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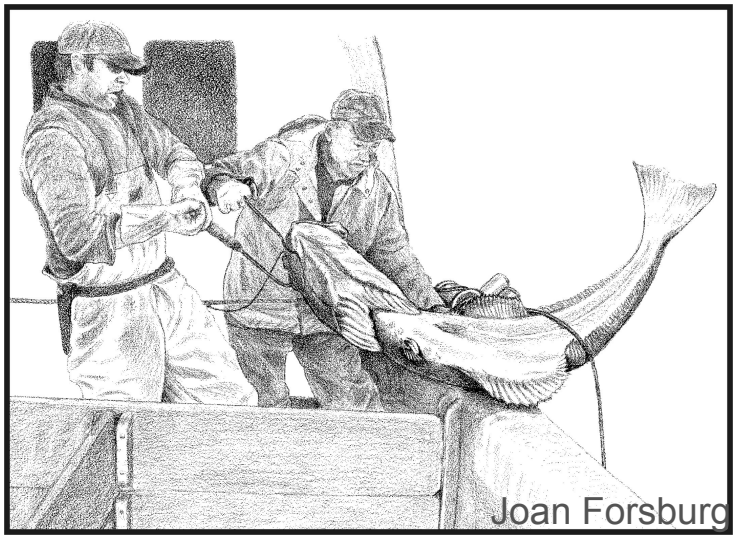
International Pacific Halibut Commission

Management Strategy Evaluation Process

Pacific halibut management

- Treaty with Canada (1923), not under U.S. Federal fisheries regulation
- No overfishing/overfished levels defined
- Current harvest policy was designed for stock conservation and fisheries stability, but not specifically MSY



Bridge from assessment to MSE

Uncertainty in how the world works integrated into probability distributions for metrics useful to management.

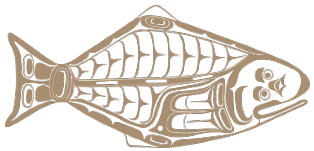
Decision table/risk-assessment:

short-term tactical metrics

- predicting outcomes of specific decisions

MSE: long-term strategic metrics

- tuning inputs of a decision-making approach



Motivation

- Changes in the biology and distribution of the stock (and therefore catch)
- Changes in the stock assessment
- Changes in the harvest policy
- Changes in the management process

→Not everyone's objectives are being met

(and we don't know if they can be)

MSE background

- This is primarily the work of Steve Martell!

Management Strategy Advisory Board

Goals:

- Lead a stakeholder driven process for designing and testing alternative management procedures
- Educate peers on the MSE process
- Provide a forum for direct communication between fishermen, processors, managers and decision-makers

Three years and four meetings

- I: Introduction to the process of MSE
- II: Demonstration closed-loop simulation & how MSE can inform harvest policy
- III: Technical elements of MSE (multiple moving parts)
- IV: Testing intuition (designing management procedures).

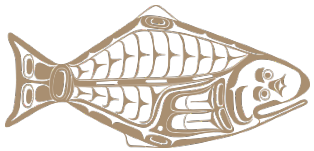
Initial efforts

- Define and rank *operational objectives* for the Pacific halibut fishery.

- Identify the *performance metrics* for evaluating alternative management procedures.

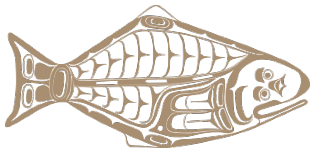
General objectives

- Biological sustainability – stock conservation
- Fisheries sustainability – harvest minimum and acceptable variability
- Assurance of access – minimize probability of fisheries closures
- Minimize bycatch and discard mortality
- Serve consumer needs



Refining objectives

- What do you specifically want?
- How badly do you want it?
- When do you want it



Refining objectives

- E.g., Biological sustainability:

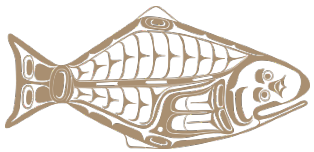
1. Maintain a minimum number of mature female halibut coast-wide (level to be determined) in each year with a probability of 99 in 100.
2. Maintain a minimum female spawning stock biomass above 20% of the unfished biomass in each year in 95 out of 100 (spawning biomass limit).
3. Maintain a minimum female spawning stock biomass above 30% of the unfished biomass in each year in 75 out of 100 (spawning biomass threshold).

What to worry about?

CAN manage	CANNOT manage
Size limits Catch limits Allocations Bycatch Discard mortality ...	Natural mortality Recruitment trends Environmental variation Changes in biology Movement among areas ...

These are parts of **procedures**.

These are **scenarios** included in the operating models.



Too many moving parts

- Initial frustration in identifying which scenarios and procedures were most important

- Needed a tool to:
  - Rapidly screen many ideas prior to full MSE
  - Allow stakeholders to create and test procedures

Shiny: exploring candidate procedures

Equilibrium Model: reference points

Scenario A

Fishery: 50% & 95% selectivity (inches)

15 30 40 60

Min & Max size limit (inches)

0 32 100

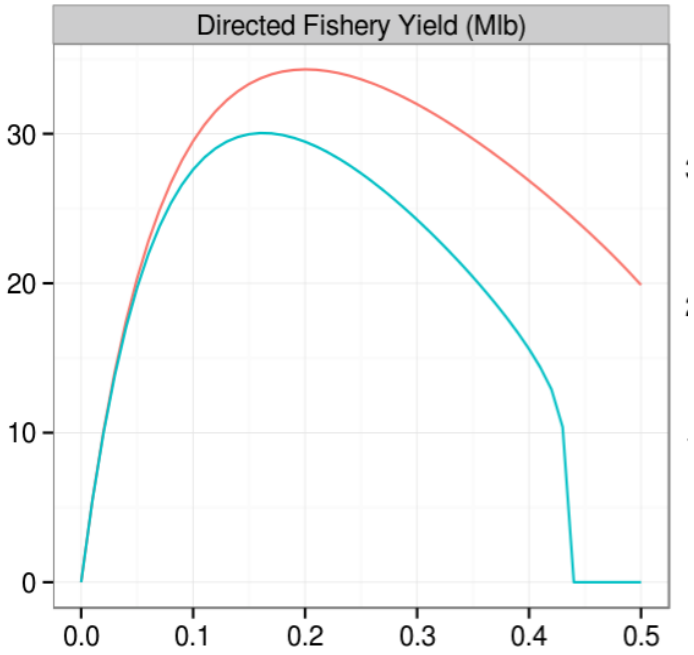
Scenario B

Fishery: 50% & 95% selectivity (inches)

15 30 40 60

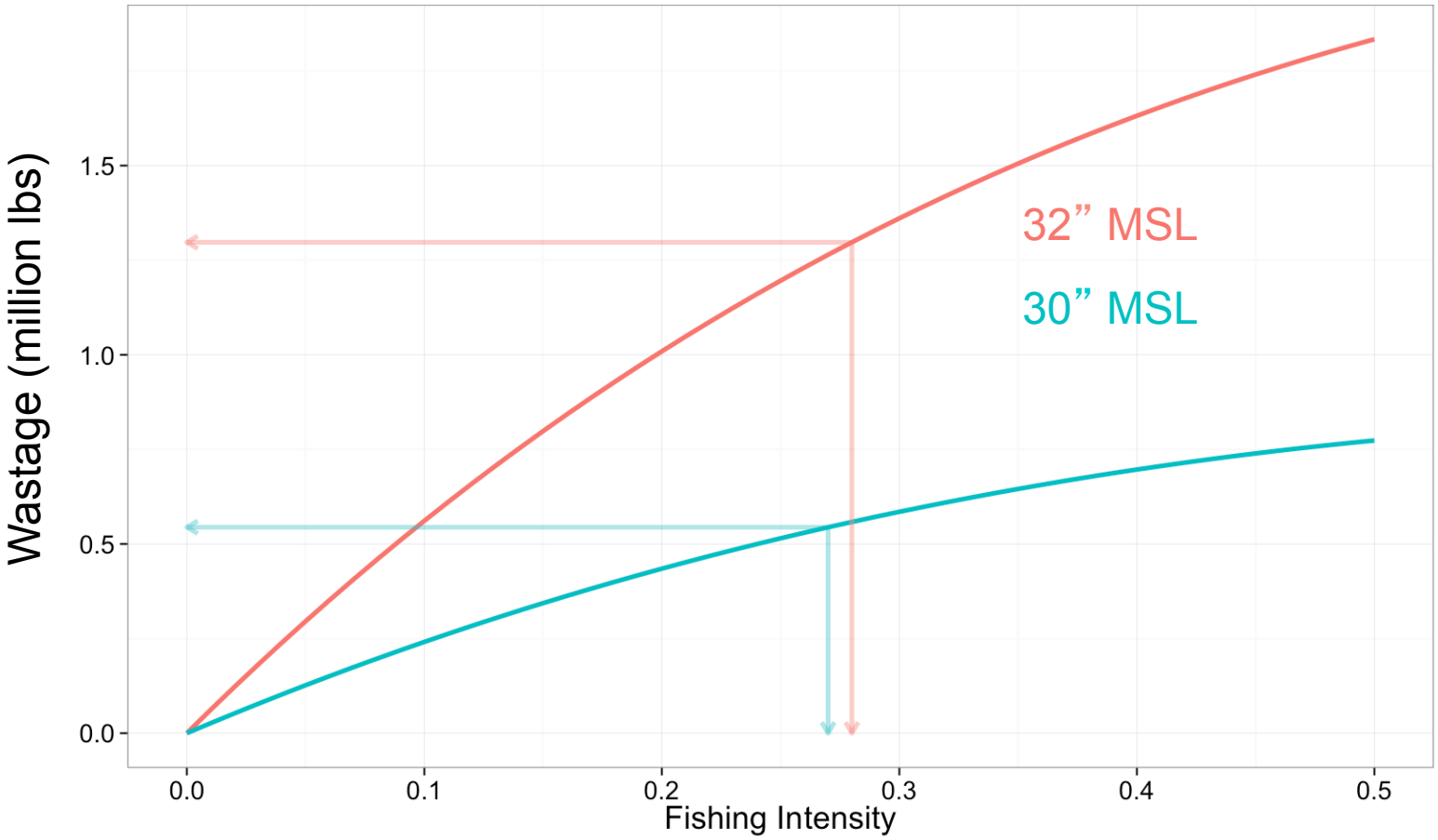
Min & Max size limit (inches)

0 32 100



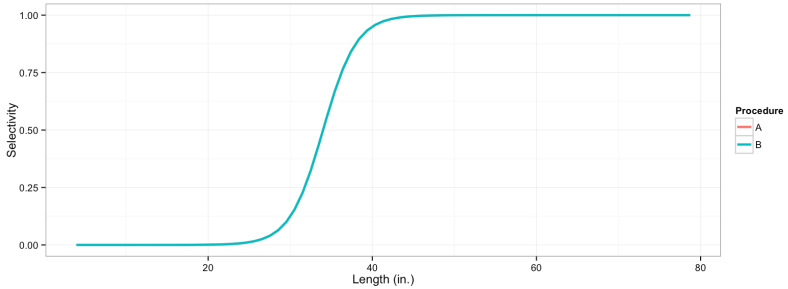
https://iphc.shinyapps.io/MSAB/

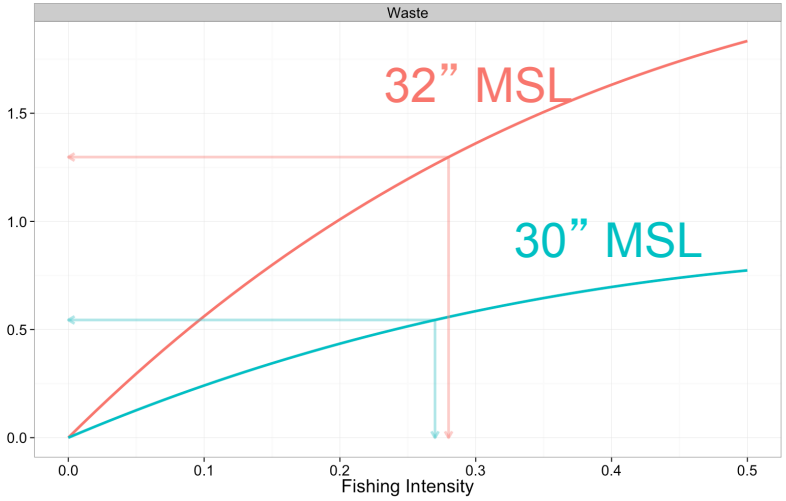
Minimum size-limits and discard mortality



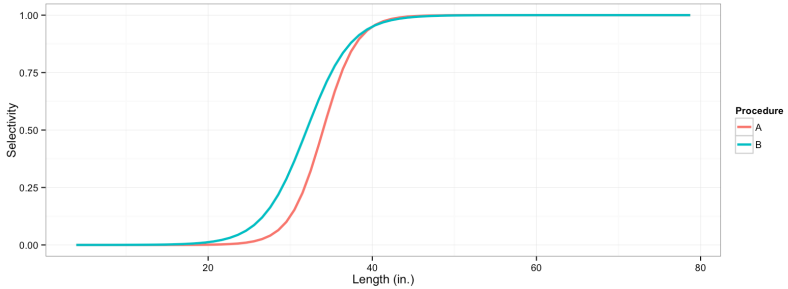
Size-limits and selectivity

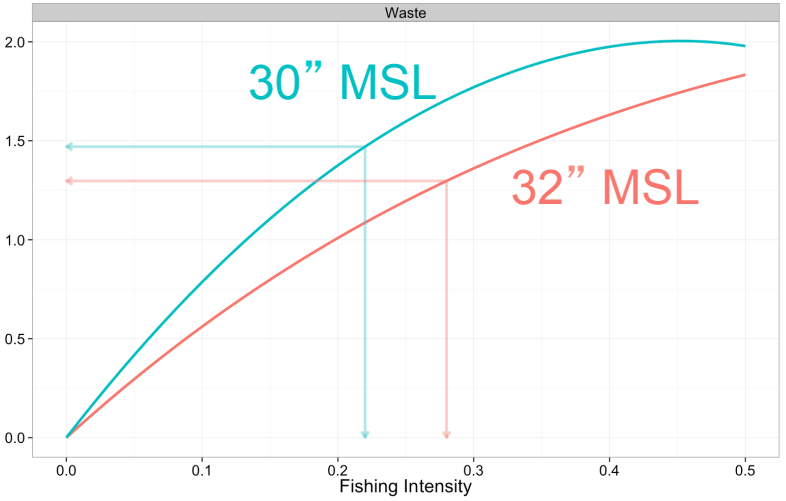
Selectivity remains unchanged





Selectivity shifts 2” smaller



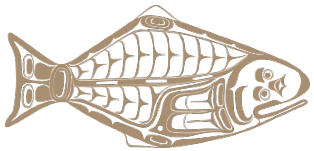
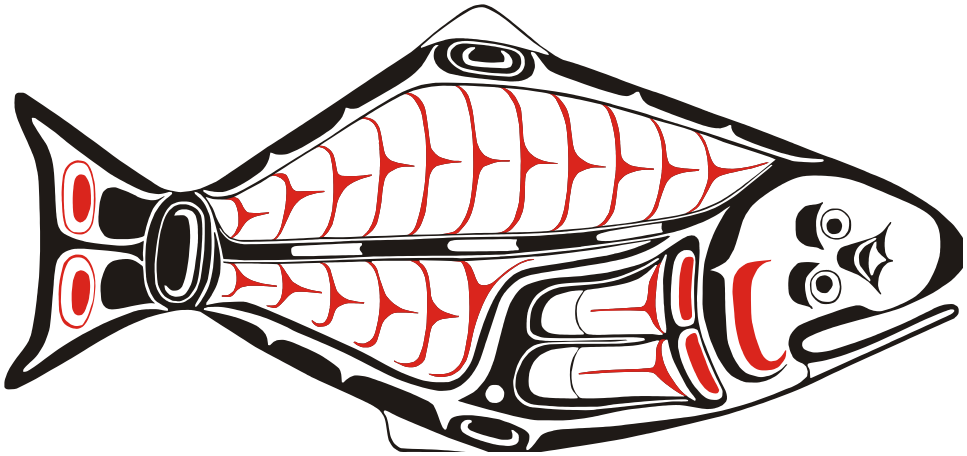
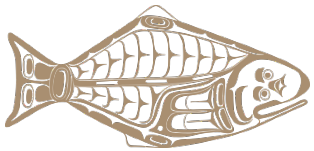


Other general examples (scenarios)

- Incorrect catch estimates
- Environmental effects on recruitment

→ These matter!

Now toward the full MSE

- Most of our objectives are spatial
  - Requires very complex operating models
  - This is slow going

- But,
  - Specific objectives and metrics are on the table
  - Stakeholders beginning to take ownership of the process