Management Strategy Evaluation Framework

MSAB Meeting Oct 16-17, 2013

IPHC

Outline

- Two Paradigms for decision making
  - Best assessment method
  - Management procedure approach
- Multiple model approach
- Tools for examining heaps of simulated outputs.

Two Paradigms

- Best Assessment Approach
- Management Procedure Approach

MSAB HOMEWORK: on youtube, search “Doug Butterworth, ICES Keynote

https://www.youtube.com/watch?v=S_Q6jvffqnc

Old Paradigm: Best Assessment Approach

- Develop a single “best” model that fits the historical data well.
- Use this model to estimate parameters that define:
  - reference points (MSY, Fmsy, Bo),
  - current stock size,
  - optimal harvest rates.
- Then develop a TAC based on projected biomass, and application of the harvest control rule.

- The IPHC has some of the best data in the world.
- So why has the “best assessment approach” been so difficult?
  - structural changes to models
  - closed area Vs. coast wide models
  - apportionment: constant q
  - assumptions imply certainty (e.g., fixed M, coast-wide selectivity).

Recent changes to the IPHC halibut assessment

- Solution to retrospective bias using time-varying selectivity
- Improvements to input data
- Attention to uncertainty
- Decision table & “The Blue Line”

The Decision Table

		Fishing intensity	Stock status		Stock trend			Catch trend		
		Effective coastwide HR	Spawning biomass					Fishery CEY		
		2013	2014				2016	2014		
	Coastwide Fishery CEY (total removals) millions lb	is greater than target	is less than 30%	is less than 20%	is less than 2013	is 5% less than 2013	is less than 2013	is less than 2013	is 10% less than 2013	Effective coastwide harvest rate
No removals	0.0 (0.0)	0%	25%	<1%	23%	<1%	41%	0%	0%	0.0%
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“The Blue Line”

- Consistent with the IPHC harvest policy.
- This policy is based on:
  - The concept of Ebio ... fixed-selectivity,
  - closed area assessments from the core areas with unique selectivities,
  - density-dependent growth,
  - recruitment is density-independent and a function of the PDO
- NONE OF THESE ARE CONSISTENT WITH THE RECENT COAST-WIDE ASSESSMENT.

However

- The decision table lays bare the consequences of applying a coast wide TAC to:
  - fishing intensity
  - stock status & stock trend
  - catch trends
- THIS TRANSITION IS FORCING DECISION MAKERS TO EXPLICITLY CONSIDER RISK

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- ... decision table based on the output of multiple models

New Paradigm: Management Procedure Approach

“Assess the consequences of a range of management strategies and present the results that exposes the tradeoffs across the range of management objectives.”

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3. Specify fisheries objectives and translate into performance measures (i.e., role of the MSAB)
4. Simulation test each MP across all OMs (my job) and look for a procedure that is robust to uncertainty and provides the "best" trade-off in performance measures (MSAB)

Under this new paradigm, how will the decision table differ?

- Short answer: it won't.

Long Answer: the objectives & chosen MP determine the appropriate row in each column.

Objective 2:
SSB > 0.2, 99/100, each year

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Long Answer: the objectives & chosen MP determine the appropriate row in each column.

Objective 3:
eg. SSB > 0.3, 75/100, each year

								Catch trend		
		HR	Spawning biomass					Fishery CEY		
	Coastwide Fishery CEY (total removals) millions lb	2013	2014				2016	2014		
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The "blue line" becomes "blue cells" which exposes trade-offs among objectives (hence the need for priority)

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Objectives must include:

- State
  - e.g., biomass, catch, depletion, revenue, bycatch
- Duration
  - i.e., a time frame in which to achieve said objective
- Probability
  - i.e., how bad do you want to achieve that objective.

Importance of clearly defined objectives

- Short-term vs. long-term objectives may differ.
- Consider strategies to phase in transitions to a new MP.
- Must rank or weight each of the primary objectives.
  - Important & useful for eliminating candidate management procedures.

Questions?

Banksy