Process Not Product

The MSE Process for Sablefish in British Columbia, Canada

Prepared by A.R. Kronlund (Rob) for the June 13-14, 2013
Meeting of the IPHC Management Strategy Advisory Board
Seattle, Washington

Expert?

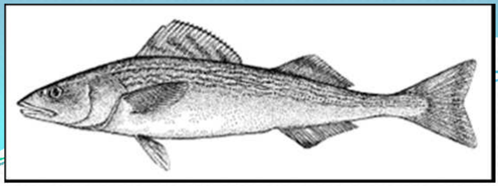
MEMBER	COUNTRY	SECTOR
1. Bruce Gabrys	U.S.	Commercial
2. John Woodruff	U.S.	Processing
3. Peggy Parker	U.S./CDN	Processing
4. Shane Halverson	U.S.	Processing
5. Brad Mirau	CDN	Processing
6. Jeff Kauffman	U.S.	Commercial
7. Per Odegaard	U.S.	Commercial
8. Ryan Littleton	U.S.	Commercial
9. Scott Mazzone	U.S.	Tribal
10. Michele Culver	U.S.	Fish Mgmt Cncl
11. Dan Hull	U.S.	Fish Mgmt Cncl
12. Gary Robinson	CDN	Commercial
13. Jim Lane	CDN	First Nations
14. Chris Sporer	CDN	Commercial
15. Gregg Elwood	U.S.	Commercial
16. Tom Marking	U.S.	Sport
Ex-officio		
Rachel Baker	U.S.	Manager
Adam Keizer	CDN	Manager
Scott Meyer	U.S.	Sport Manager
Rob Kronlund	CDN	MSE Expert
Robyn Forrest	CDN	Sci. Advisor
Loh-Lee Low	U.S.	Sci. Advisor
Commissioner Ryall	CDN	
Commissioner Balsiger	U.S.	

An ordinary man away from home giving advice. Oscar Wilde

You must continue to gain expertise, but avoid thinking like an expert. Denis Waitley

My definition of an expert in any field is a person who knows enough about what's really going on to be scared. P. J. Plauger

MSE ~~Expert~~ student



Outline

The MSE Process for Sablefish in British Columbia, Canada

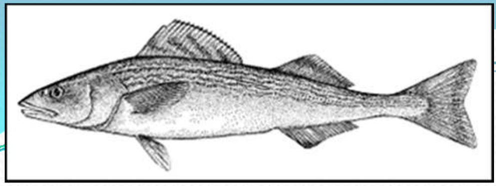
- Why did it happen?
- What was causing the problem?
- What was done?

Disclaimer

- The MSE process for Pacific Halibut will be different than that for BC Sablefish
- The biology, fisheries and stakeholder environment are obviously not the same
- The process will proceed at a different rate

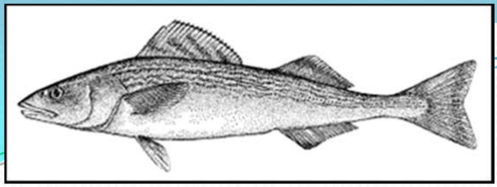
- The principles that apply are common
- The **process** has value beyond designing a specific management procedure
- Community effort is a requirement

Why did it happen?



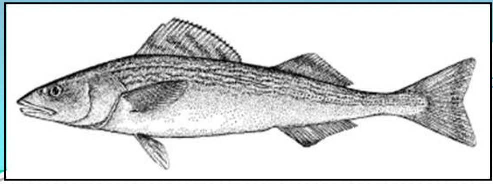
Industry Views 2004

- Why is the model changing again?
- We like the model with the higher quota.
- Which model is right? The tagging model? Which one?
- We don't understand how the quota is calculated.
- Why don't you just say the quota should be 4,500 t per year and leave it alone?
- You are in government, we can't fire you, but we would…
- We keep getting told we have to be precautionary, and that always means the quota goes down – when are we being precautionary enough? Who decides this?
- Why don't you just give us something that reflects our experience on the grounds?



2004 Sablefish Decision Tables: $P(B_{2010} > B_{2002})$

Total Annual Catch	Longer-term recs. (1980-2004)				Shorter-term recs. (1994-2004)			
2005-2009	Low	Avg.	High	Exp	Low	Avg	High	Exp.
0	0.82	0.80	0.82	0.81	0.70	0.67	0.68	0.68
3500	0.73	0.72	0.74	0.73	0.52	0.49	0.53	0.52
4500	0.71	0.70	0.71	0.71	0.48	0.45	0.49	0.47
5500	0.68	0.68	0.70	0.69	0.43	0.42	0.45	0.43
7500	0.63	0.63	0.66	0.64	0.36	0.33	0.38	0.36
10000	0.57	0.58	0.60	0.58	0.26	0.26	0.28	0.27



An Inciting Incident

Independent Review of the British Columbia Sablefish (*Anoplopoma fimbria*) Scientific Research and Assessment Program

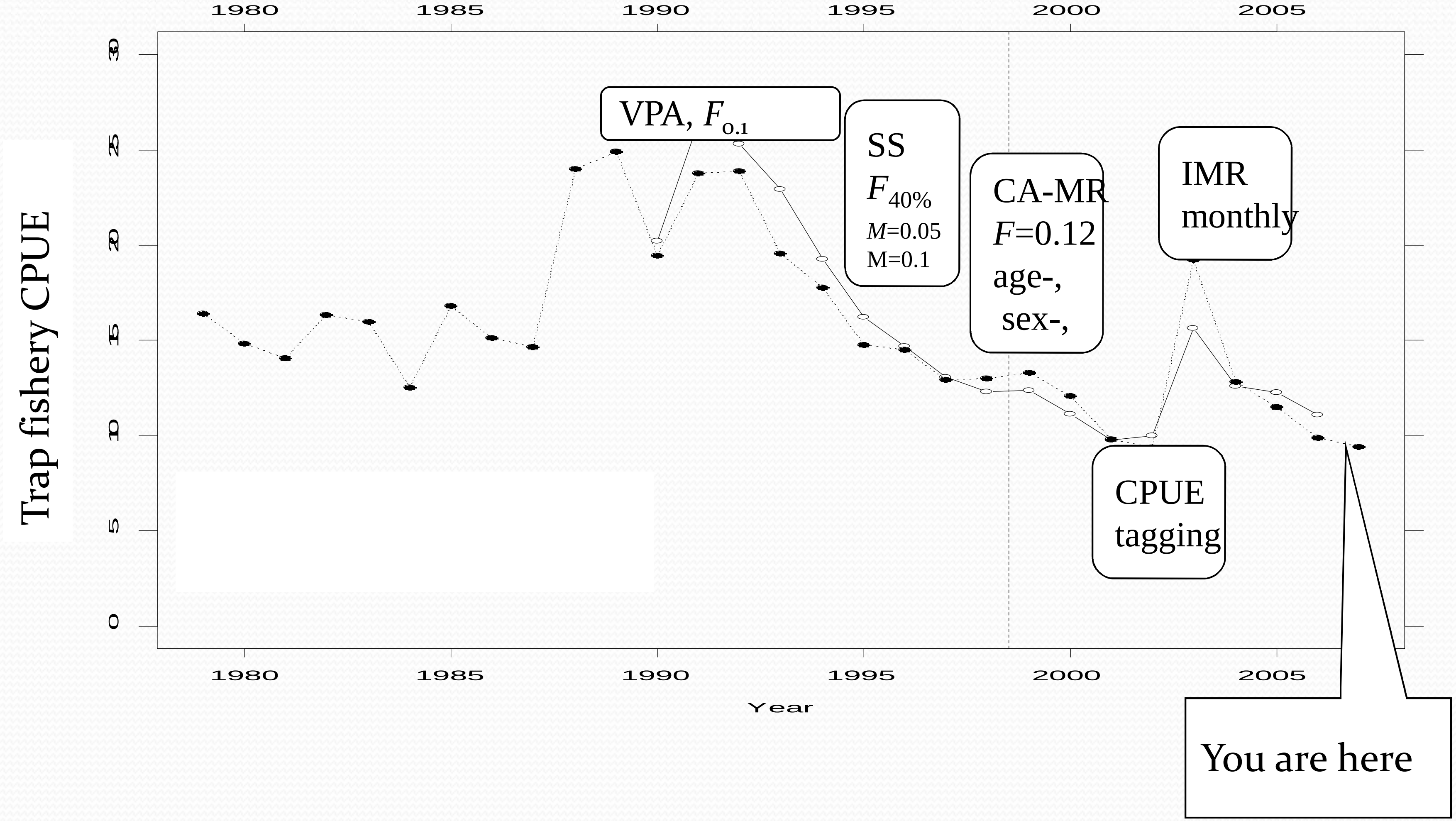
Sean Cox[1] and Steven Martell[2]

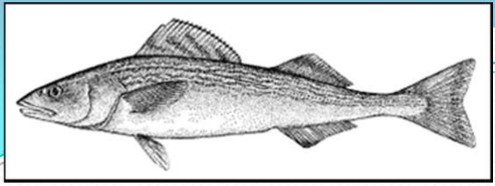
May 4, 2005

[1] School of Resource and Environmental Management, Simon Fraser University
8888 University Drive, Burnaby, BC, V5A 1S6

[2] The Fisheries Centre, University of British Columbia
2204 Main Mall, Vancouver, BC., V6T 1Z4

Sablefish stock assessment (1989-2005)



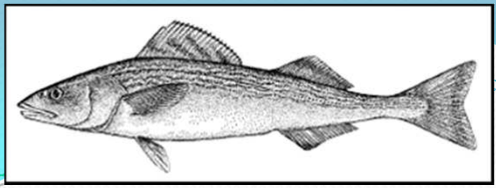


Damning Review Points

Sablefish stock assessment models change almost annually. In the past, they have ranged from simple statistical trend analysis to complex spatially explicit, catch-at-age, mark-recapture models. Even models of modest complexity have shown at least a few pathological features that make interpretation difficult, especially where these models have not been tested against simulated data. Thus, one has to wonder whether the form of stock assessment models used in the past has had much impact upon the management actions taken. Most models produce projections containing enough uncertainty that approximately 4500t looks acceptable in most years (which may, in fact, be an accurate assessment).

BC Sablefish had 17 different models (or tinkered versions) in 18 years...

Tinkering with the management procedure is a problem, despite best intentions of analysts.

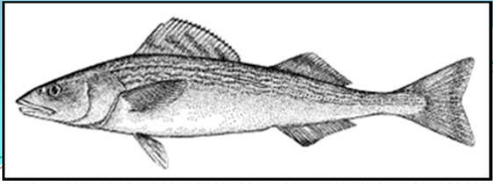


Even more damning…

Evaluation was conducted in the context of a fisheries management system that includes the following minimum standard components: long-term objectives for the fishery; a set of clearly defined decision rules to regulate the fishery such that it consistently meets the objectives; key quantities to be input to decision rules; stock assessment models that reliably estimate the key quantities; and best available data to support the stock assessment models. In terms of long-term objectives and decision rules, the fishery either has none, or they have not been clearly stated. The lack of these two essential components represents a significant barrier to testing whether existing stock assessment models and data collection programs are adequate for long-term sustainable management of BC sablefish.

Review Recommendation

We strongly recommend that a Management Strategy Evaluation (MSE) be conducted for the BC sablefish fishery. This process involves testing decision rules, stock assessment models, and data collection designs across a range of plausible scenarios for sablefish population structure, movement, and population dynamics. The objective of the exercise is to design a standard set of operating procedures (decision rule/assessment model/data) that consistently meet management objectives. It also allows a direct, quantitative framework in which to evaluate potential new data sources.



Review Points

Table 2: A review of Standard Criteria related to the BC sablefish stock assessment/management system.

Standard Criteria	Meets standard?	Recommendation
Long-term objectives...	No	Clearly defined fishery objectives must be given to stock assessment scientists
A set of decision rules...	No	Transparent decision rules must be developed and agreed upon by all stakeholders
Key Quantities...	Yes	Biomass relative to B_{2002} is a reasonable Key Quantity, but non-conservation objectives should also be explored
Stock assessment models...	Unknown	Models change frequently. Should be tested for reliability and performance given management strategy. Key Quantity output B_t/B_{2002} may be robust for many models.
Best available data...	Yes	New survey and tagging design provide needed improvement. Basic biological data needed.

Example Goals

Wild CANADIAN SABLEFISH

Home | Contact Us | Member Login

ABOUT WILD CANADIAN SABLEFISH | WHERE TO BUY? | SUSTAINABLE FISHING | CANADIAN SABLEFISH ASSOCIATION

- OVERVIEW
- OUR STORY
- PROGRAMS & ACTIVITIES
- CONTACT US
- MEMBERS' PORTAL

PROGRAMS & ACTIVITIES

The CSA funds and manages programs and activities to promote healthy sablefish stocks, set sustainable harvest levels, achieve secure access to the resource, minimize operating costs and maximum value from the fish.

The CSA funds and manages programs and activities to **promote healthy sablefish stocks**, **set sustainable harvest levels**, achieve secure access to the resource, **minimize operating costs and maximum value from the fish**.

These are goals or aspirations and must be translated into measurable objectives for evaluation.

Measurable Objectives

1. *Outcome*: What outcome do you want?

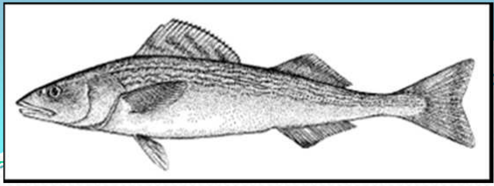
2. *Time Horizon*: When you want the outcome?

3. *Probability*: What is your tolerance for failure?

Specifying 1-3 makes objectives measurable.

We can try to design a fishery management system to meet measurable objectives.

However, objectives are usually in conflict.



Goal to Objective

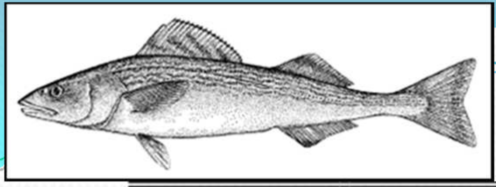
Goal: Promote Healthy Sablefish Stock

Measurable Objective:

1. *Outcome*: Spawning stock greater than $0.4B_{MSY}$

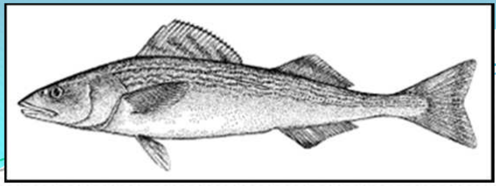
2. *Time Horizon*: Evaluate over 36 years

3. *Probability*: Spawning stock greater than $0.4B_{MSY}$ at least 95% of the time in a given year



Sablefish Objectives

Objective	Definition
1	Maintain spawning stock biomass above LRP = $0.4B_{MSY}$ in 95% of years measured over two sablefish generations (i.e., 36 years), where B_{MSY} is defined by operating model scenario.
2	When the spawning stock biomass falls within the Cautious Zone ($0.4B_{MSY} < B < 0.8B_{MSY}$), limit the probability of decline over the subsequent 10 years from very low (5%) when at the LRP to moderate (50%) when at B_{MSY}. At stock status levels between these two points, define the tolerance for decline by linear interpolation (Figure 1A). Biological reference points defining stock status zones are defined by operating model scenario.
3	Maintain spawning biomass above the target reference point B_{MSY} in 50% of the projection years measured over two sablefish generations, where B_{MSY} is defined by operating model scenario.
4	Maintain 10-year average annual variability in catch (AAV) less than 15%.
5	Maximize the median average catch over the first 10 projection years.



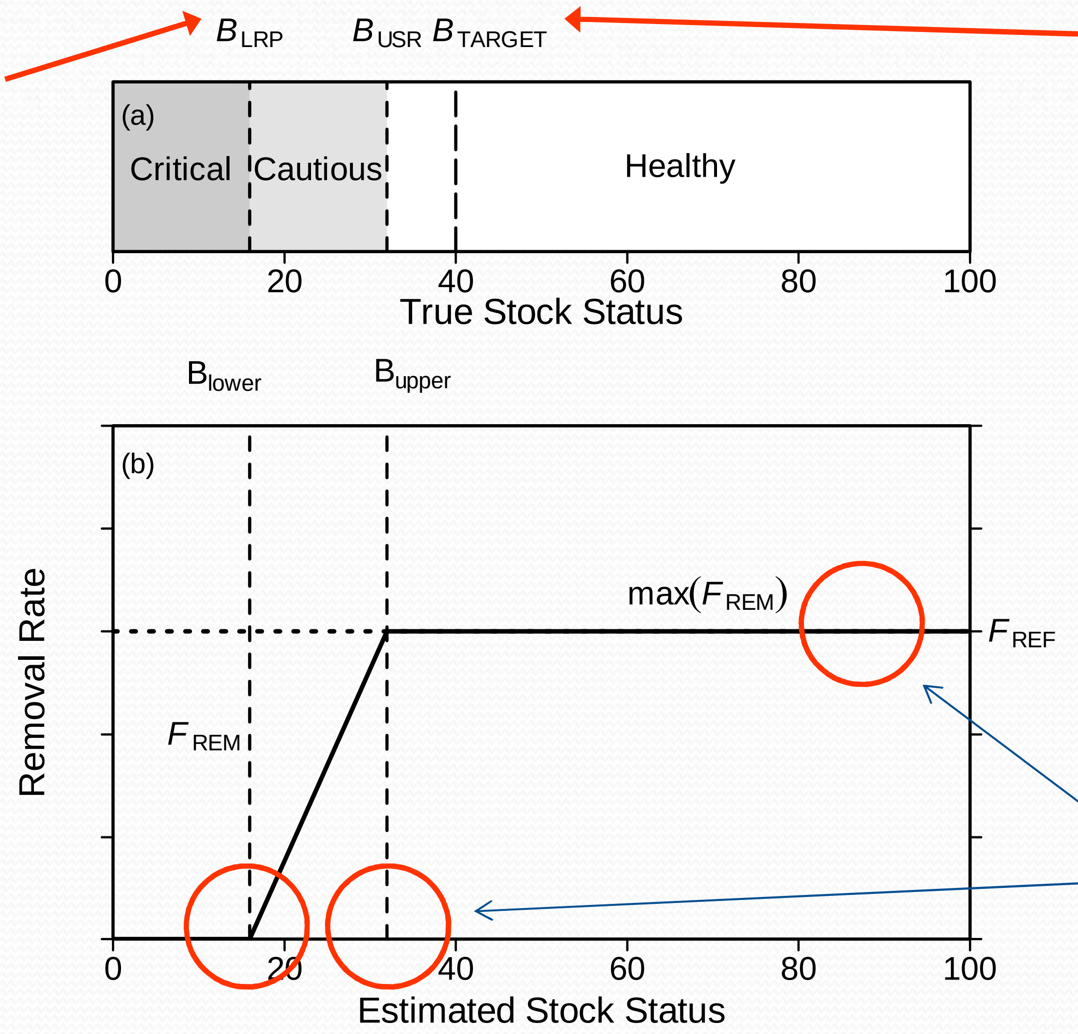
Review Points

Table 2: A review of Standard Criteria related to the BC sablefish stock assessment/management system.

Standard Criteria	**Meets standard?**	**Recommendation**
Long-term objectives...	No	Clearly defined fishery objectives must be given to stock assessment scientists
A set of decision rules...	No	Transparent decision rules must be developed and agreed upon by all stakeholders
Key Quantities...	Yes	Biomass relative to B_{2002} is a reasonable Key Quantity, but non-conservation objectives should also be explored
Stock assessment models...	Unknown	Models change frequently. Should be tested for reliability and performance given management strategy. Key Quantity output B_t/B_{2002} may be robust for many models.
Best available data...	Yes	New survey and tagging design provide needed improvement. Basic biological data needed.

Objectives, Reference Points and Decision Rules

Avoid with high probability over *X* years



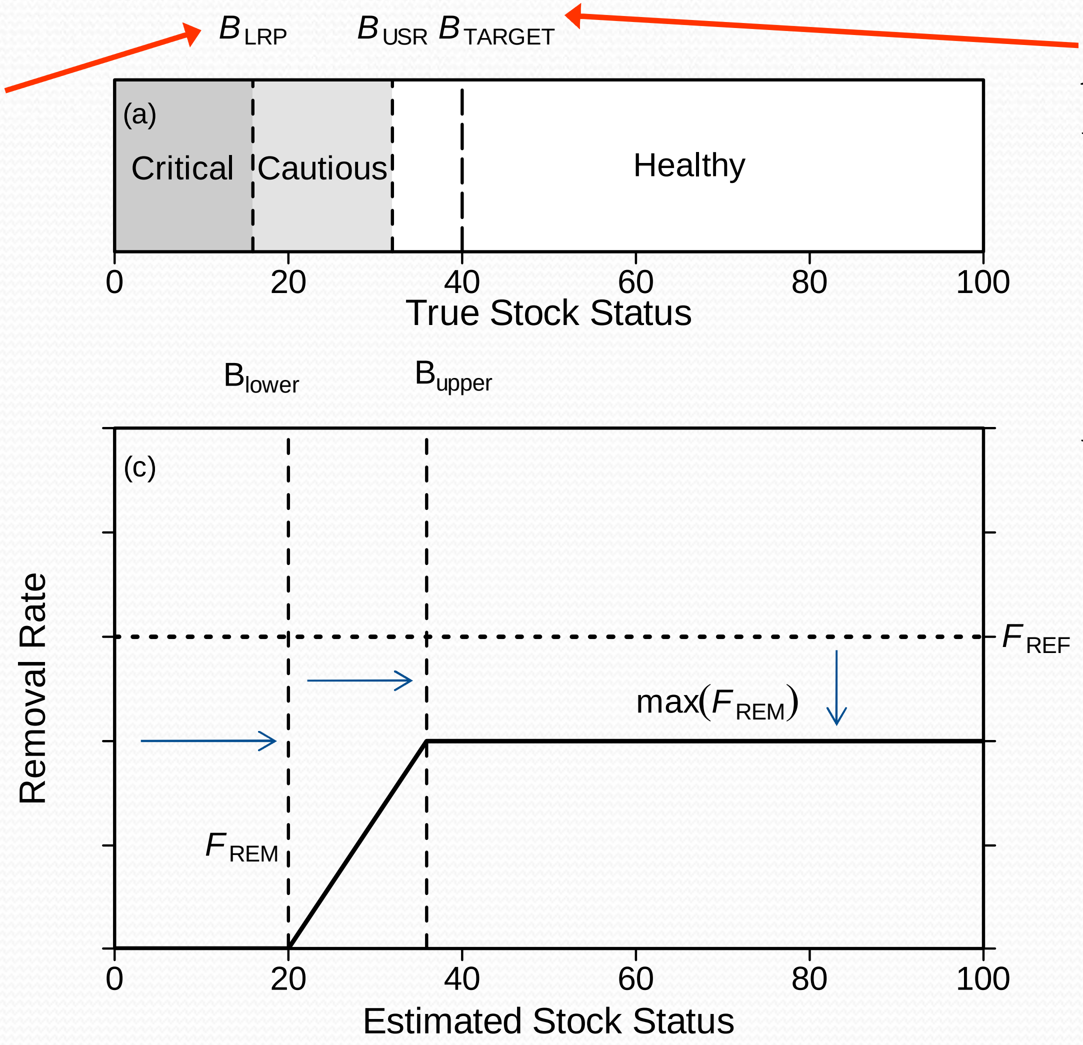
Achieve with desired probability over *X* years

HCR is a Tactic

Control Points

Harvest Control Rule Design – Avoid Limits (B_{LRP}, max F)

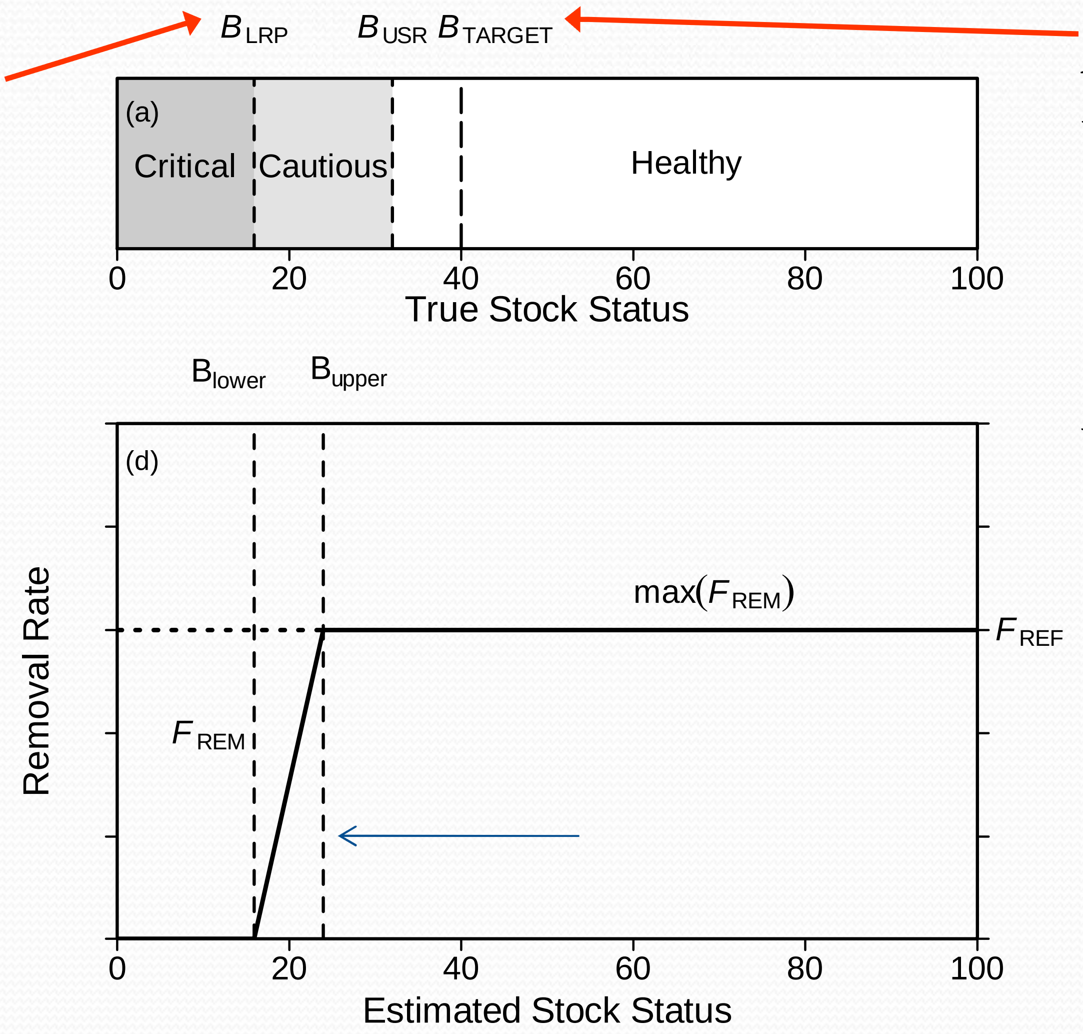
Avoid with high probability over *X* years



Achieve with desired probability over *X* years

Harvest Control Rule Design - Stability

Avoid with high probability over *X* years



Achieve with desired probability over *X* years

Halibut has issue of coast-wide harvest rate versus area-specific effects that are important to stakeholders.

Other Examples of Inciting Incidents

- Demand to meet new policy requirements
- Model changes each assessment – why?
- Decision-making process unclear
- Issues indirectly related to stock status ignored
- Models appear to ignore "real world" experience
- Impediments to communication
- Perceived or real participation gaps
- Stakeholders losing confidence in existing approach
- Conflicts between users (fishermen, processors, FN, ENGOs) that science cannot and should not resolve
- Conflicts between scientists!

What was causing the Problem?

The Assessment-Based Approach

- Common practice to use:
  - Annual stock assessment
  - Target **reference points** to represent desired state
  - Threshold **reference points** to prevent over-fishing
  - Rules to trigger management actions
- For this to work the following must be true:
  - Assessment must be reliable and consistent
  - Reference points must be well determined

Catch = "*BEST*" estimated biomass **X** Target harvest rate

Assessment results depend on choices

NRC (1998) study on bias in stock assessment models

True Stock

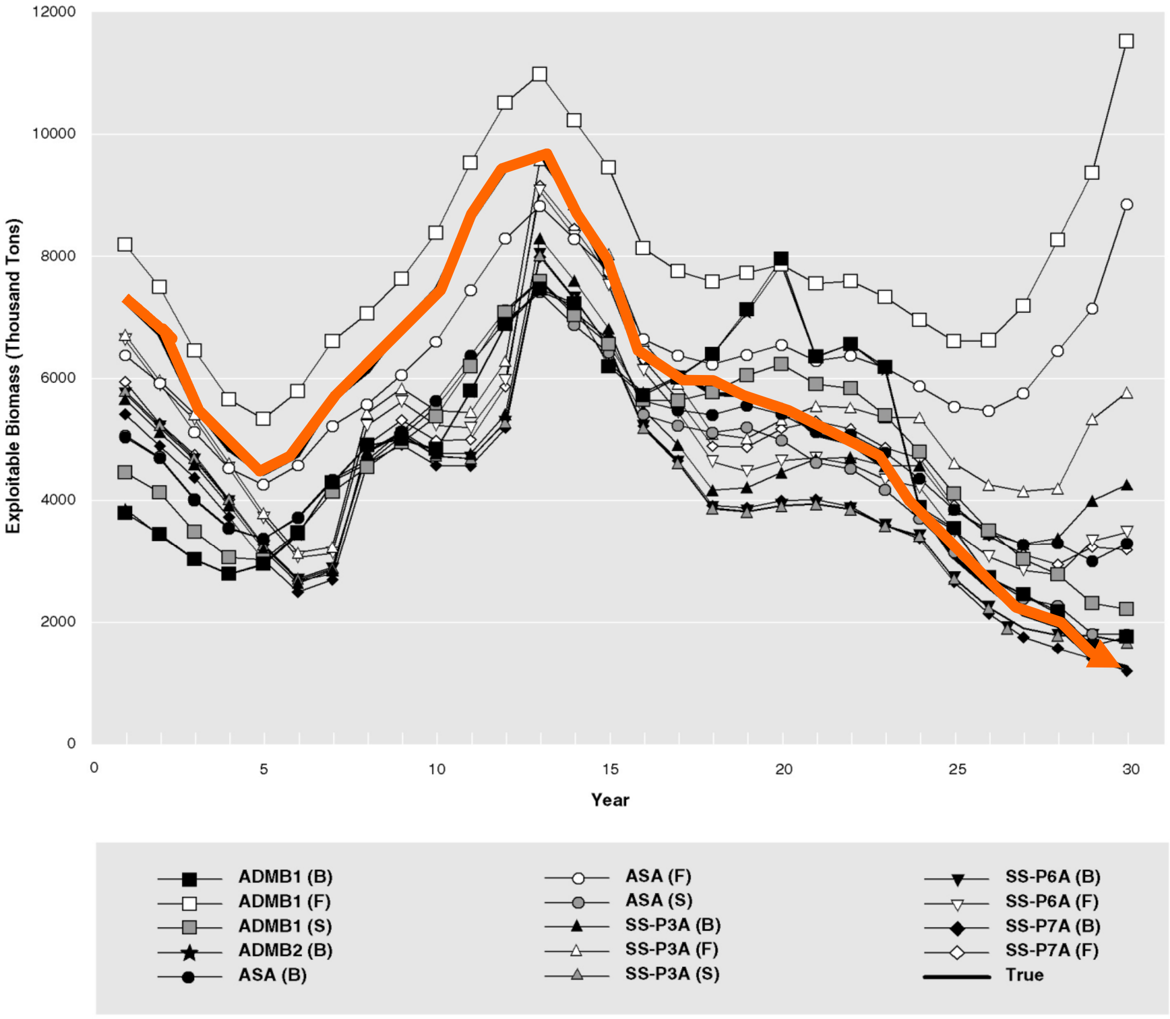


FIGURE I.8 Total biomass values using data set 3.

Errors in scale and trend!

Predicting the future…

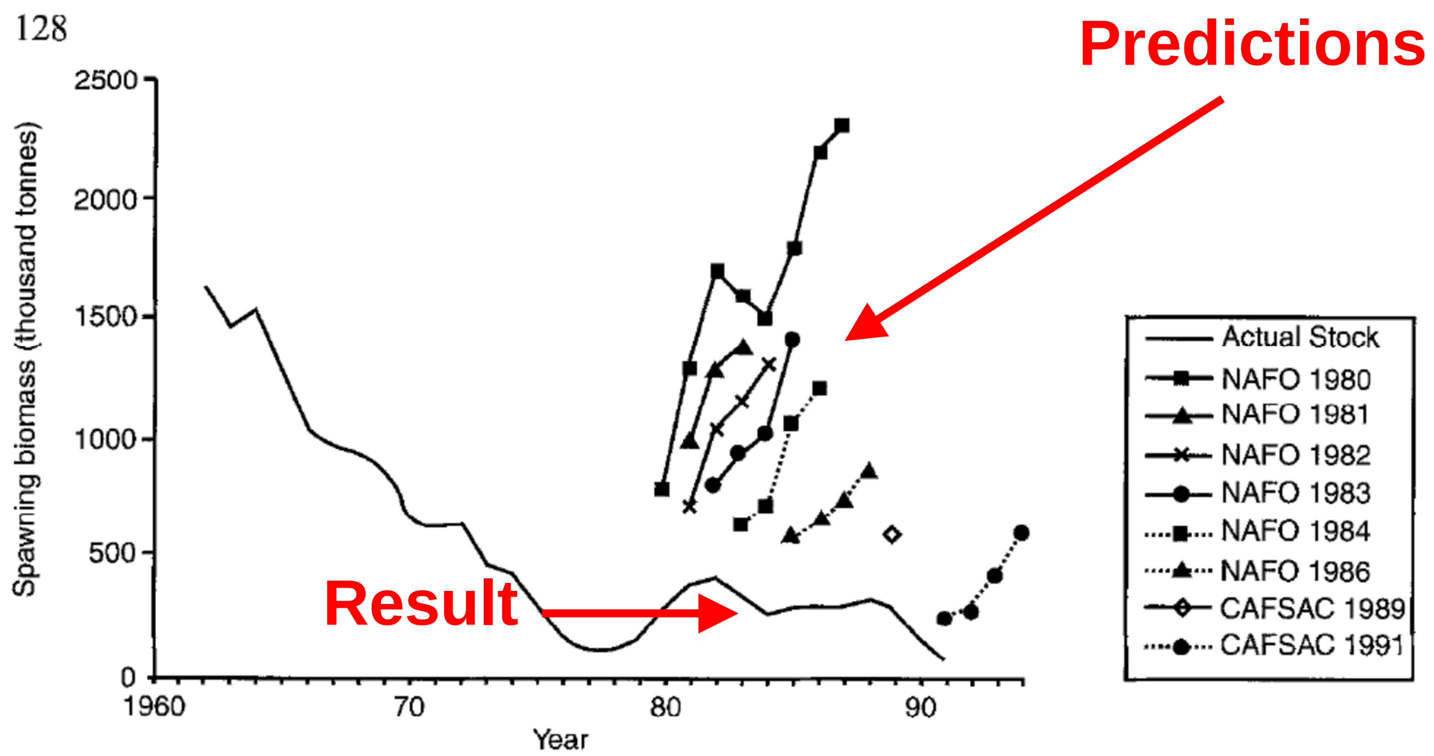


Fig. 1. Comparison of recent 'converged' VPA estimates of northern cod spawning stock biomass (biomass of 7+ year old fish) with estimates and projections published over the years in North Atlantic Fisheries Organization (NAFO) and Canadian Atlantic Fisheries Scientific Advisory Committee (CAFSAC) annual reports. Recent VPA estimates were made by the authors using age composition data in Baird *et al.* (1992) and assuming $M = 0.2$, $F_{1991} = 0.8$. Each dated sequence rising away from the converged VPA is the spawning biomass estimate published in the dated year followed by projections for future years as published that year.