ISC International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean

Management Strategy Evaluation Application Case Studies

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Pacific Bluefin Tuna
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Presentation Outline

- MSE Principles
- Case Studies (domestic Canadian examples)
- Some commonalities among MSEs processes
- What MSE is/what MSE is not
- Concluding Thoughts

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Main Points

- MSE is a structured process to provide decision-makers and stakeholders with the information on which to base rational management decisions, given their own objectives, preferences, and attitudes to risk.
- Scientists could make all the necessary choices … if the only objective is to maximize annual yield
- Reality is more complicated

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MSE Principles

- Collaboration among scientists, stakeholders and managers is critical
- Identifies a range of strategies or decision choices
- Measures performance against objectives of alternative strategies or decision options
- Robustness to important uncertainties (monitoring, assessment, decision-making, and management action)
- Communicates results, highlighting trade-offs among multiple and sometimes conflicting objectives, to stakeholders and decision-makers
- Iterative process

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Case Study:

Sablefish (*Anoplopoma fimbria)*, Canada

- Started 2005, funded by the Sablefish Industry (very lucrative fish - ~$40M CA
  - Maintain spawning stock biomass above LRP = $0.4SSB_{MSY}$ in 95% of years measured over two sablefish generations (i.e., 36 years)
  - When the spawning stock biomass falls within the cautious zone ($0.4SSB_{MSY} < B < 0.8SSB_{MSY}$), limit the probability of decline over the subsequent 10 years from very low (5%) when at the LRP to moderate (50%) when at SSB_{MSY}. At stock status levels between these two points, define the tolerance for decline by linear interpolation.
  - Maintain spawning biomass above the target reference point SSB_{MSY} in 50% of the projection years measured over two sablefish generations, where SSB_{MSY} is defined by operating model scenario
  - Maintain 10-year average annual variability in catch (AAV) of less than 15%
  - Maximize the median average catch over the first 10 projection years
- Process ongoing; recently revised operating model & evaluated whether management strategy was robust to lack of information on discards; it was not as robust as hoped so licence conditions and monitoring modified.

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Case Study:

Pacific Halibut (*Hippoglossus stenolepis),* IPHC (Can & USA)

1. Maintain a minimum of number of mature female halibut coast-wide (e.g., one million) in each year with a probability of 0.99.
2. Maintain a minimum spawning stock biomass of 20% of the unfished biomass in each year with a probability of 0.95 (spawning biomass limit).
3. Maintain the spawning stock biomass above 30% of the unfished biomass in each year with a probability of 0.75 (spawning biomass threshold).
4. Maintain directed fishing opportunity each year, conditional on satisfying objectives 1 and 2, with a probability of 0.95 (i.e., cannot afford to close the directed fishery for a single year).
5. Maximize yield in each regulatory area each year without exceeding the target harvest rate in a given area 50% of the time.
6. Limit annual changes in TAC, coast wide and/or by Regulatory Area, to less than 15% per year, conditional on satisfying objectives 2 and 3.
7. Maintain median catch within ±10% of 1993-2012 average within five years of implementing the procedure.
8. Maintain average catch at >70% of historical 1993-2012 average, 90% of the time.
9. Reduce bycatch mortality to within 5% of total catch limits/minimize bycatch to the extent practicable.

- Process has stalled in last few years; receiving new support as abundance appears to be declining

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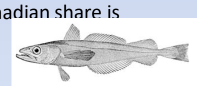
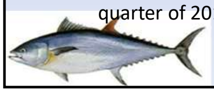
Case Study:

Pacific Hake/Whiting (*Merluccius productus*), Can & USA

- Maintain the offshore Pacific Hake resource above a certain threshold to allow for a sustainable population and sufficient numbers in a diversity of age classes. A threshold may be defined as a level that does not impair recruitment.
- Maintain a healthy stock status across a range of recruitment events and consider total allowable catch levels that spread the harvest of strong cohorts over multiple years.
- Manage the fishery resource in a manner that aims to provide the best long-term benefits to the Parties.
- Manage the fishery to ensure that each country has the opportunity to receive the intended benefits contemplated in the treaty.
- [T]he default harvest rate is F-40 percent with a 40/10 adjustment.
- The United States' share of the overall TAC shall be 73.88 % and the Canadian share is 26.12%



- Process began as scientific exercise but stalled due to lack of management support, but has received recent support from both countries & goal is to have first useful results in first quarter of 2019.



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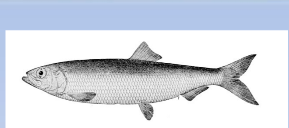
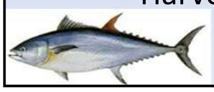
Case Study:

Pacific Herring (*Clupea pallasii*), Canada

- 5 main stocks, 2 minor stocks
- Important ecosystem component



- Fishery management undergoing modernization, many viewpoints – MSE underway to help decision-making since 2015
- Objectives:
  - Maintain healthy stock size $\geq SSB_{MSY}$
  - Avoid critical stock sizes $<0.5\ SSB_{MSY}$
  - Reach target stock size SSB_{MSY}
  - Harvest at F=0.225 when escapement > $0.25\ SSB_0$



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Case Study: North Pacific Albacore (*Thunnus alalunga*)

- First discussed by ALBWG in 2014 as way to respond to request for advice on target reference points (& harvest strategy development)
- Workshops held in Yokohama (April 2015 & May 2016) and Vancouver (October 2017)
  - Develop a common understanding of the MSE process and the roles and responsibilities of participants in this process;
  - Develop a proposed set of management objectives for the north Pacific albacore stock; and
  - Quantify the objectives so that they can be measured and used in the first iteration of the NPALB MSE; and
  - Provide time to discuss future engagement/needs of NC members.
- Objectives defined & harvest control rules developed;
- First iteration results expected by Aug 2019

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Case Study: North Pacific Albacore (*Thunnus alalunga*)

Proposed Objectives

1. Maintain spawning biomass above the limit reference point
2. Maintain the total biomass, with reasonable variability (x%), around the average depletion level in the recent 10 years of the latest stock assessment
3. Maintain harvest ratios by fishery (fraction of the SSB harvested) at current average
4. Maintain catches by fishery above average historical catch
5. Limit the magnitude of change to effort or catch to < 15% at any one time due to management actions by fishery
6. Maintain F at the target value with reasonable variability

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Commonalities Among MSE Objectives

- Objectives cover issues that are important to all groups (scientists, stakeholders, managers)
- No set number of objectives, but fewer (e.g., 4) is probably better than many (e.g., 10)
- A conservation objective relating to the danger zone for a stock (avoid it and be pretty certain)
- A target objective speaking to the healthy zone for a stock (aim for it)
- An objective(s) identifying expected yield and other benefits and stability in achieving these benefits from a stock
- Sometimes there is an objective(s) relating to ecosystem impacts (e.g., minimize bycatch)

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What MSE Is Not

- It is not a best assessment approach to stock assessment conducted by Scientists – i.e., not an optimization process in which parameters are optimized for single model
- It is not used for short-term tactical decisions (i.e., setting the annual total allowable catch (TAC) for stock x)

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What MSE Is

- MSE is a decision-making tool design to develop long-term strategies for managing a stock
- MSE is an iterative, ongoing process that can address both management and scientific issues
- MSE is hard work for scientists, managers, & stakeholders

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Concluding Thoughts

- MSE must be relevant to stakeholders and managers to be useful
- Requires active participation by stakeholders & managers to understand & make informed decisions about objectives & trade-offs revealed by results
- Let’s us test things before they are used for real
- Does not provide certainty but guides decisions in uncertain world
- Requires dedicated effort by scientist(s)

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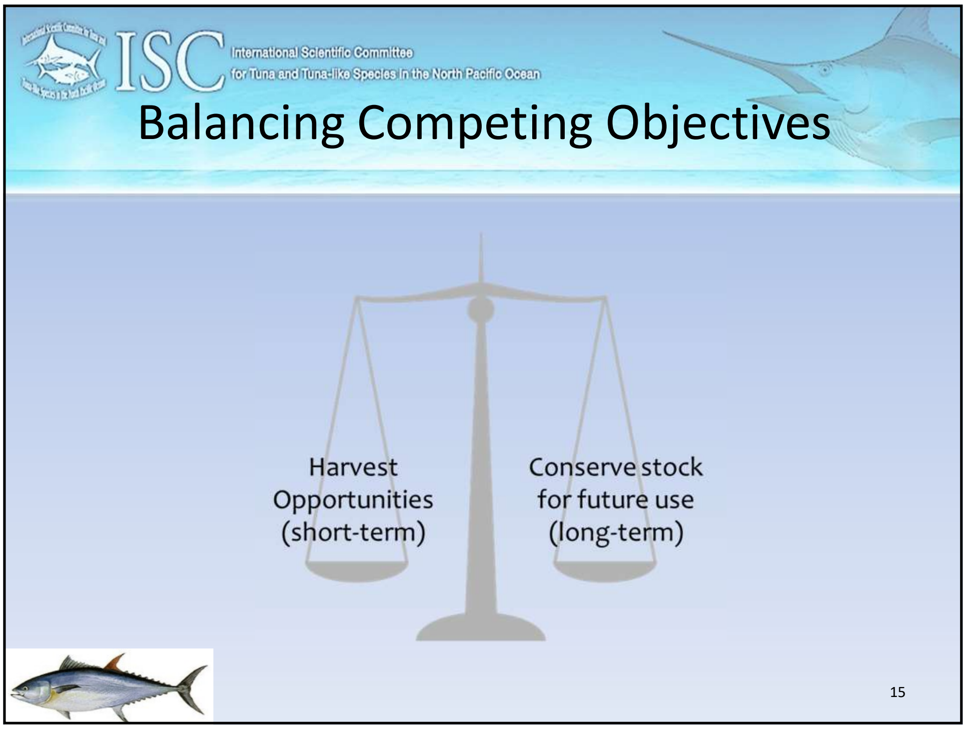
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Balancing Competing Objectives
Harvest
Opportunities
(short-term)
Conserve stock
for future use
(long-term)
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