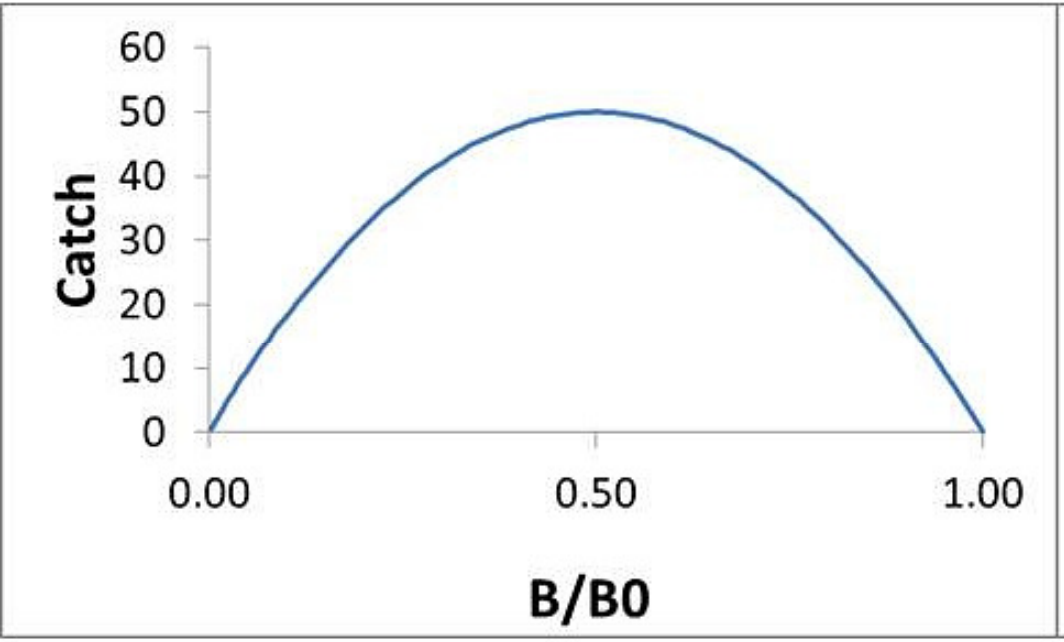
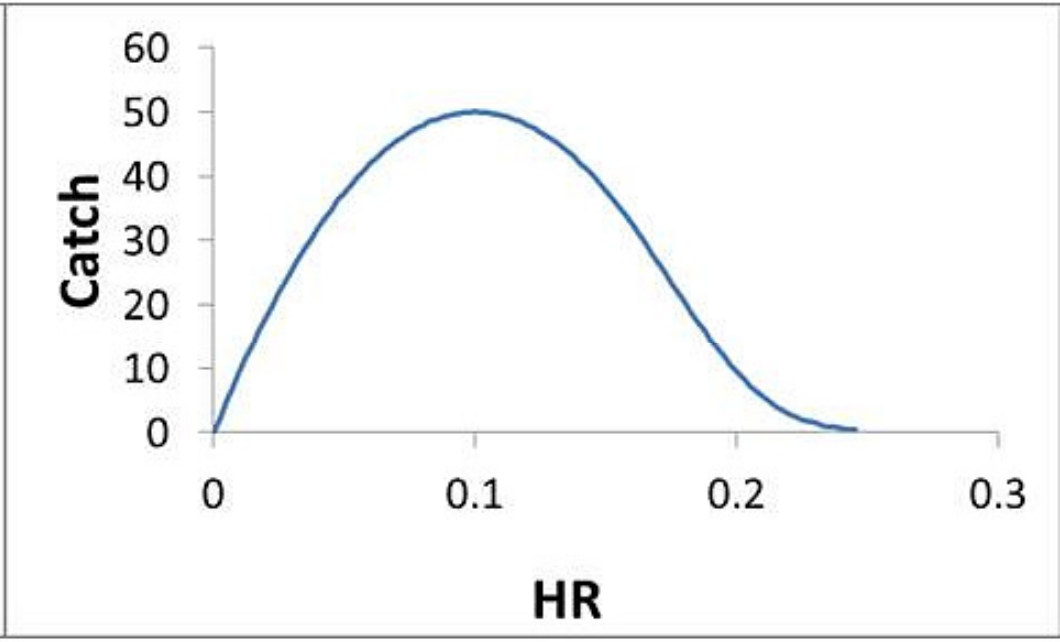
Simple Simulation Demo: Projections, HCR and Kobe plot

Management Strategies for Tuna Industry Stakeholders in the Eastern Pacific Ocean (EPO)
San Diego, August 12, 2019

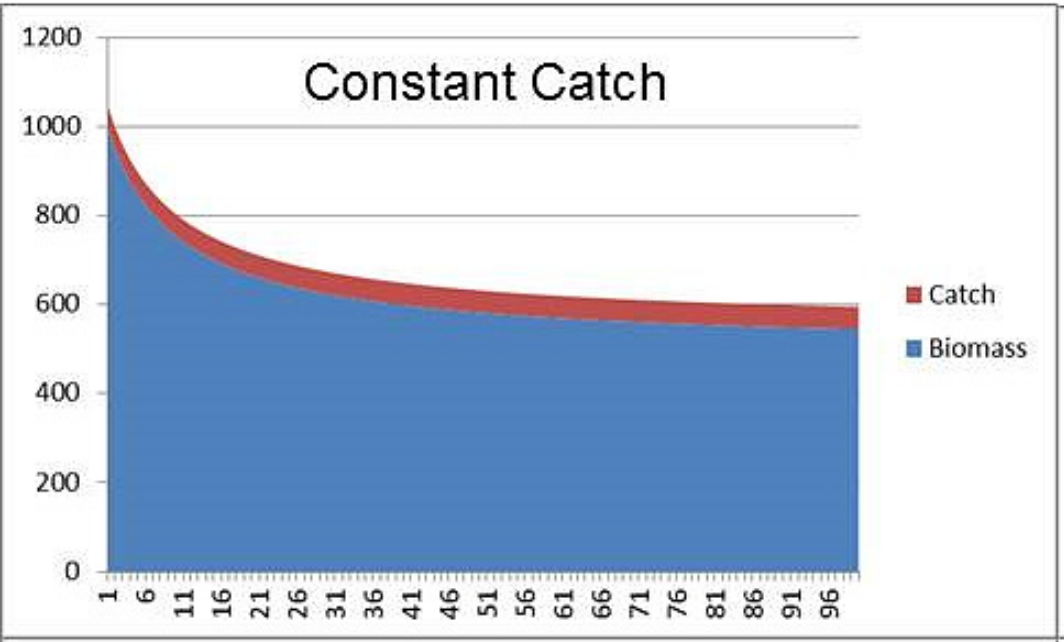
Evaluating Strategies

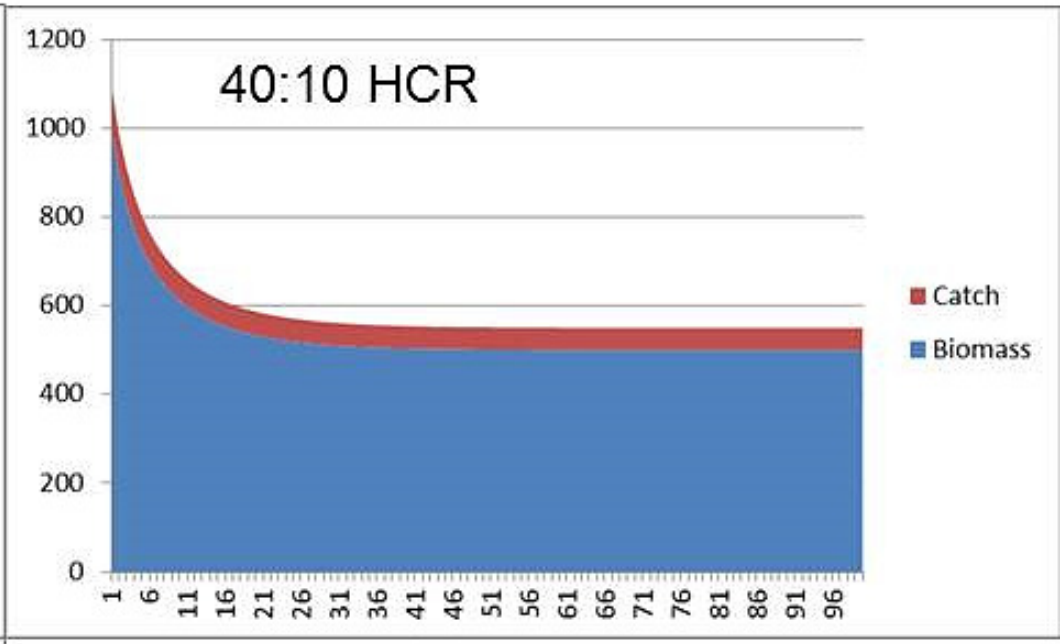
Using computer models, in this case a very simple population model with no error or uncertainties

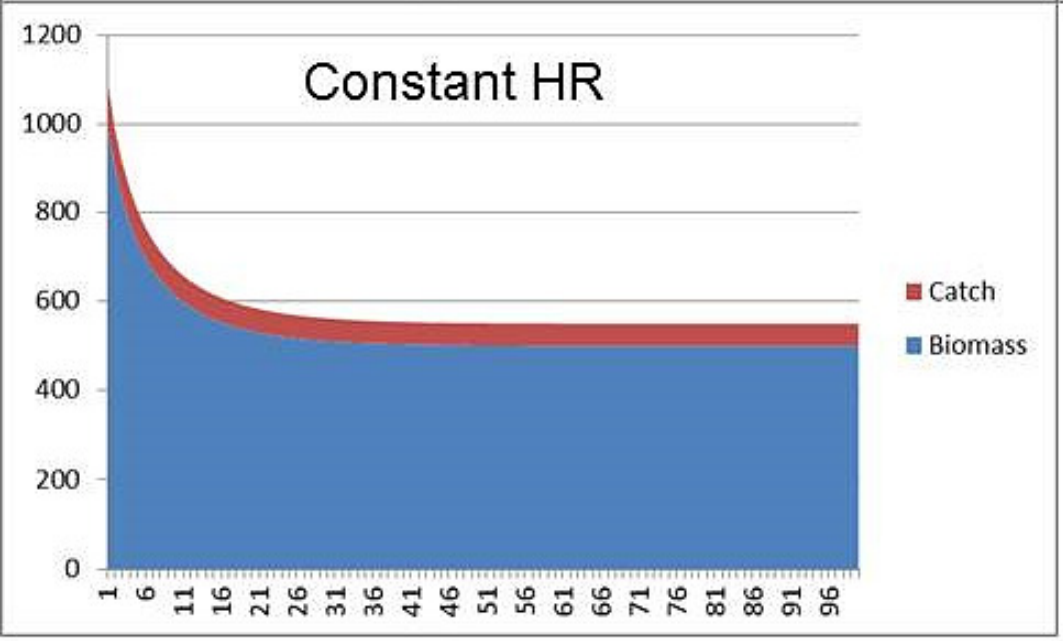




Catch and Population Size Trajectories



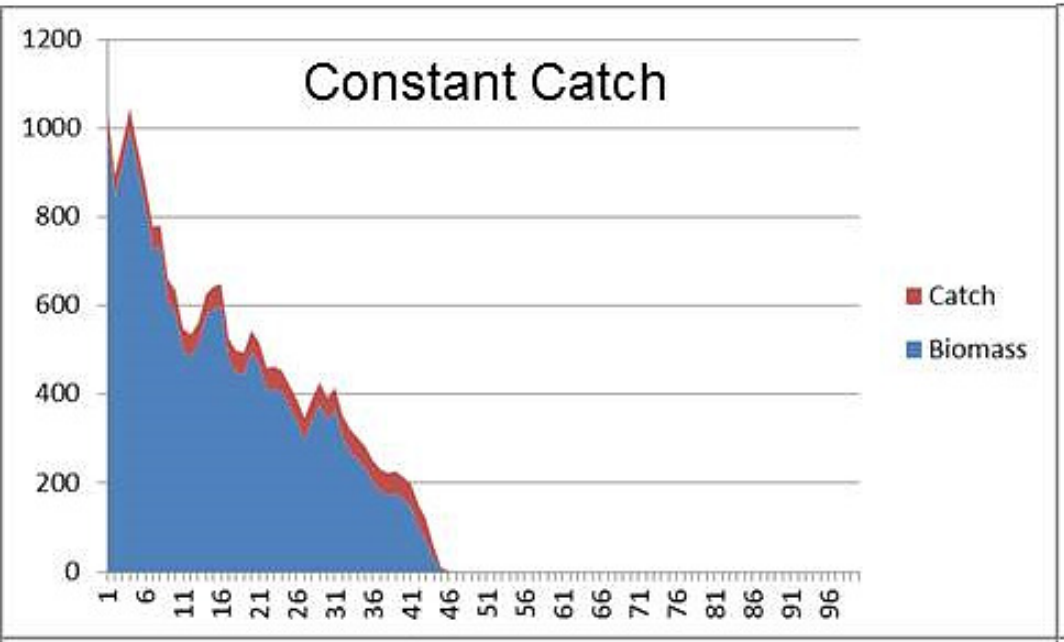


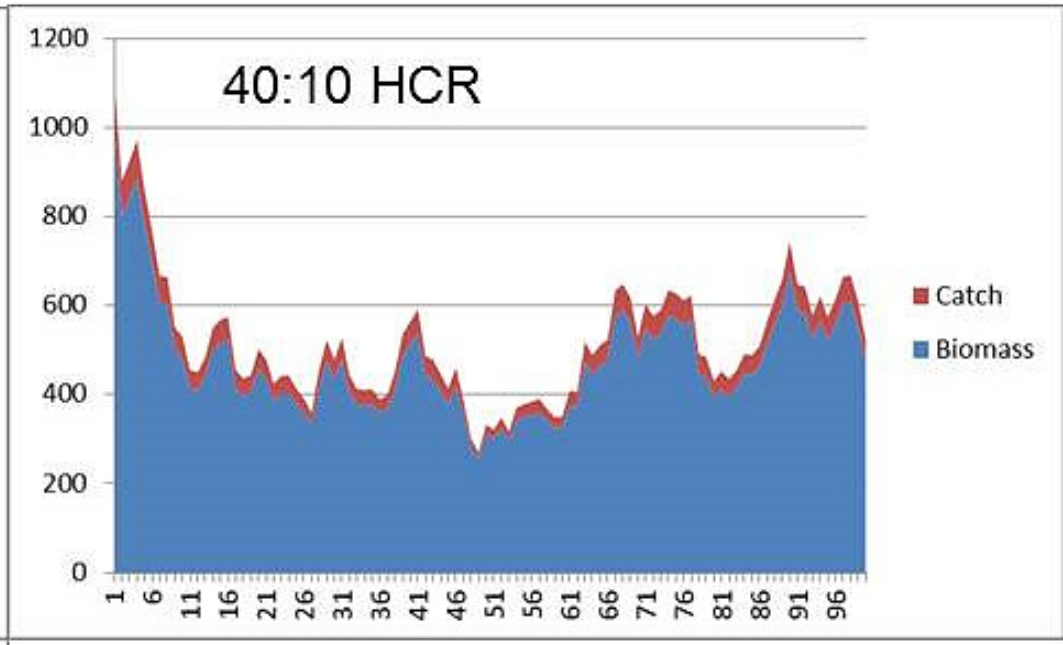


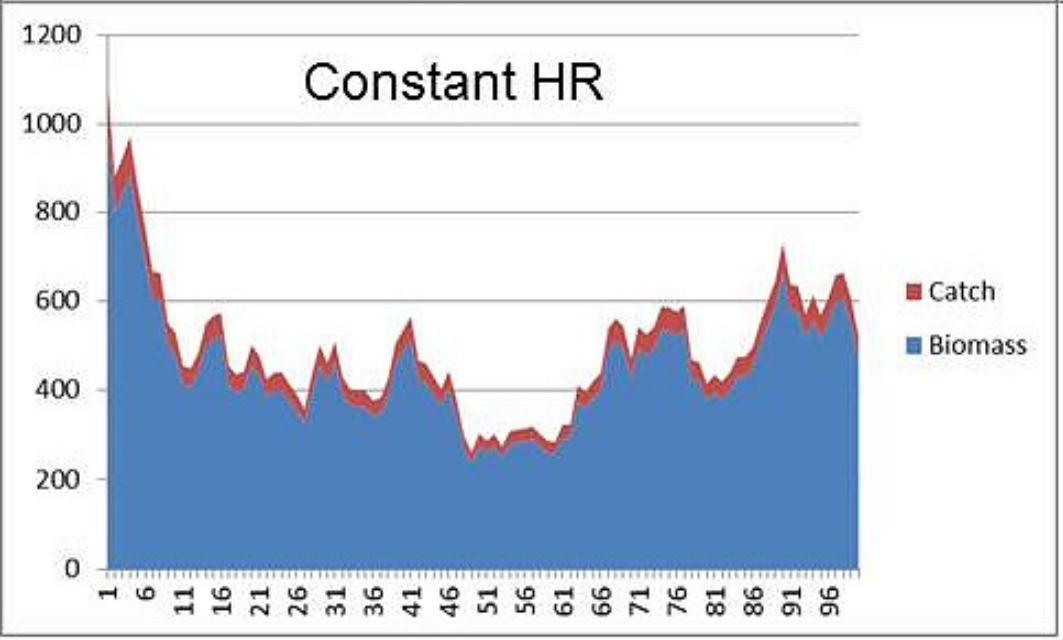
Extending to a Model with uncertainties

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

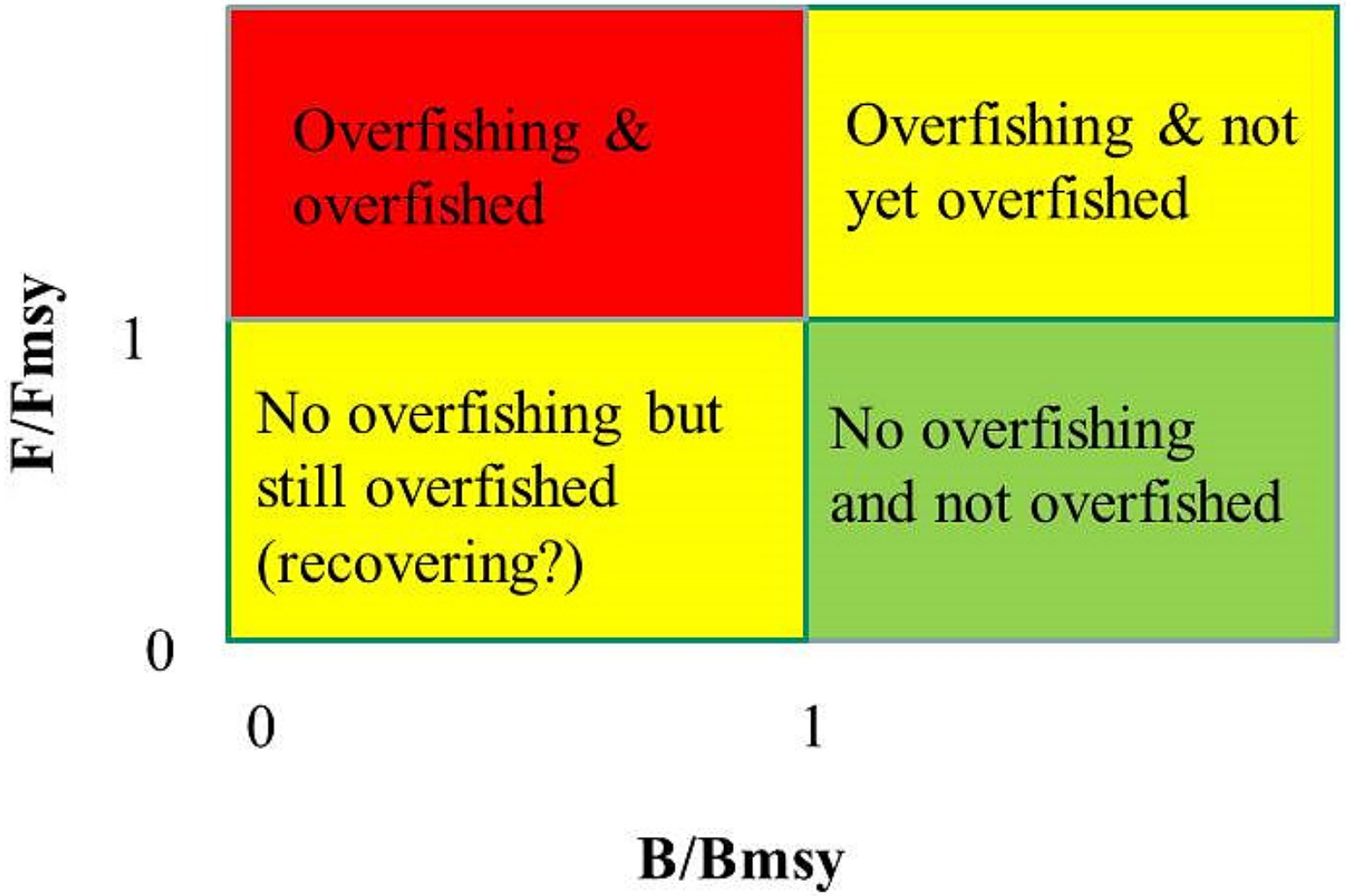
Catch and Population Size Trajectories





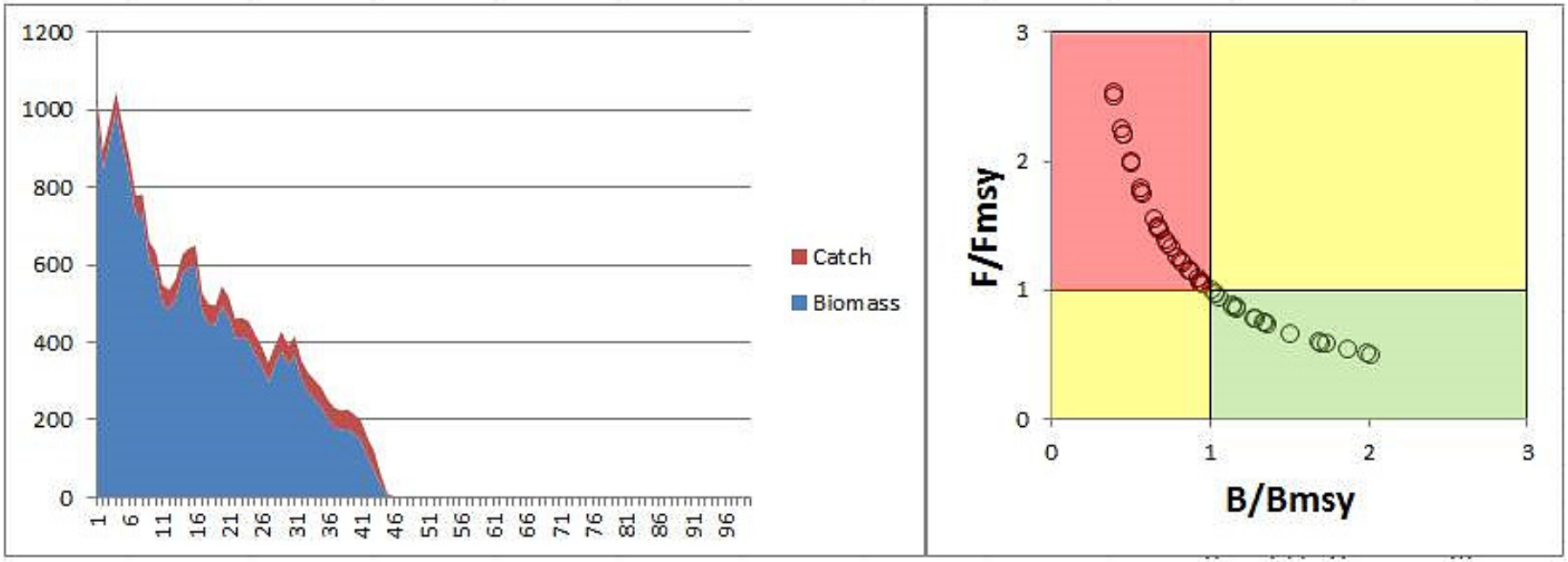


Kobe plot


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

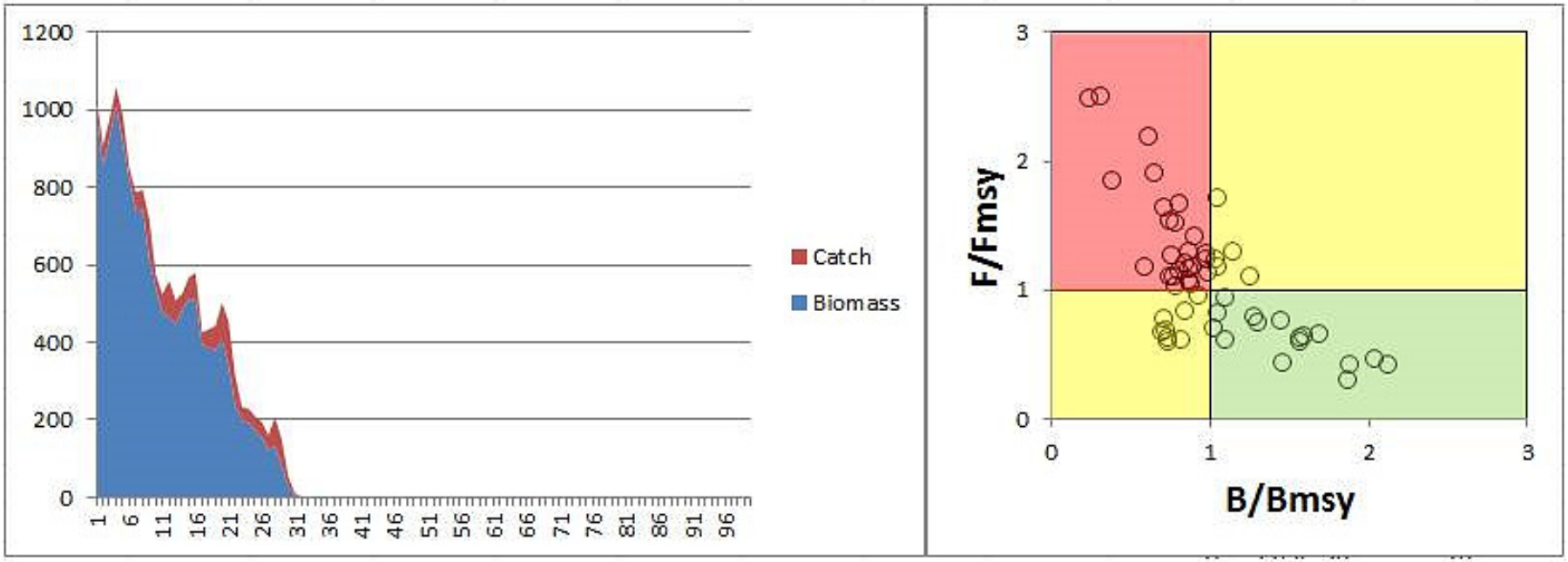
Kobe plot, simple model

Constant Catch



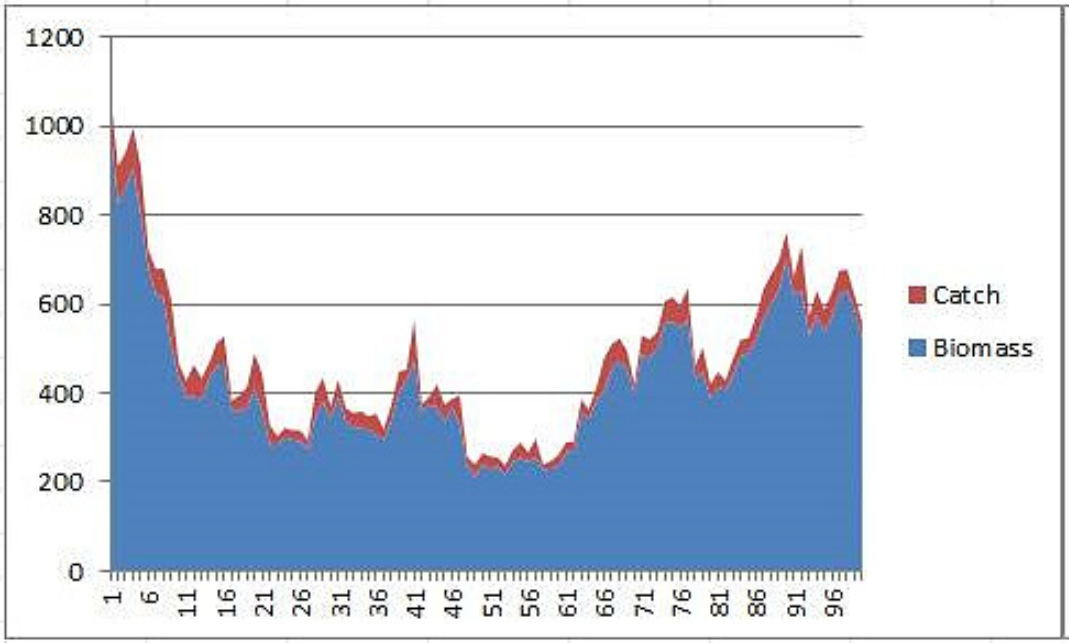
Kobe plot, simple model

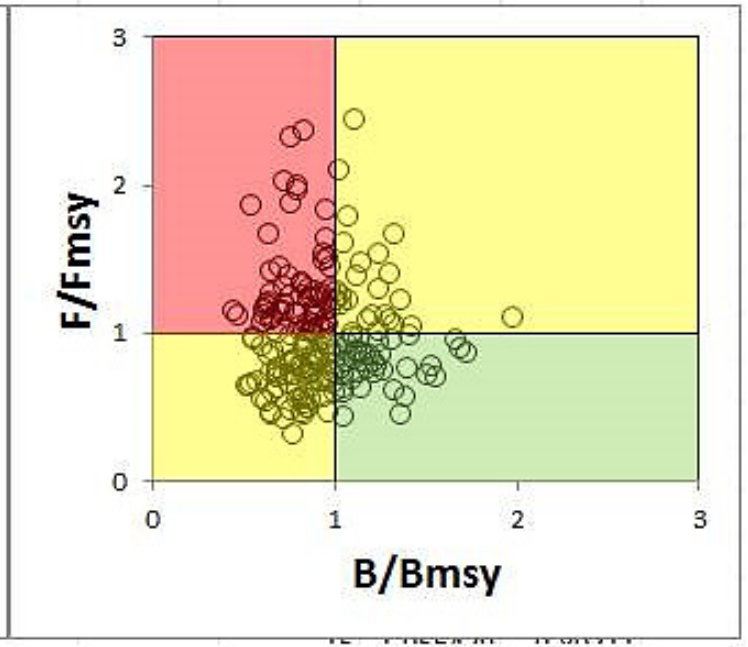
Constant Catch with Implementation error



Kobe plot, simple model

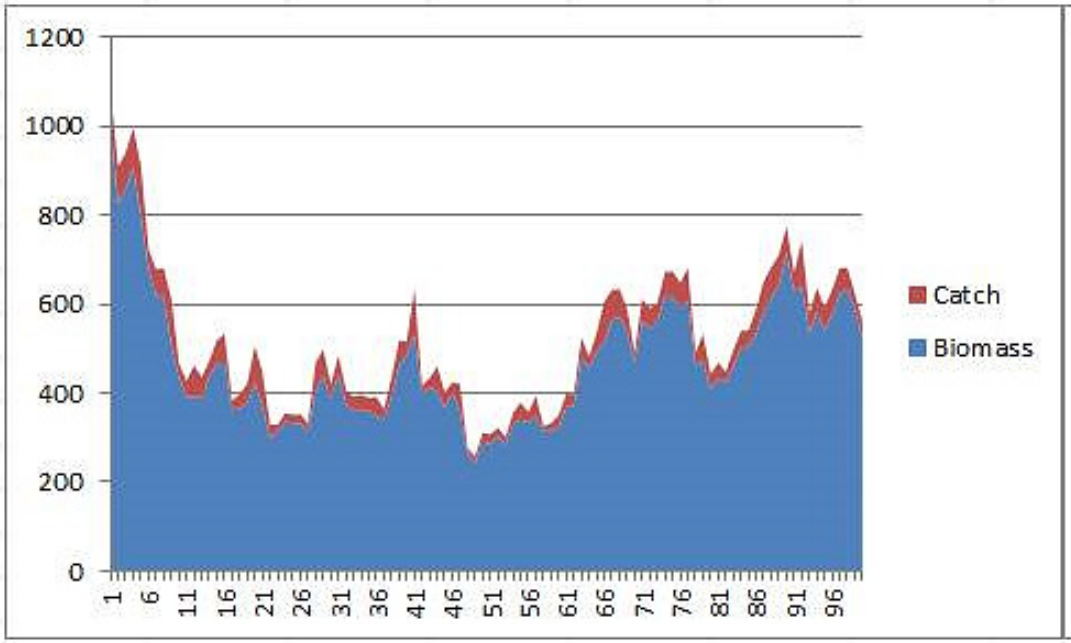
Constant HR (Fmsy) with Stock Assessment error

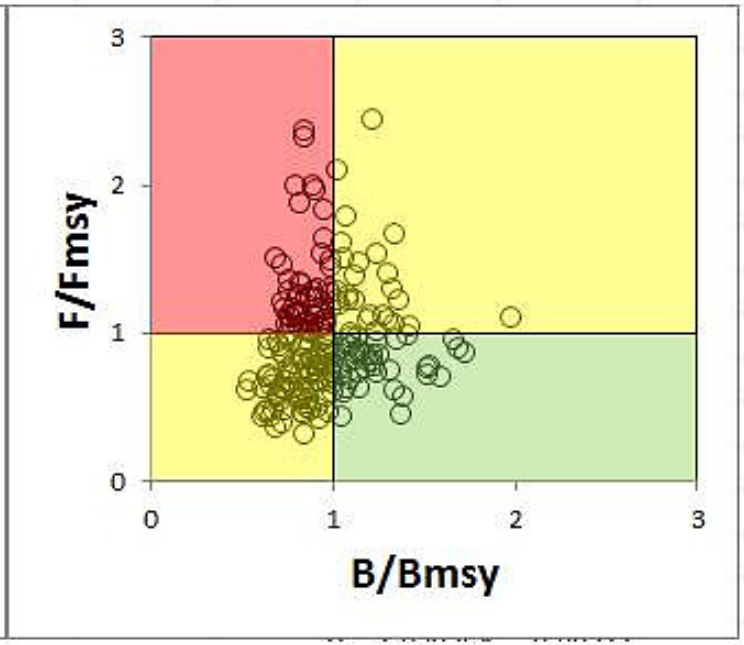




Kobe plot, simple model

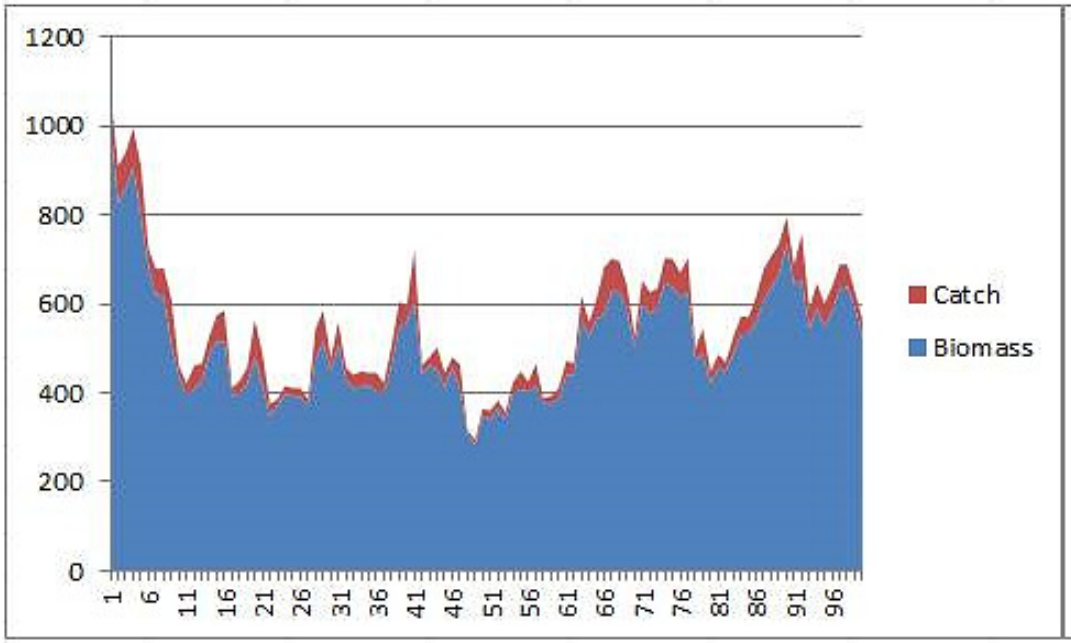
40:10 HCR, HR target (Fmsy) with Stock Assessment error

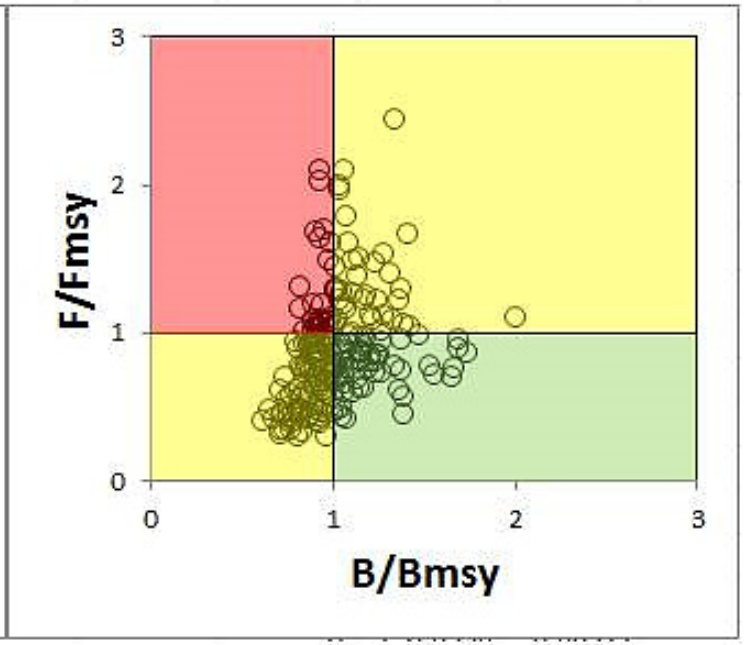




Kobe plot, simple model

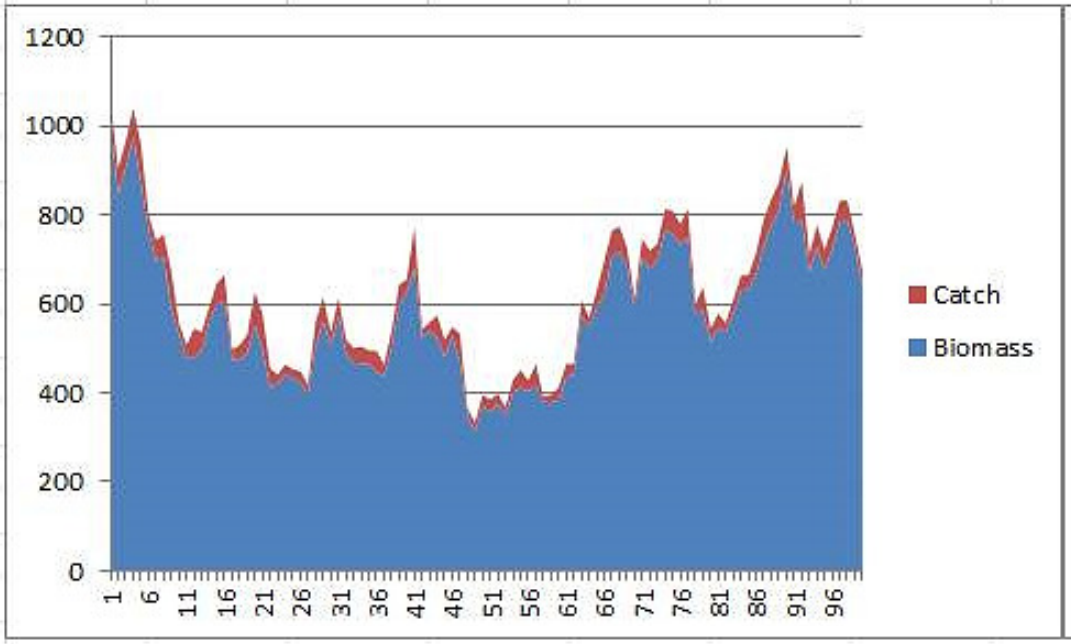
50:20 HCR, HR target (Fmsy) with Stock Assessment error

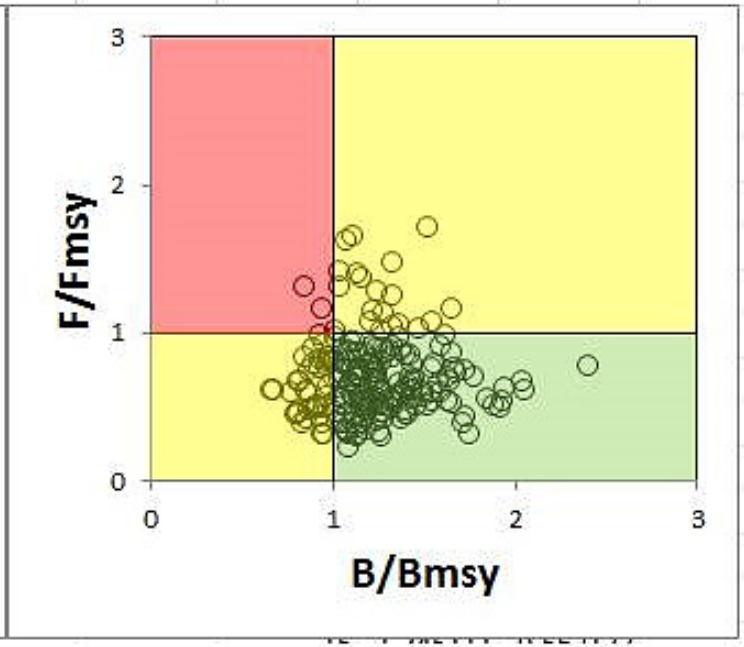




Kobe plot, simple model

40:10 HCR, HR target (0.7*Fmsy) with Stock Assessment error





Going Beyond the Simple Case

- 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 catch limits so that the probability of recovery equals a desired level).

Thank you!

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