Comisión Interamericana del Atún Tropical
Inter-American Tropical Tuna Commission



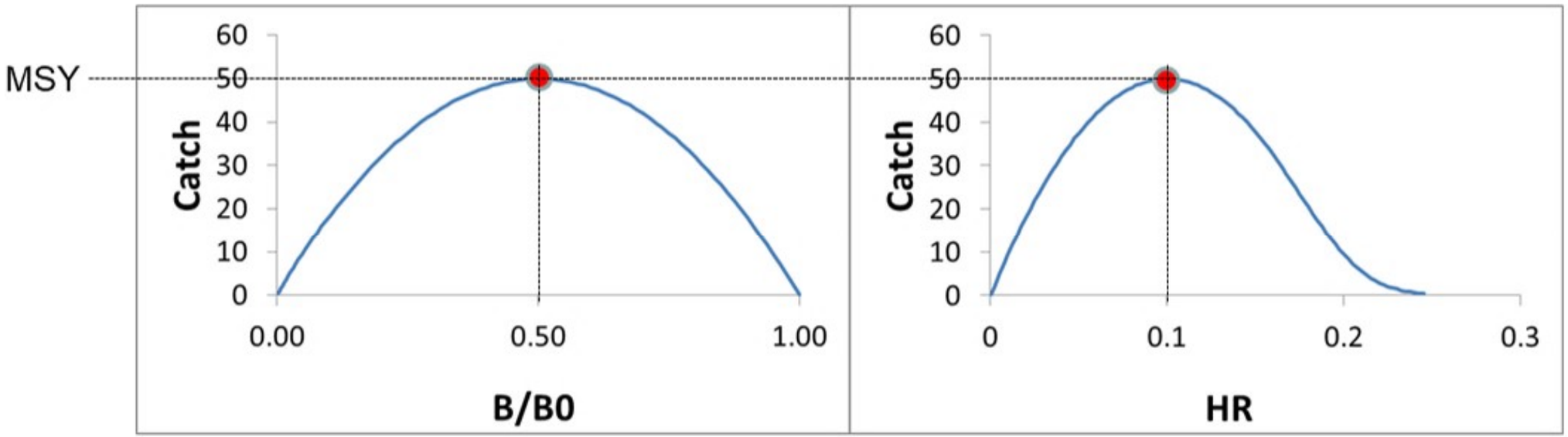

CIAT
IATTC

Simple Simulation Demo: Projections, HCR and Kobe plot

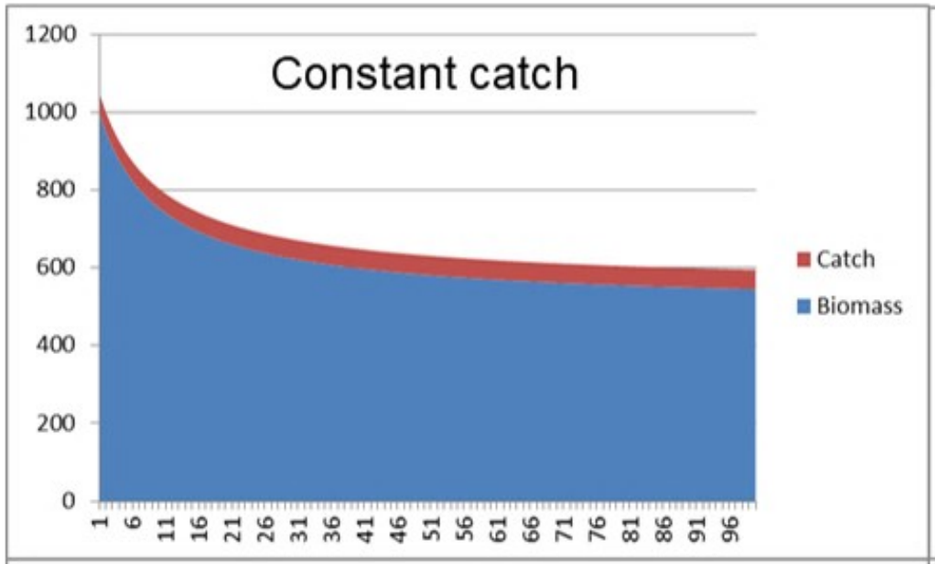
1st IATTC Tropical Tuna MSE Workshop, San Diego, California (USA), December 9-10 2019

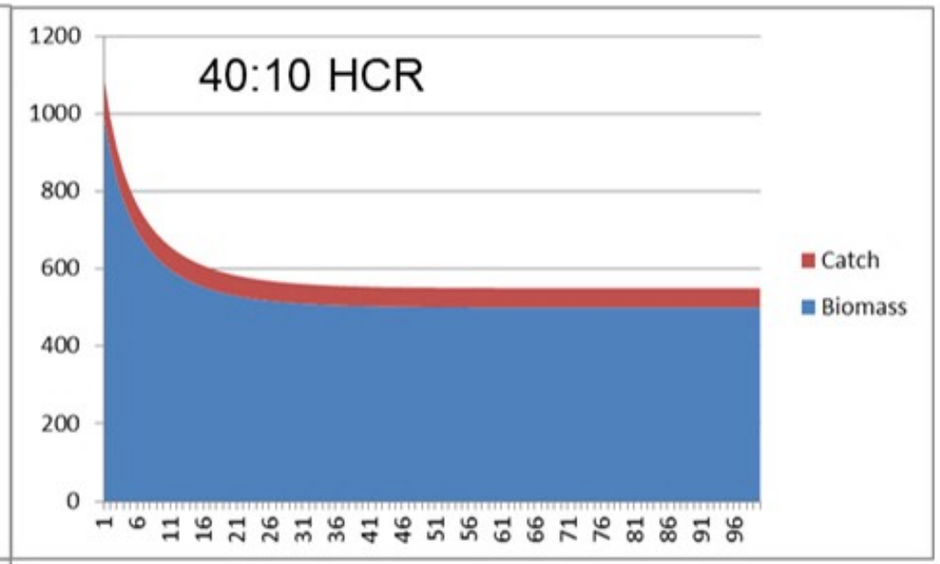
Strategy Evaluation: simple example

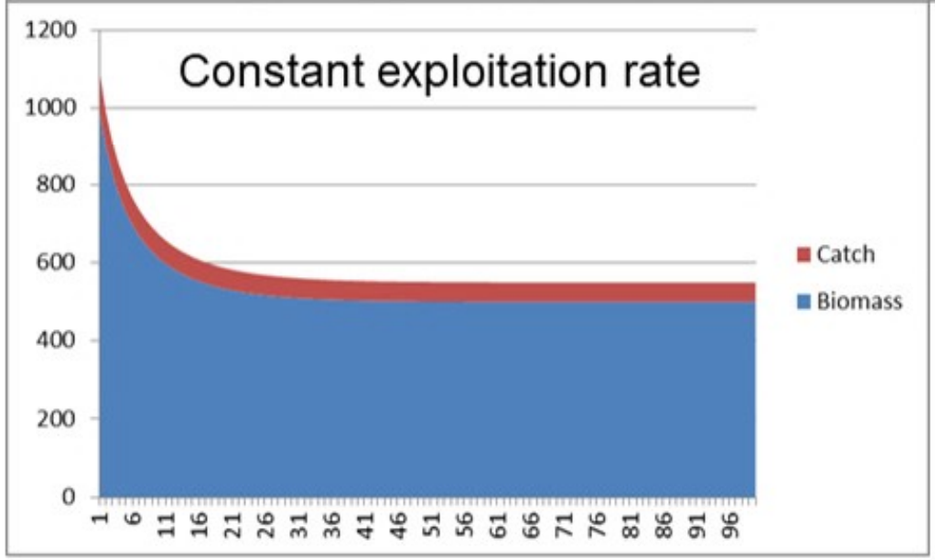
Using computer models, in this case a very simple population model with no error or uncertainties

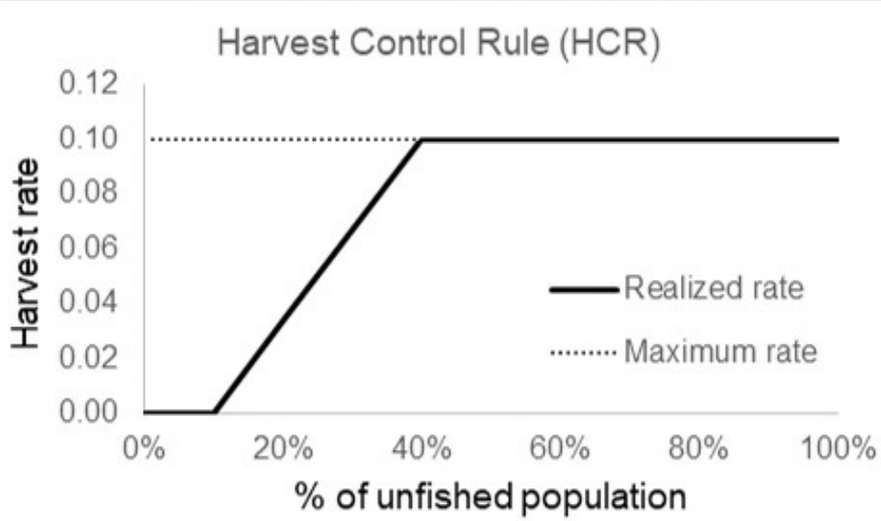


Catch and Population simulated trajectories





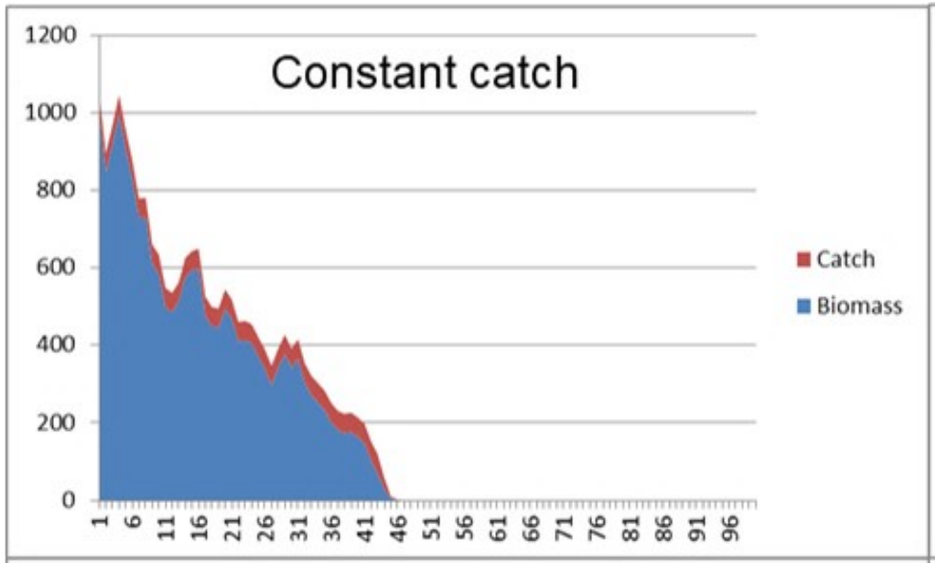


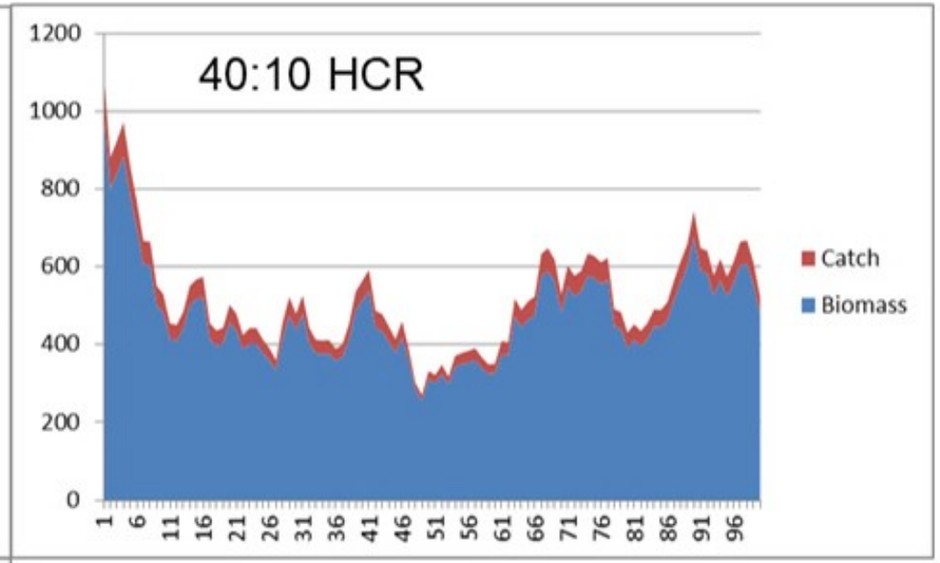


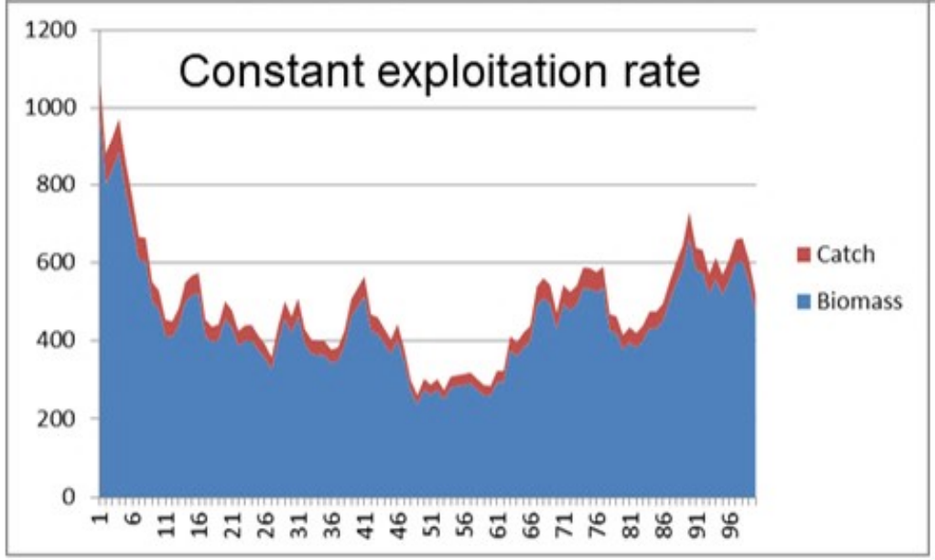
A more realistic model with uncertainties

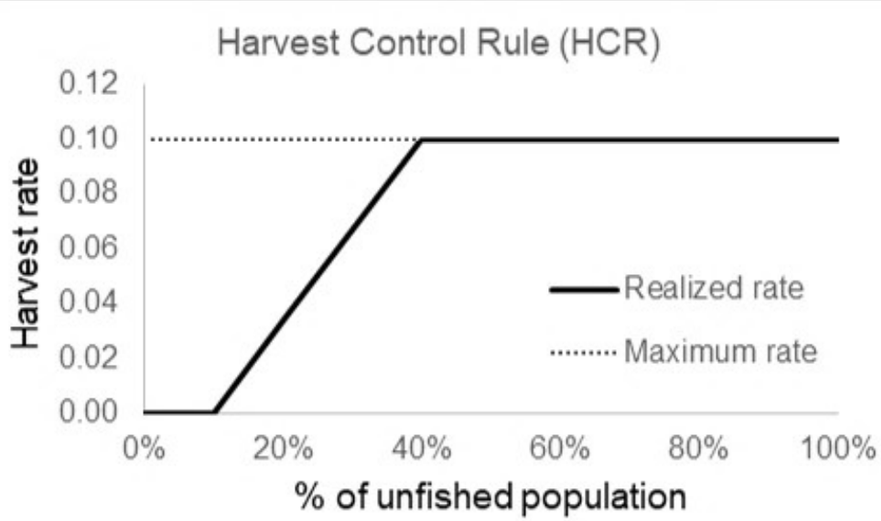
- Same model, adding random errors
- Run the model 100 times

Catch and Population simulated trajectories







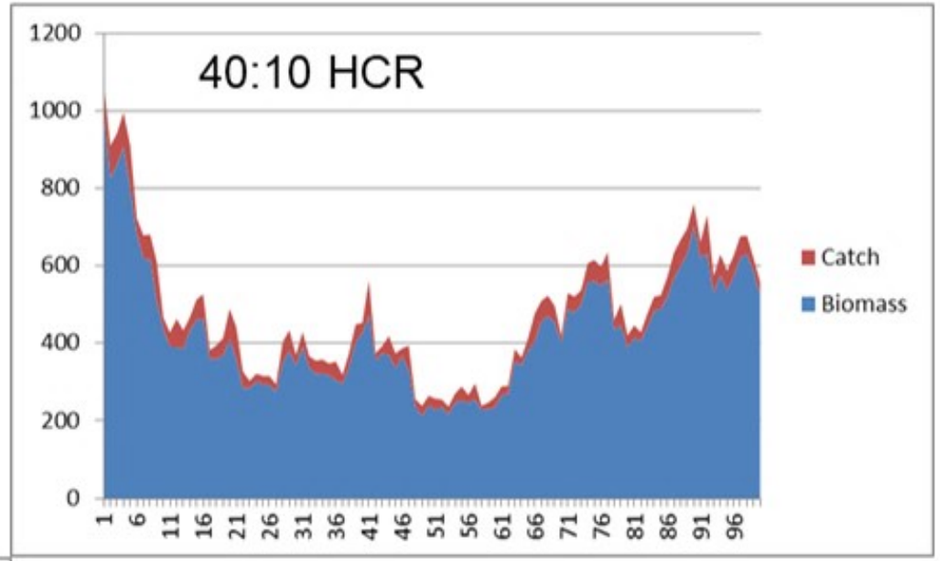


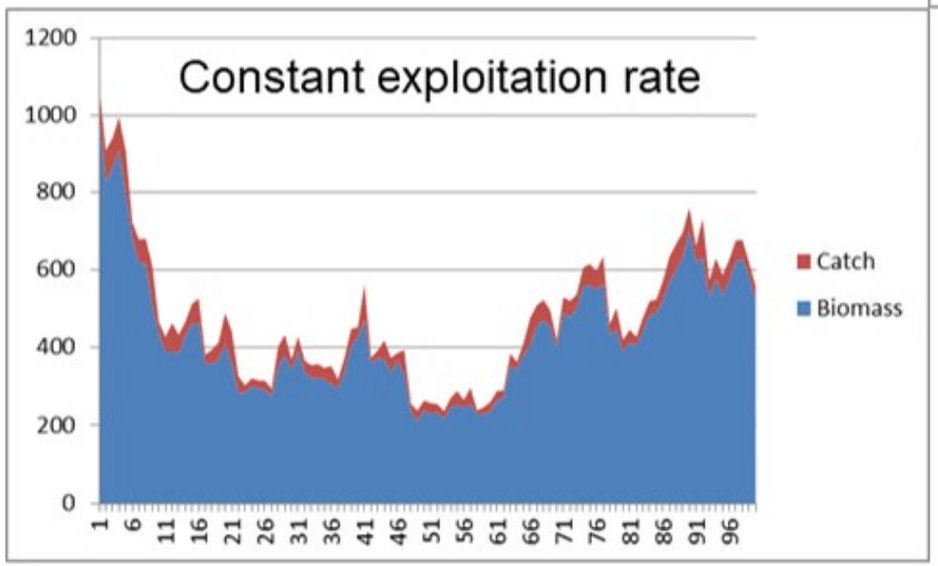
Incorporating errors in the stock assessment

- Incorporating correlated errors in the stock assessment (if this year's stock assessment is off, next year is probable that it will also be off).

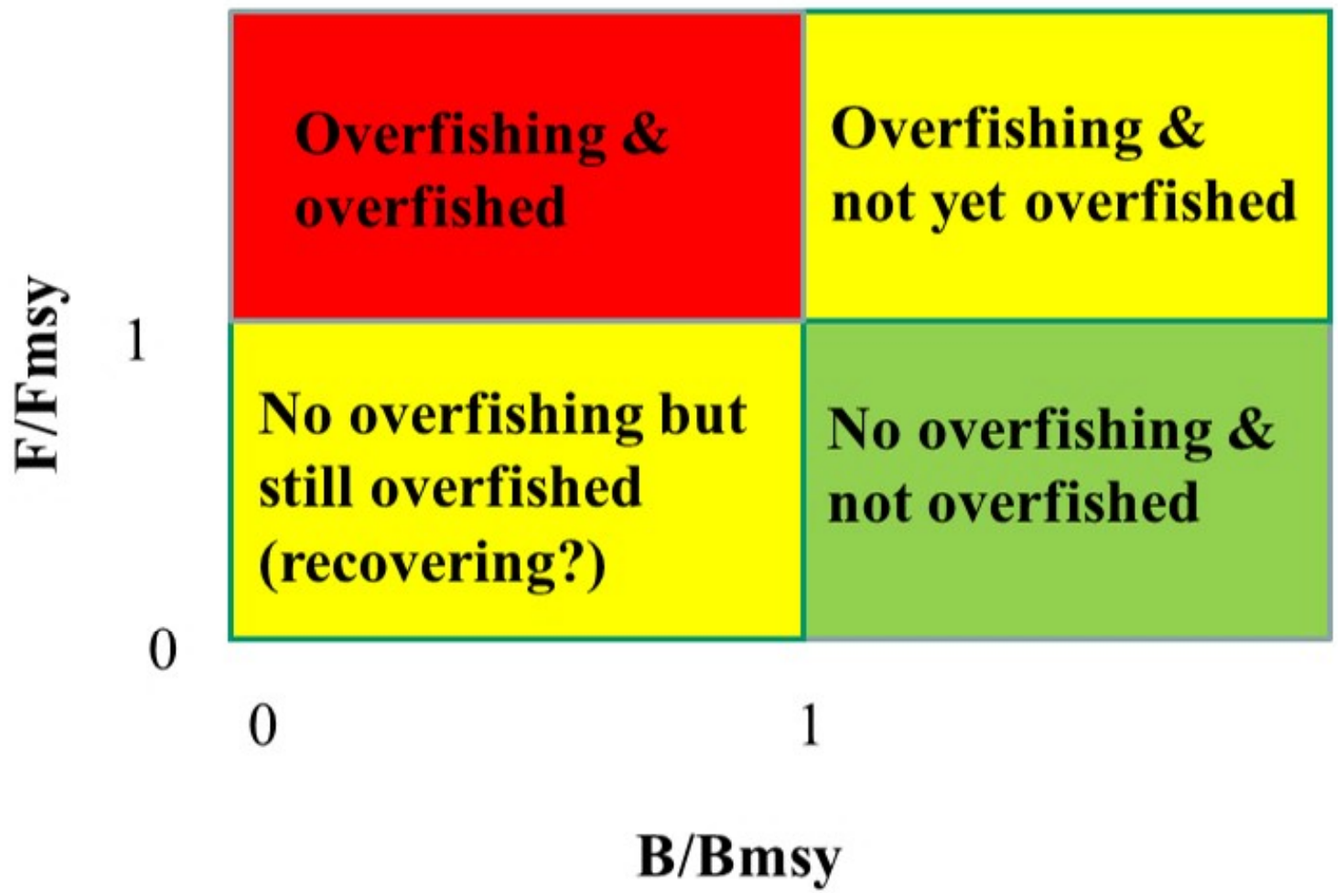
- Incorporating biases (greater chance to err low or high) rather than just random errors (equal chance to err low or high)

Catch and Population simulated trajectories



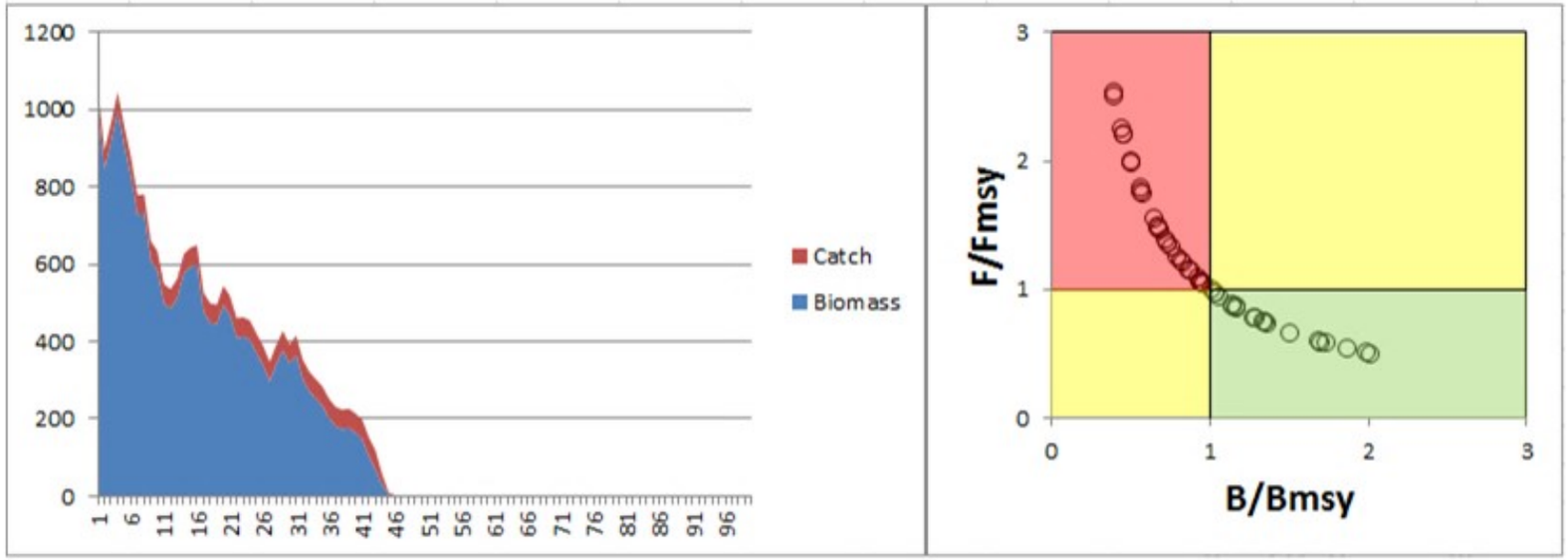


Kobe plot


Overfishing & overfished
Overfishing & not yet overfished
No overfishing but still overfished (recovering?)
No overfishing & not overfished
F/Fmsy
1
0
0
1
B/Bmsy

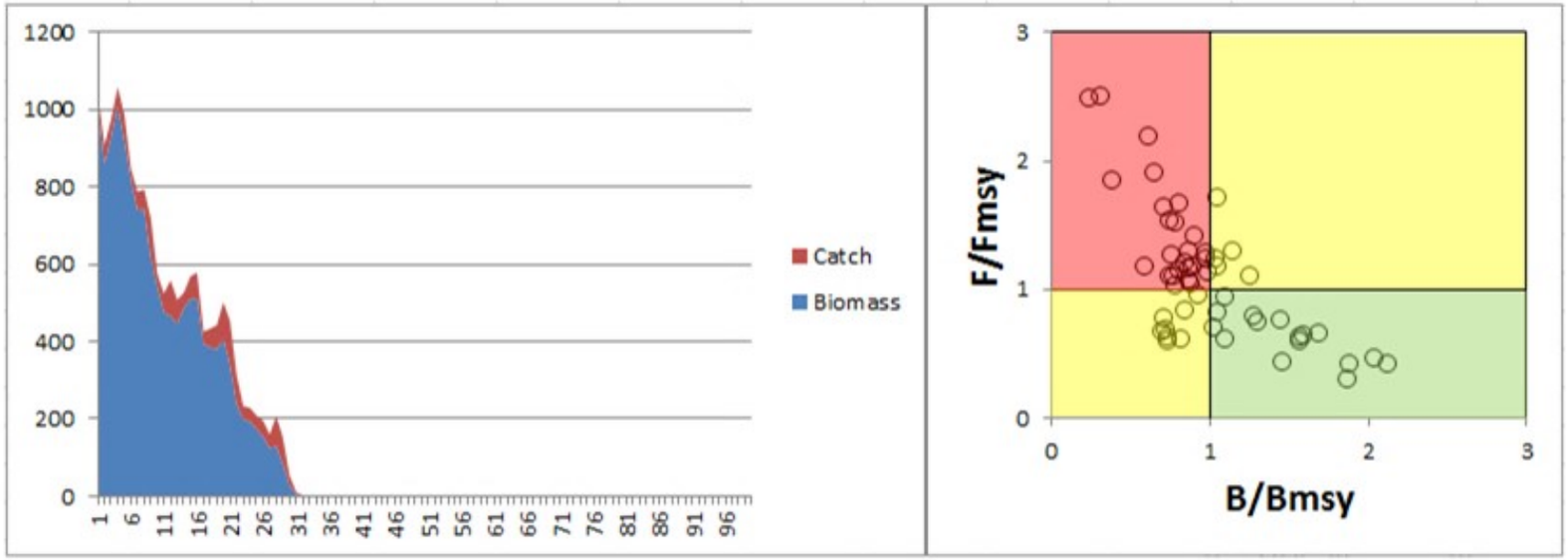
Kobe plot: simple simulation model

Constant catch



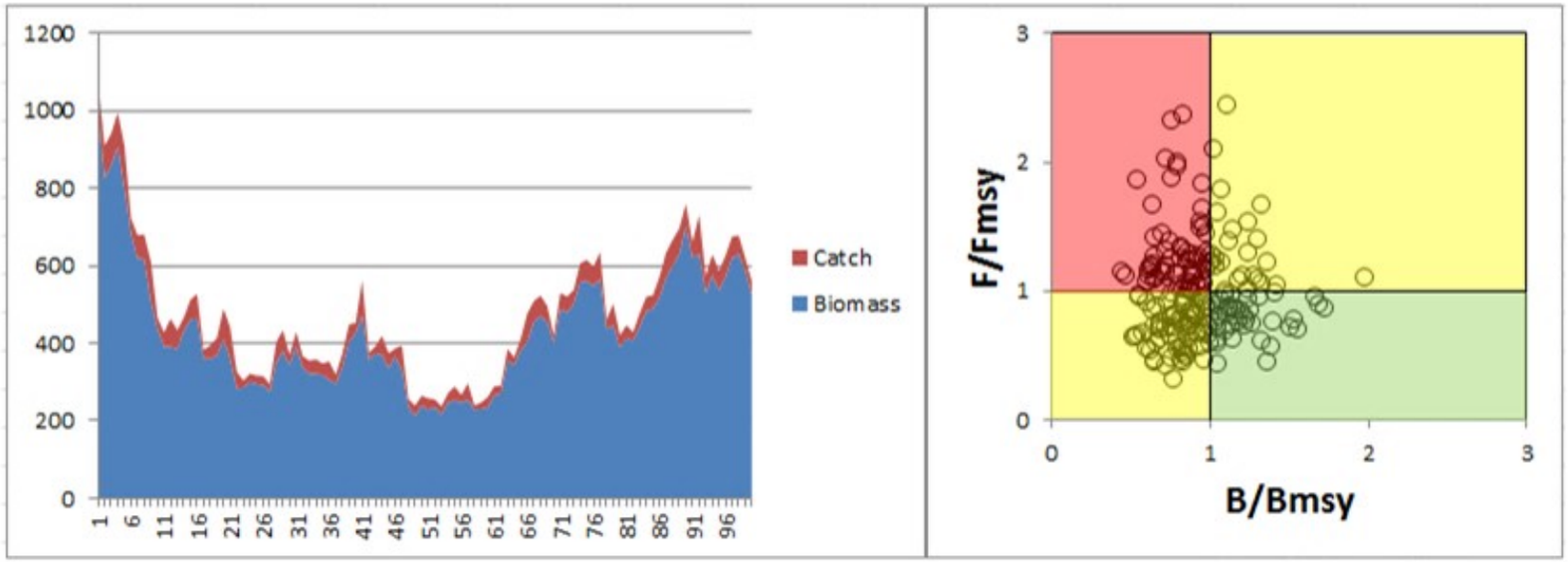
Kobe plot: simple simulation model

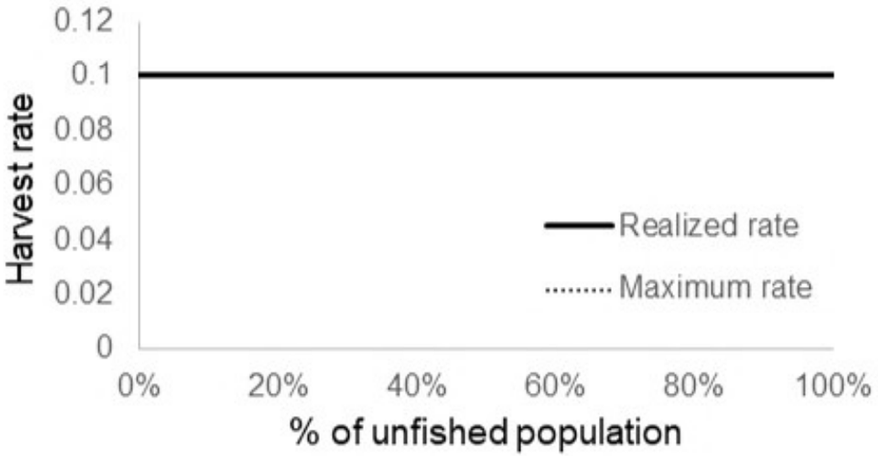
Constant catch with implementation error



Kobe plot: simple simulation model

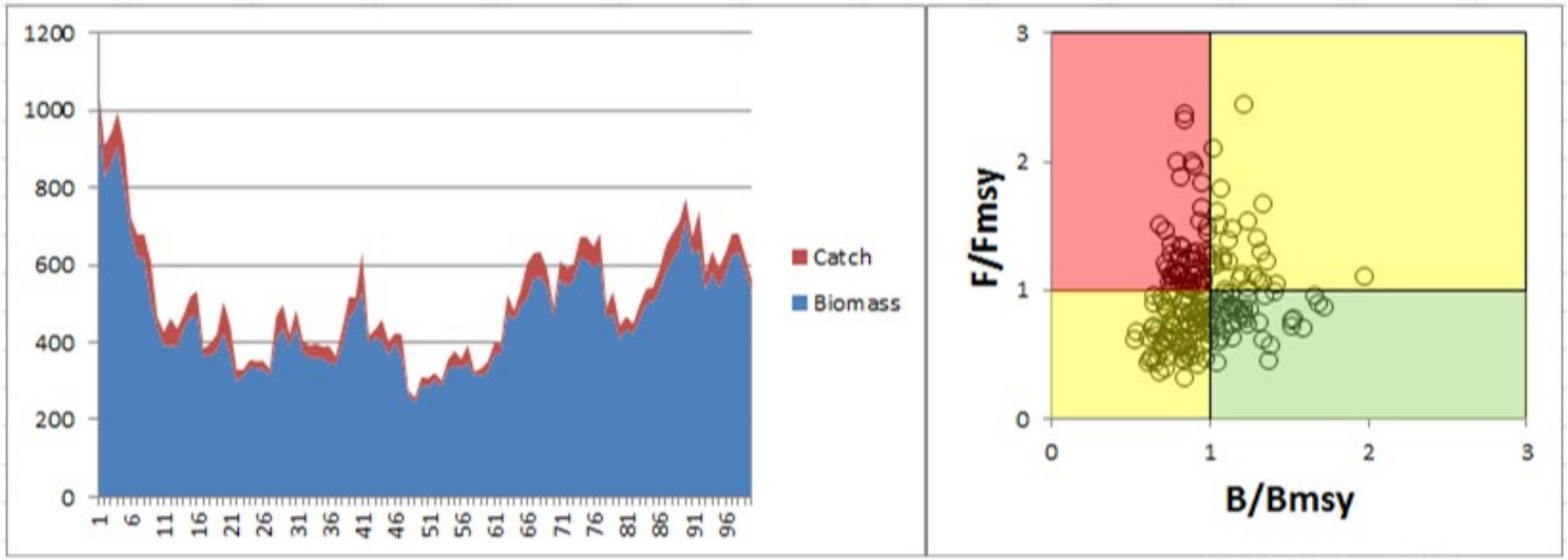
Constant exploitation rate (Fmsy) with assessment error

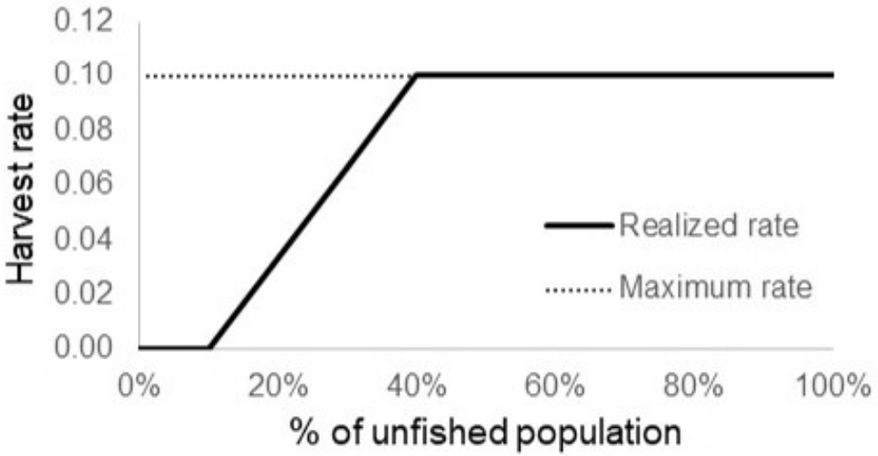




Kobe plot: simple simulation model

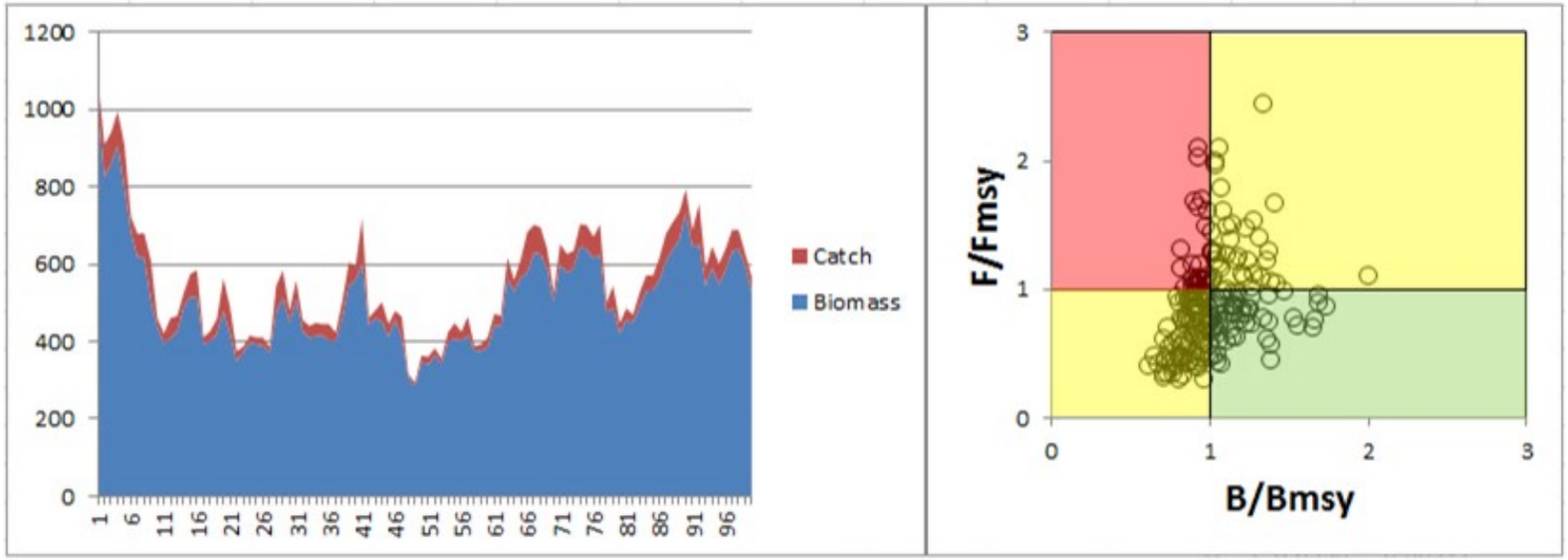
40:10 HCR, target exploitation rate (F_{MSY}) with assessment error

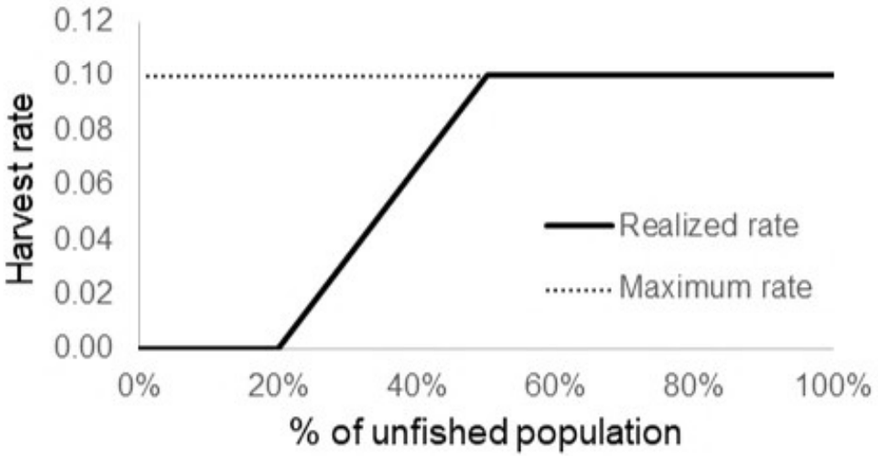




Kobe plot: simple simulation model

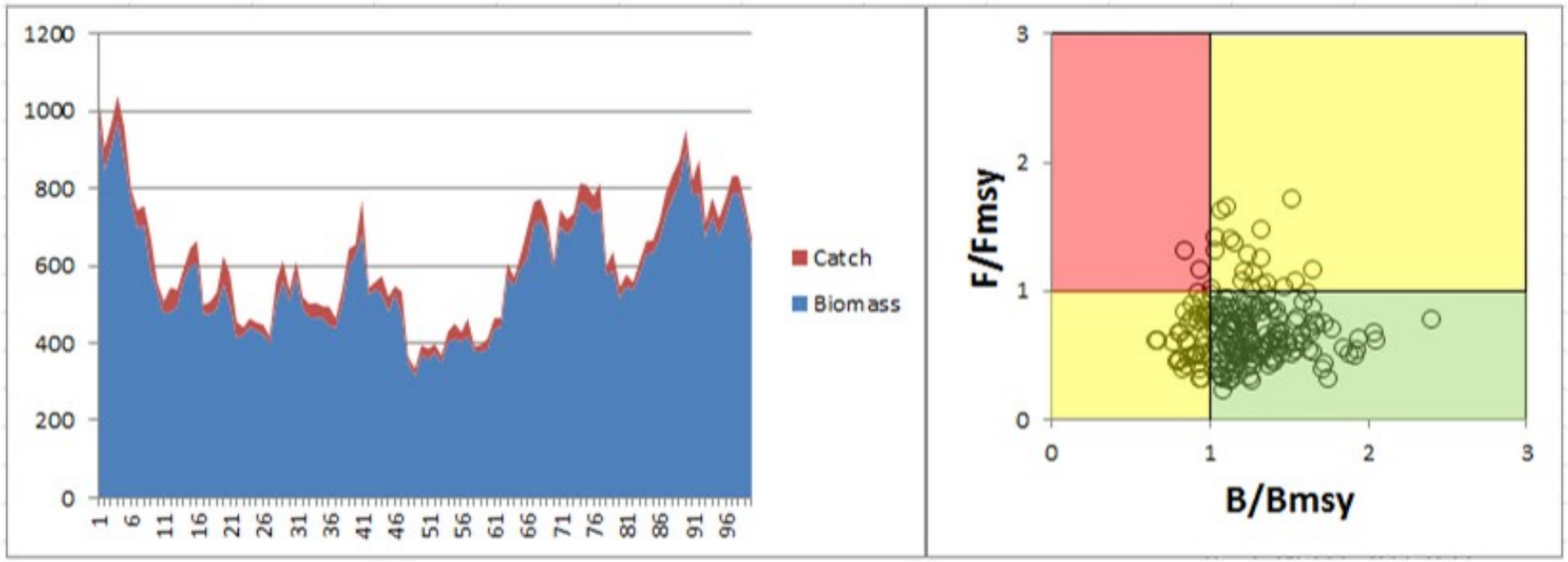
50:20 HCR, target exploitation rate (F_{MSY}) with assessment error

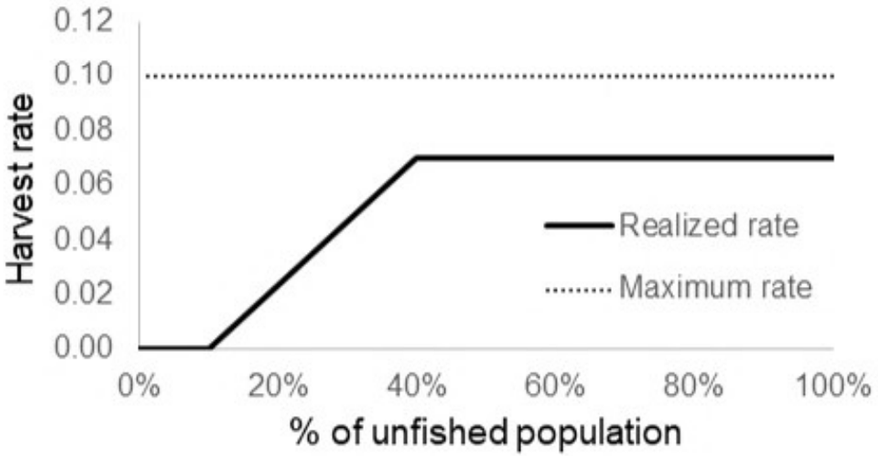




Kobe plot: simple simulation model

40:10 RCE, target exploitation rate (0.7* F_{MSY}) with assessment error





Extending the simple model

- Rather than assume assessment random errors, simulate the process of conducting annual assessments (this is highly computationally intensive).
- Examine strategies designed to achieve specific management objectives (e.g. select alternative catch levels to spend a particular percentage of time in the green or red quadrant of the Kobe plot).
- We will see other examples later on in this workshop.

CIAT
IATTC

Questions?