

Recovery strategies: science, enforcement, allocation and governance

Joseph E. Powers

and

Melissa Hedges Monk

*Department of Oceanography and Coastal Sciences
Louisiana State University
USA*

Organization

- 1) Short review of selected case histories
- 2) Questions that need to be asked
- 3) Example Simulations of the governance/enforcement /allocation
- 4) Discussion and Conclusions

Case studies

Swordfish

King Mackerel

Bluefin tuna

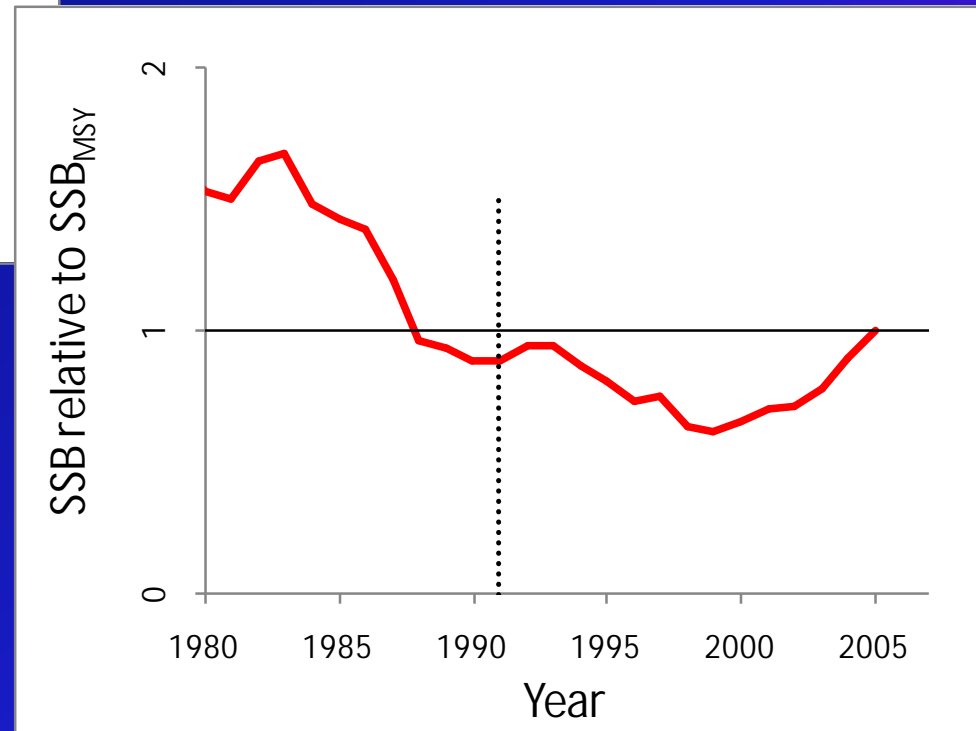
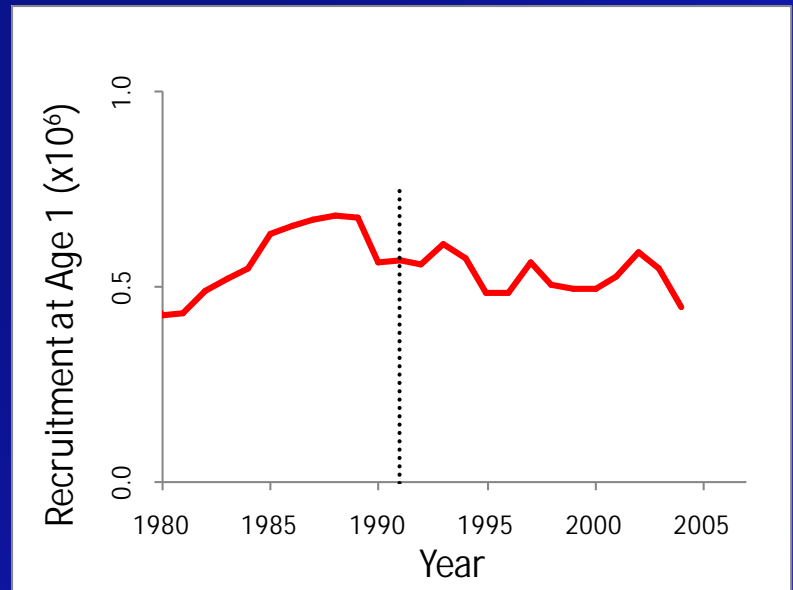
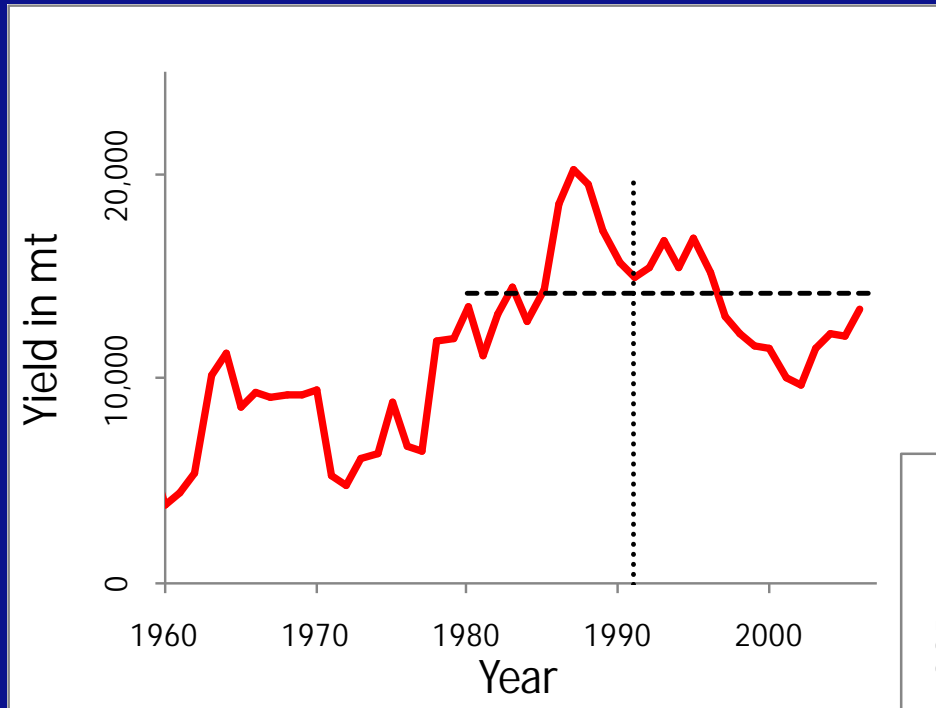
1) science

2) enforcement

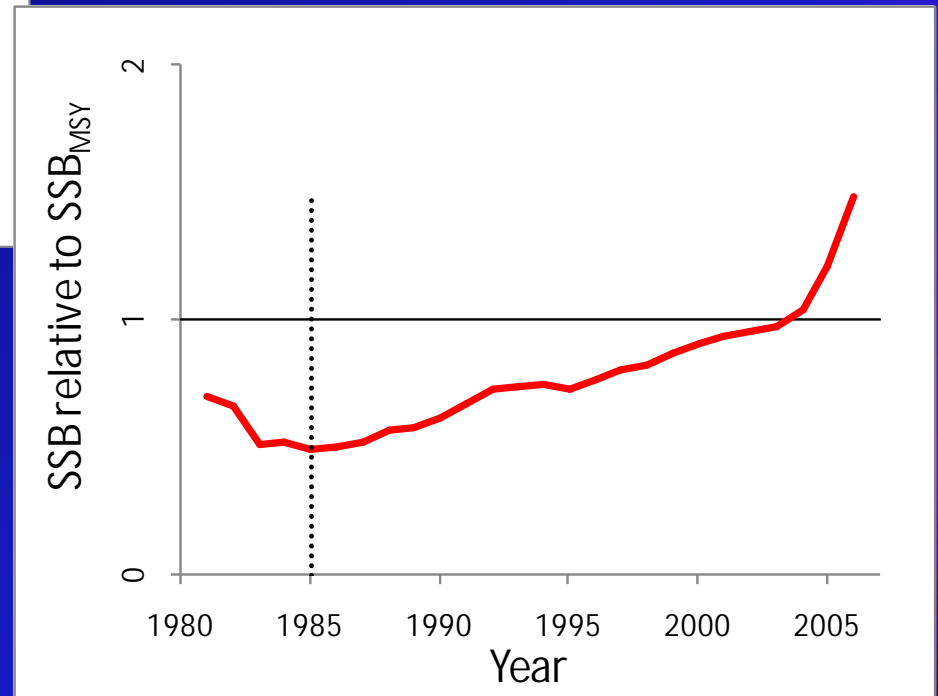
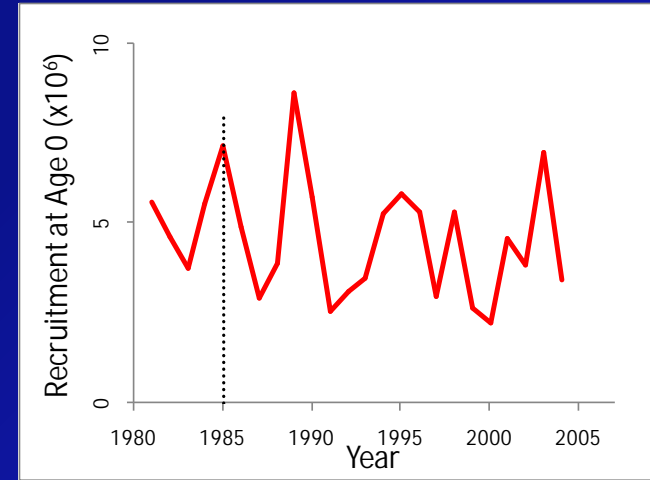
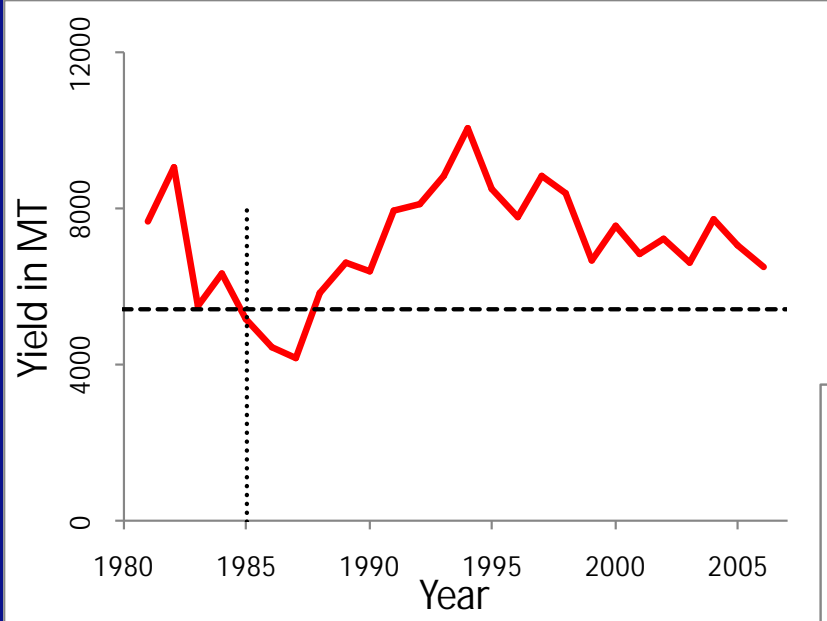
3) allocation

4) governance

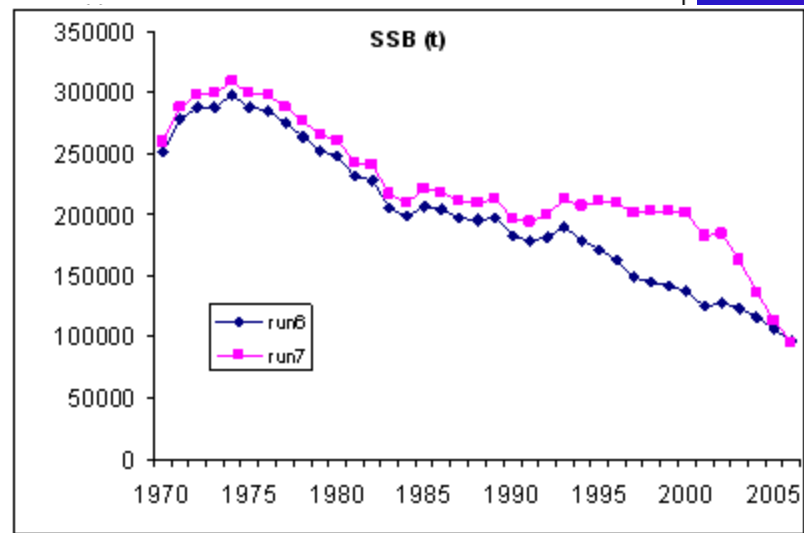
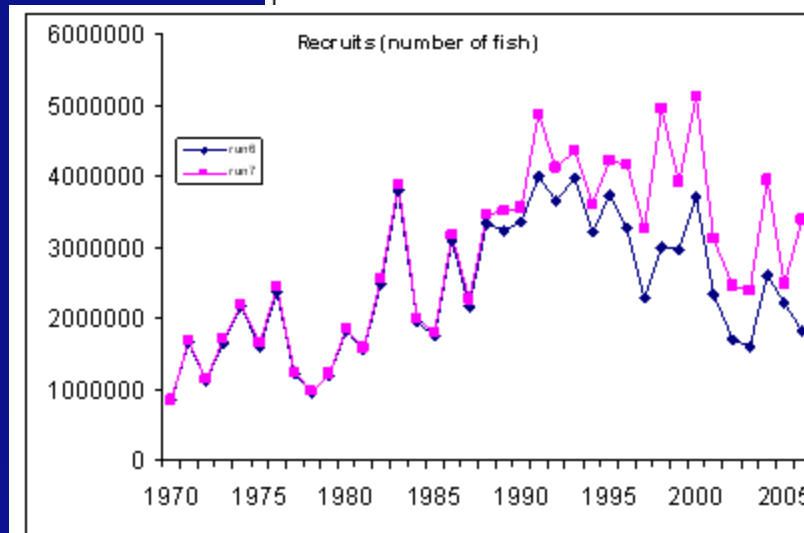
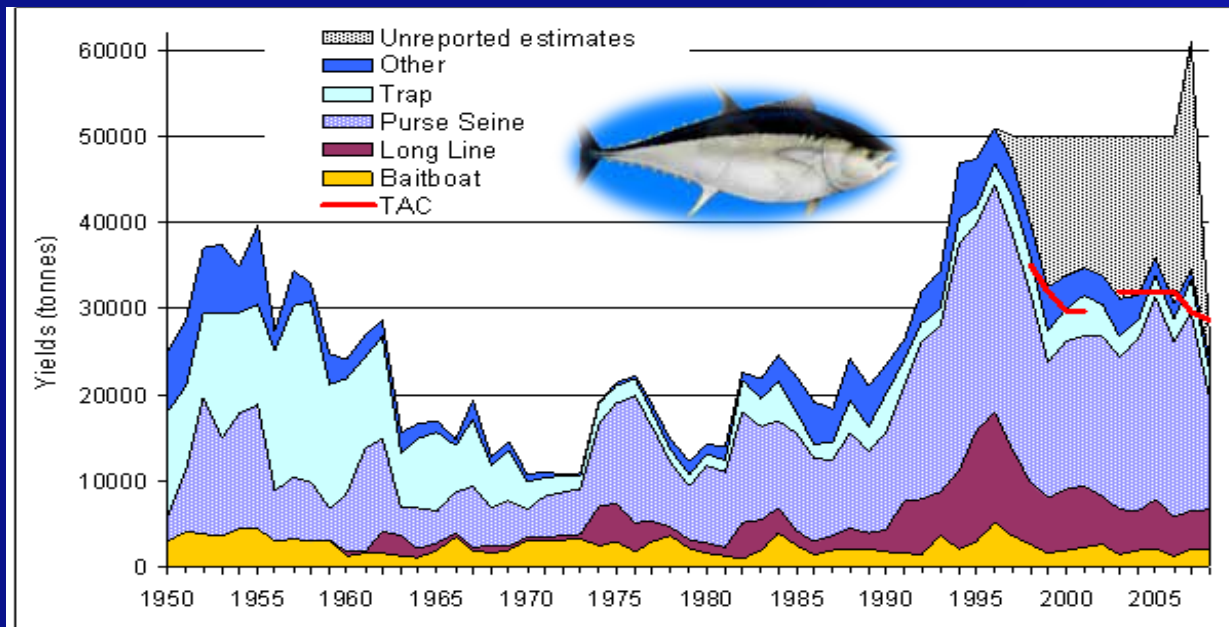
North Atlantic Swordfish



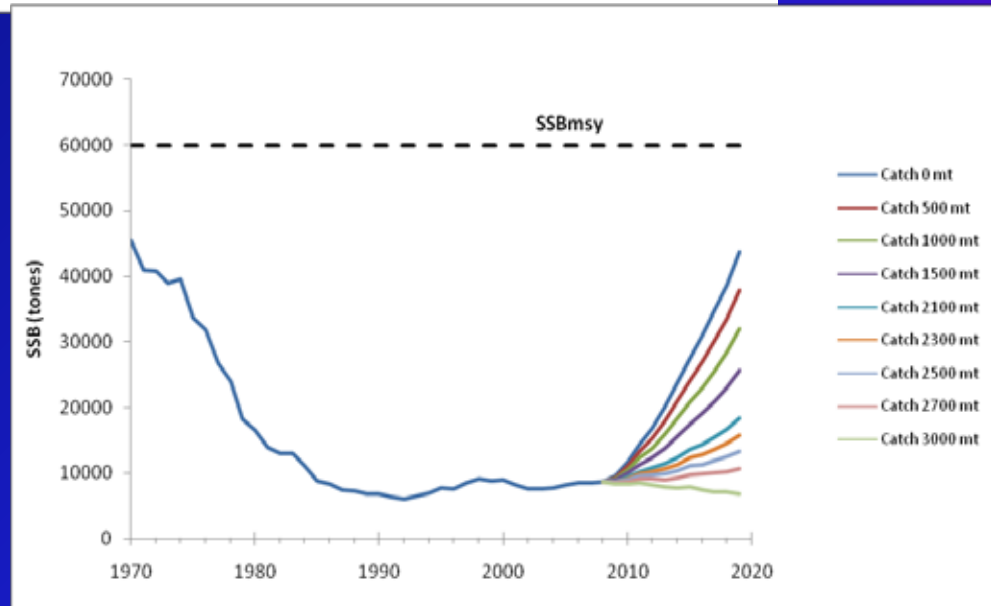
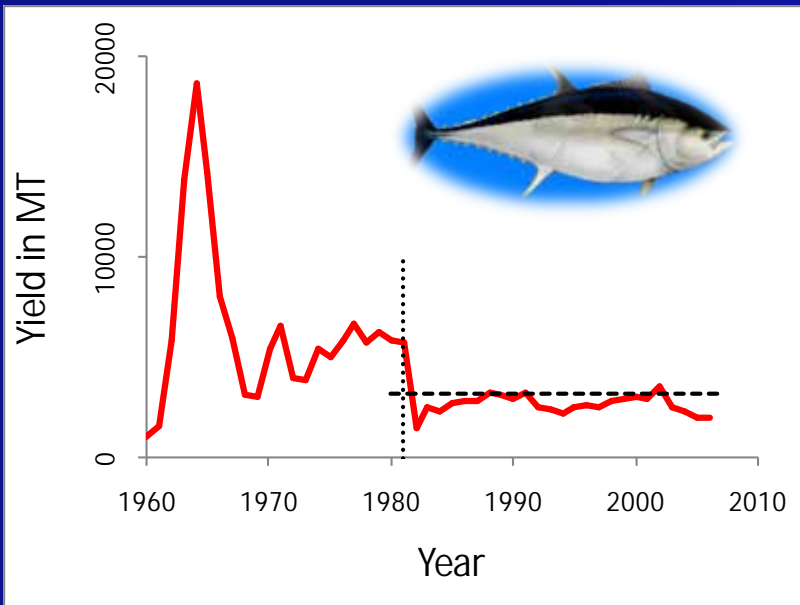
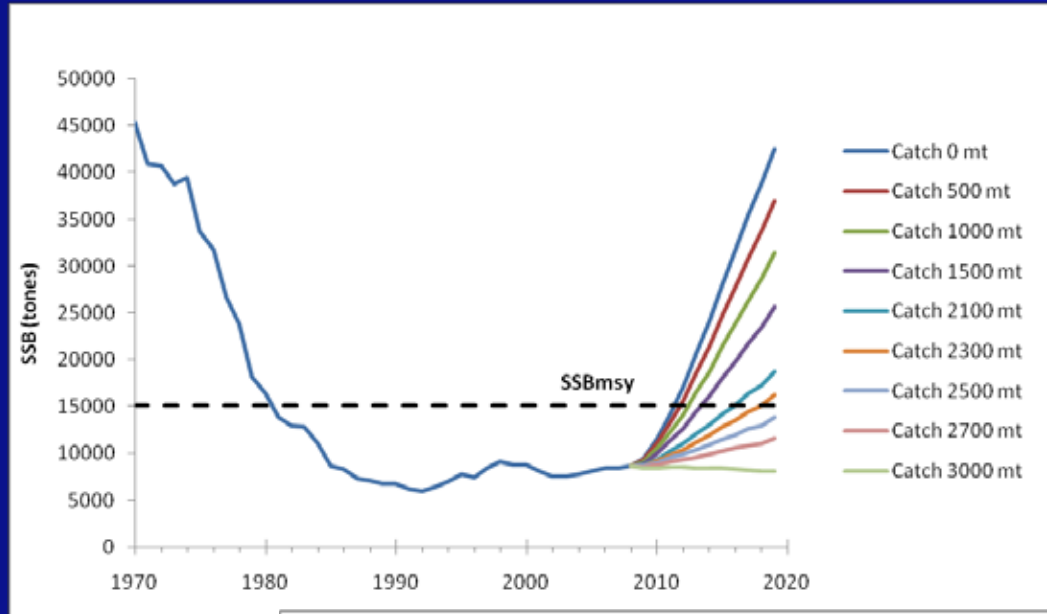
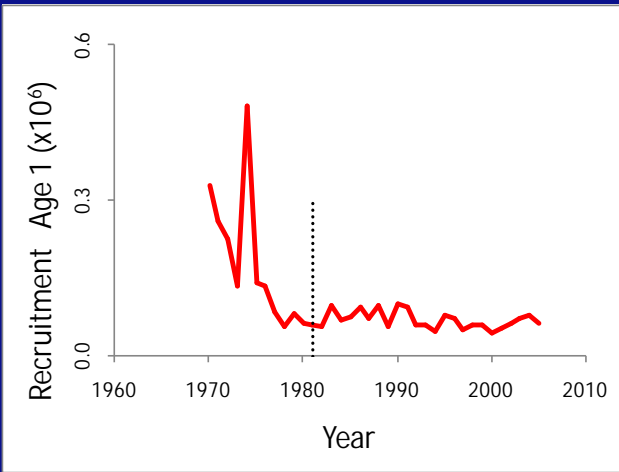
Gulf of Mexico King Mackerel



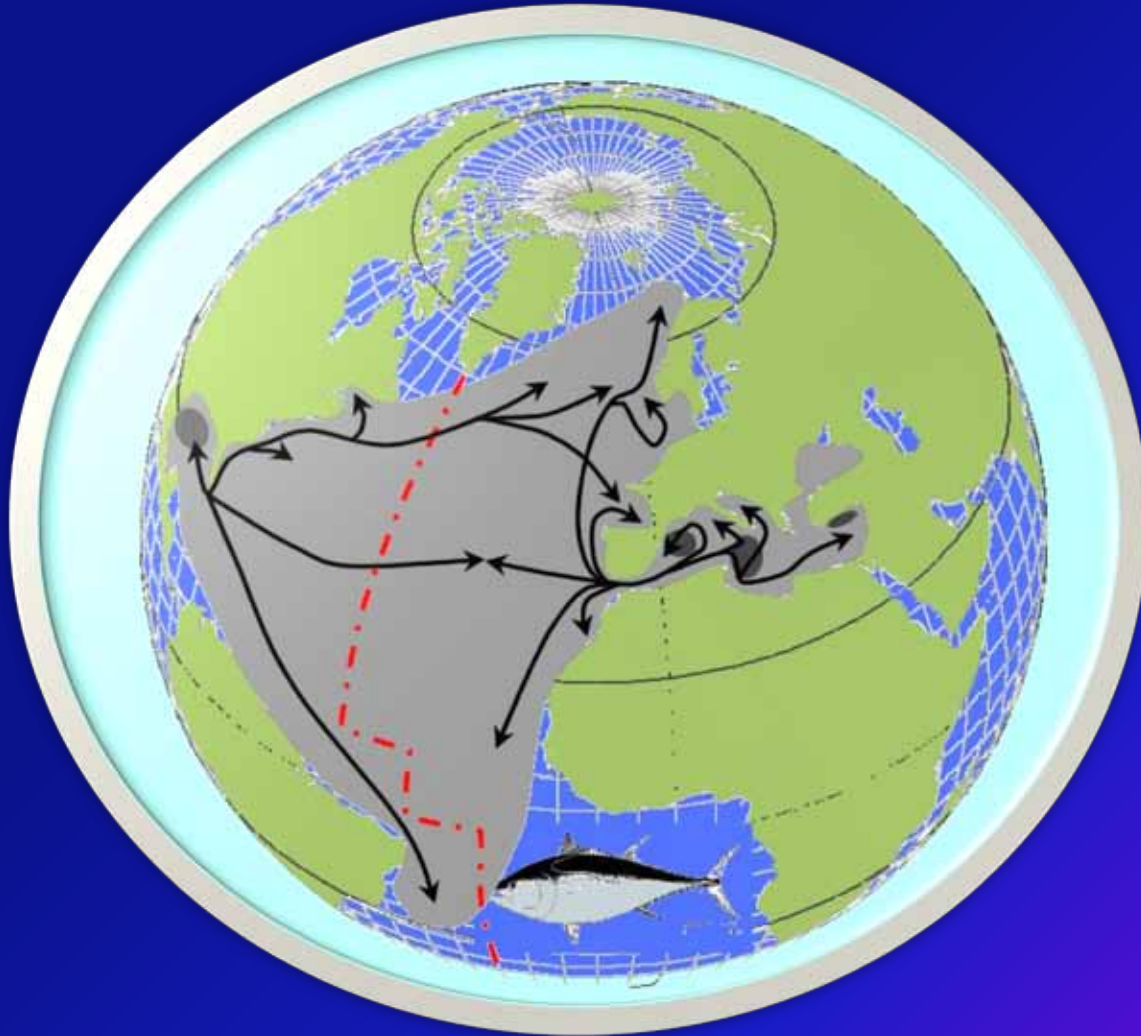
Bluefin Tuna – Eastern Atlantic and Mediterranean



Bluefin Tuna – Western Atlantic



Bluefin Tuna – Mixing



What Happened? Why was the Stock Overfished?

Yes, fishing mortality rates were too high,
but

Which sectors contributed most?

Which sectors have historical participation?

Why was governance unresponsive?

What were the penalties for transgressions?

What Happened? Why was the Stock Overfished?

Yes, fishing mortality rates were too high,
but

Since you know it's overfished, the science is
probably at least adequate

What are the science issues for credibility
affecting the overfished determination?

What are the science issues for designing
recovery strategies?

Simulations

- 1) Assume assessments perfect
- 2) Two fishing sectors (different selectivities)
- 3) Management Policy, e.g. $F = F_{msy} * B / B_{msy}$, if $B < B_{msy}$; else $F = F_{msy}$
- 4) Monitoring decisions for each sector: a) CV (variability in reported; b) bias in reporting (misreporting, lying, ignoring)
- 5) Penalties (paybacks), non-compliance consequences
- 6) Age-structured model, VB growth, BH recruits: $h=0.7$, low M at age, 40% CV on recruitment deviations

Simulations

- 7) Nash bargaining solutions for: a) deviation from scientific advice ($S=1 \pm$ deviations); and b) allocated shares of the TAC ($p_1+p_2=1$)

Parameters:

“power” or influence ;

fishing sectors 1 and 2

“others” , i.e. government, NGO's, and/or sector's without access who might desire it

sector power derived from %catch;

“others” power influenced by depletion ($1-ssb/ssb_0$) and by the accumulation of power over time as the recovery plan is implemented.

Simulations

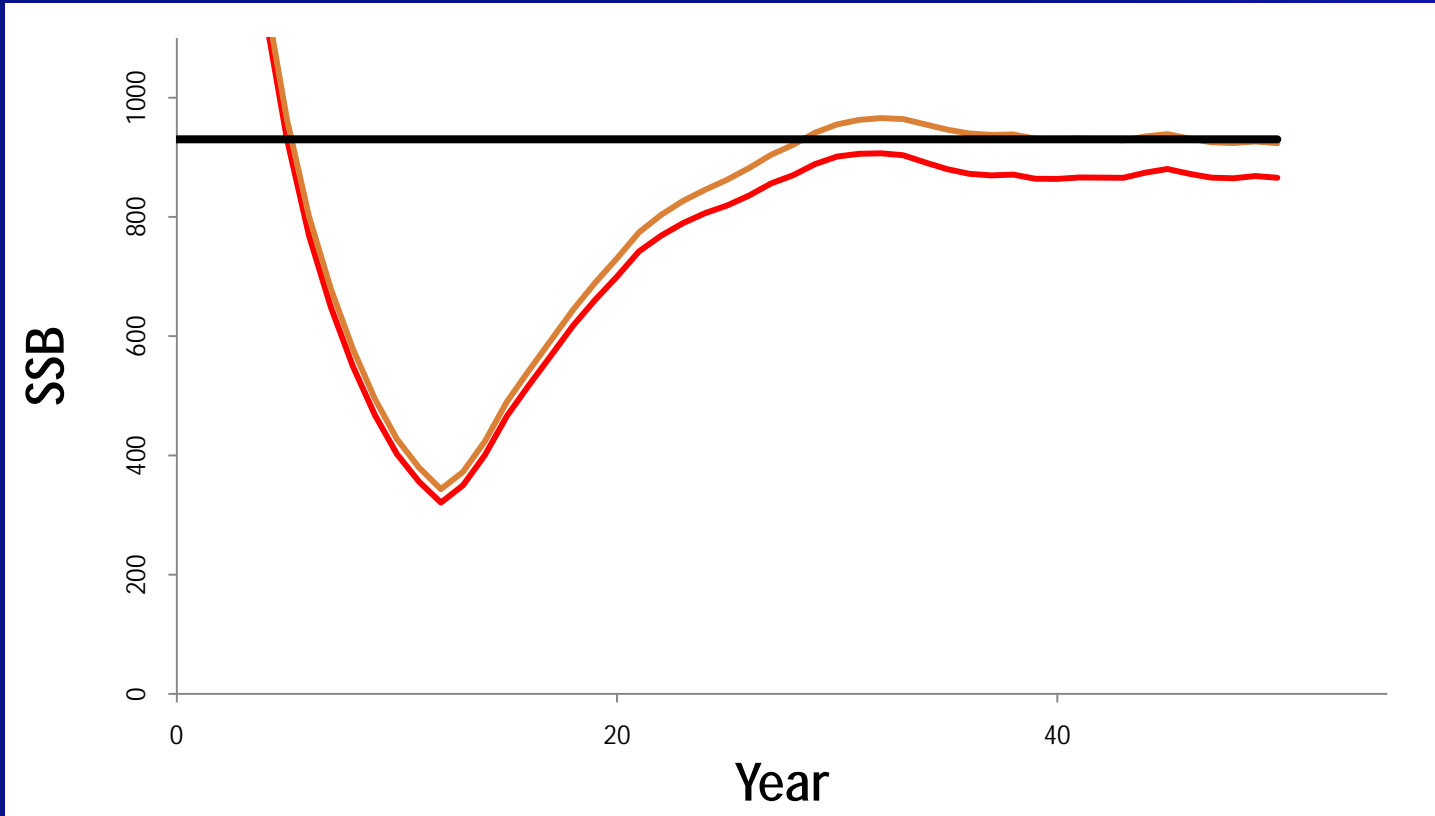
7) Nash bargaining solutions for: a) deviation from scientific advice ($S=1 \pm$ deviations); and b) allocated shares of the TAC ($p_1+p_2=1$)

TAC Sector 1 = $ABC * S * p_1$ –penalties for past overages of 1

TAC Sector 2 = $ABC * S * p_2$ –penalties for past overages of 2

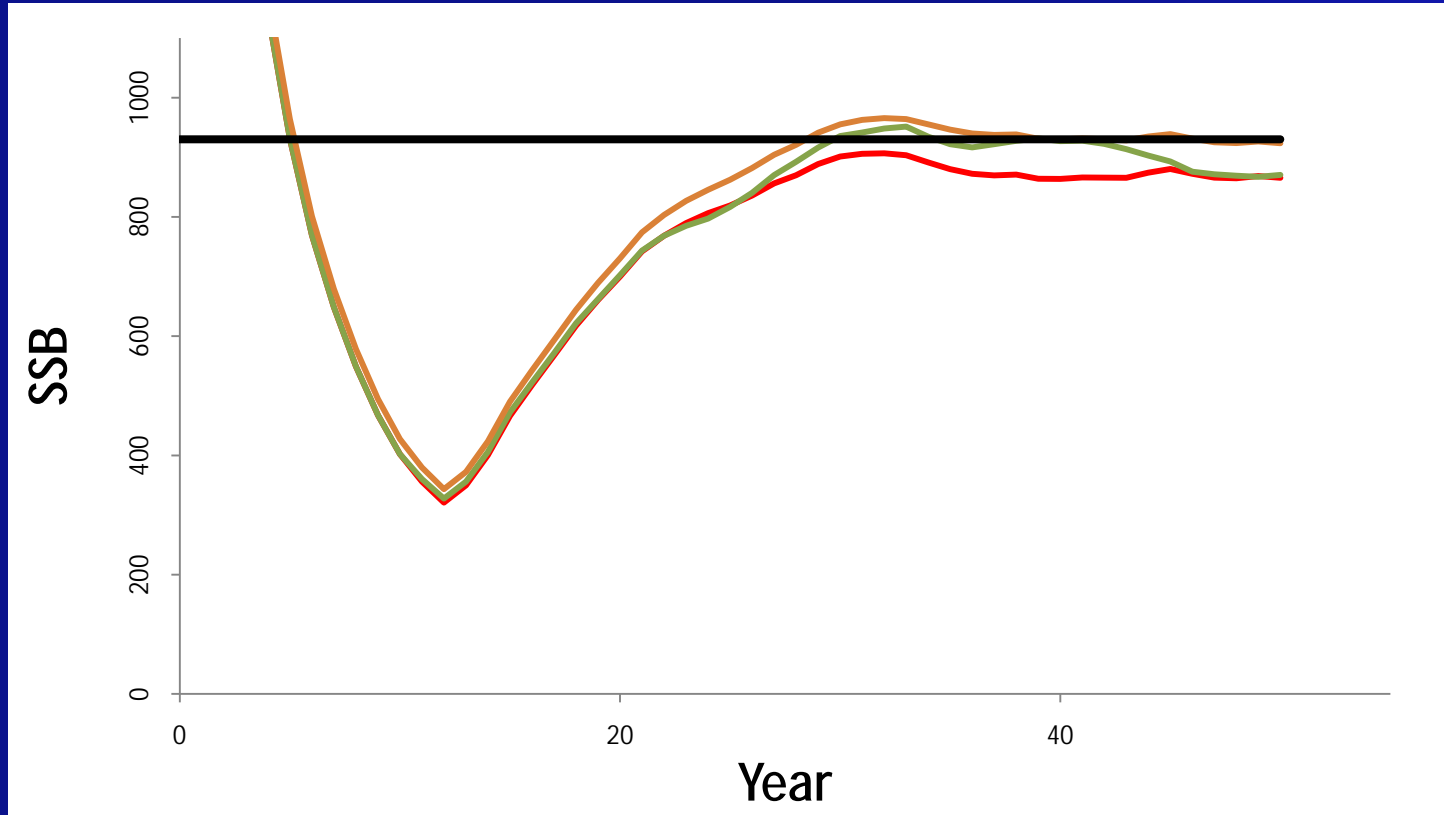
Simulations

Perfect implementation



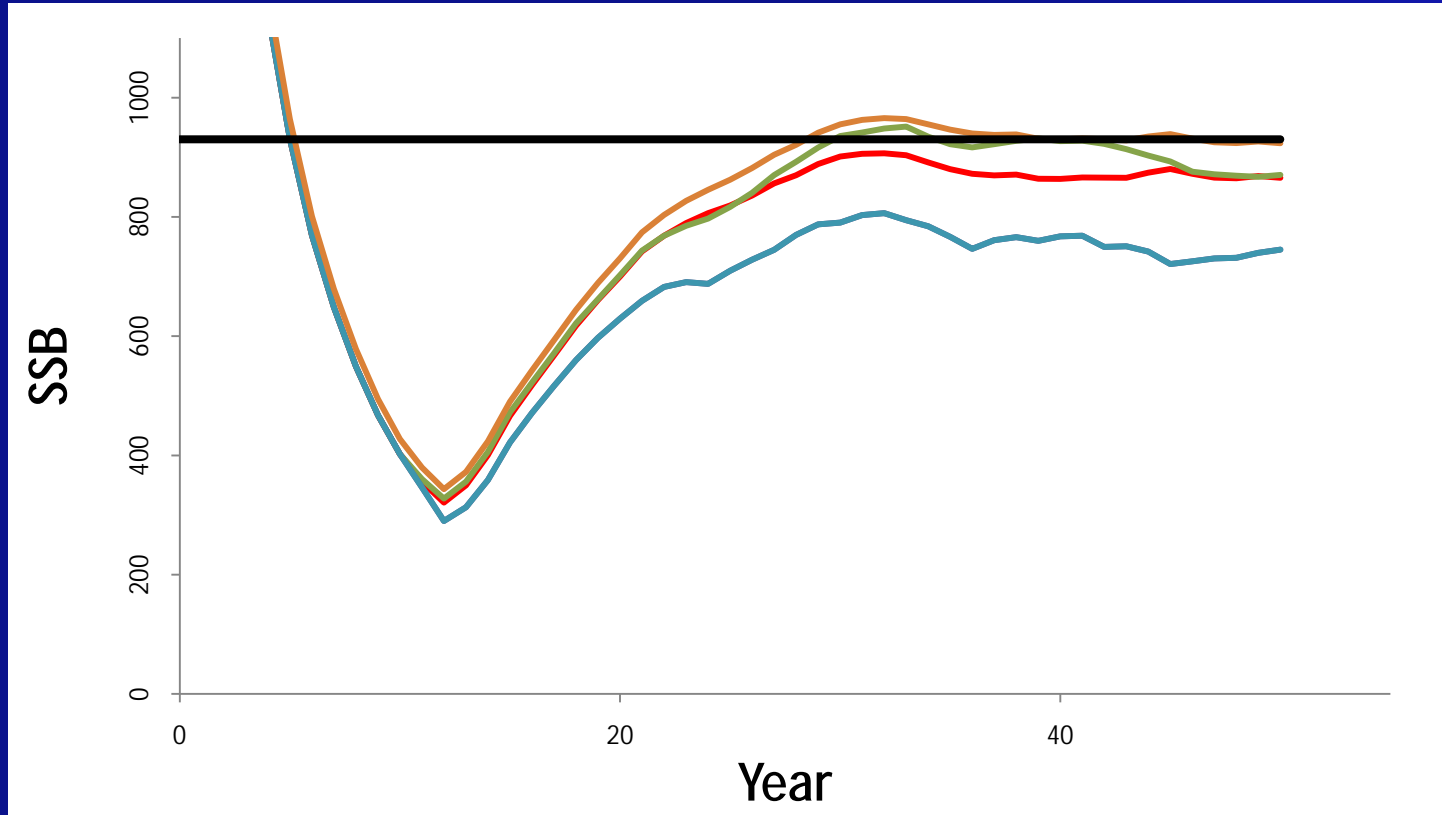
Perfect implementation Versus Bargaining Solution

Simulations



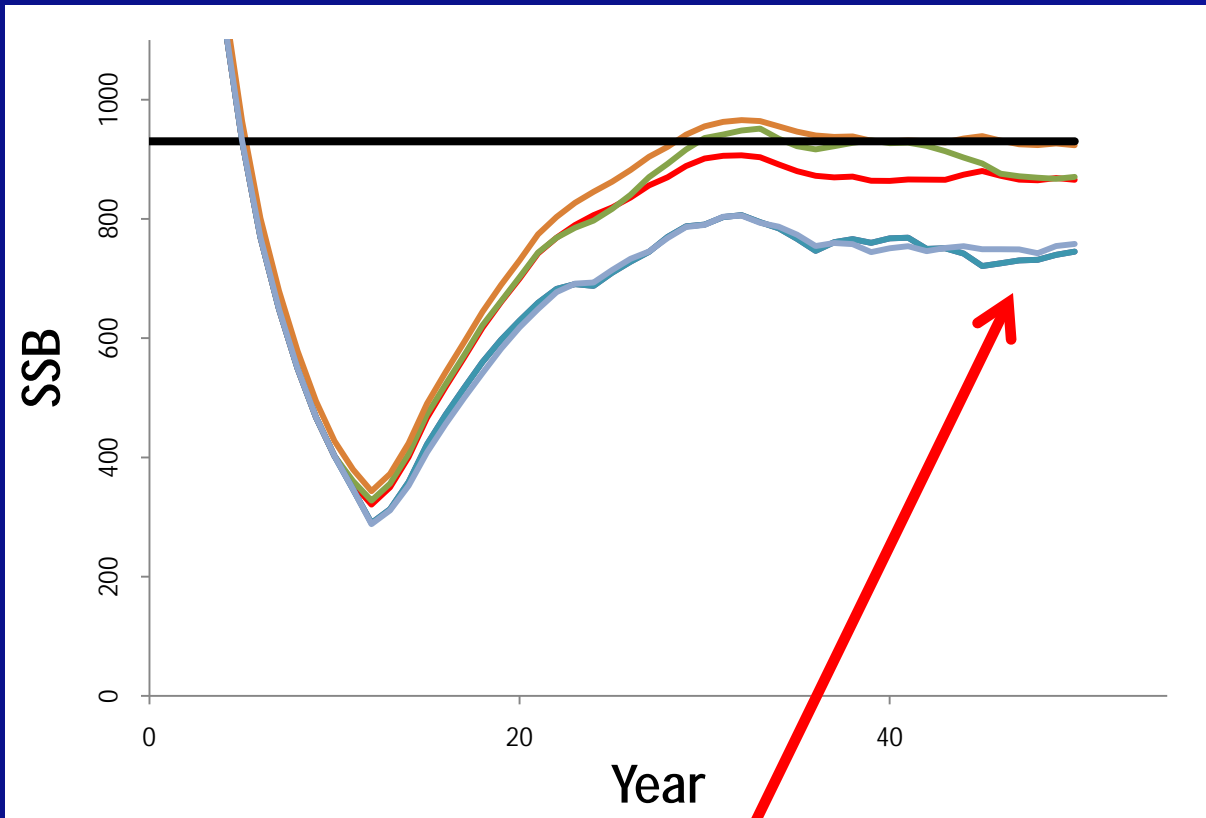
Adding 10% random misreporting doesn't do much

Simulations



Adding 10% random misreporting doesn't do much,
But adding 20% underreporting DOES.

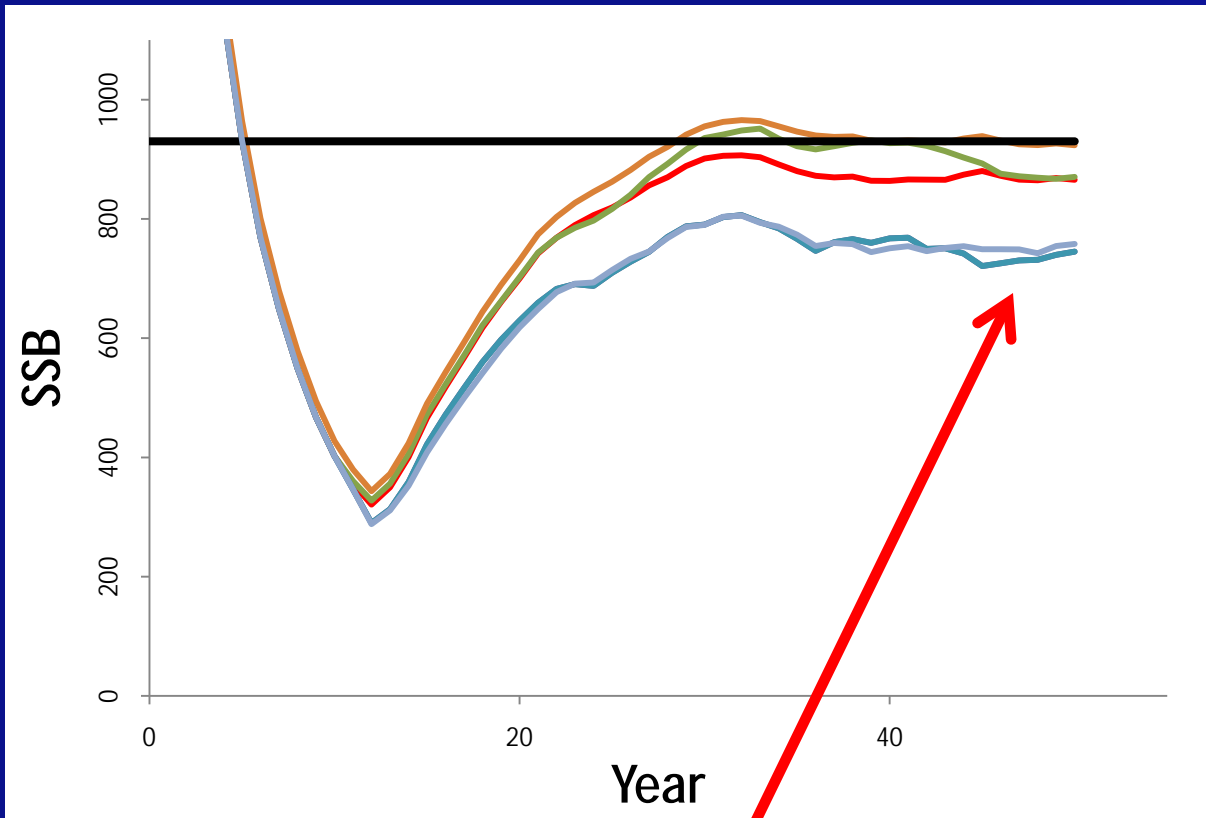
Simulations



But bargaining dynamics eventually squeezed one fishing sector out!

Mis- and Under-reporting : one with bargaining allocation
The other with a fixed allocation

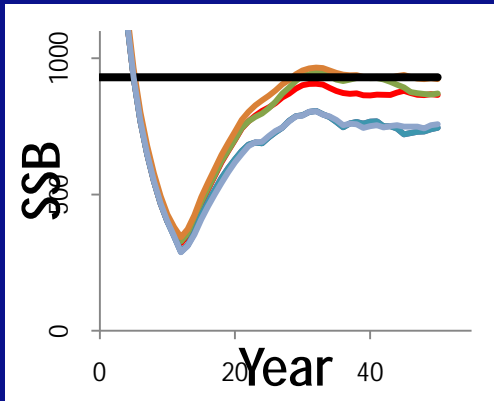
Simulations



But bargaining dynamics eventually squeezed one fishing sector out!

Mis- and Under-reporting : one with bargaining allocation
The other with a fixed allocation

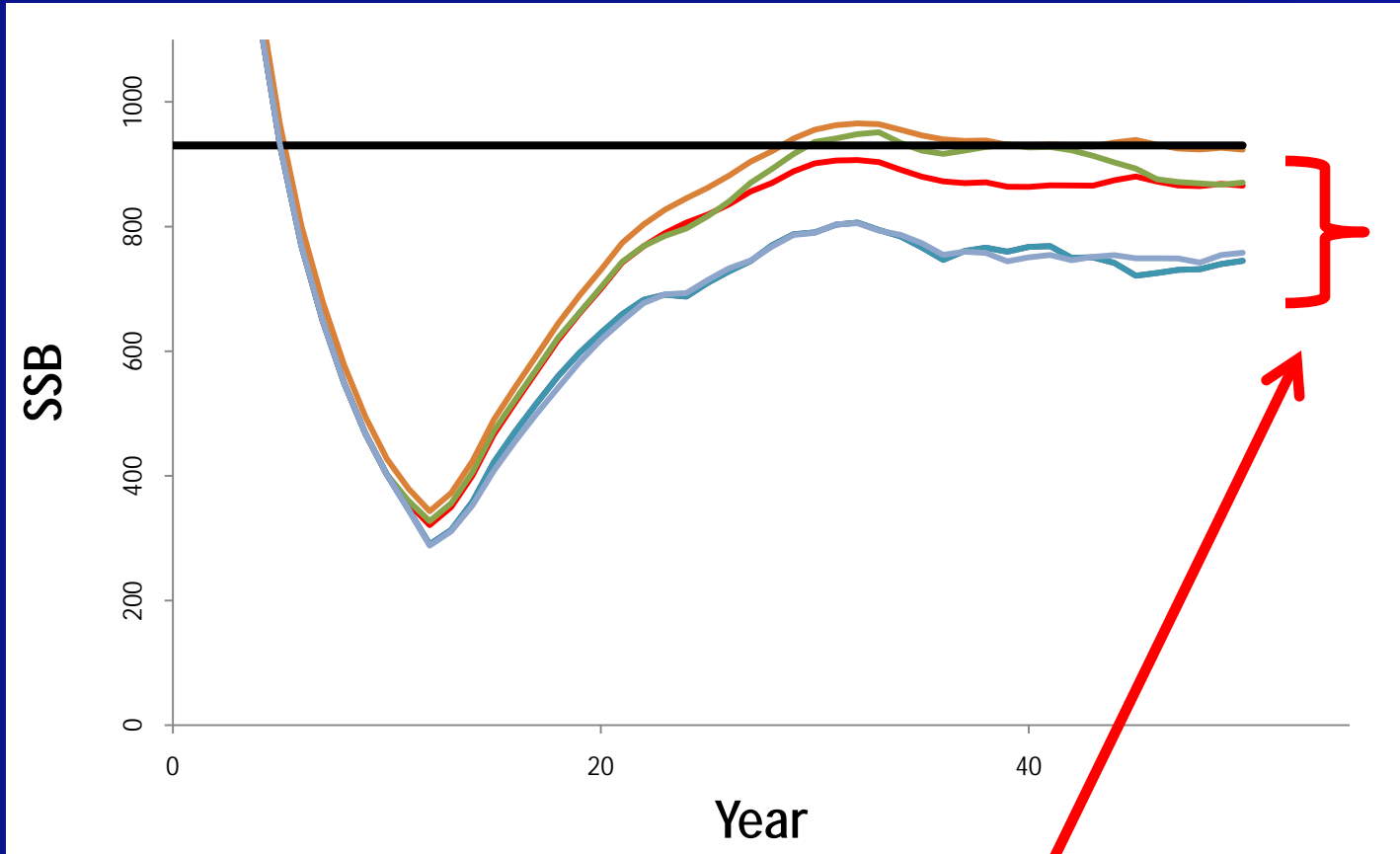
Simulations --- Other results



If one Sector 1 starts to underreport , then as the underreporting gets larger eventually it is Sector 2's best strategy to underreport too.

Mis- and Under-reporting :

Simulations --- Other results



In these simulations the "Others" have less influence than the fishing sectors ,especially at the beginning of recovery... thus, an undershoot

Suggestions from the case histories and the modeling.....

Allocation Axioms

- 1) There's no such thing as a fixed long term recovery plan
- 2) There's no such thing as a permanent allocation
- 3) All science uncertainties are manifested as allocation issues (corollary: there's an opportunity to reassign blame)
- 4) *De facto* sector allocations (Gear, Nation, State, etc) that were accepted during overfishing are probably not acceptable during recovery
- 5) Recovery provides opportunities for sectors to improve their allocation (with concomitant losers)
- 6) Underreporting is the hidden reallocation strategy

Why won't the stock recover?

fishing mortality rates are too high, yes, but

....

Probably there is someone(s) who will be better off WITHOUT recovery

Find out who they are; what is the game for which it is their best strategy to overexploit?

Develop processes to limit the influence;

What does that mean?

F policy (control rule) ... formalize ...precautionary

Strengthen influence of govt, NGO's or
future fishing participants Political will

Establish compliance and accountability
measures

Research support on key recovery options

To paraphrase...

Recoveries are like sausage

You really don't want to know what goes
into them