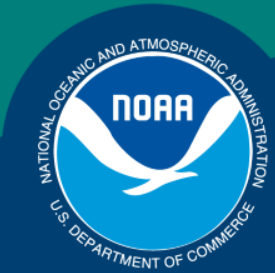


*Science, Service, Stewardship*



# **Accounting for Management Uncertainty in U.S. Fisheries.**

Wes Patrick, PhD

Office of Sustainable Fisheries

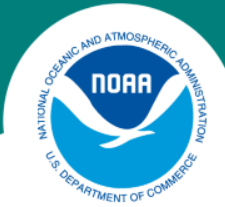
**NOAA  
FISHERIES  
SERVICE**

NOAA



## **Outline**

- The Annual Catch Limit Framework
- Management Uncertainty Research
- Council implementation

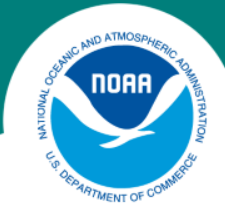


## **The ACL Framework**

### **Magnuson-Stevens Reauthorization Act 2007**

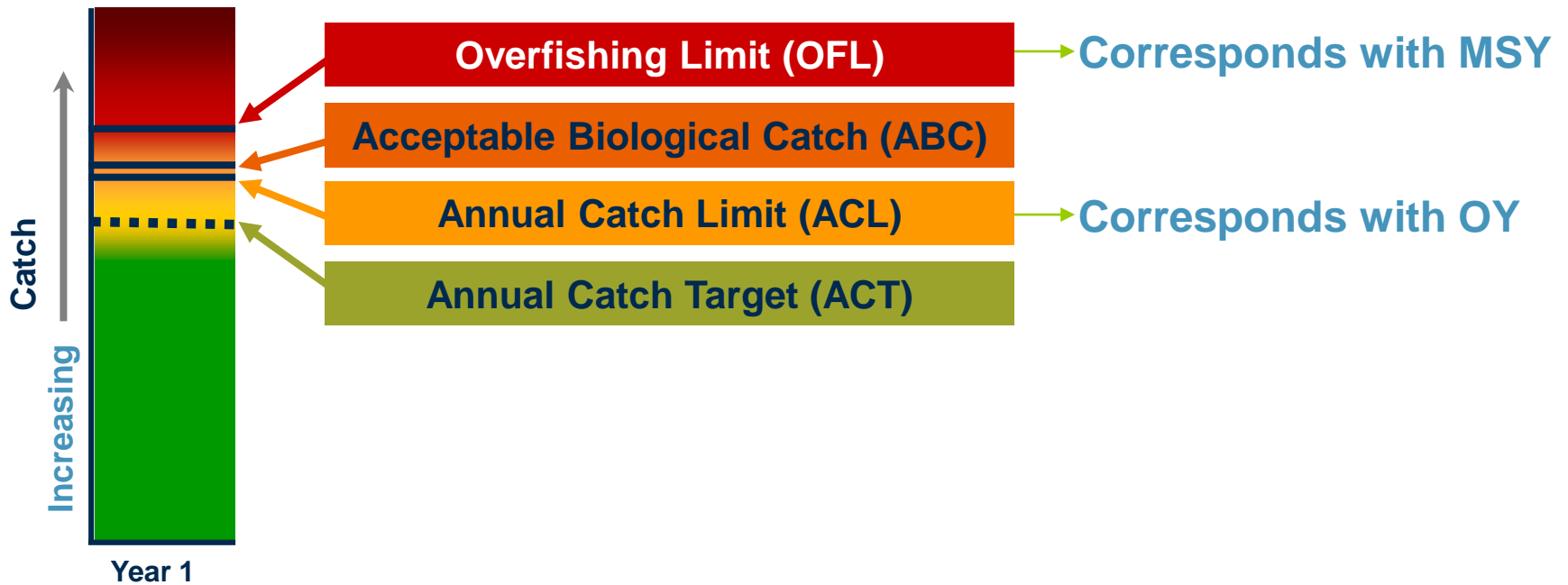
New requirements to end and prevent overfishing through the use of:

- “annual catch limits” (ACLs), and
- “measures to ensure accountability” (accountability measures or AMs).
- May not exceed a Council’s Scientific and Statistical Committee’s (SSC) fishing level recommendation of “acceptable biological catch” (ABC).



## The ACL Framework

$$\text{OFL} \geq \text{ABC} \geq \text{ACL} \geq \text{ACT}$$

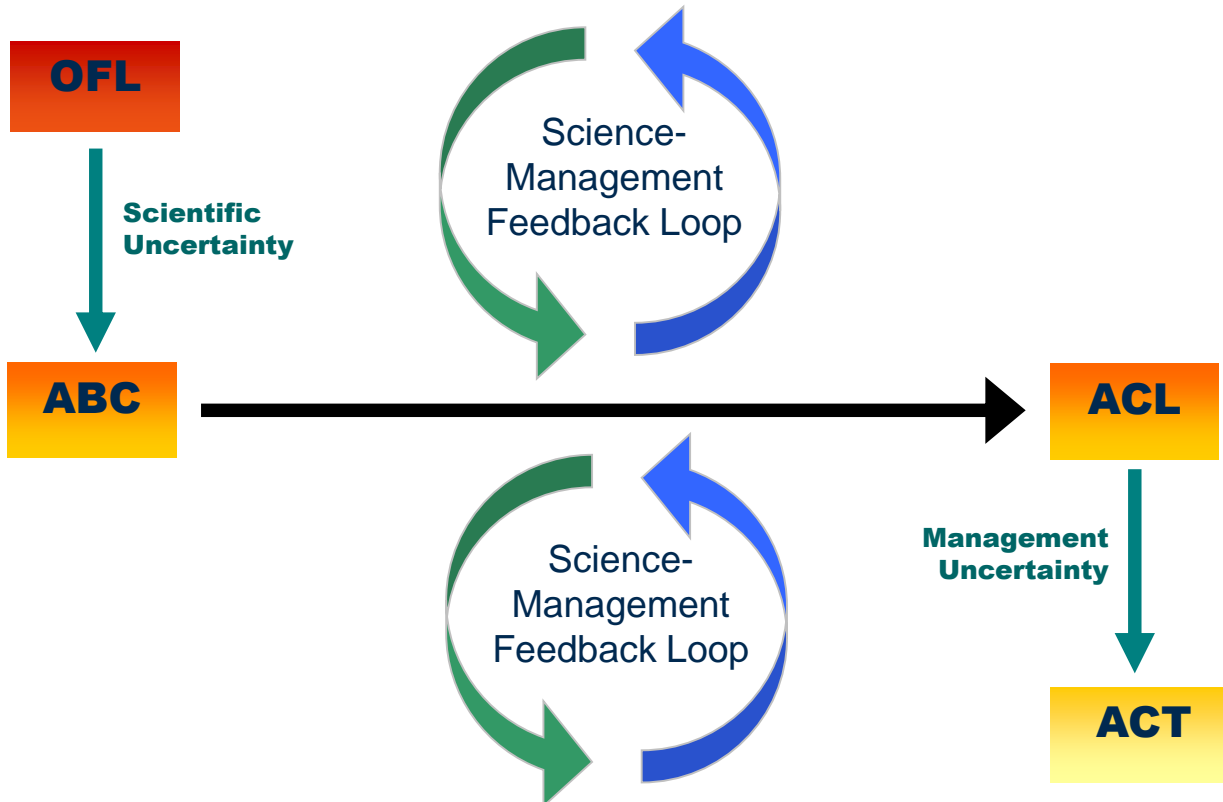




# The ACL Framework

## SSC Role

## Council Role





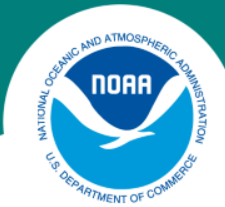
## The ACL Framework

### Scientific uncertainty

- $OFL \geq ABC$
- Is the uncertainty of a stock's current biomass and maximum sustainable yield reference points.

### Management uncertainty

- $ABC \geq ACL$  or  $ACL \geq ACT$
- Is the uncertainty of a fishery's management regime – including regulations, catch monitoring, and other management controls – in achieving the target level of catch (i.e., ACL).

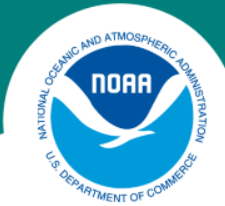


## Management Uncertainty

### Origins:

Passive adaptive management – an approach to managing natural resources that encourages learning from the outcomes of implemented policies and strategies (Allan and Curtis, 2005; Walters, 2007).

Precautionary principle – which holds that, where the likely impact of resource use is uncertain, priority should be given to maintaining the productive capacity of the resource (FAO 1995).



## Management Uncertainty

Synonyms often used:

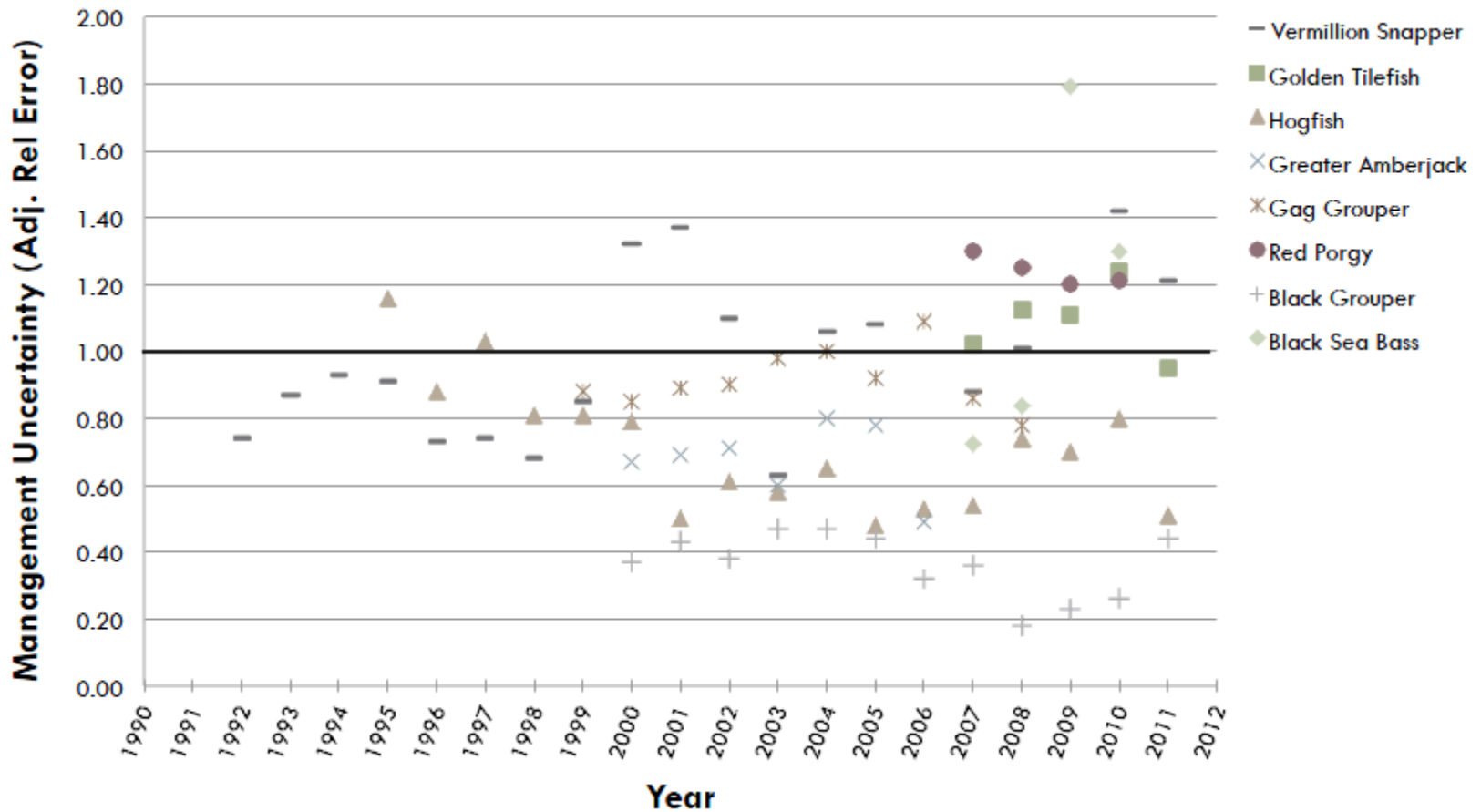
- Implementation error (e.g., Rosenberg et al. 1993)
- Implementation uncertainty (e.g., Shertzer et al. 2010)
- Partial controllability (Williams 1997)
- Structural uncertainty (Charles 1998)
- Outcome uncertainty (Holt and Peterman 2006)
- Catch control (Melnychuk et al. 2012)

While well described, very few studies have characterized management uncertainty of fisheries.



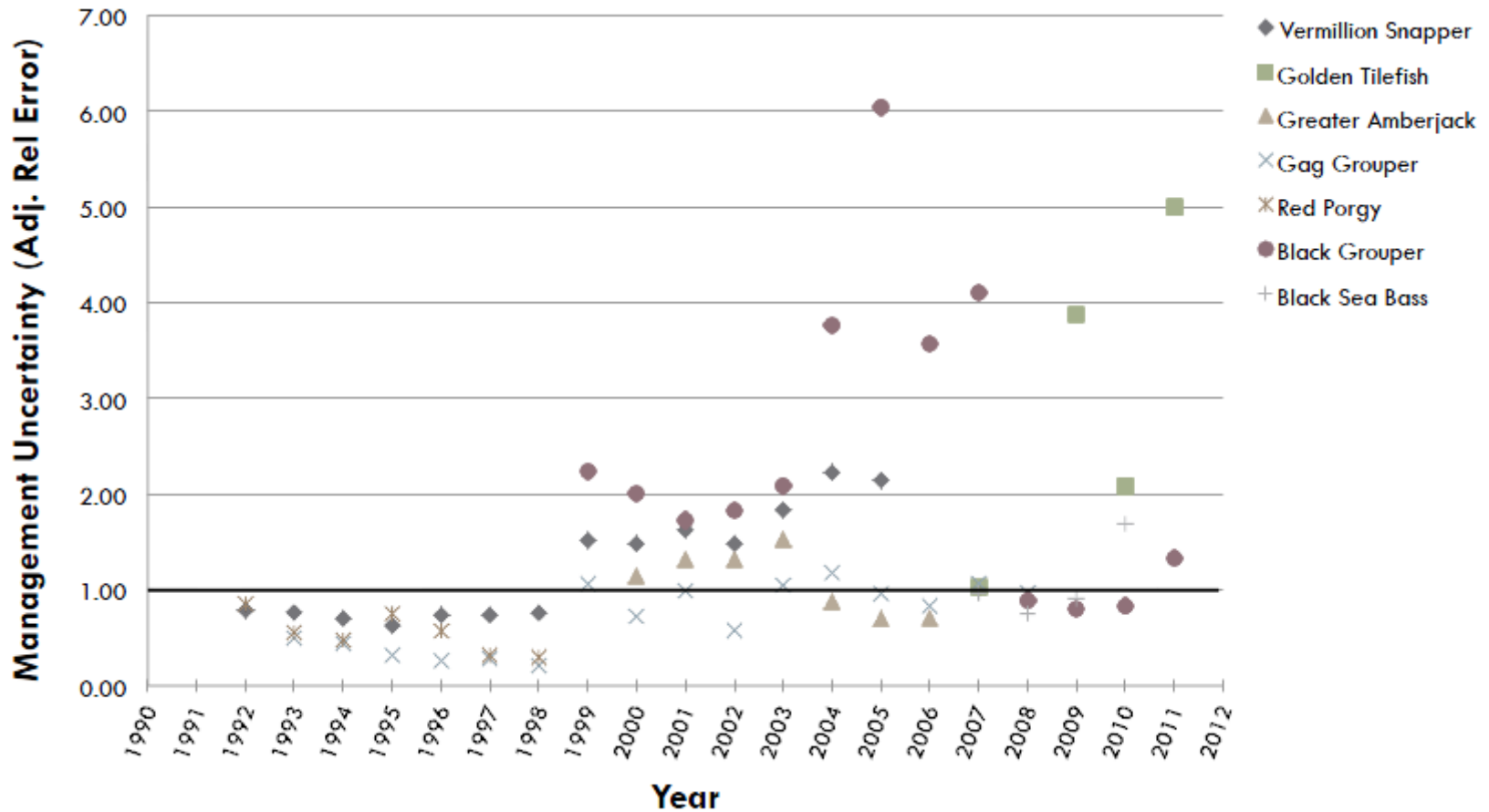


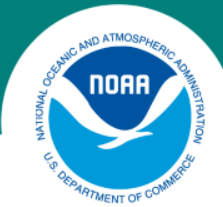
## Management Uncertainty (Shugart-Schmit 2012)



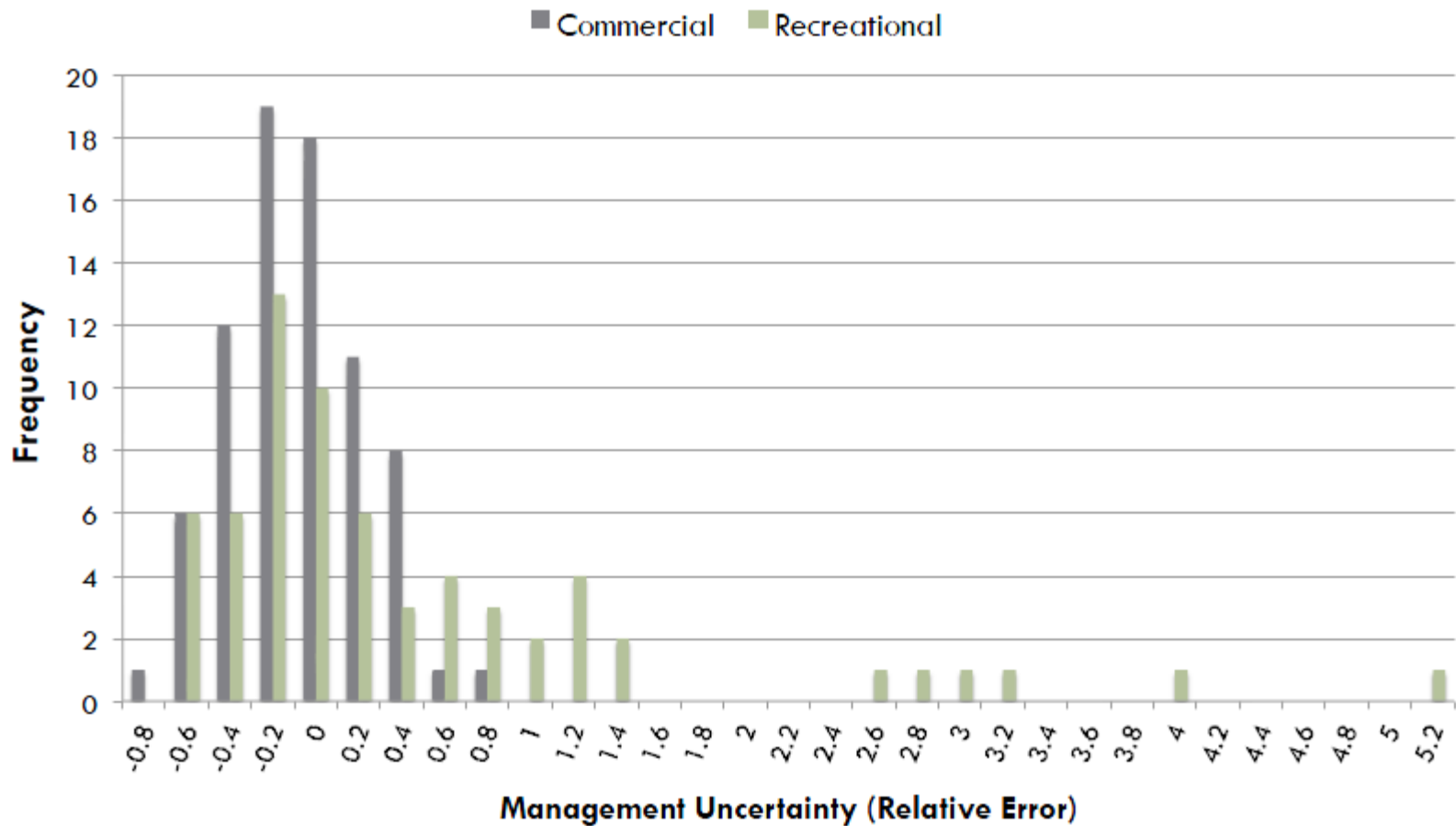


# Management Uncertainty (Shugart-Schmit 2012)





# Management Uncertainty (Shugart-Schmit 2012)



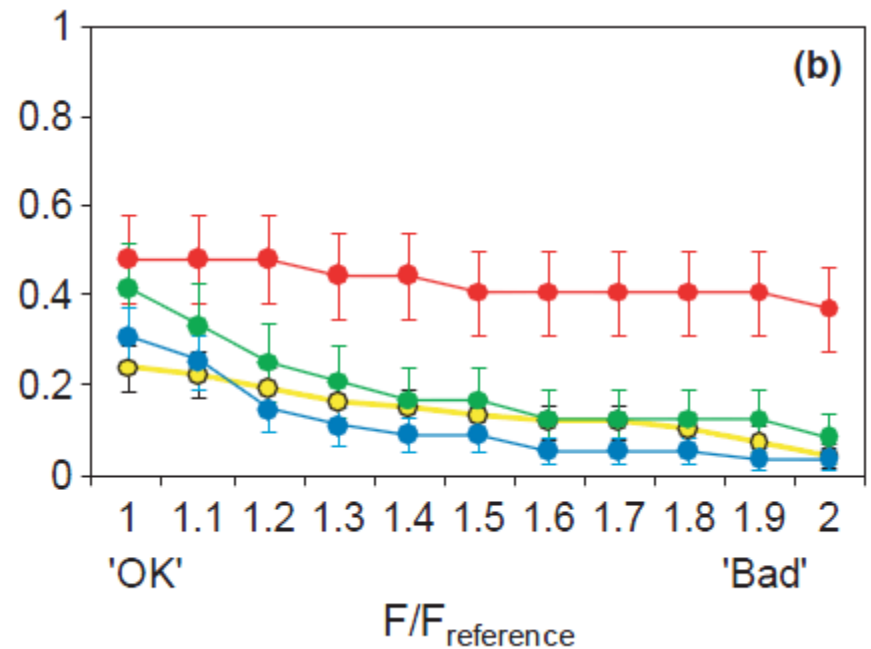
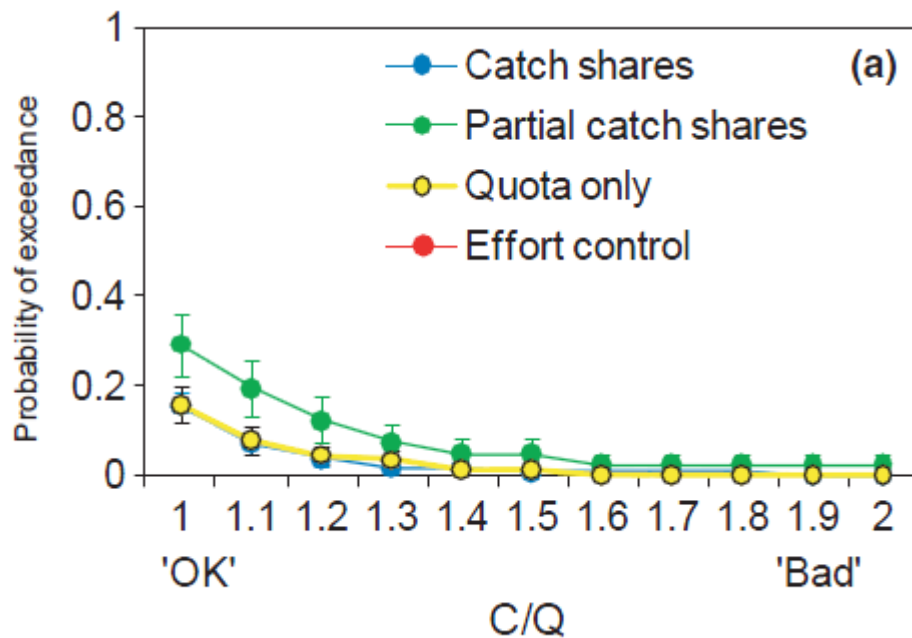


## Management Uncertainty (Melnychuk et al. 2012)

Proportion of stocks whose ratios of :

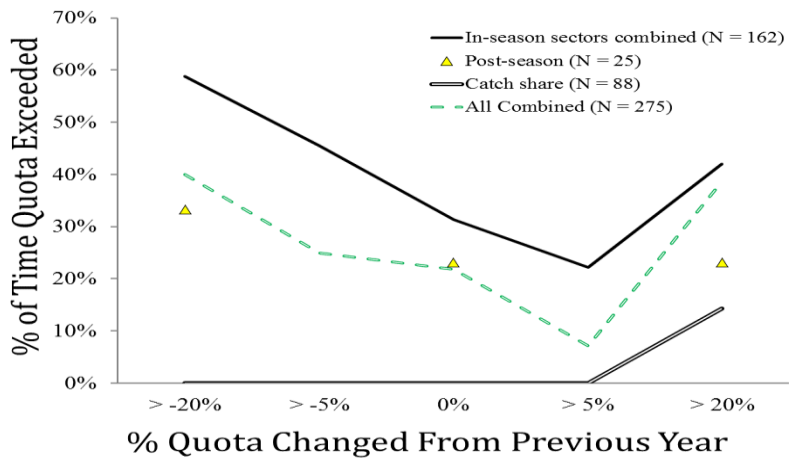
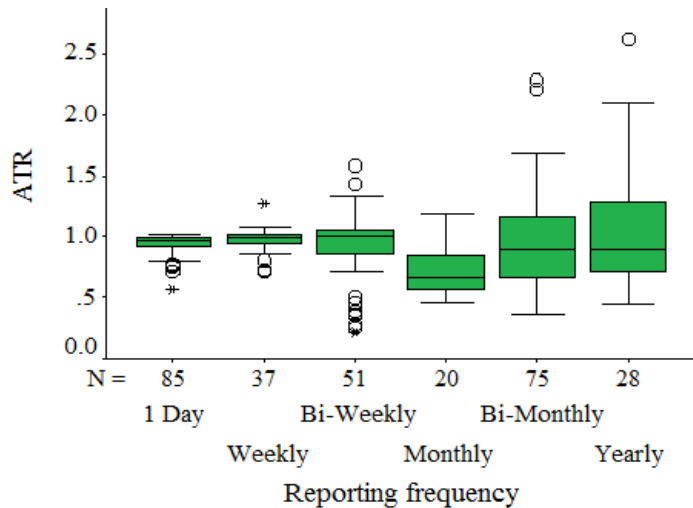
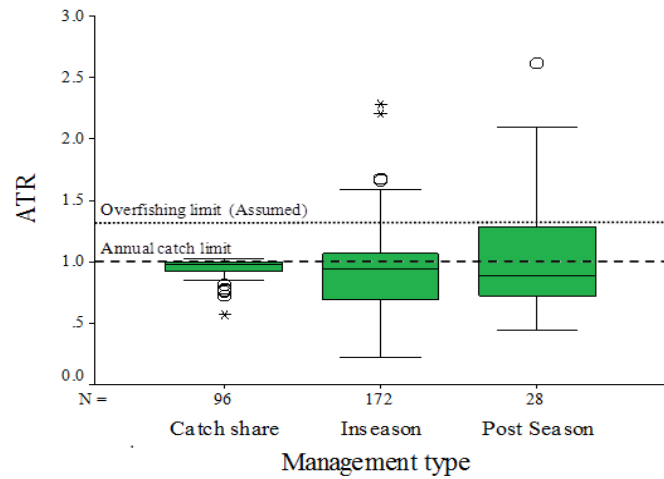
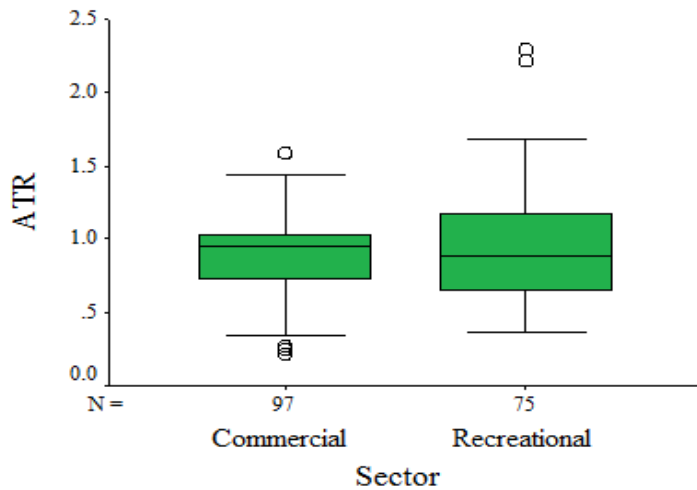
(a) catch/quota

(b) current exploitation rate/reference exploitation rate.





# Management Uncertainty (Patrick et al. 2013)





## Council Implementation

### ACL or ACT Reductions?

#### North Pacific – **No**

- Most are catch share fisheries with high observer coverage.



#### Pacific – **No**

- Mixture of catch share fisheries and in-season AMs to prevent ACL overages.



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**SEEM Analysis Factors**

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**Social Dimension:**

- 1 Perpetuates cultural and traditional values.
- 2 Provides symbolically-valued and culturally-important fish.
- 3 Bottomfishing is a unique highly skilled occupation that is waning and should be maintained.
- 4 Contributes to Hawaii's food security.

**Economic Dimension:**

- 1 There is economic reliance of other industries on the fishery (multiplier effect).
- 2 Financial security of the fishery and its participants is readily compromised by management decisions.
- 3 Provides a unique product (never frozen, fresh low carbon footprint signature fish in regional cuisine).

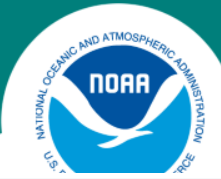
**Ecological Dimension:**

- 1 Uncertainty of ecosystem dynamics.
- 2 Shift of fishing pressure onto species outside Deep 7 upon closure of the Deep 7 fishery.

**Management Uncertainty Dimension:**

- 1 Unreported recreational landings.
  - 2 Commercial catch reporting, including misreporting.
  - 3 Weather influences ability to fish and productivity of fishing.
  - 4 Monitoring, including ability to forecast.
  - 5 Recreational discard mortality associated with high-grading.
- 





# Council Implementation

ACL/ACT Buffer Spreadsheet		version 4.1 - April 2011		Red Snapper	
sum of points	6.5			Recreational	
max points	9.5	Buffer between ACL and ACT (or ABC and ACL)		Unweighted	13
<b>Min. Buffer</b>	<b>0</b>	<b>min. buffer</b>	User adjustable	<b>Weighted</b>	<b>17</b>
Max Unw. Buff	19	max unwt. Buff			
<b>Max Wtd Buff</b>	<b>25</b>	<b>max wtd. buffer</b>	User adjustable		
Component	Element score	Element	Selection	Element result	
Stock assemblage	0	This ACL/ACT is for a single stock.	x	0	
	1	This ACL/ACT is for a stock assemblage, or an indicator species for a stock assemblage			
Ability to Constrain Catch	0	Catch limit has been exceeded 0 or 1 times in last 4 years		5.5	
	1	Catch limit has been exceeded 2 or more times in last 4 years	x		
		For the year with max. overage, add 0.5 pts. For every 10 percentage points (rounded up) above ACL Not applicable (there is no catch limit)		4.5	
Apply this component to recreational fisheries, not commercial or IFQ fisheries					
Precision of Landings Data Recreational	0	Method of absolute counting		1	
	1	MRIP proportional standard error (PSE) <= 20	x		
	2	MRIP proportional standard error (PSE) > 20 Not applicable (will not be included in buffer calculation)			
Apply this component to commercial fisheries or any fishery under an IFQ program					
Precision of Landings Data Commercial	0	Landings from IFQ program		not applicable	
	1	Landings based on dealer reporting			
	2	Landings based on other Not applicable (will not be included in buffer calculation)	x		
Timeliness	0	In-season accountability measures used or fishery is under an IFQ	x	0	
	1	In-season accountability measures not used			
				Sum	6.5
Weighting factor					
	Element weight	Element	Selection	Weighting	
Overfished status	0	1. Stock biomass is at or above $B_{OY}$ (or proxy).		0.3	
	0.1	2. Stock biomass is below $B_{OY}$ (or proxy) but at or above $B_{MSY}$ (or proxy).			
	0.2	3. Stock biomass is below $B_{MSY}$ (or proxy) but at or above minimum stock size threshold (MSST).			
	0.3	4. Stock is overfished, below MSST.	x		
	0.3	5. Status criterion is unknown.			







## Council Implementation

<b>Stock</b>	<b>MRIP PSE</b>	<b>ACT (% of ACL)</b>
Barjack	76	24%
Margate	46	54%
Red hind	77	50%
Cubera snapper	74	25%
Yellowedge grouper	86	14%
Silk snapper	69	31%
Atlantic spadefish	38	50%
Gray spadefish	11	50%
Gray snapper	24	50%
Rock hind	61	39%
Tomtate	31	50%
White grunt	21	50%
Scamp	47	50%
Gray triggerfish	20	50%





## Council implementation

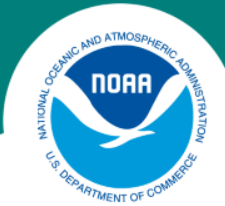
### ACL or ACT Reductions?

#### Mid-Atlantic – Yes

#### Species Monitoring Committees

- ACT Control rules (TAC or TAL)
- Examples (Amendment 17 – 2013 Specs):
  - Atlantic mackerel ACT = 90% of ACL
  - All other stocks had ACT = ACL, because actual harvest < ACL in the past.





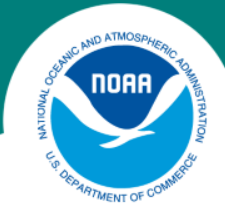
## Council Implementation

### ACL or ACT Reductions?

#### New England – Yes

- Uses a range of ACL and ACT specification options
- Examples:
  - Herring:  $ACL = 95\%$  of ABC
  - Monkfish – SMA:  $ACT = 93\%$  of ACL
  - Monkfish – NMA:  $ACT = 86.5\%$  of ACL
  - Small-mesh Multispecies:  $ACL = 95\%$  of ABC
  - Northeast skate complex:  $ACT = 75\%$  of ACL





## Summary

- The NS1 guidelines recommend that Councils account for management uncertainty through the use of ACTs.
- Management uncertainty can vary among fisheries and within fisheries (i.e., sectors) due to a number of factors (e.g., management regime, reporting frequency, stability, etc.).
- Council's have devised a number of ways to account for management uncertainty, usually by adjusting the ACL downward from ABC or specifying an ACT.



# Questions?