

# MSAB Meeting #4

October 21-22

# Agenda

Monday October 20, 2014

- 12:30 PM: Welcome, introductions, meeting objectives and questions.
- 1:00 PM: Summary review from MSAB Meeting 3 (May 5-6, 2014).
- 1:30 PM: Conditioning the coast wide operating model with Pacific halibut data.
- 2:30 PM: BREAK
- 2:45 PM: Process of creating alternative scenarios.
- 3:30 PM: Process of creating alternative management procedures.
- 4:30 PM: Discussion about research priorities & the list of questions to address.
- 5:00 PM: ADJOURN

# Agenda

Tuesday October 21, 2014

8:00 AM: COFFEE & PASTRIES

8:30 AM: Recap from previous day, questions & discussion.

9:00 AM: Long-term vs short-term objectives (equilibrium vs. dynamic models).

10:00 AM: BREAK

10:15 AM: Developments on status quo versus perfect information.

11:00 AM: Allan Hicks on MSE process for Pacific hake.

12:00 PM: LUNCH

1:00 PM: MSE laundry list (priorities and objectives for the MSE process).

2:00 PM: Selection of MSAB Chairs and Co-chairs & procedures for reporting to the Commission at Interim and Annual meetings.

2:30 PM: Discussion & feedback, and closing remarks.

3:15 PM: ADJOURN

# Meeting Objectives

- Update on the status of the MSE objectives.
- Current status of the coast-wide operating model.
- A new tool for exploring alternative policy options.
- Compare notes with the Pacific hake MSE process.
- Set research priorities.
- Selection of chairs and co-chairs, and develop procedures for reporting to the commission.

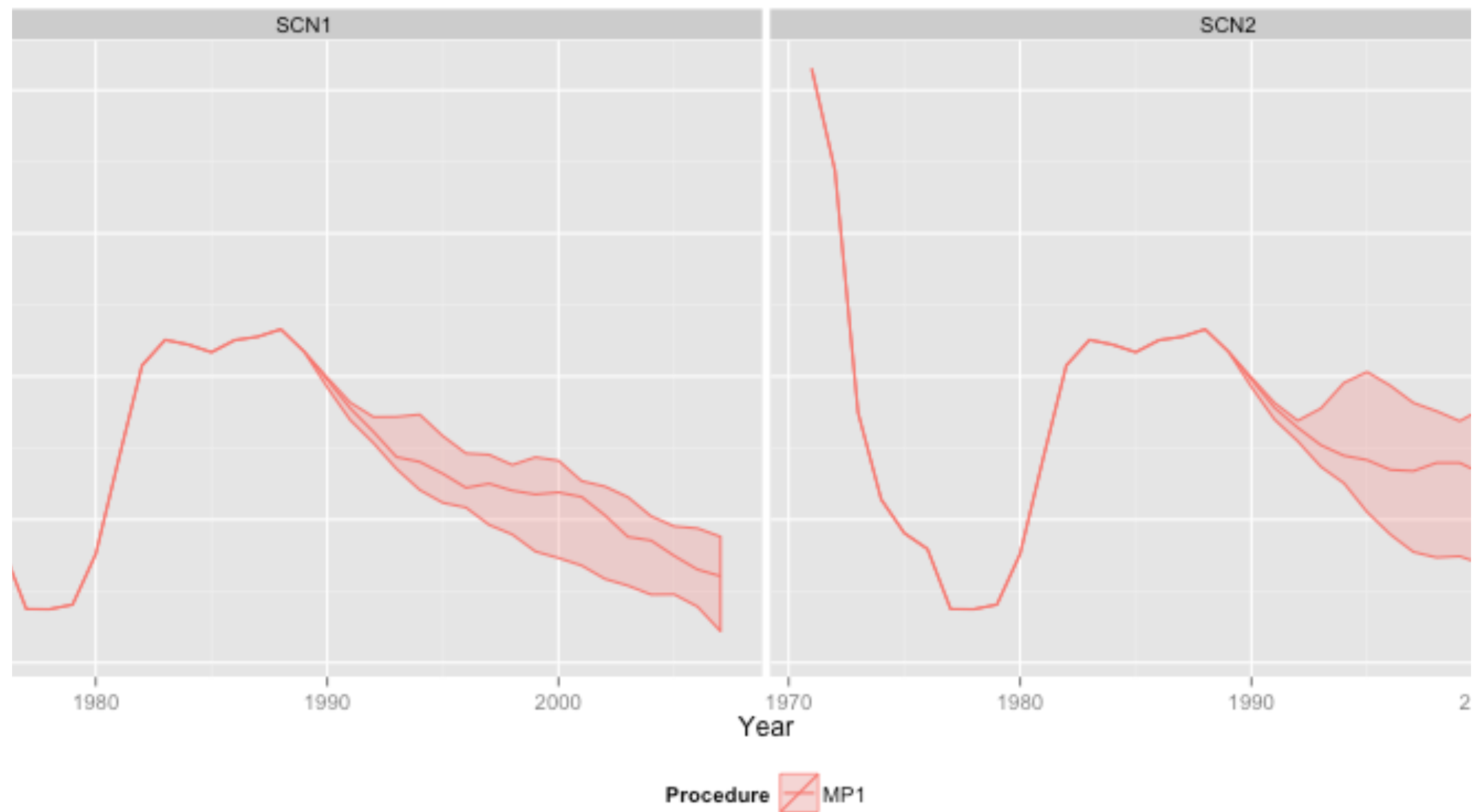
Questions?



Review of previous meeting.

# Size limit example

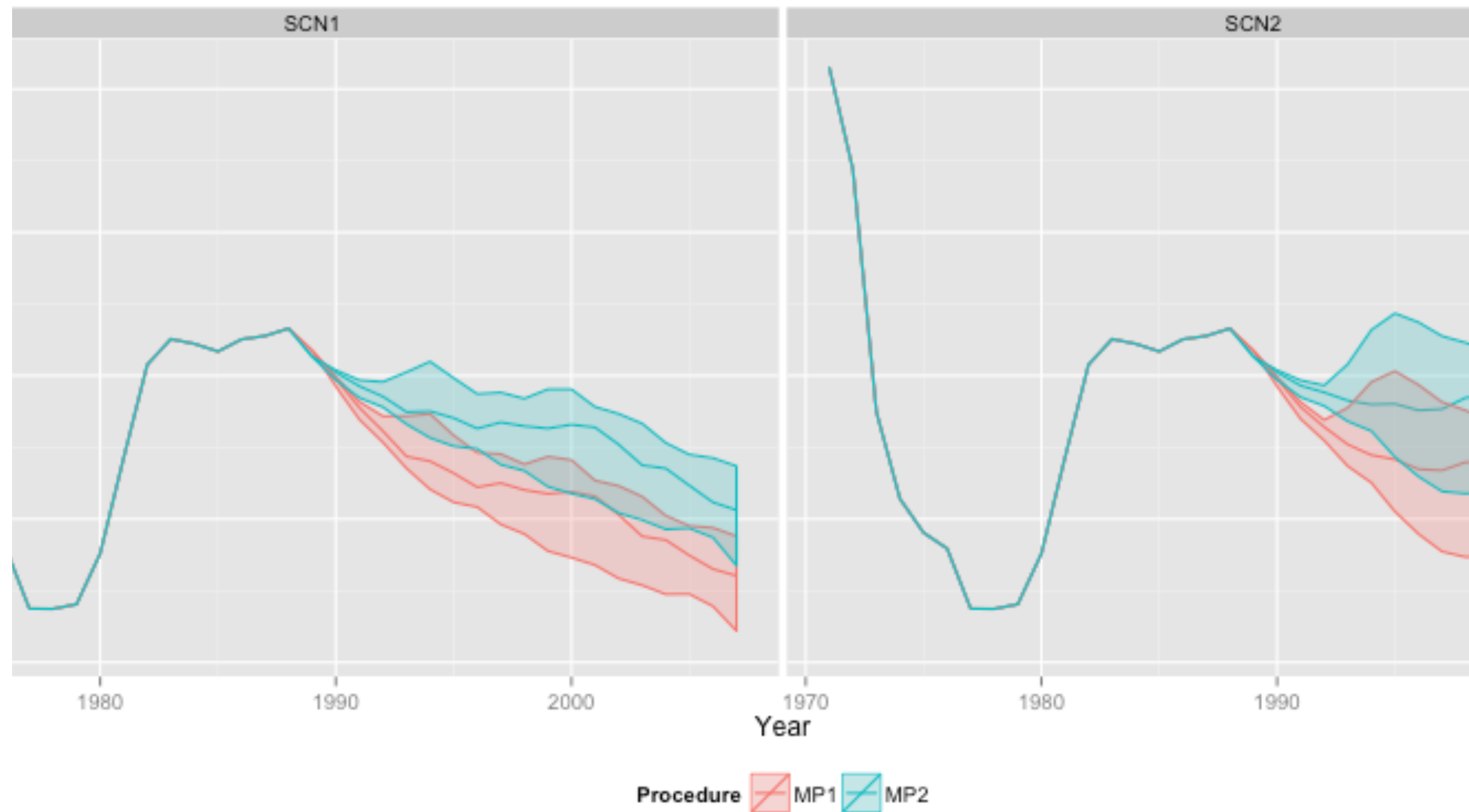
- Generic age-structured model (1 fishery–halibut like fish).
- Scenarios:
  - (SCN1) independent recruitment,
  - (SCN2) environmentally forced recruitment
- Procedures:
  - (MP1) no size limits, fixed harvest rate
  - (MP2) 82 cm min size limit, fixed harvest rate
  - (MP3) 82-108 cm slot limit, fixed harvest rate
  - (MP4) 82 cm min size limit, 30:20 harvest control rule.



# Spawning biomass

No size limit!

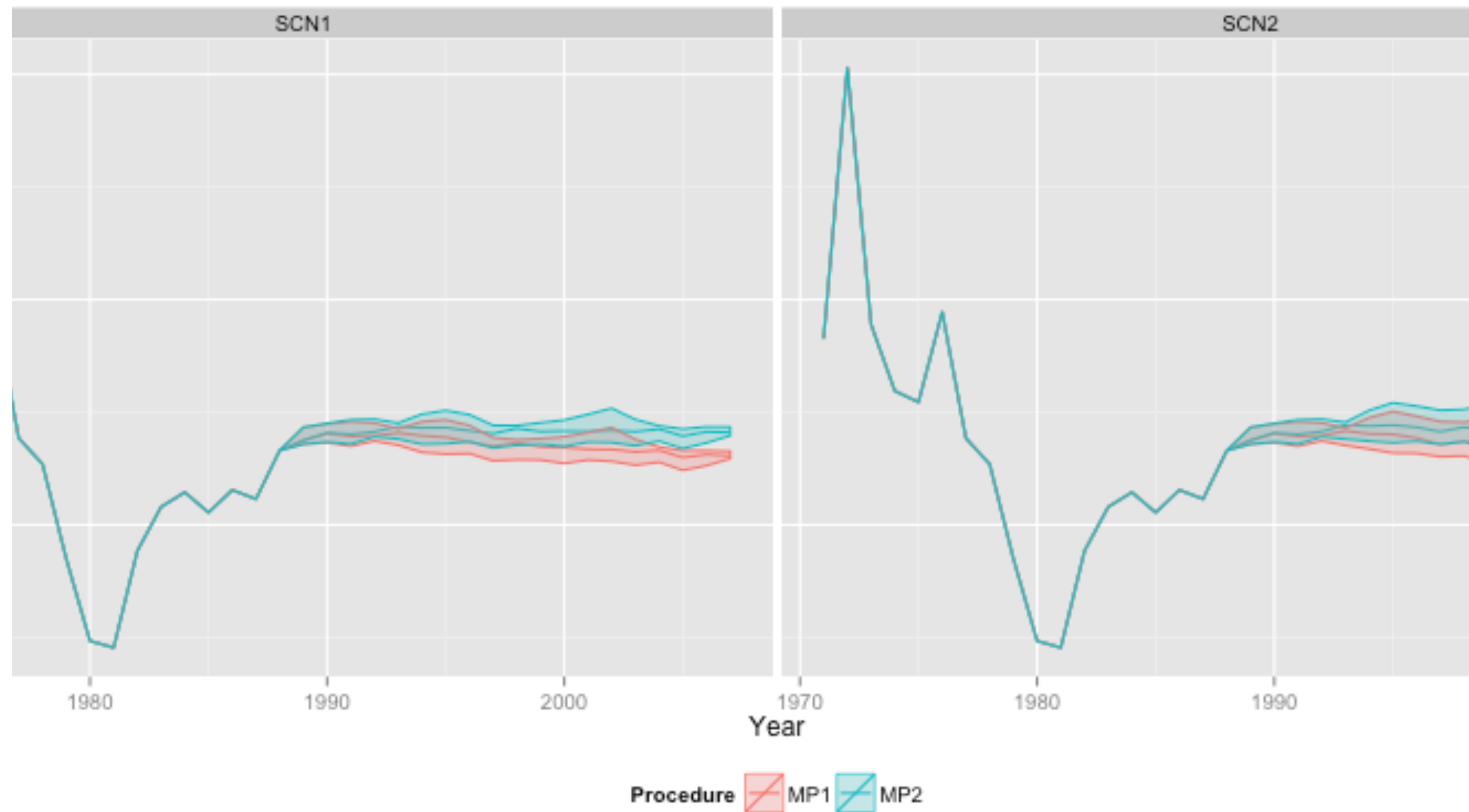




# Spawning biomass

Minimum size-limit, discard mortality rate 15%

Good for spawning biomass.



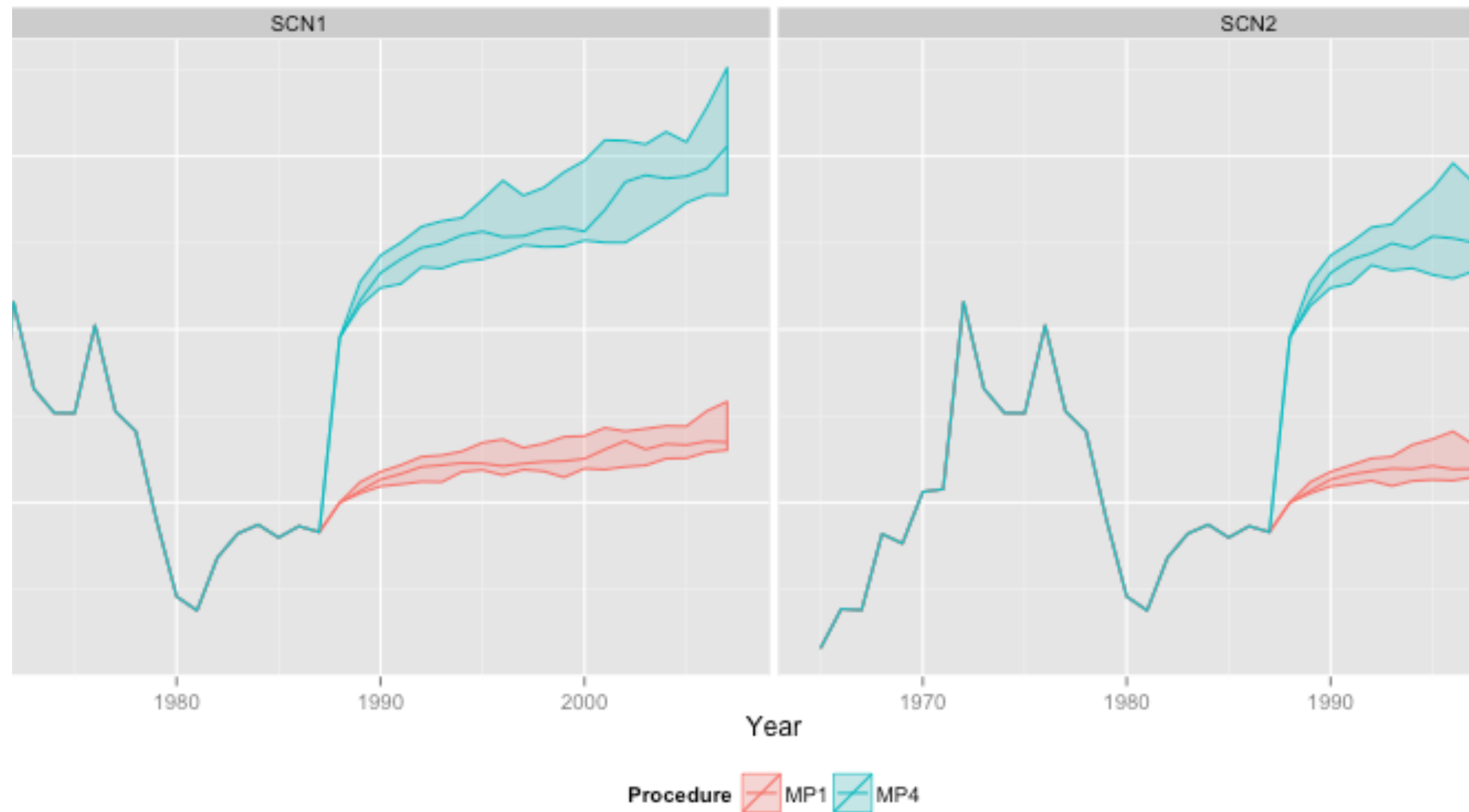
# Fisheries yield

Average yield increase.

Size-structure rebuilds after a few years & hence increased SSB.

# Size-limits

- Pro's: increased SSB, roughly similar average yields after age-structure has stabilized.
- So what are the cons?



# Fishing mortality

You need to fish a lot harder—smarter to catch the same amount of fish (by weight).

# Highlights from Meeting #3

- IPHC MSE TOOL:
  - useful in highlighting the tradeoffs among management objectives,
  - highlighted the need for joint consideration of all performance metrics.
- STAKEHOLDER DIALOGUE:
  - diverse range of interest,
  - integration of management by Councils, DFO, and IPHC,
  - and “Don’t fall in love with the models” (validation is key),
  - confusion about the role of the MSAB-MSE process in the decision-making process.

# Highlights from Meeting #3

- CANDIDATE OBJECTIVES:
  - conservation remains the priority of the MSAB,
  - re-visited management objectives from Meeting #2,
  - area-specific versus coastwide objectives;
    - short-term focus on coastwide objectives, long-term integrate area-specific objectives, and understand tradeoffs.
  - Developed modified objectives in a tabular format clearly stating the goals, objective, performance metric, probability, and time frame.
    - IPHC staff commented on these objectives (Table 1 from Meeting #3 minutes).

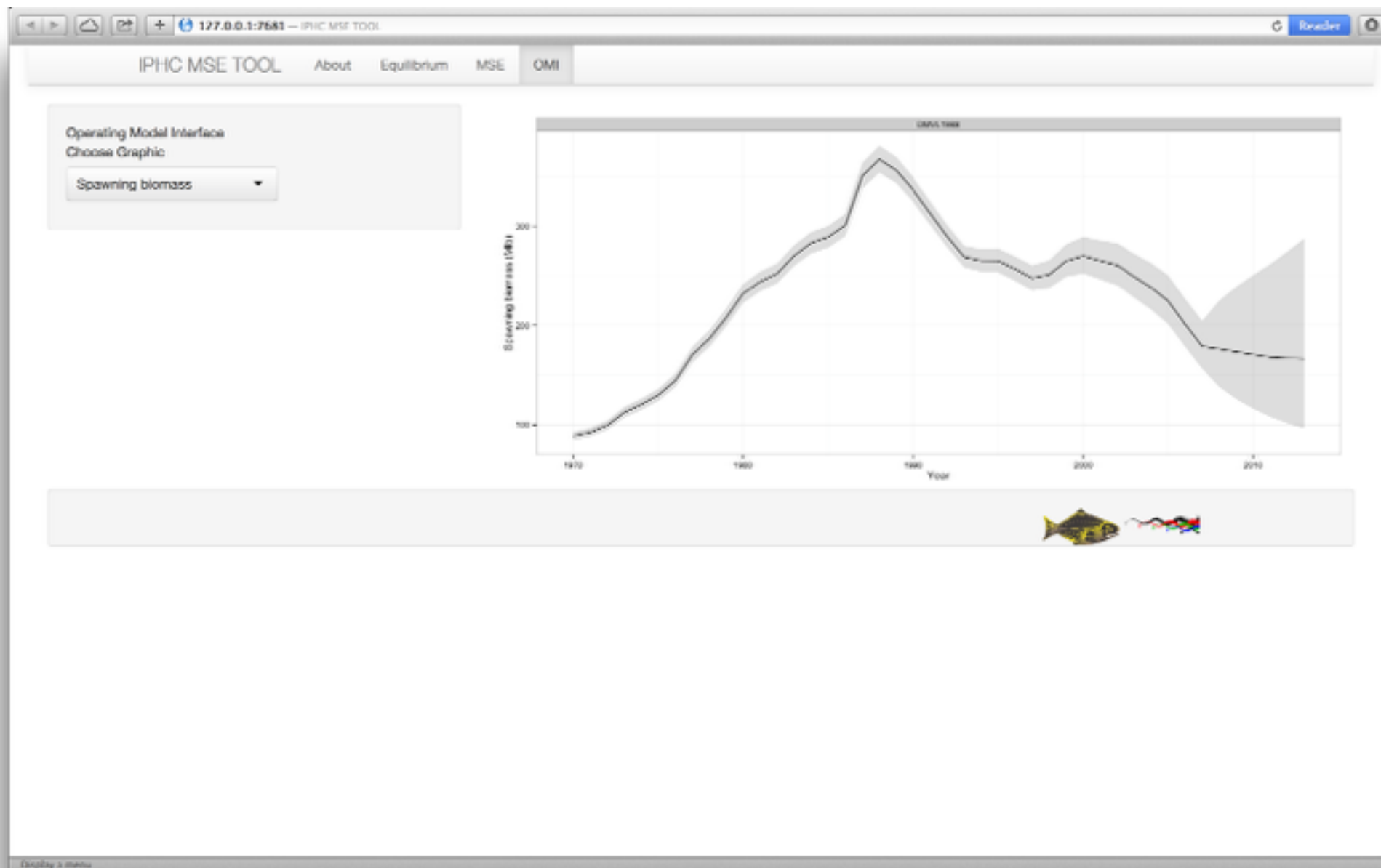
**Table 1. Candidate goals and objectives for MSE process – May 2014**

Goal	Objective	Performance Metric	Probability	Time frame	IPHC Staff Comments
Biological sustainability	Limit - the level of biomass below which no fishing can occur	1) Maintain a minimum of number of mature female halibut coast-wide (e.g., one million)	0.99	Each year	Number of females and spawning biomass can be equivalent, however this objective could also be evaluated with respect to average female size
		2) Maintain a minimum spawning stock biomass of 20% of the unfished biomass	0.95	Each year	Part of current harvest policy. The probability should be evaluated relative to recruitment variability and yield
Biological sustainability	Threshold - the level of biomass below which the harvest rate should decline	3) Maintain a minimum spawning stock biomass of 30% of the unfished biomass	0.75	Each year	See above.
Fishery sustainability and stability  Assurance of access  Serve consumer needs	Target Harvest Rate - harvest rate applied when biomass is above threshold level - Maintain median catch within $\pm 10\%$ of 1993-2012 average - Maintain average catch at $>70\%$ of	4) Maintain directed fishing opportunity	0.95	Each year	Evaluate probability relative to recruitment variability and minimum annual variation in catch desired by industry. This needs a quantifiable unit in order to calculate a probability, e.g., maintain directed fishing opportunity of xx million pounds each year.

# Highlights from Meeting #3

- BYCATCH IMPACTS
  - multiple agencies attempting to control mortality of halibut,
  - need for coordinated management among agencies,
  - MSAB suggested a joint protocol committee between agencies.
- FUTURE STEPS
  - Staff ranking of objectives.
  - MSAB Chair and co-Chairs to be selected at Meeting #4: report on the MSAB process to the Commission.





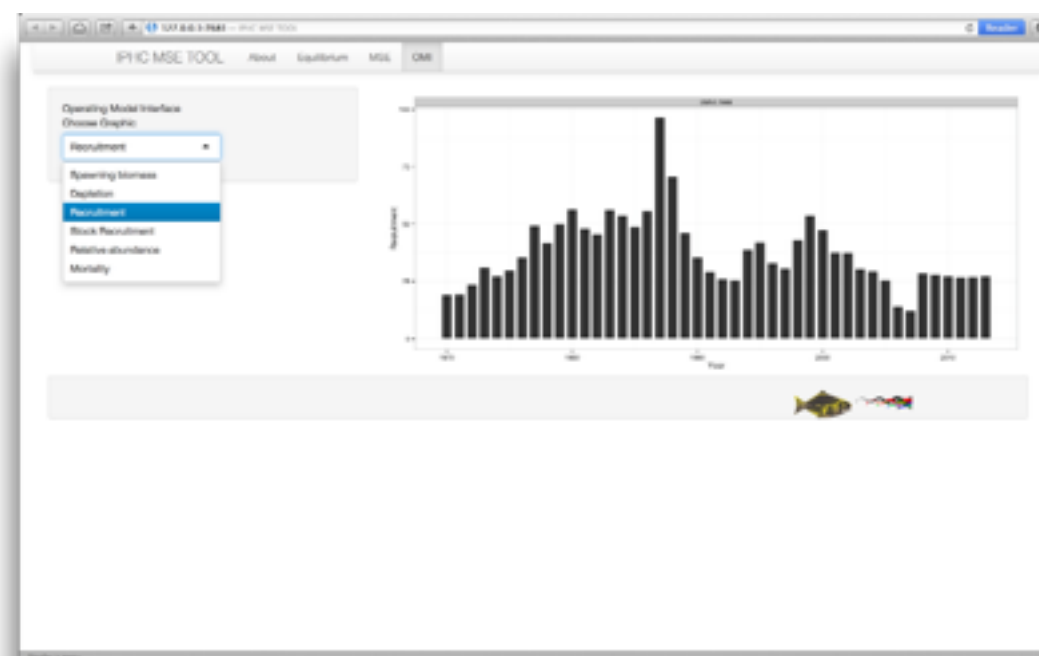
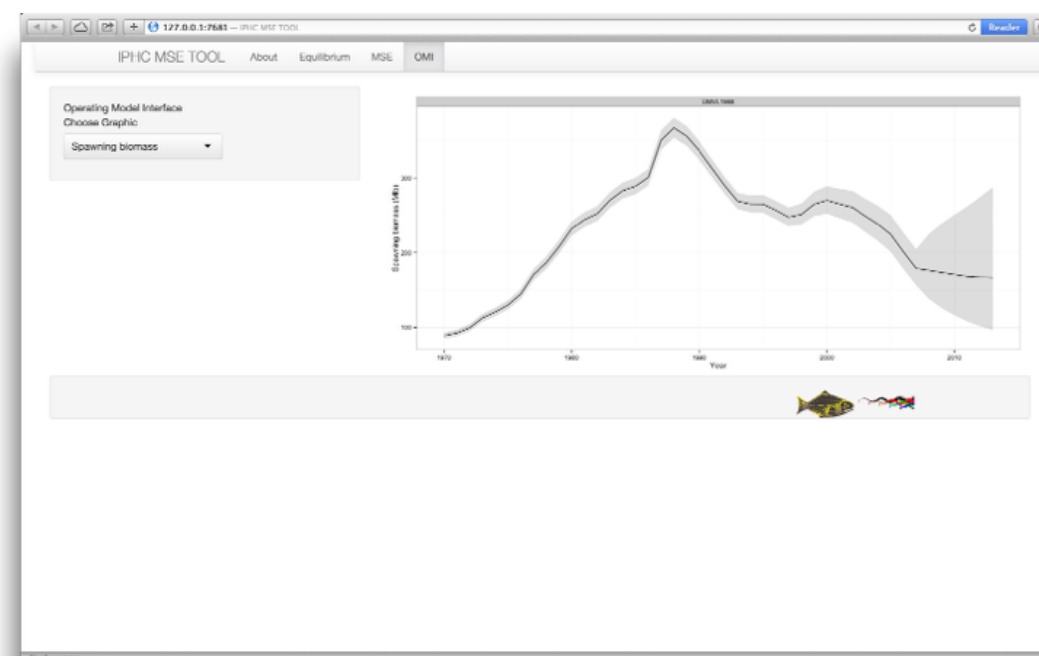
# Operating Model

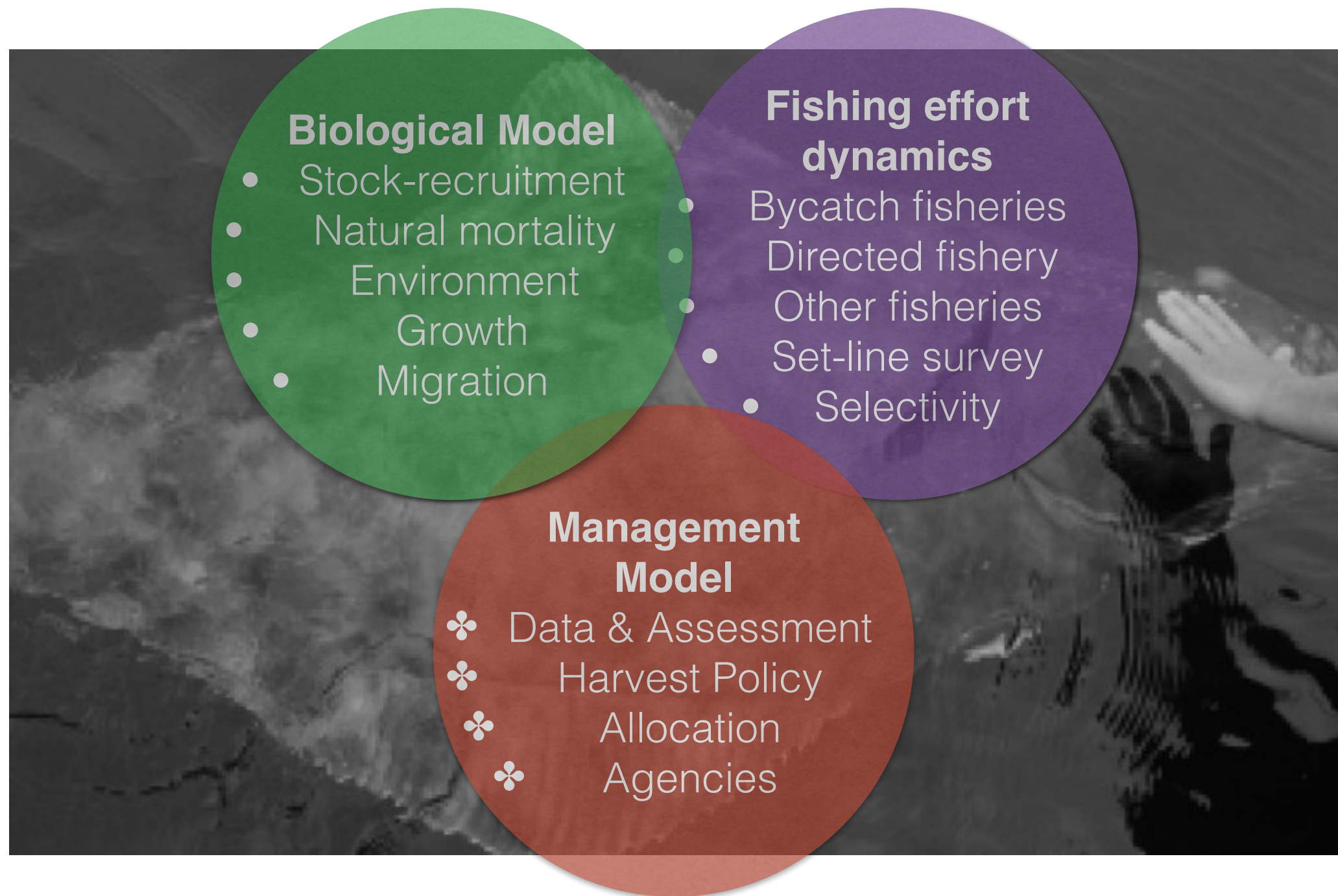
Conditioning the Operating Model With Halibut Data

# Current status of the Operating Model

- Coastwide halibut data now assembled.
- Model fitting:
  - early stages, modifications to accommodate majority of assumptions in the ensemble models.
- Spatial data for a 4-area model now ready.

WORK IN  
PROGRESS  
CHECK BACK SOON!





# Model Scenarios

Establish a range of operating model scenarios.

# PROCEDURES

# SCENARIOS

	Things we can manage	Things we cannot manage
Things were certain about	<ul style="list-style-type: none"><li>● Size limits</li><li>● Catch limits</li><li>● Rate of TAC change</li><li>● Allocation among sectors</li><li>● ...</li></ul>	<ul style="list-style-type: none"><li>● PDO - recruitment variation</li><li>● Changes in size-at-age</li><li>● Migration, dispersal</li><li>● ...</li></ul>
Things were uncertain about	<ul style="list-style-type: none"><li>● Bycatch</li><li>● Wastage</li><li>● Discard mortality rates</li><li>● ...</li></ul>	<ul style="list-style-type: none"><li>● Natural mortality</li><li>● Recent recruitment trends</li><li>● Range contraction</li><li>● ...</li></ul>

# Alternative scenarios

- Model selection for an Operating model should bracket the range of hypothesized uncertainty.
- Ensemble model approach is a sufficient starting point to bracket range – but has some limitations:
  - same assumptions in suite of models (e.g., migration embedded with selectivity),
  - tend to focus on statistical performance, and less on policy performance.
- Limit number of scenarios to a manageable number.
- Focus on (uncertain) components that represents the *greatest impact on harvest policy*.



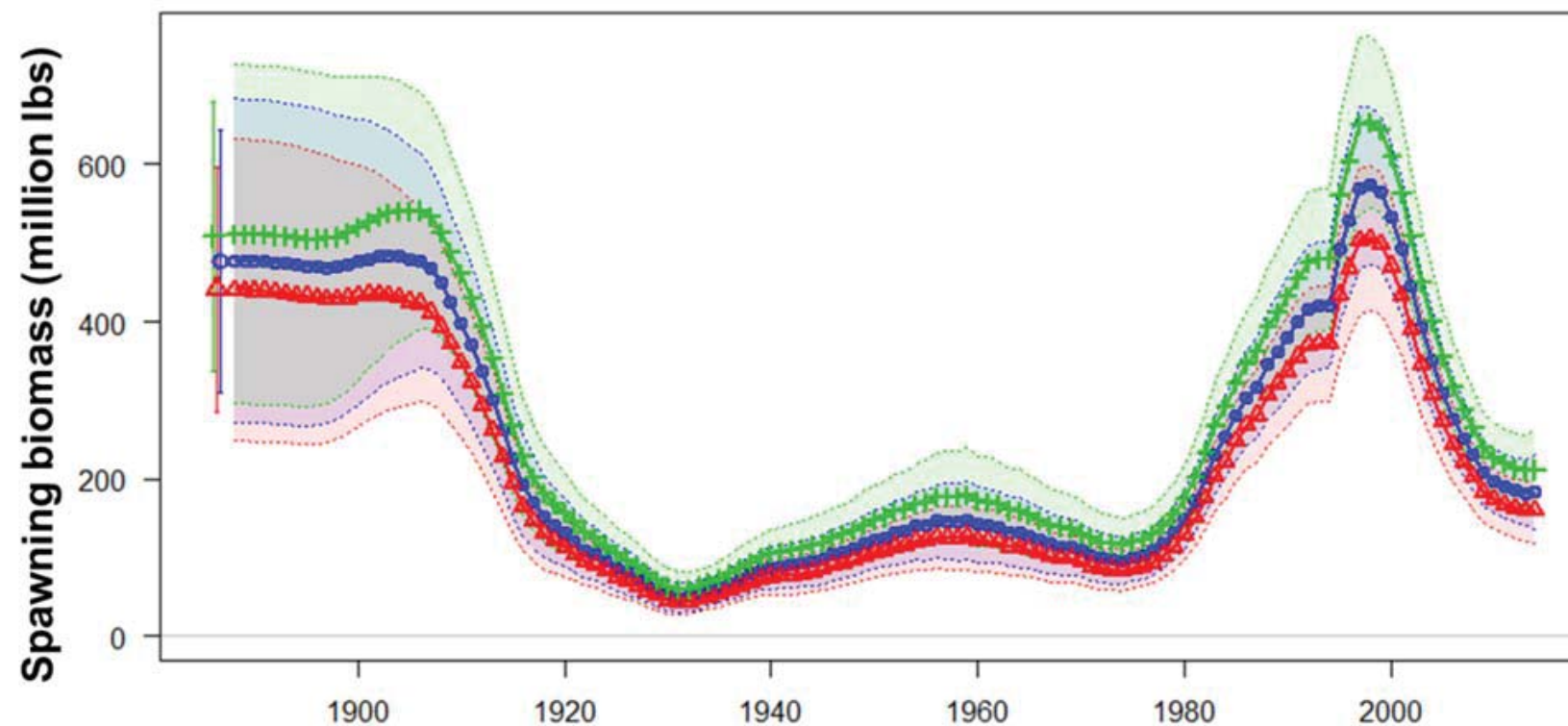
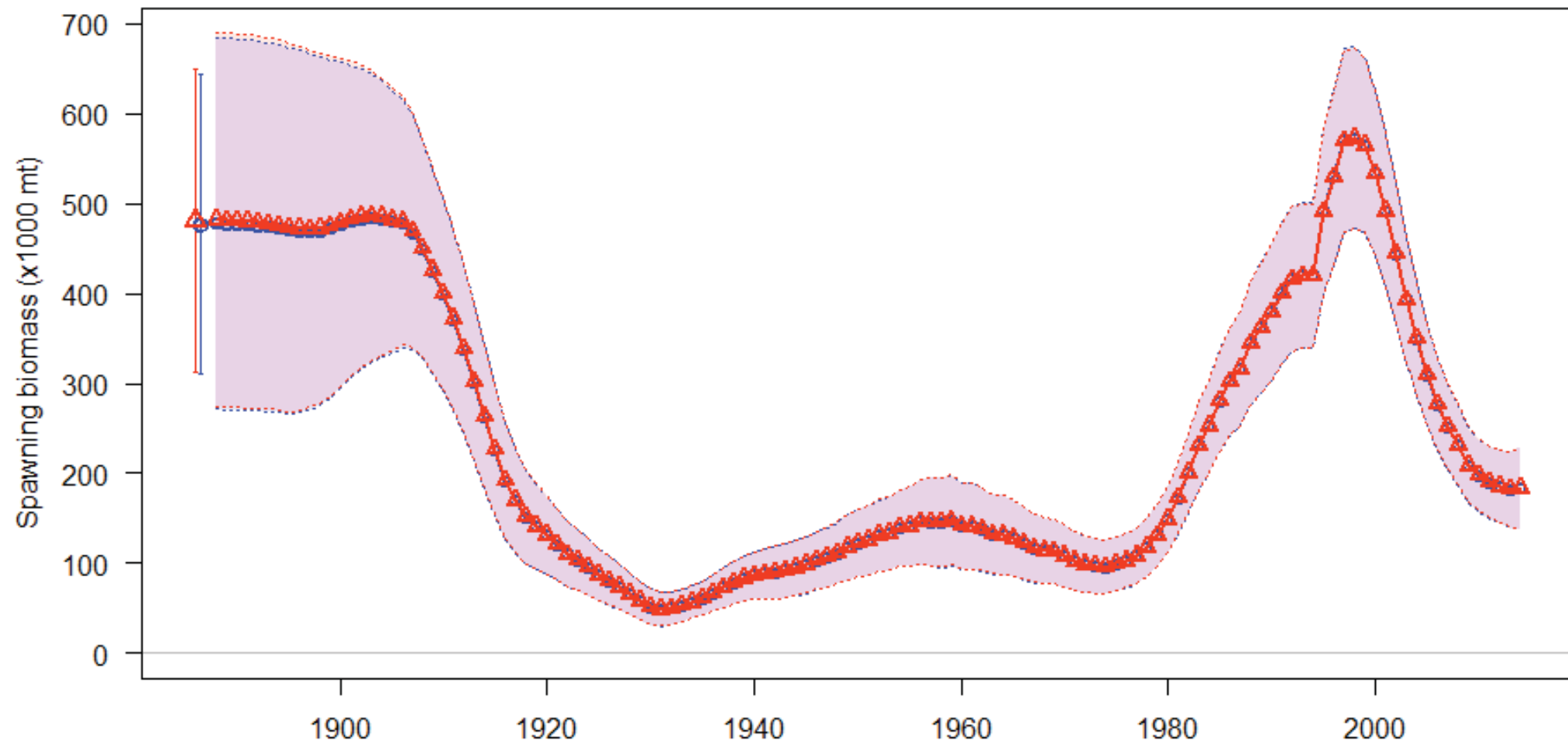


Figure 11. Sensitivity analysis to the assumption regarding relative selectivity of male and female halibut.

E.g., Commercial catch sex-ratio

A  $\pm 10\%$  change in sex ratio of the catch translates into a 50 million pound range of spawning biomass estimates.

# Sensitivity to doubling the wastage in the directed commercial fishery



## Pop Quiz

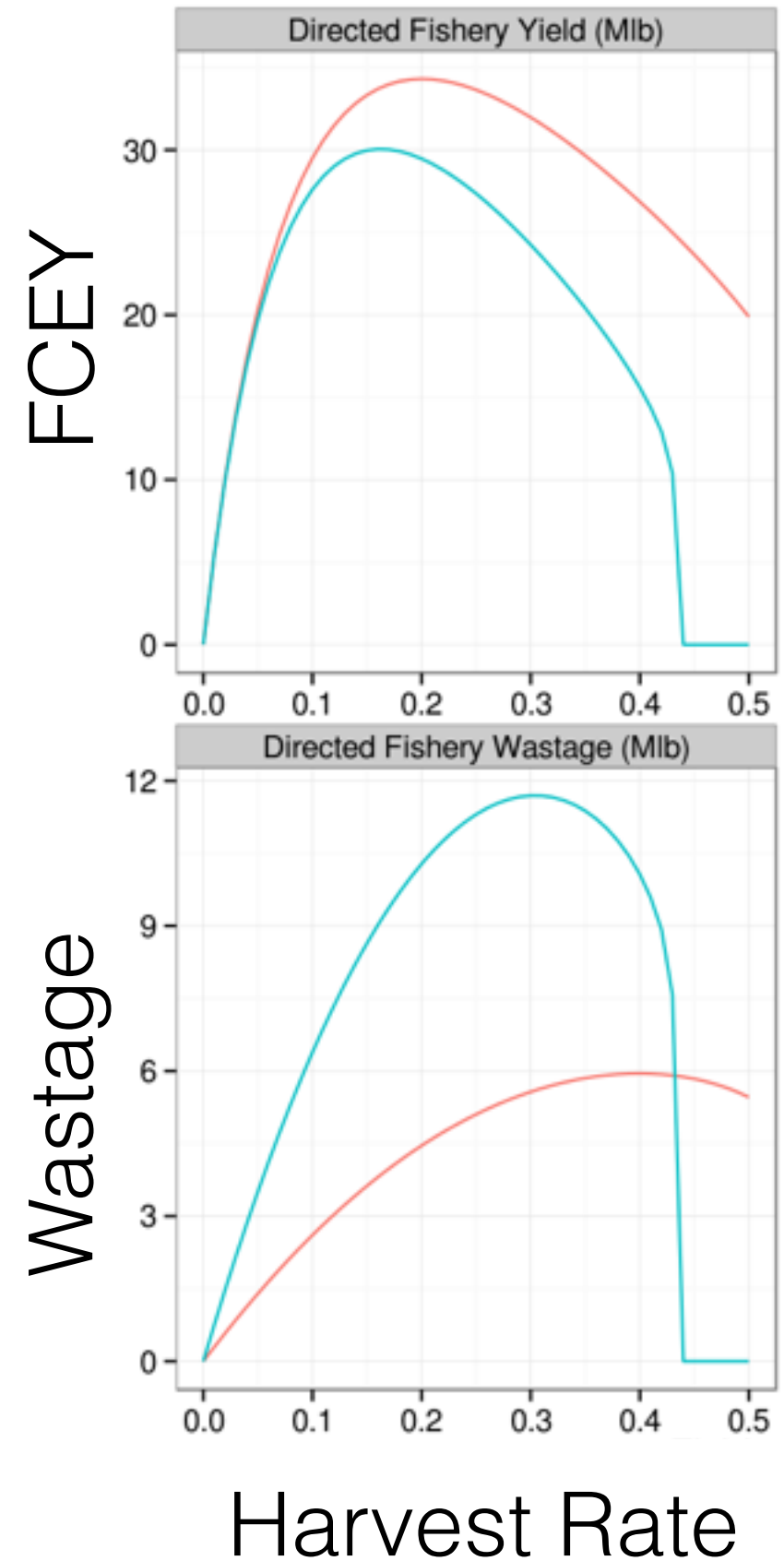
Should we be concerned about the apparent insensitivity of spawning biomass estimates to the doubling of wastage?



# Double wastage

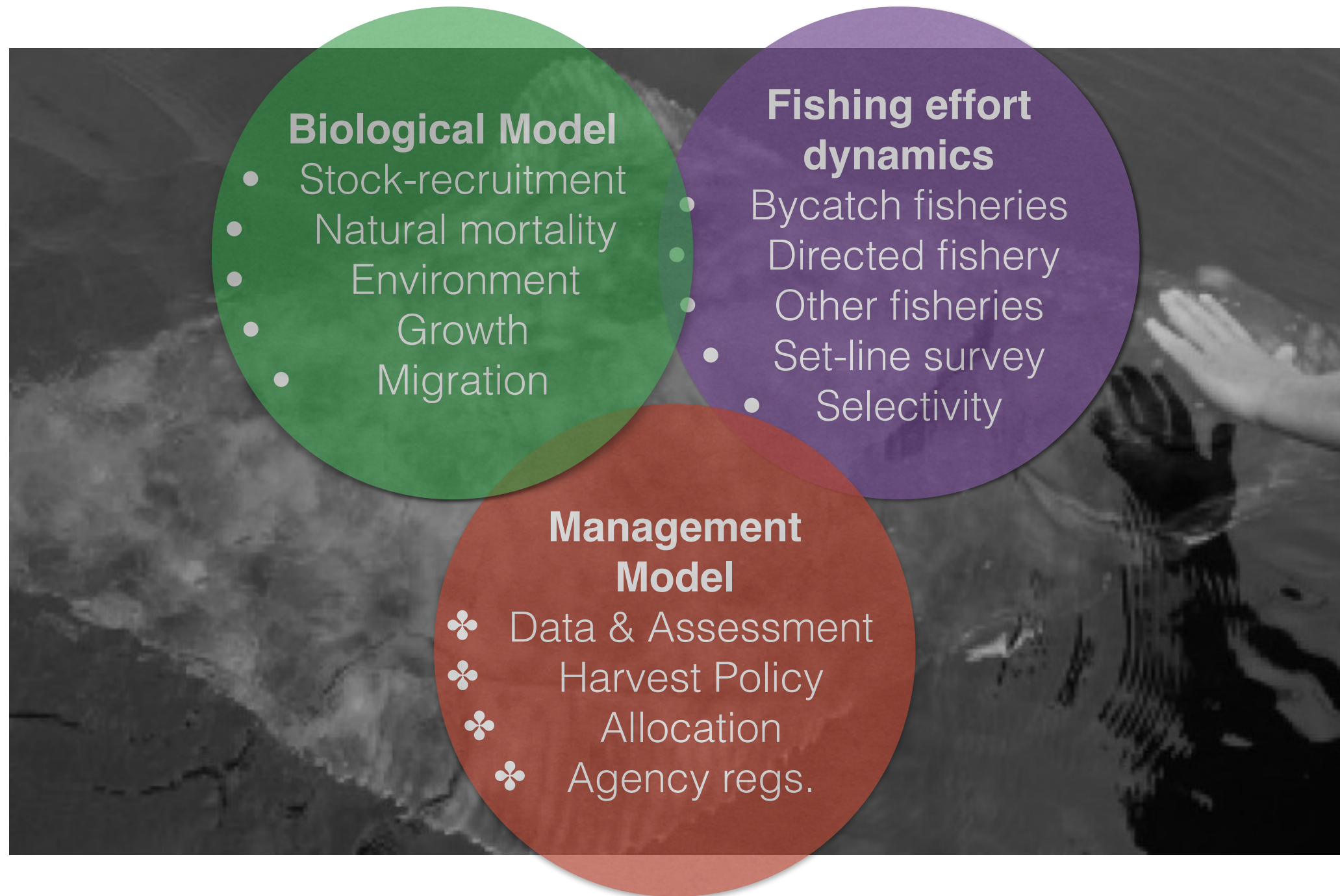
Wastage	Optimum Harvest Rate	TCEY	FCEY
4.5	0.20	46.8	34.3
9.0	0.16	47.1	30.1

Sensitivity of policy parameters to doubling commercial wastage.



# Summary

- The last example highlights some of the counterintuitive challenges between sensitivity in model estimates (spawning biomass) versus sensitivity in policy parameters (optimal harvest rates).
- A key challenge in choosing appropriate scenarios is identifying the contrasting scenarios that fit the data equally well but diverge in policy prescription.
- Tip: Focus on parameters that define the underlying production function (i.e., natural mortality, stock-recruitment, growth) and global scaling (i.e.,  $B_{100\%}$ , average recruitment).



# Model Procedures

Establish a range of operating model procedures.

# PROCEDURES

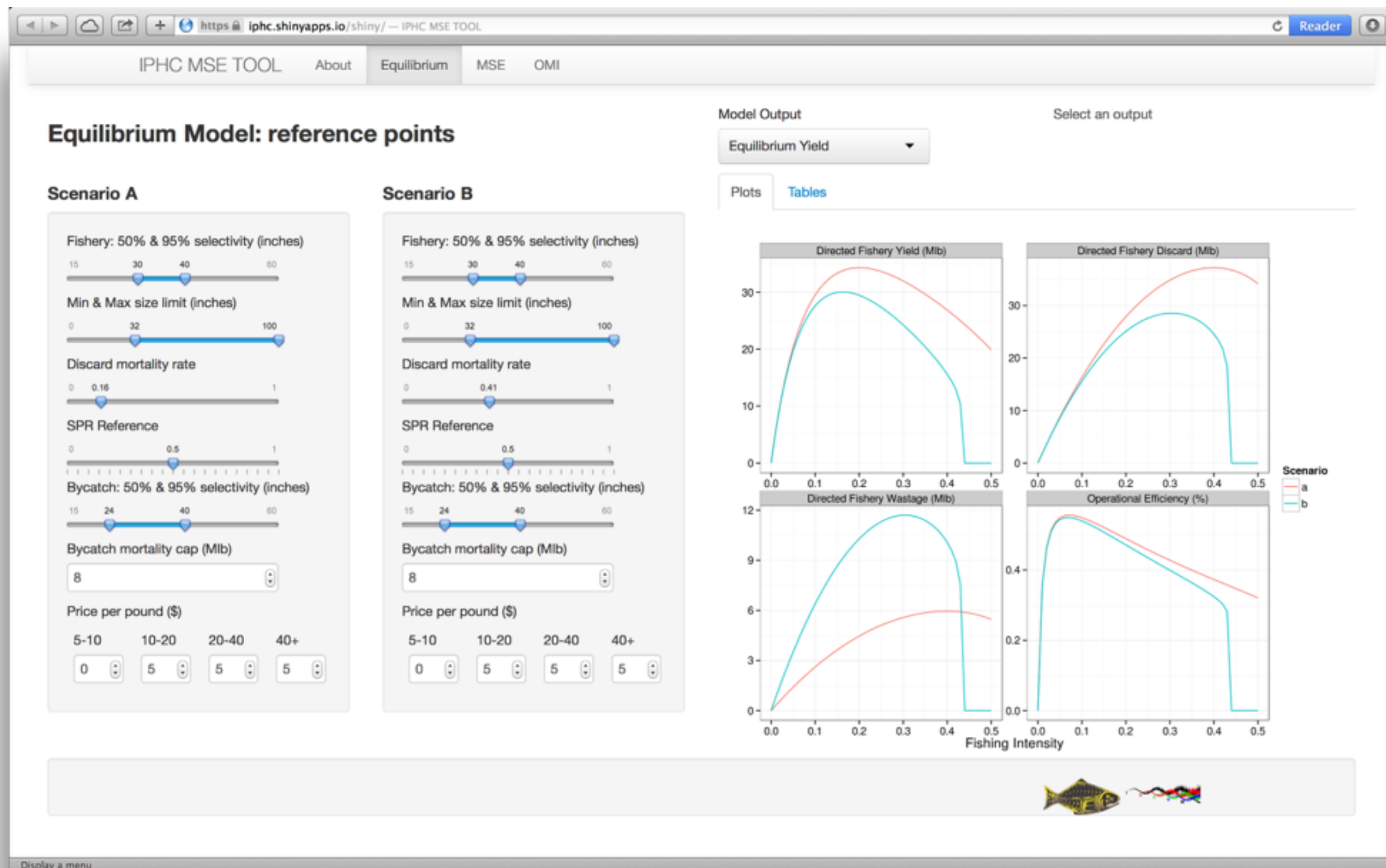
# SCENARIOS

	Things we can manage	Things we cannot manage
Things were certain about	<ul style="list-style-type: none"><li>● Size limits</li><li>● Catch limits</li><li>● Rate of TAC change</li><li>● Allocation among sectors</li><li>● ...</li></ul>	<ul style="list-style-type: none"><li>● PDO - recruitment variation</li><li>● Changes in size-at-age</li><li>● Migration, dispersal</li><li>● ...</li></ul>
Things were uncertain about	<ul style="list-style-type: none"><li>● Bycatch</li><li>● Wastage</li><li>● Discard mortality rates</li><li>● ...</li></ul>	<ul style="list-style-type: none"><li>● Natural mortality</li><li>● Recent recruitment trends</li><li>● Range contraction</li><li>● ...</li></ul>

# Alternative procedures

- There are an infinite number of combinations (regulations, data, assumptions, models) that can be used to construct a management procedure.
- Hierarchical Objectives are key; must initially be defined *a priori*, and used as a screening tool.
- Individual intuition about how the stock/fishery/market may respond to a change in policy.
  - Some have better intuition and some have different objectives (confronting tradeoffs).
- FOCUS ON WHAT CAN BE MANAGED

# Equilibrium tool for exploring candidate procedures



<https://iphc.shinyapps.io/shiny/>

# Discussion on research priorities



# Agenda

Tuesday October 21, 2014

8:00 AM: COFFEE & PASTRIES

8:30 AM: Recap from previous day, questions & discussion.

9:00 AM: Long-term vs short-term objectives (equilibrium vs. dynamic models).

10:00 AM: BREAK

10:15 AM: Developments on status quo versus perfect information.

11:00 AM: Allan Hicks on MSE process for Pacific hake.

12:00 PM: LUNCH

1:00 PM: MSE laundry list (priorities and objectives for the MSE process).

2:00 PM: Selection of MSAB Chairs and Co-chairs & procedures for reporting to the Commission at Interim and Annual meetings.

2:30 PM: Discussion & feedback, and closing remarks.

3:15 PM: ADJOURN

# Recap

- Current status of the Operating Model.
  - Model Scenarios – span the range of uncertainty in policy parameters.
  - Management Procedures – components that can be controlled. “Should we trust our intuition?”
- Research priorities: the MSE process is being quoted as tool for addressing a large number of uncertainties and harvest policy scenarios.
  - We need to start a list, and rank the priorities.

# Long-term vs Short-term

- The equilibrium model is a convenient tool for exploring long-term consequences of alternative policy options.
  - Fast, with immediate feedback.
- Short-term we need to use a dynamic model to explore the transitional phase of status quo versus proposed changes in the management procedures.
  - Slow, (can take months–years for feedback).

# Developments on Status quo versus perfect information

- There are no new developments
- Priority has been to try and integrate the models used in the MSE process into the ensemble models used in our assessments.
- Creates the necessary linkage between IPHC assessments and harvest policy development.

MSE process for Pacific Hake

Allan Hicks (NWFSC NOAA)

# MSE Laundry List

- Priorities & Objectives for the MSE process.

# Short-term priorities

Ranked list of short-term research priorities for the MSE Process

# Long-term priorities

Ranked list of long-term research priorities for the  
MSE Process