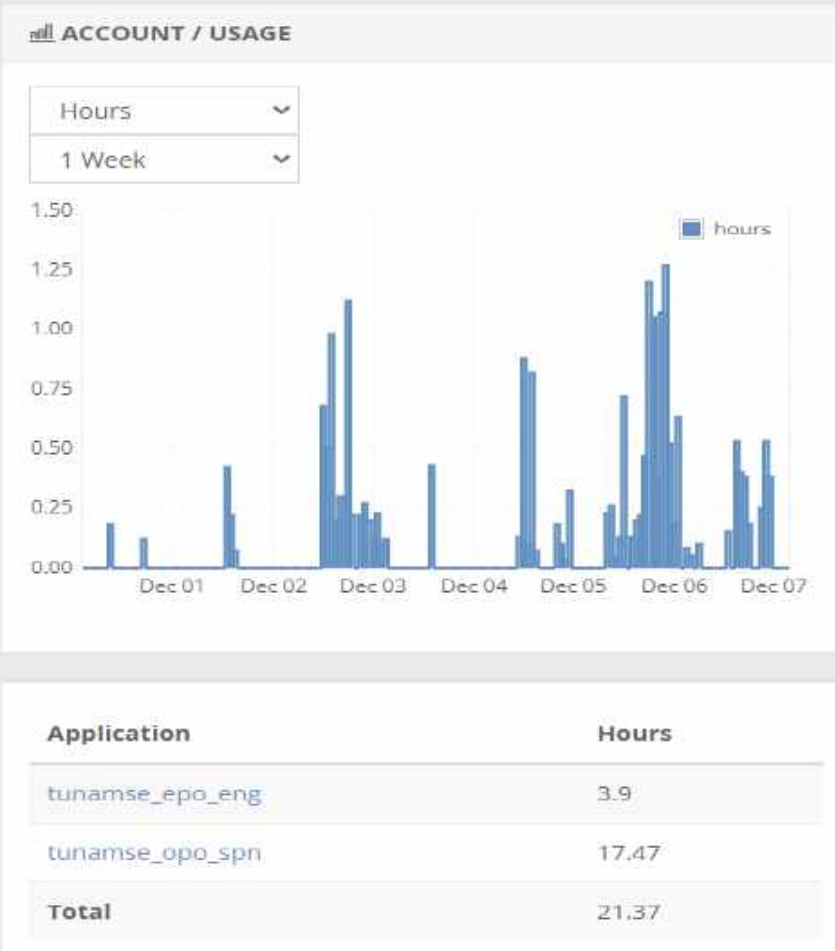
What is this game about?

- Hands on exploration of Management Strategy Evaluation
- TunaMSE, simple tool to illustrate iteratively:
  - Population/Fishery model projections
  - Elements of the strategy evaluation process
    - Compare simple HCR
    - Interrogating performance measures to make comparisons between HCRs
  - Configured for EPO Bigeye tuna

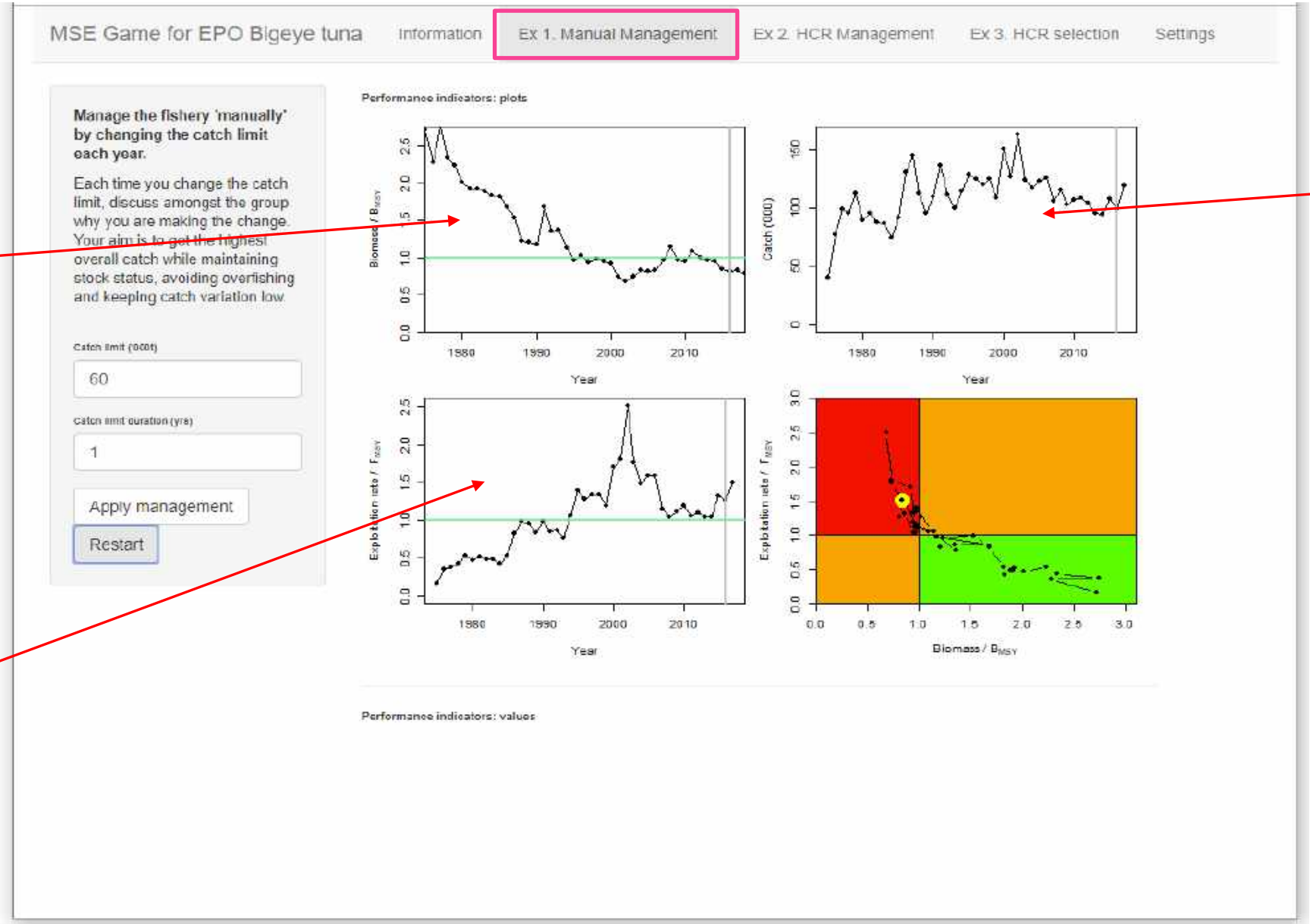
How to use this game

https://valeromaspez.shinyapps.io/tunamse_epo_eng/





How to interpret game results

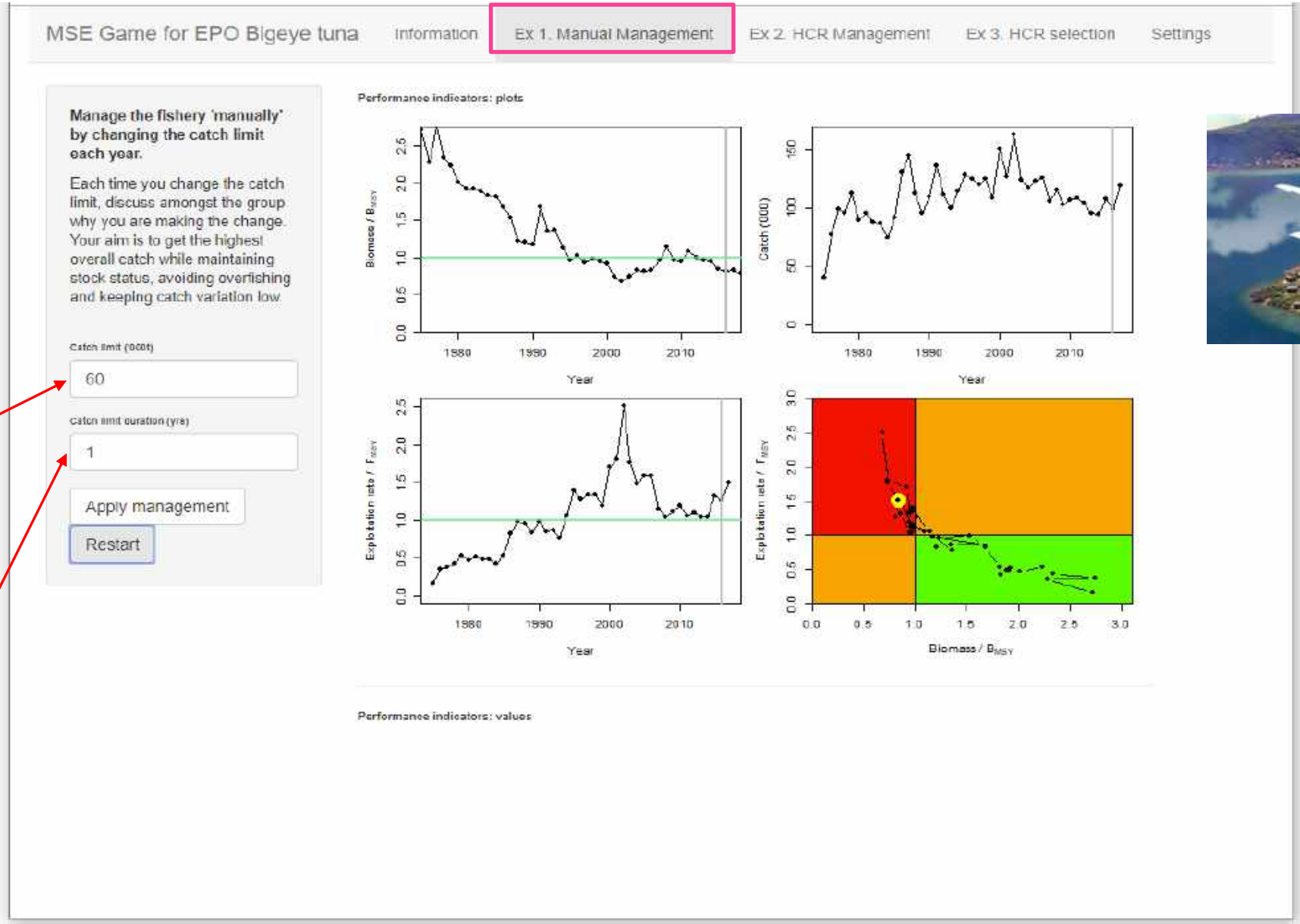


Biomass

Catch

Exploitation rate

How to play the game



Future catch 60,000 t

Management cycle 1 year

Game settings and output

MSE Game for EPO Bigeye tuna | Information | Ex 1. Manual Management | Ex 2. HCR Management | Ex 3. HCR selection | Settings

Manage the fishery 'manually' by changing the catch limit each year.

Each time you change the catch limit, discuss amongst the group why you are making the change. Your aim is to get the highest overall catch while maintaining stock status, avoiding overfishing and keeping catch variation low.

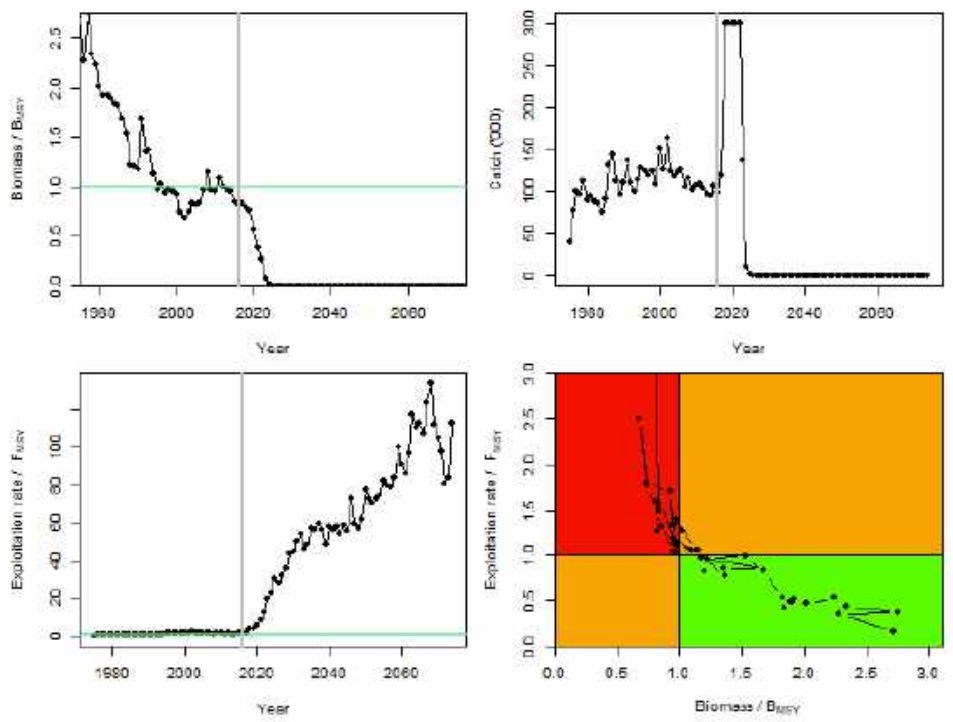
Catch limit (mt)
300

Catch limit duration (yrs)
35

Apply management

Restart

Performance indicators: plots



Performance indicators: values

	Stock status (B/Bmsy)	Fishing intensity (F/Fmsy)	Prob. green	Catch (kt)	Catch variation (%)
Current (2075)	0.00	85.25	0.00	0.00	61.46
Overall (2018-2075)	0.06	51.06	0.00	28.91	18.53

Future catch 300,000 t

Management cycle 35 years

Last year

Overall

Performance metrics

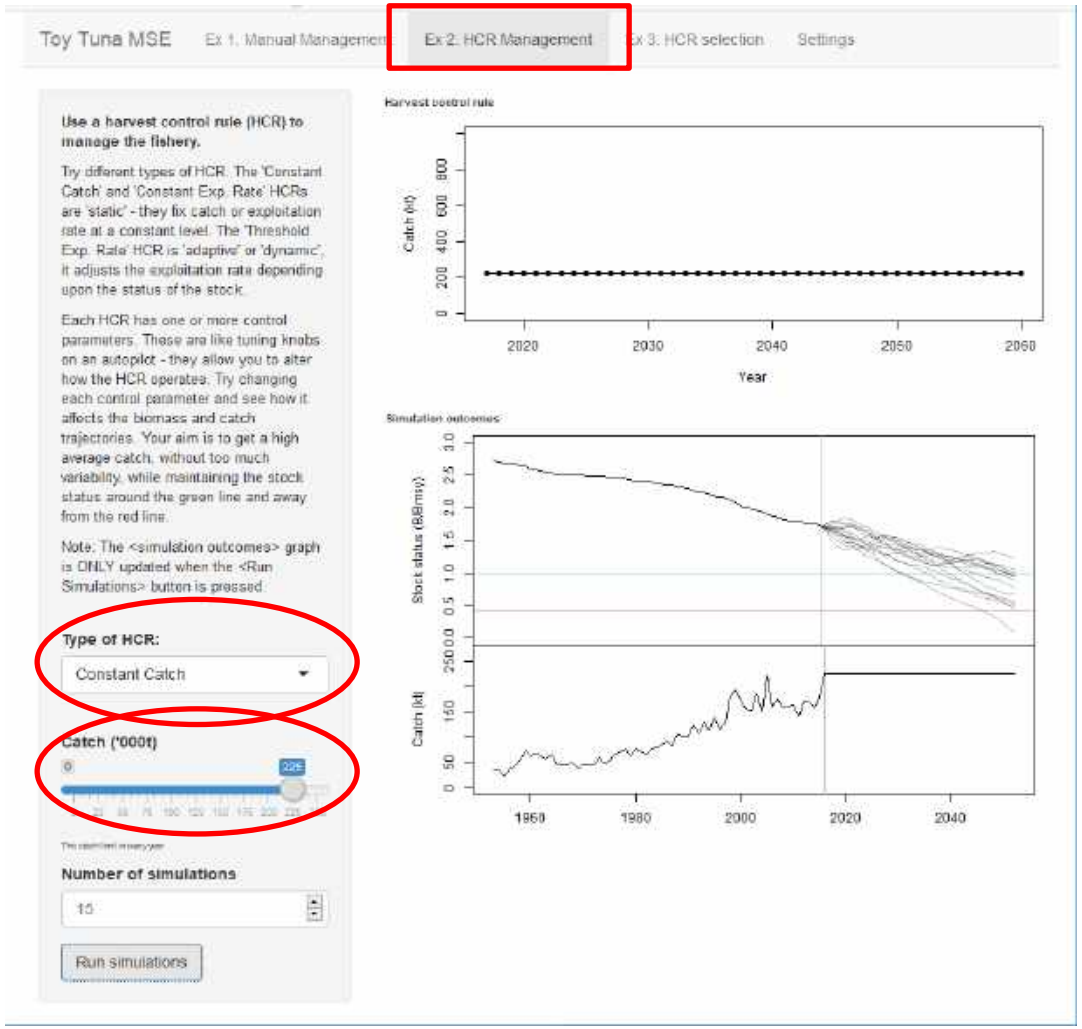
- Stock Status - B/B_{MSY}
- Exploitation level - F/F_{MSY}
- Probability of being in the Kobe plot green area
- Catch (median)
- Catch variability
- Probability of being above B_{LIMIT}

- Are all metrics equally important?
- What is the time period of interest? Short, medium, long term?

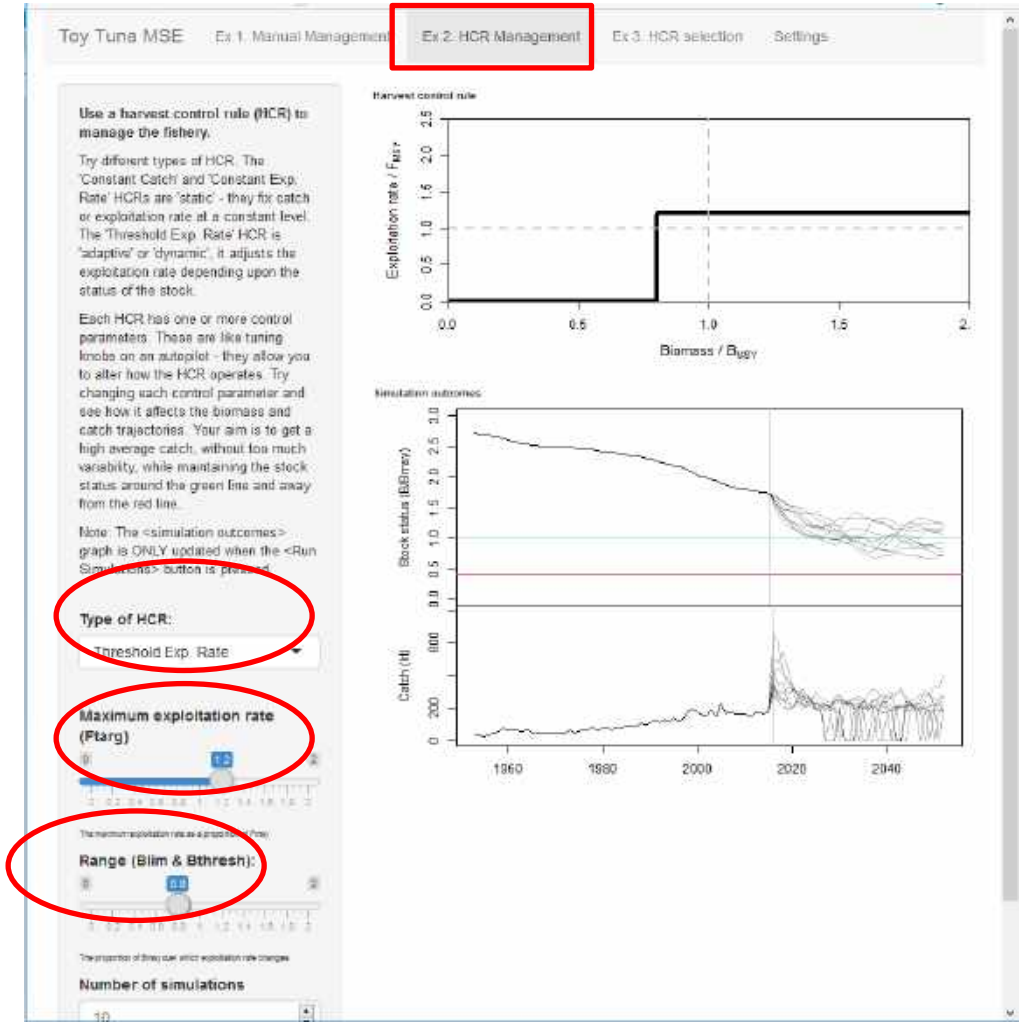
Exercise (1) – manual management

- Try projections with different catch levels and management cycle lengths.
  - Use graphs and performance metrics to check game outcomes and try different catch levels to keep the stock close to B_{MSY}
  - Examples:
    - 3 projection years, Catch = 60 kt
      - Followed by:
    - 3 projection years, Catch = 100 kt
      - Followed by:
    - 3 projection years, Catch = 120 kt

Exercise (2) – HCR management



Exercise (2) – HCR management



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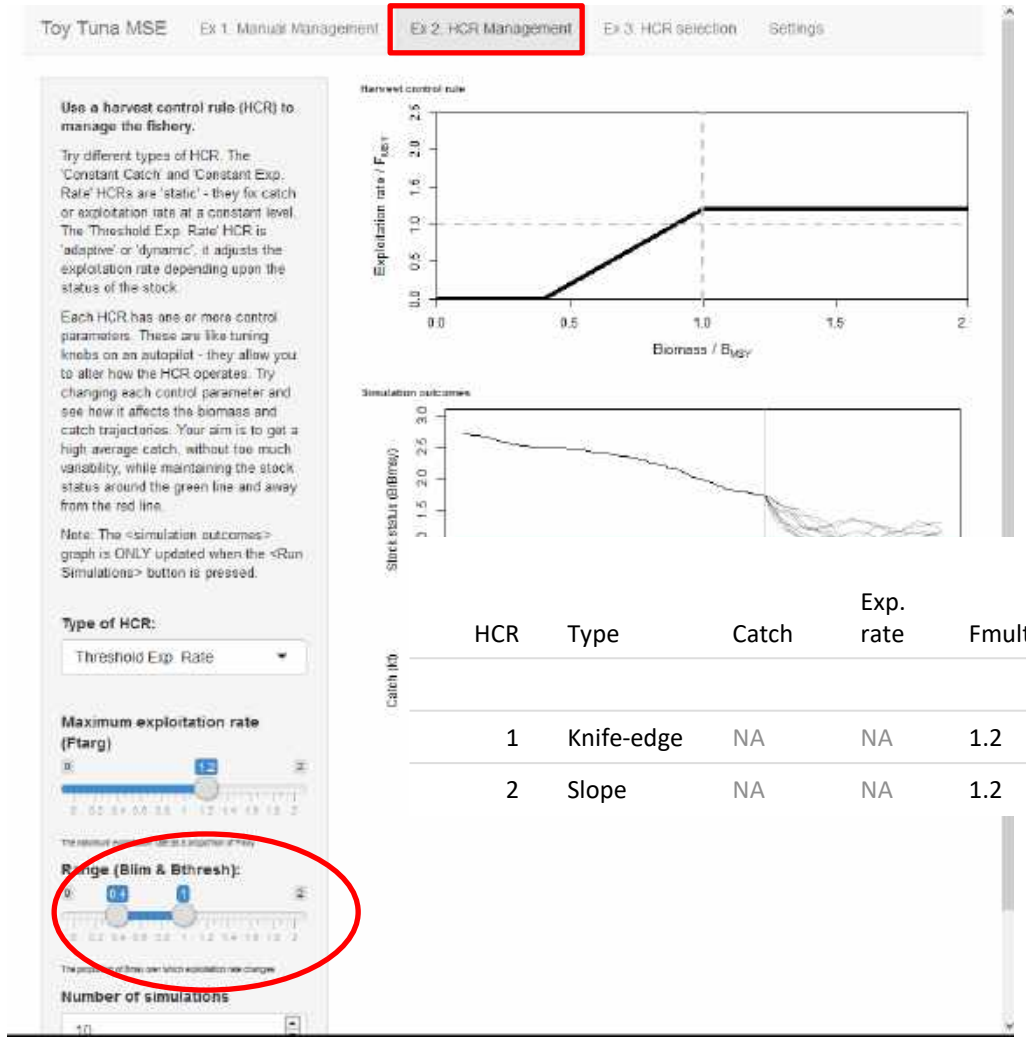

HCR	Type	Catch	Exp. rate	Fmult	Blim	Bthresh	Median Depletion (%)	*Prob. green	*Catch	*Catch var.
1	Knife-edge	NA	NA	1.2	0.8	0.8	37.7	0.694	207.5	0.227
2	Slope	NA	NA	1.2	0.4	1	37.9	0.675	209.2	0.172

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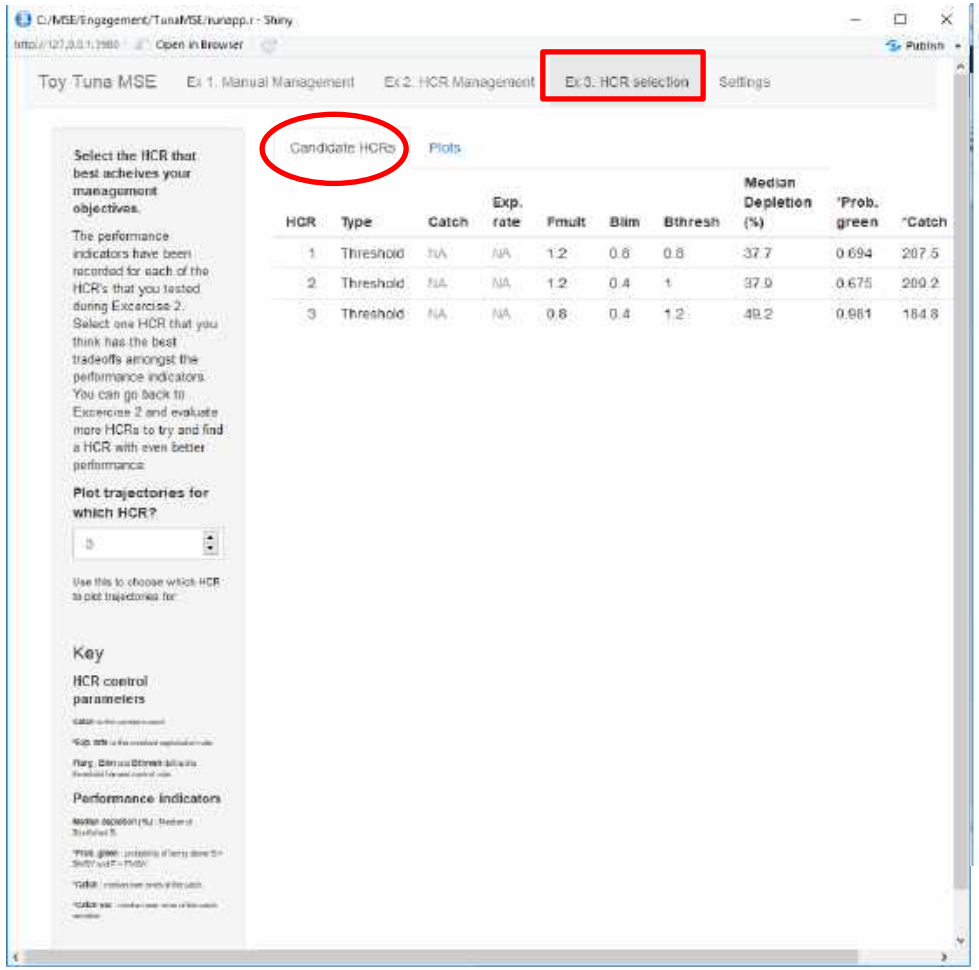
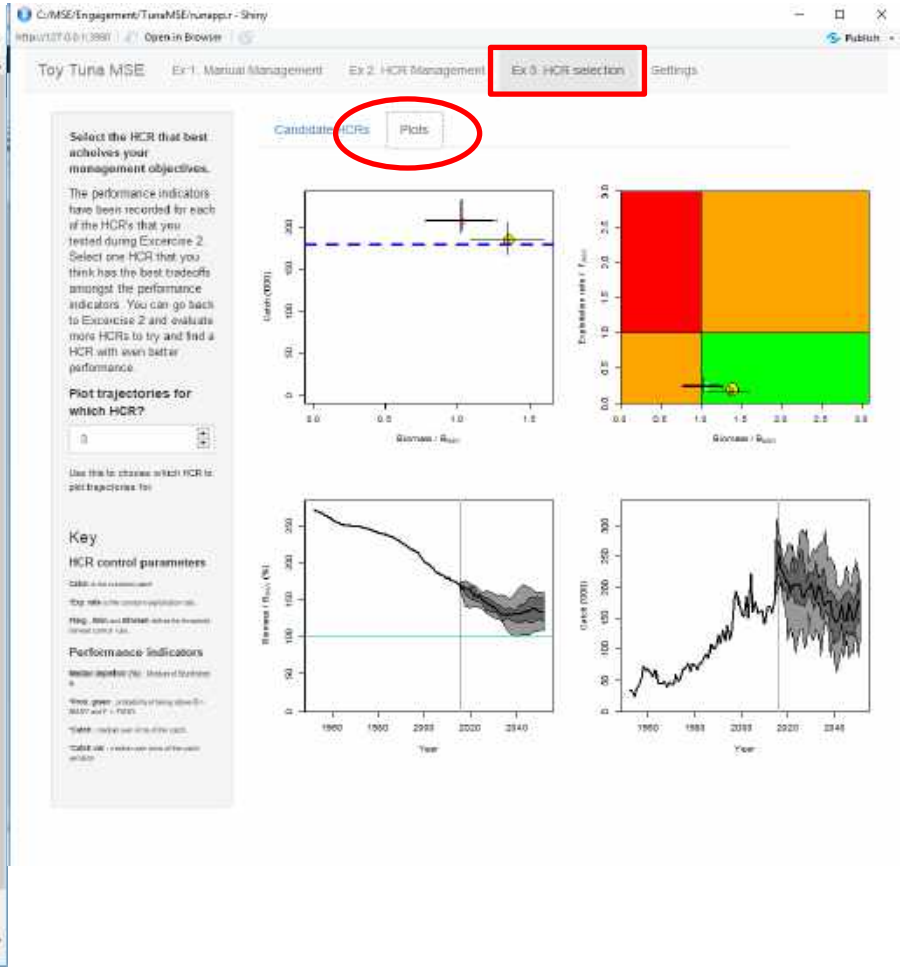
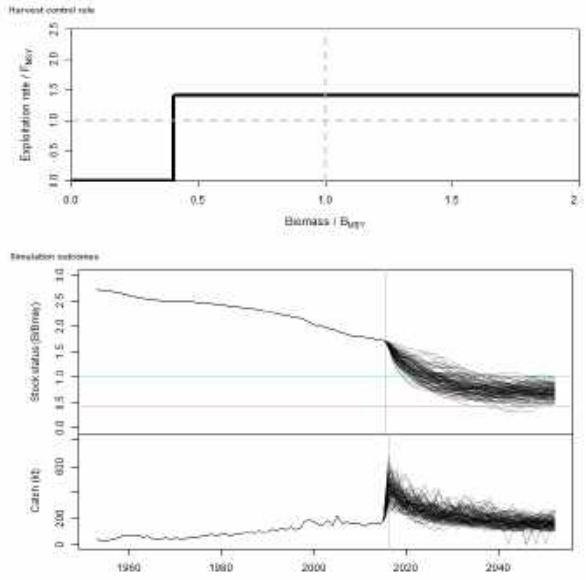


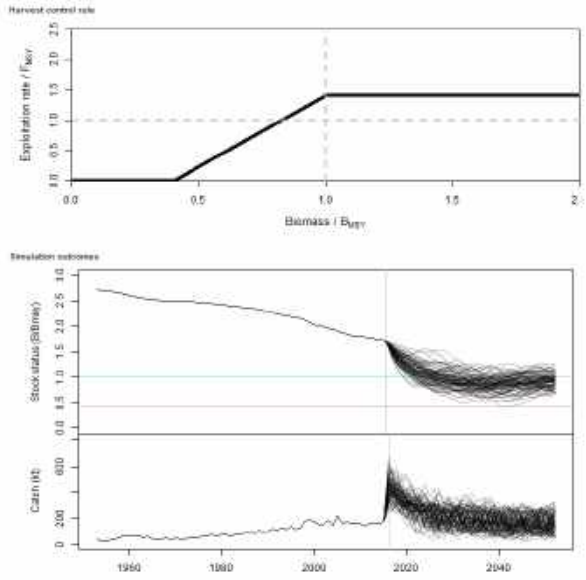


Examples of game results

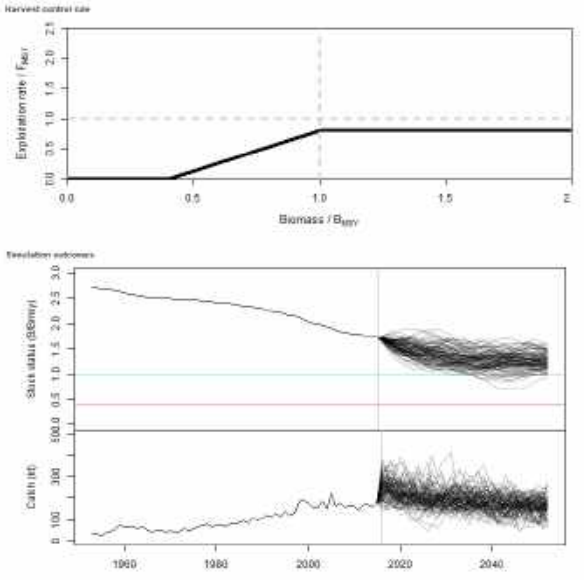
HCR 1



HCR 2



HCR 3



Aggressive

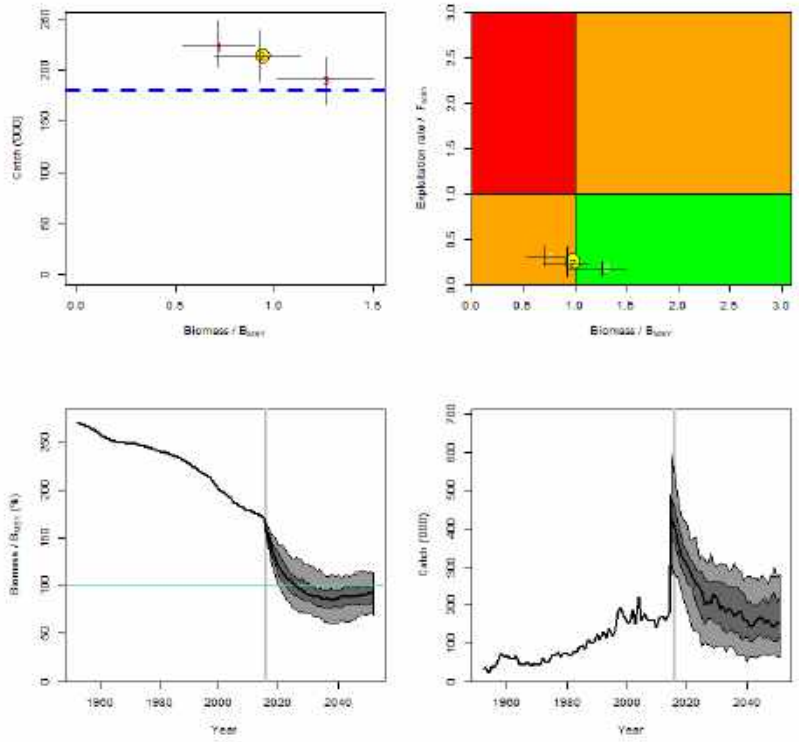
Moderate

Conservative

Examples of game results

HCR	Type	Catch	Exp. rate	Fmult	Blim	Bthresh	Median Depletion (%)	*Prob. green	*Catch	*Catch var.
1	Threshold	NA	NA	1.4	0.4	0.4	26.3	0.306	223.3	0.11
2	Threshold	NA	NA	1.4	0.4	1	34	0.419	214	0.2
3	Threshold	NA	NA	0.8	0.4	1	46.3	0.972	191.5	0.113

HCR 2



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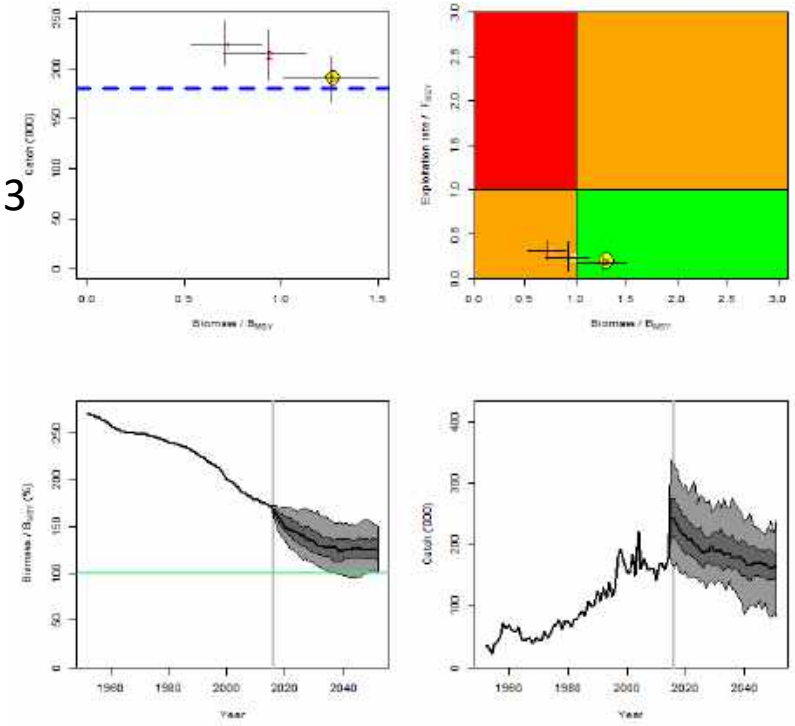

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Questions?