An Introduction to Management Strategy Evaluation

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Science. Education. Community.

Management Strategy Evaluation

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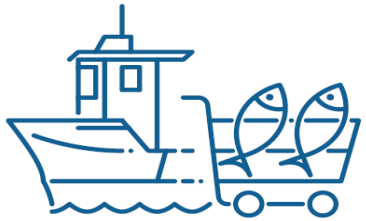
MSE is a **participatory** decision-making process that involves **scenario testing** as a means of identifying a fisheries management strategy that achieves desired outcomes for the fishery.



Models + People ► Inform Management

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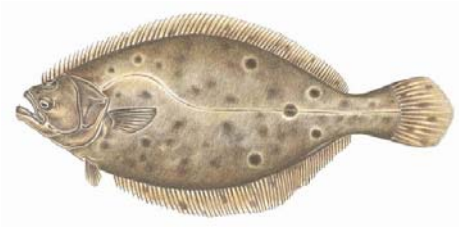
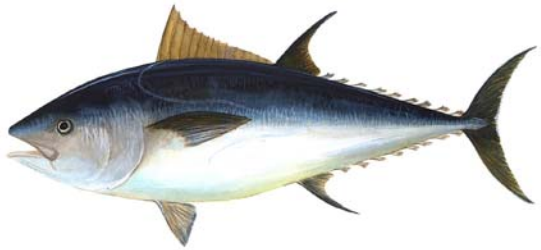
- The application of MSE to understand the performance of fisheries management is on the increase.

- Developing a shared understanding of MSE will support future MSE applications in the region and enable stakeholders to effectively engage in shaping the vision for their future fishery.

Potential Benefits of MSE

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- Testing management before implementing changes “on the water”.
- Addressing management performance in the face of uncertainty.
- Increased stakeholder involvement and improved transparency in process.
- Transition away from ad hoc decision-making.
- Increase likelihood of achieving fishery management objectives.

Roles in an MSE Process

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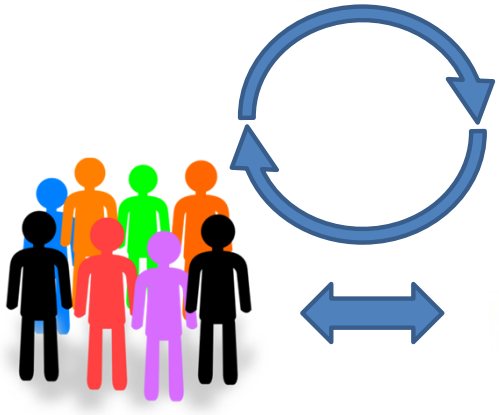

Stakeholders and managers ID desired outcomes for the fishery.

Scientists create a virtual reality (simulation) of the system.

Stakeholders and managers review results.

Managers implement an action.

Management Strategy Evaluation is intended to be an iterative process that involves dialogue between scientists, managers, and stakeholders.

J. Deroba

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Stakeholder Participation in Management Strategy Evaluation

Opportunities for Stakeholder Participation

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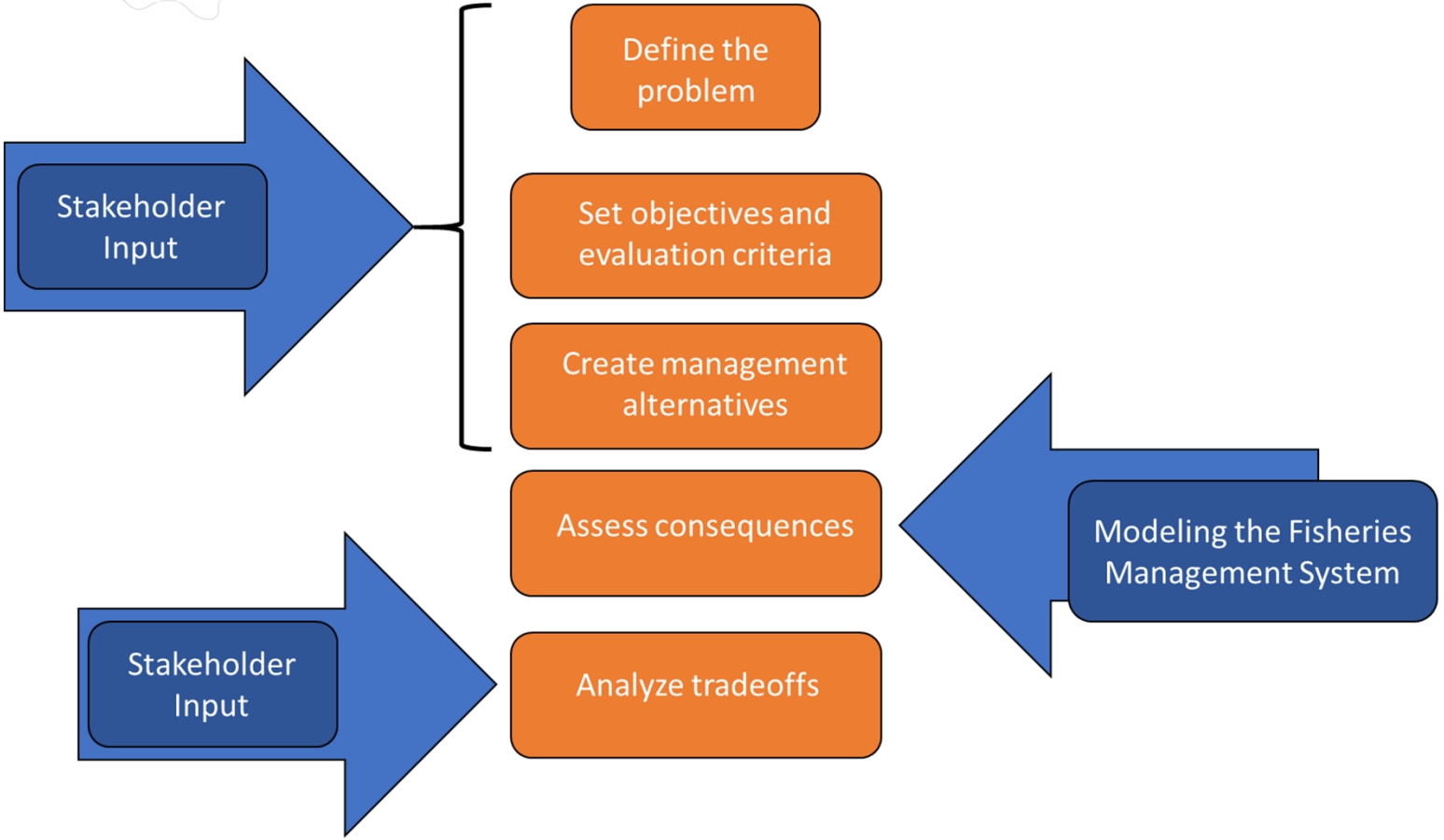

Types of Stakeholder Processes

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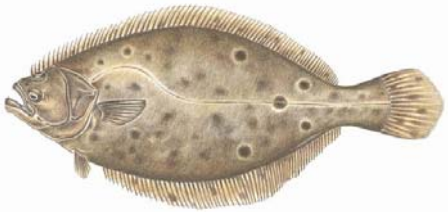
- Open meetings with broad representation of stakeholders.
- Scientist-manager working groups.
- Select small group of representative stakeholders.



What to Expect as a Participant

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- MSE offers an opportunity to express input and help define what management ought to achieve, BEFORE analysis and decisions are made
- You will be explicitly asked what you value.
- Your input on simulation features and management actions can inform design elements of the model.
- You will be asked for management approaches that would achieve “success”.
- Answers are not binding; they are a starting point to identify management actions that may achieve your wish list.

Management Objectives

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Some objectives are legally mandated

Some objectives are fishery specific....

Management Objectives
Achieve optimum yield.
Ensure sustainability of stocks
Prevent overfishing.
Achieve catch stability
Conserve spatial population structure.
Maximize economic performance.

Examples of Objectives in MSE Processes

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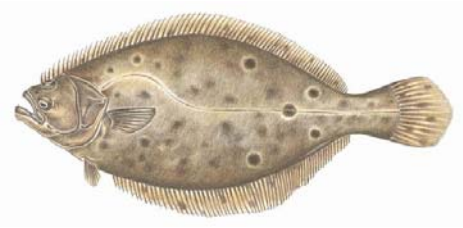
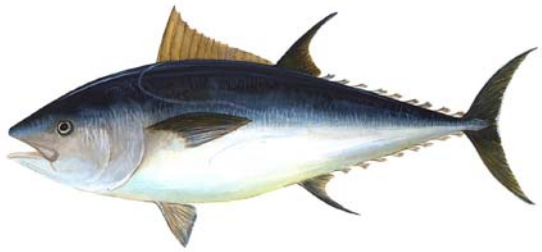
- **NEFMC Atlantic herring**: Identified a harvest control rules for Atlantic herring that accounts for the role of herring as forage (ecosystem considerations).

- **MAFMC Summer Flounder**: Identify management strategies designed to minimize discards in the recreational summer flounder fishery.



- **ICCAT Bluefin Tuna**: Identify harvest control rules that will maintain populations at levels that will support maximum sustainable catch.



Goal of Today

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- Use a simplified model to understand some of the concepts of MSE.
- Experience providing input on objectives (your values/what you want)
  - e.g., I don't want yo-yo in quotas from year to year (fundamental objective)
  - e.g., I want stable catch over time (quantifiable objective)
- Experience providing input on harvest strategies.
  - Interpret performance of alternative management actions.
- Experience providing Input on tradeoffs
  - What tradeoffs or compromises are you willing to make to achieve success?

Taking on a Persona

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Captain Cod

A commercial fisherman who owns and operates an inshore vessel landing diverse, low-volume catches

Priorites

- Consistent access to high-value stocks
- Flexibility in target species

Concerns

- Trip costs
- Crew salaries
- Vessel maintenance costs
- Quota restrictions and prices
- Choke stocks
- Short- and long-term business planning

Goals

- Reduce variability in TAC
- Stock assessments reflect what I see on the water
- Lease prices reflect market value of fish

Dr. Fish

Council staffer who coordinates with NMFS and industry stakeholders to develop policy and regulatory options.

Priorities

- Fishing occurs at sustainable levels
- Seafood supply is sustained and protected
- Healthy ecosystems
- Access to fisheries is preserved for all

Concerns

- Overfishing
- Low recruitment
- Decline of the commercial fishing fleet

Goals

- Stocks are not overfished
- Fishing economy is sustained

Captain Hook

A for-hire charter captain who brings clients to Stellwagen Bank and Jeffreys Ledge.

Priorities

- Clients catch large, healthy fish and leave happy
- Access to Stellwagen Bank and Jeffreys Ledge

Concerns

- Trip costs
- Crew salaries
- Vessel maintenance costs
- Seasonal business strategy
- Size and possession limits
- Clients return annually

Goals

- Recreational anglers keep access to the stock
- Size and possession limits stay high
- Target species are abundant and fish are large

Mr. Blue

An environmentalist who supports commercial fishing but is concerned about its impacts on habitats, forage fish, and endangered species.

Priorities

- Healthy ecosystems
- Abundant fish populations
- Reduced waste
- Accurate reporting

Concerns

- Overfishing
- Low recruitment
- Fishing impacts on protected species

Goals

- Stocks are not overfished
- Fish populations grow
- Fish health increases
- Impacts to other species are reduced

Objectives

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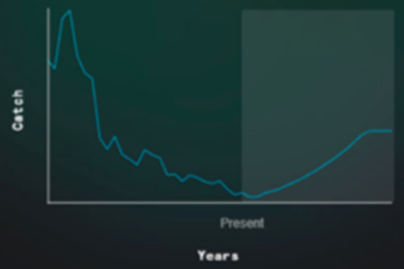
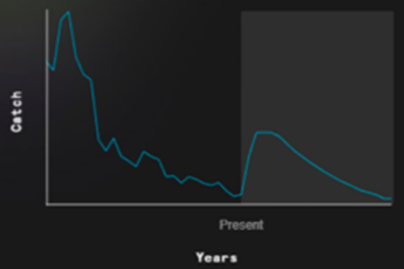
Maximize Long-Term Catch

This objective seeks to achieve the maximum sustainable yield (MSY) over the next 10 years. One trade-off is that short-term catch could be lower



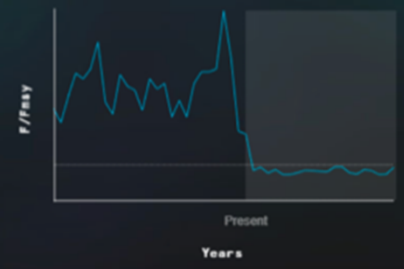
Maximize Short-Term Catch

This objective sets a high catch limit in the short-term but may come at the expense of fishery health and long-term catch.



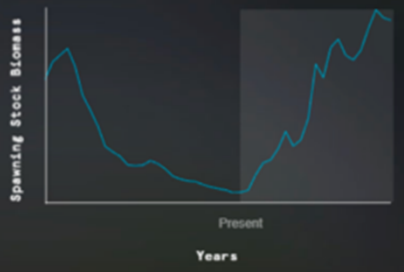
Avoid Overfishing

This objective sets quotas conservatively to provide a large uncertainty buffer for the stock assessment, but it comes with the potential for underfishing.



Rebuild the Fishery Stock

This objective seeks to maximize the long-term viability of the fishery, but it may come at the expense of short-term catch objectives.



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Role of Models in Management Strategy Evaluation

Scenario Testing Framework: Operating Models

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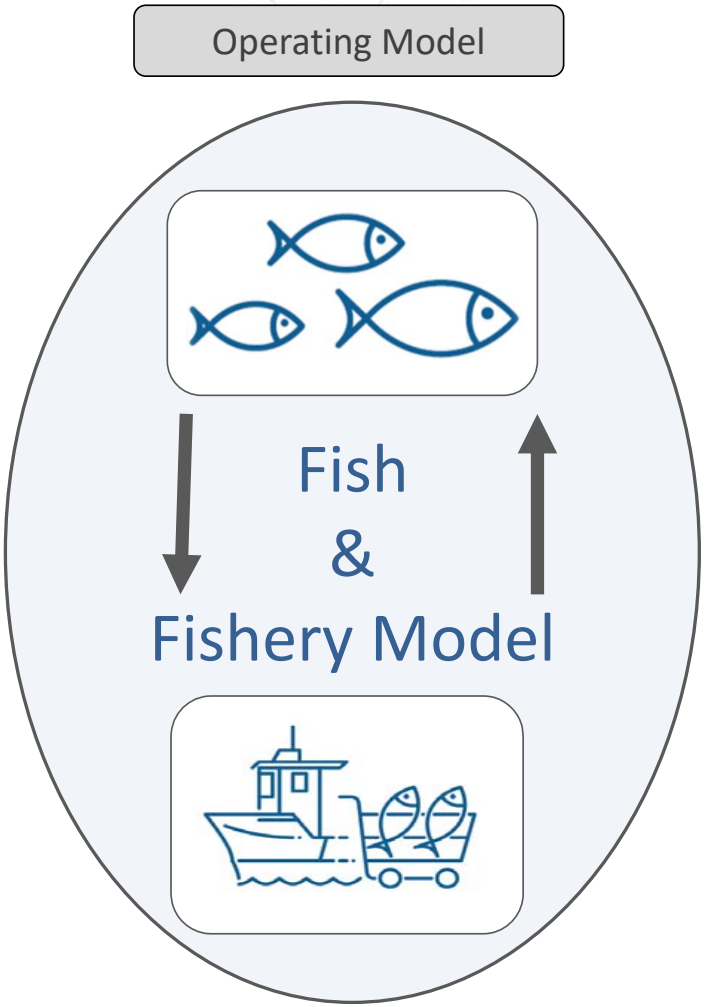

Operating models simulate the “TRUE” fish and fishery dynamics.

Scenario Testing Framework: Observation Models

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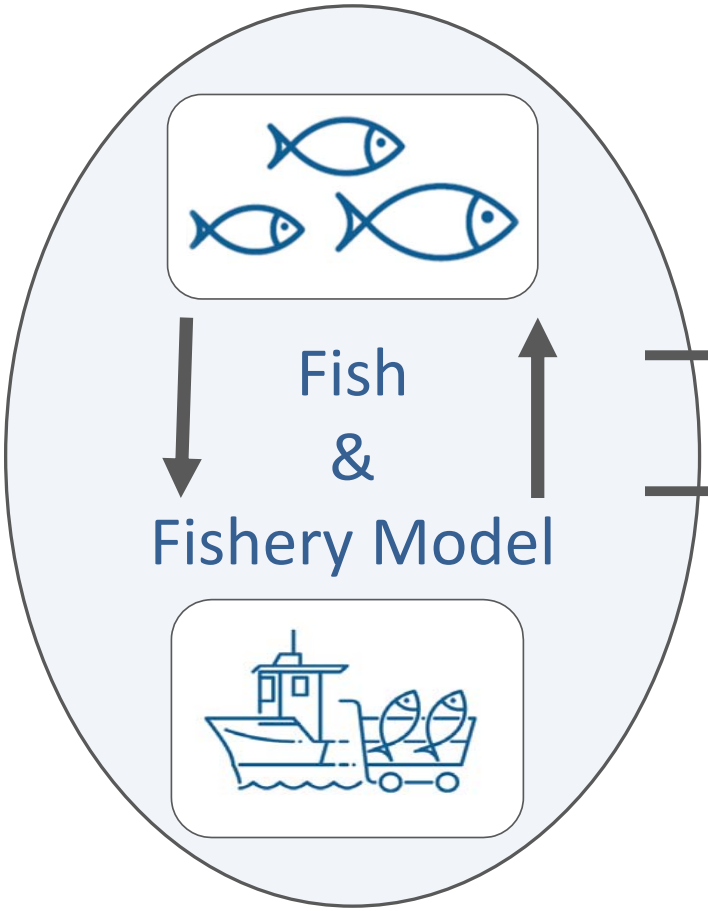
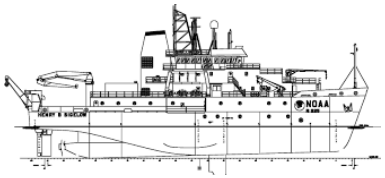
Operating Model

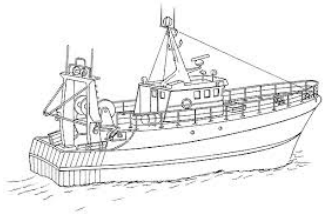
Management Procedure





Survey: index of fish abundance

Fishery data: catch information



Operating Model(s) are used to generate data with the characteristics of our survey and fishery data collection.

Scenario Testing Framework: Stock Assessment

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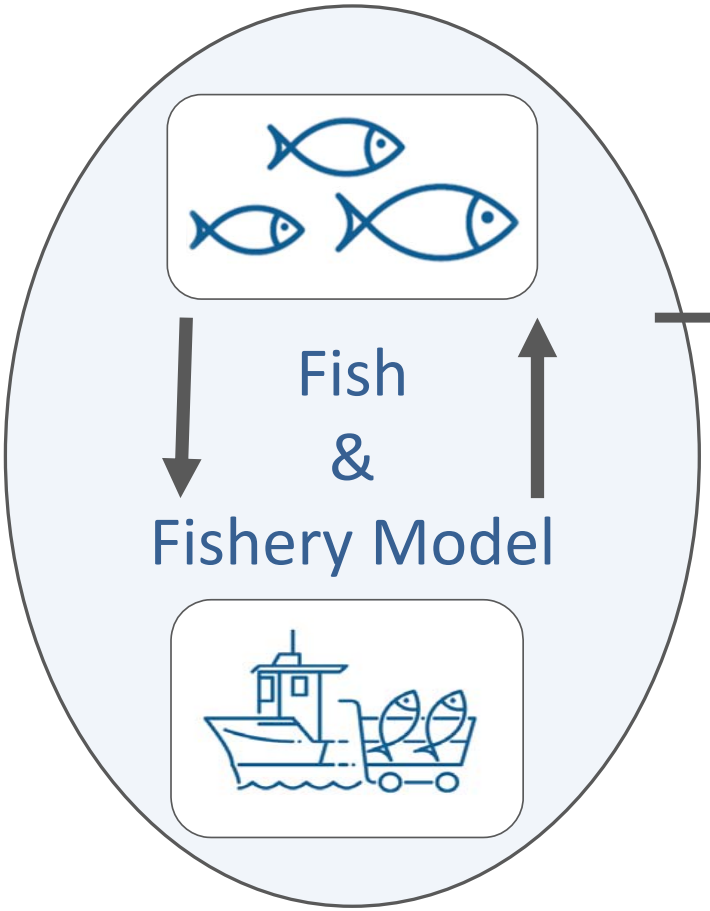
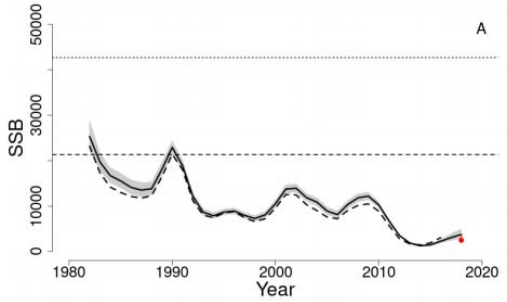
Operating Model

Management Procedure



Survey and Fishery Data

Survey and fishery data are used to inform a stock assessment that estimates stock biomass and fishing mortality.



Scenario Testing Framework: Reference Points

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Operating Model

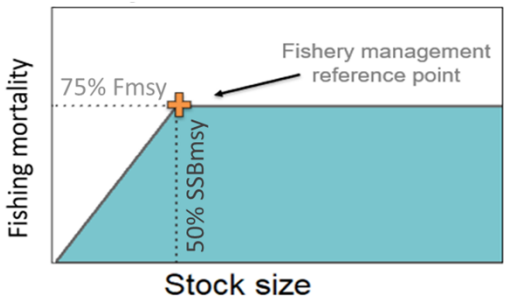
Management Procedure

Fish & Fishery Model

Survey and Fishery Data

Stock Assessment

Comparison to reference levels



Harvest Control Rule

Scenario Testing Framework: Harvest Control Rules

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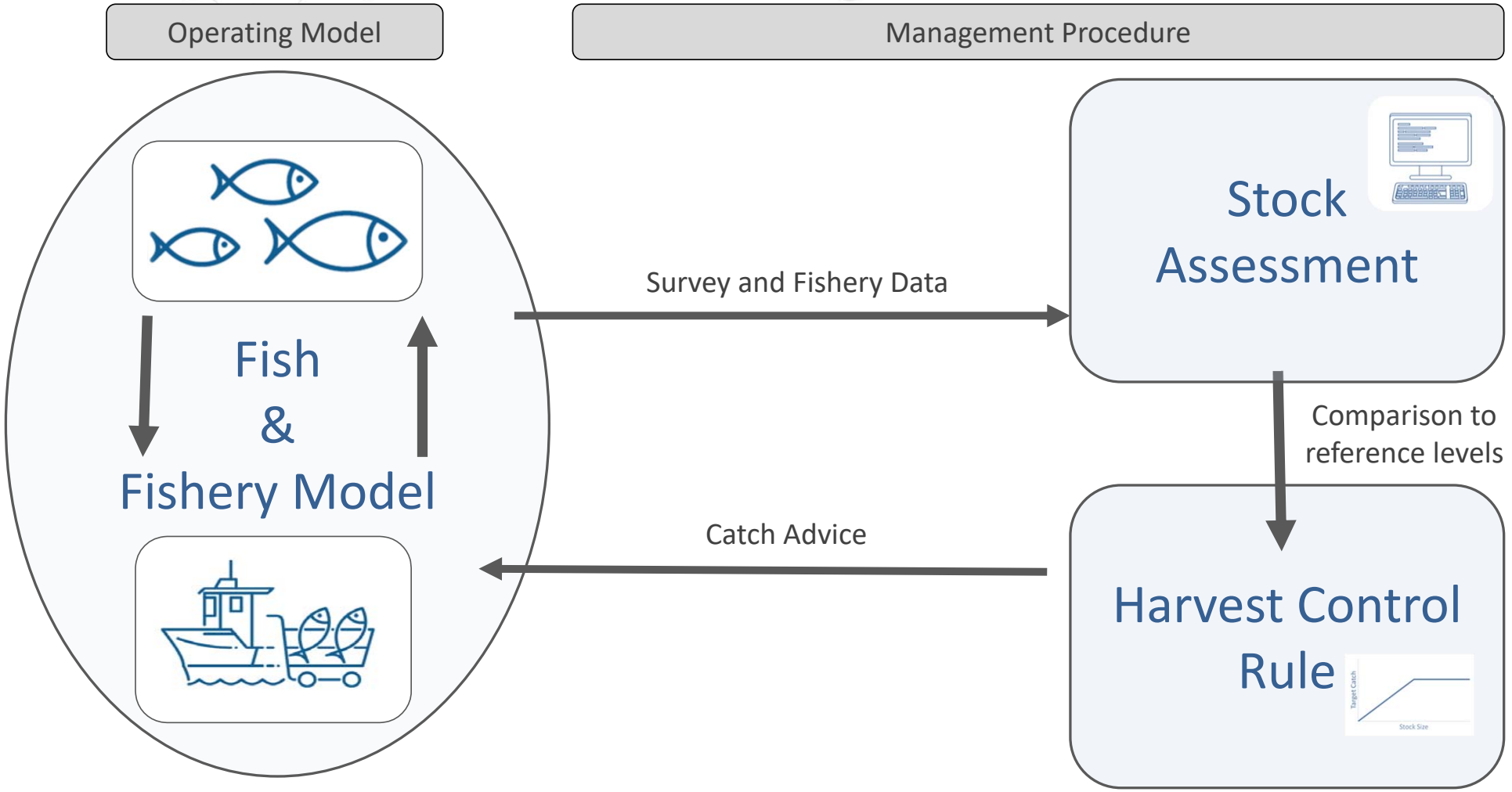

Harvest Control Rules

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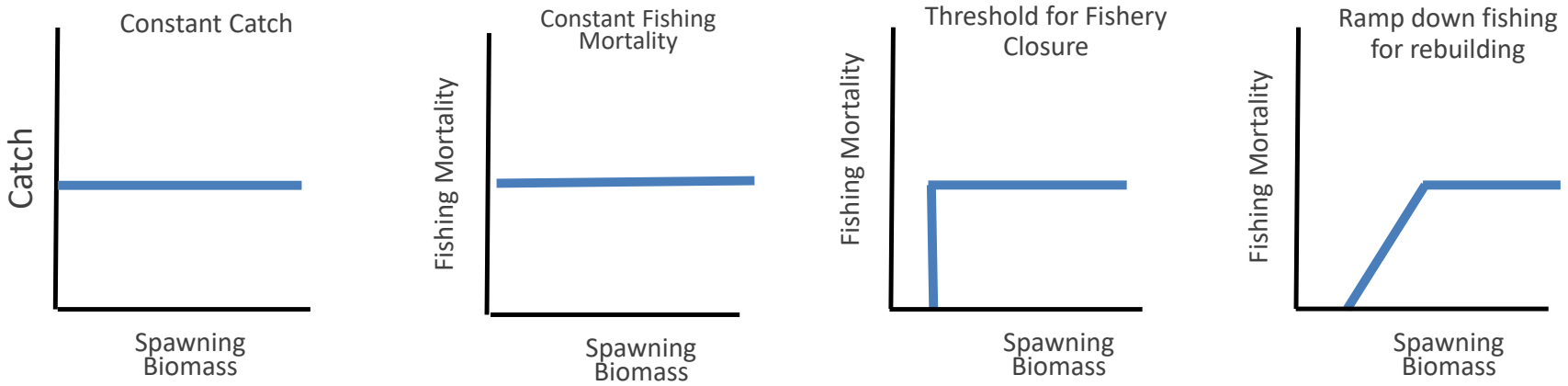
In general…

Stock Status ↑ Catch ↑

Stock Status ↓ Catch ↓

To get more specific…

Harvest control rules provide guidelines that determine how much fishing can take place.



Example of a Harvest Control Rule In Action

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Stock Assessment

Alternative Harvest control rules

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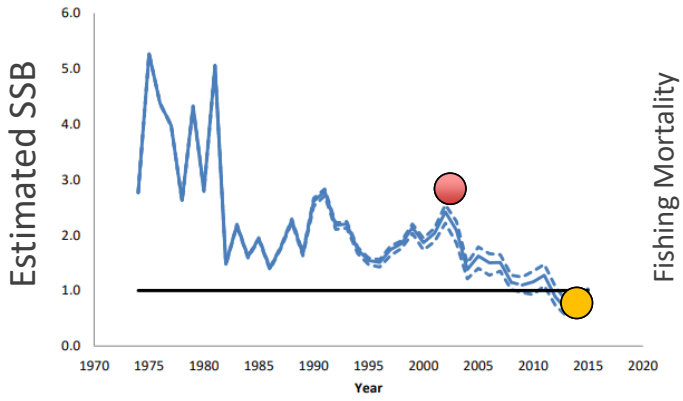
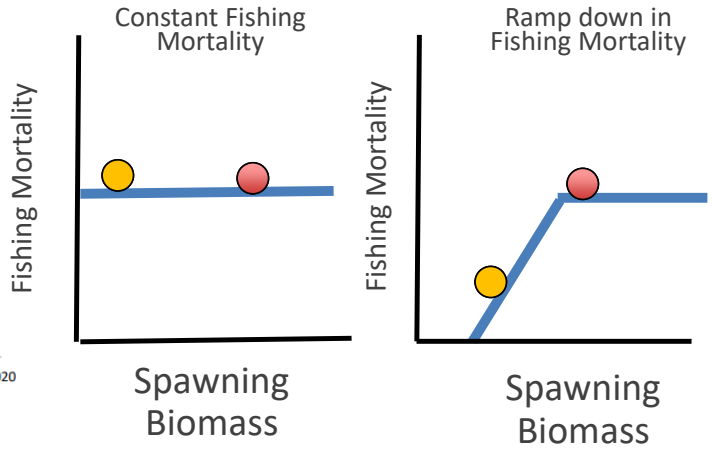
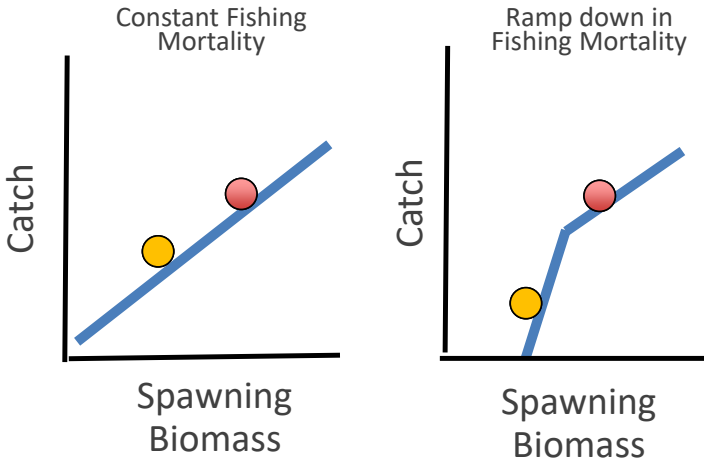
Total allowable catch







Measuring Performance

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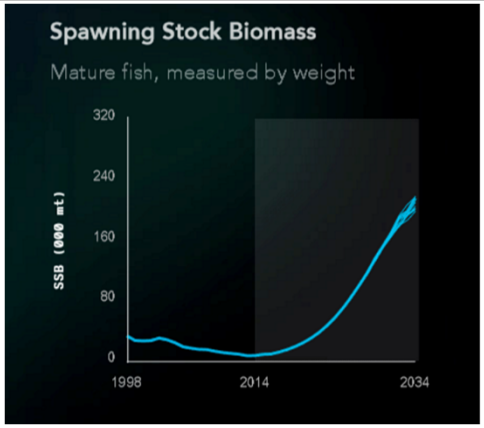
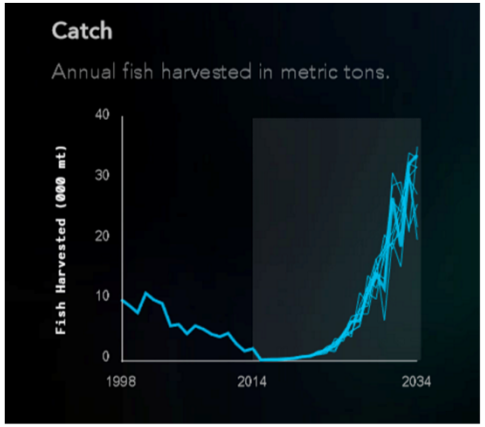
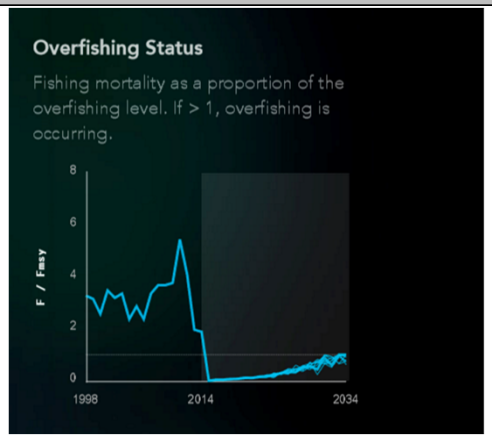
What happens to biomass over time?



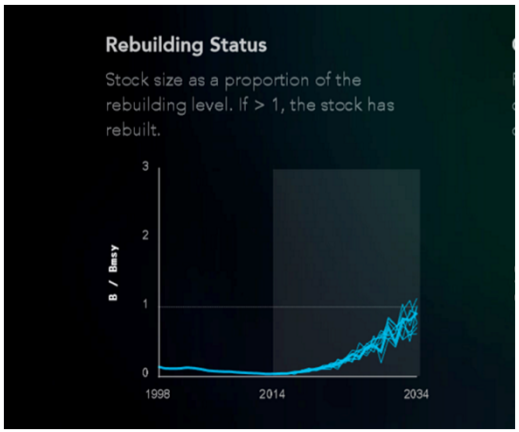
What happens to catch over time?



How often is overfishing occurring ?



How long will it take to rebuild?



Evaluating Tradeoffs

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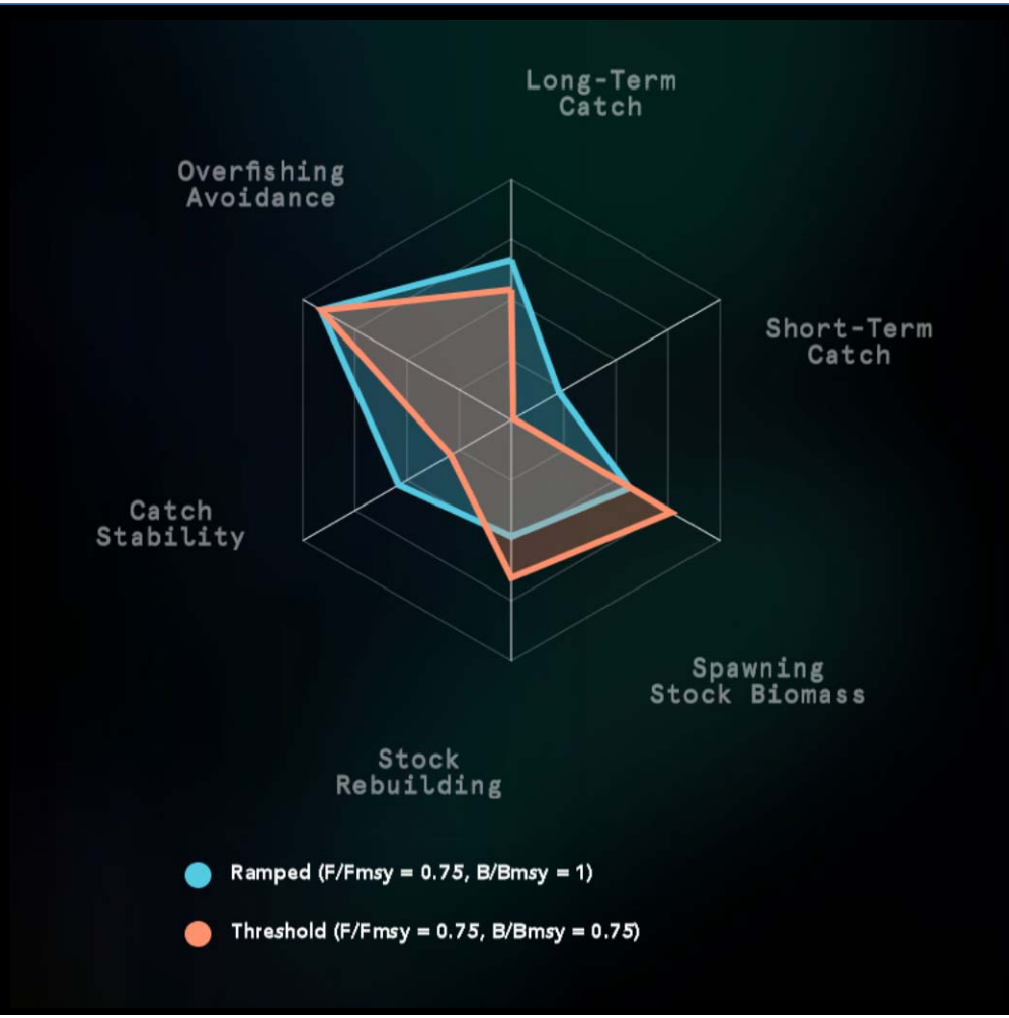

Role of Models in MSE

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