Alternative CPUE-abundance dynamics in purse seine fisheries
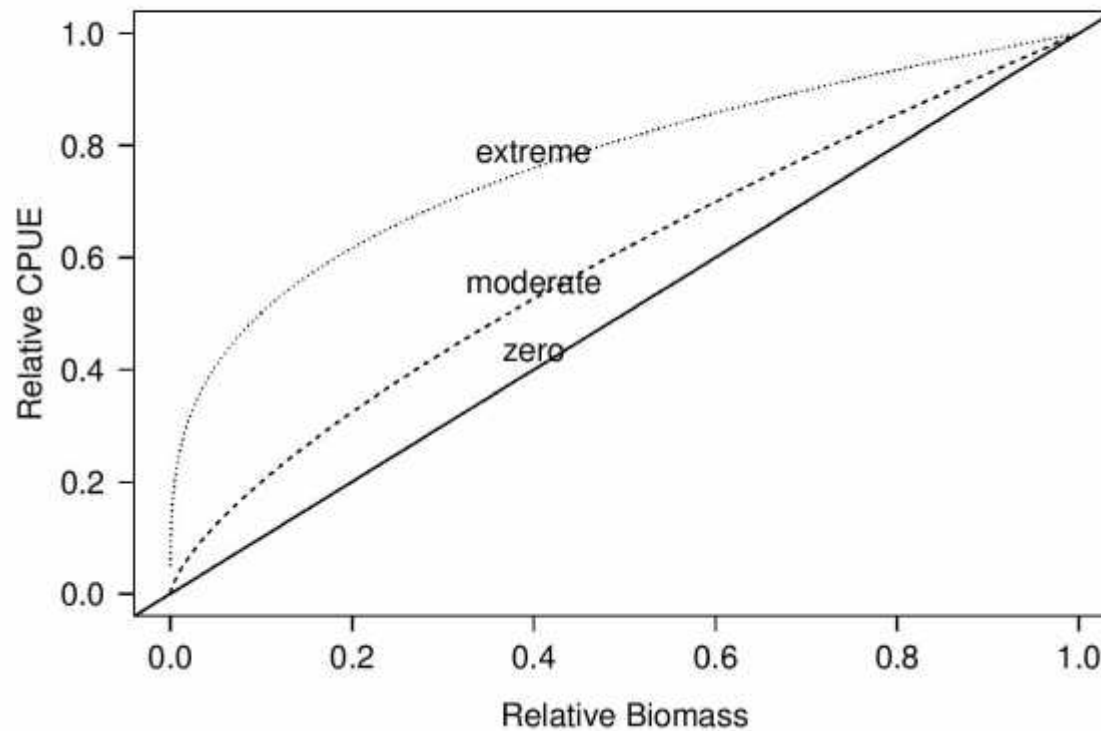
SPC, OFP

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Objectives

- Implement a non-linear CPUE to abundance relationship within MULTIFAN-CL

- Demonstrate the potential impact of hyper-stability in the context of potential TRPs for skipjack.

- Motivate some discussion on how this information could inform the TRP decision and future work on harvest control rules.

What is hyper-stability in CPUE?

Non-linear CPUE-abundance relationship assumed for purse seine fleets only
All other gears retain a linear (proportional) relationship

Projections

- 20 year deterministic projections
- Future recruitment determined from mean of recent time series (2002:2011).
- Future fishing effort based on 2012 effort levels with scalers between 0.5 and 2.0.
- Effort scalers applied to all fleets
- Catchability determined from the assumed CPUE abundance relationship.

- Identify the effort scaler required to achieve TRP at the end of the 20 year projection period.
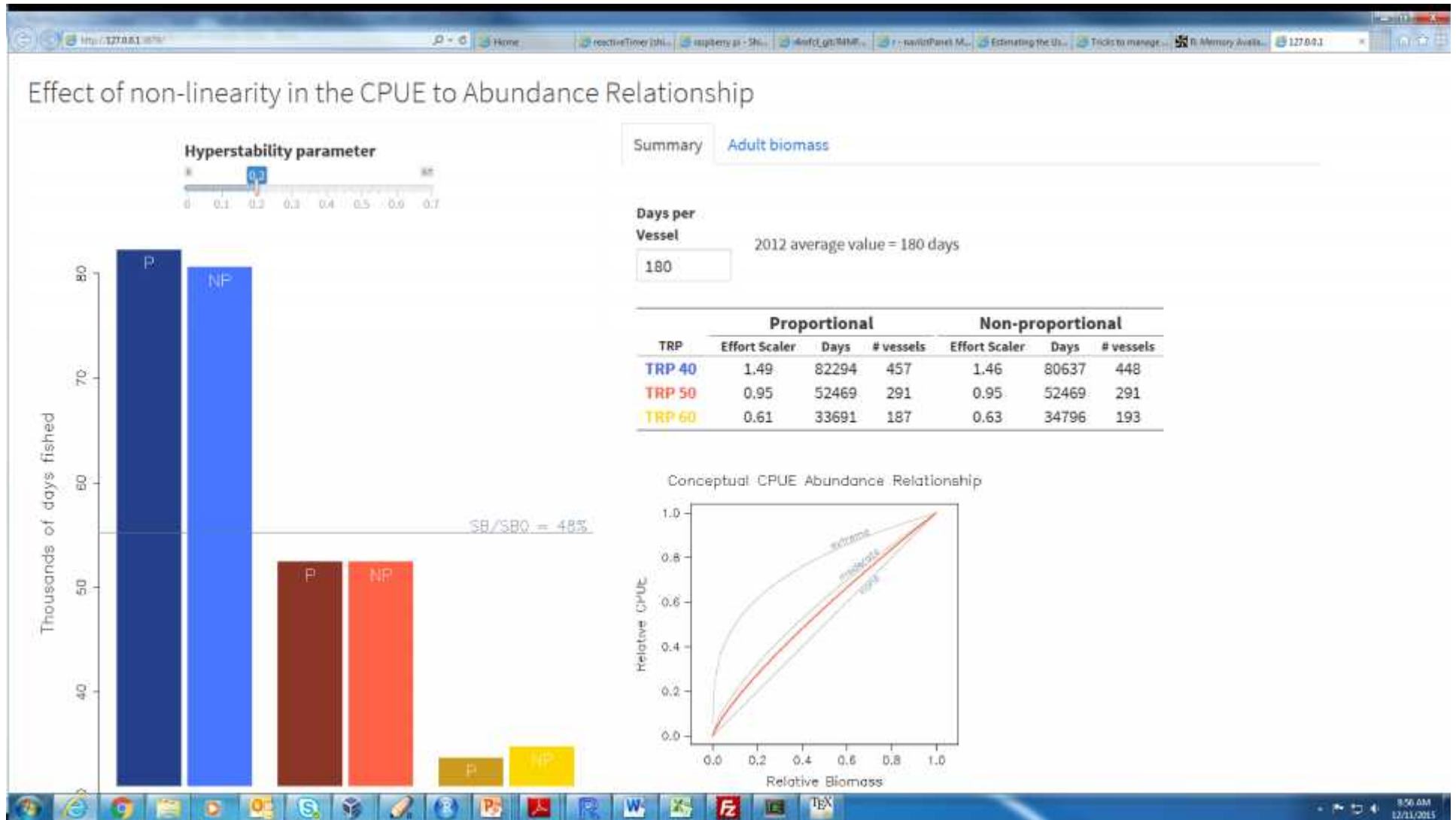
Results

TRP % $SB_{F=0, 2002:2011}$	Change in spawning biomass from 2012 levels	Change in effort from 2012 levels		
		Zero	Moderate	Extreme
60%	+22%	-39%	-36%	-32%
50%	+2%	-5%	-4%	-4%
40%	-18%	+49%	+44%	+35%

Under status quo conditions (ie an effort scaler of 1.0) the stock is estimated to remain at 48% $SB_{F=0}$ throughout the projection period.

When hyper-stability exists, a smaller effort reduction is required to increase the stock to 60% and a smaller effort increase is required to reduce the stock to 40%

Results Dissemination
https://ofp-sam.shinyapps.io/cpue-dynamics

Discussion Points

Specific issues regarding purse seine dynamics

- Given the results, have you revised your opinion on what should be an appropriate TRP for skipjack?

- How useful are tools such as the R-shiny application for disseminating the results of such analyses?

Broader issues regarding the application of the harvest strategy approach

- How can we develop management systems (eg harvest control rules) that are robust to the potential impact of phenomena such as effort creep and hyper-stability?