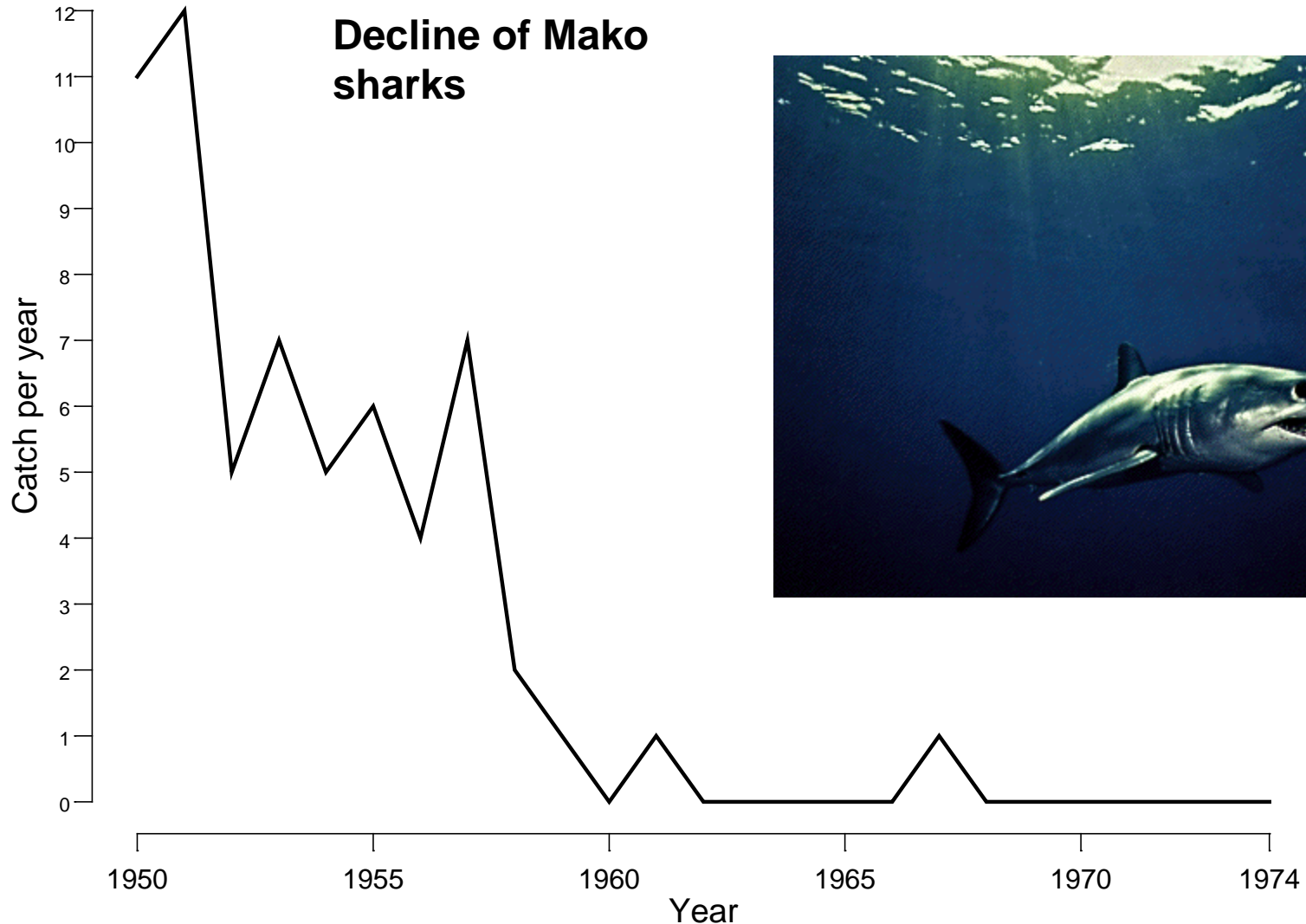


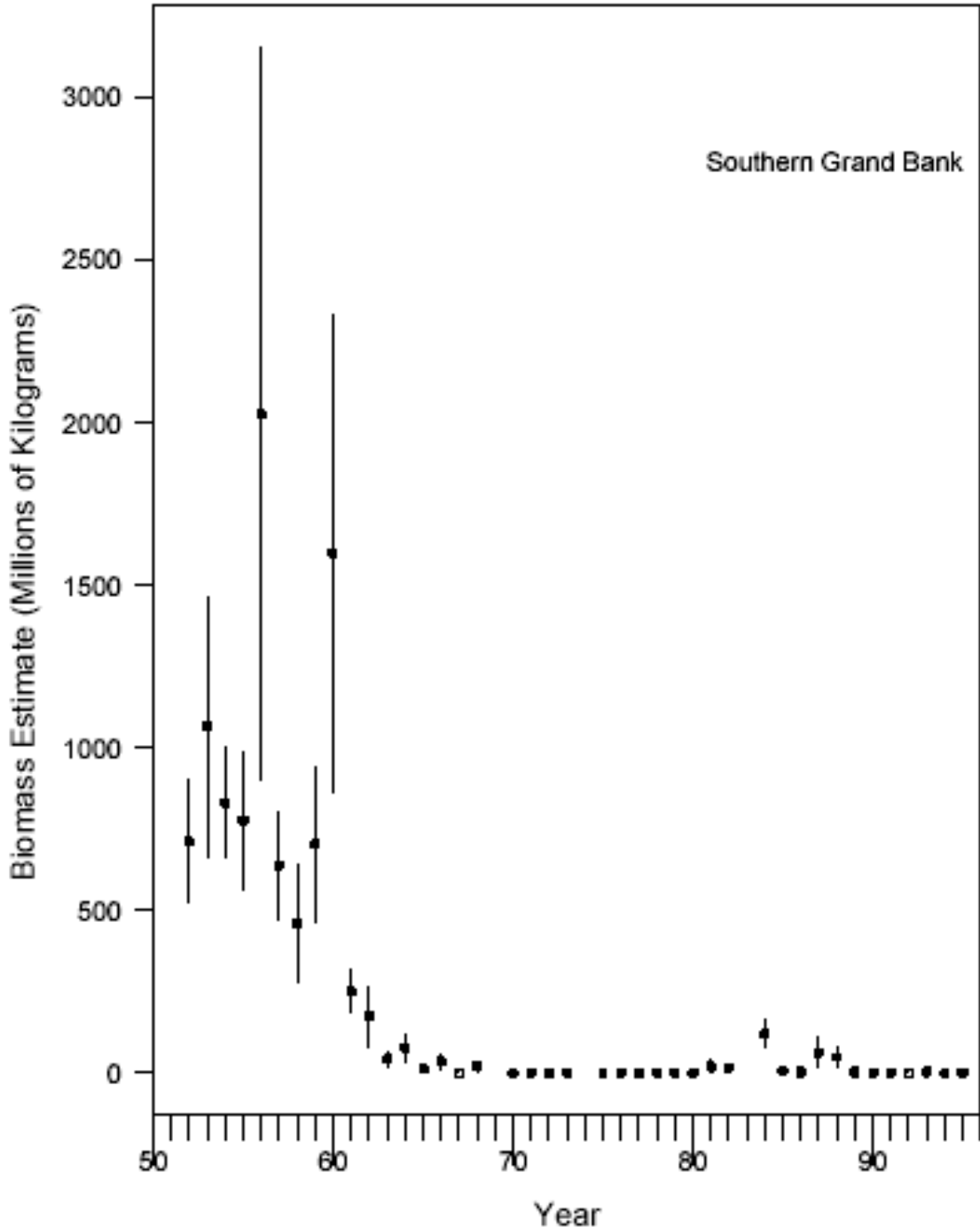
RAM's 12 step plan: Reach the heart through mathematics.

# Step 1: You get mad as Hell.



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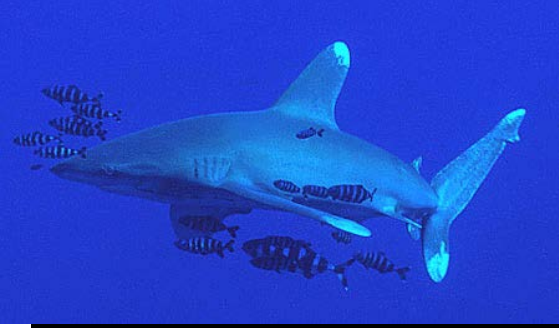
Some cod photo's deleted to allow file to be emailed.



Southern Grand Bank

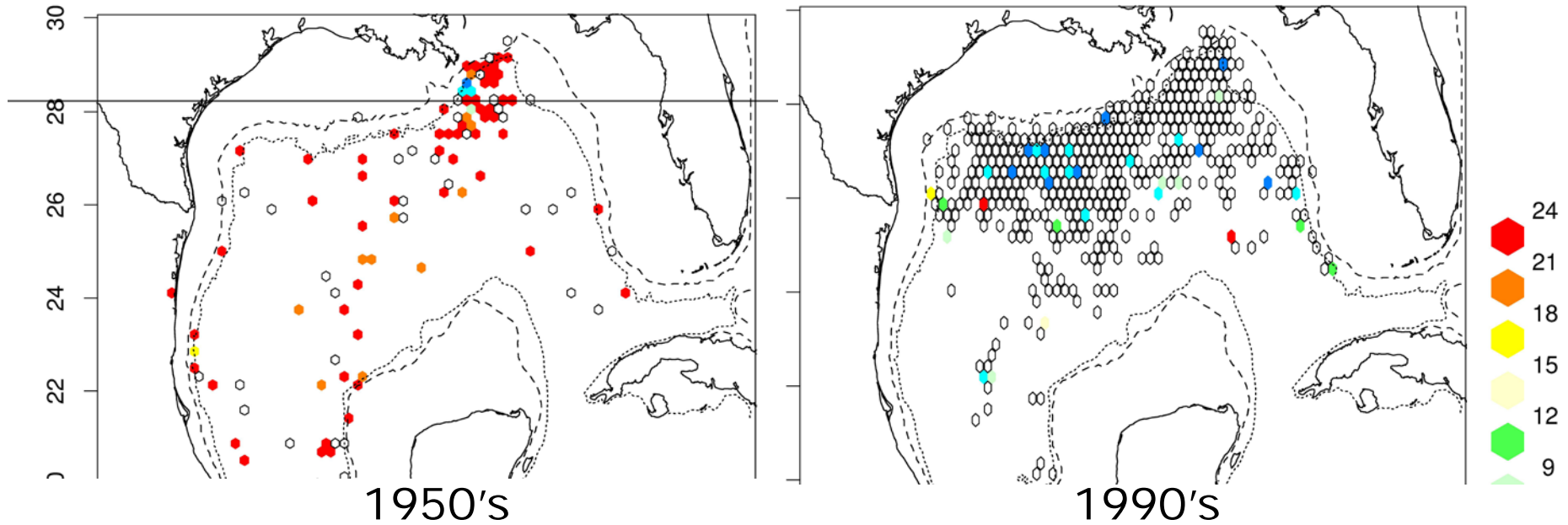
Loss of haddock on the Grand Banks – data from research surveys

What was the most common large animal (>50 Kg) in the world? (perhaps this one was)



# Loss of sharks in the Gulf of Mexico

300 fold decline – no one noticed



Oceanic Whitetip captures per 10,000 hooks

## Step 2: Intellectual honesty and independence.

- “Tame” scientist: “Think what they are told to think even before they told to think it”.
- We are a tribal species, and anyone who believes that thinking independently is easy, has simply never tried it.

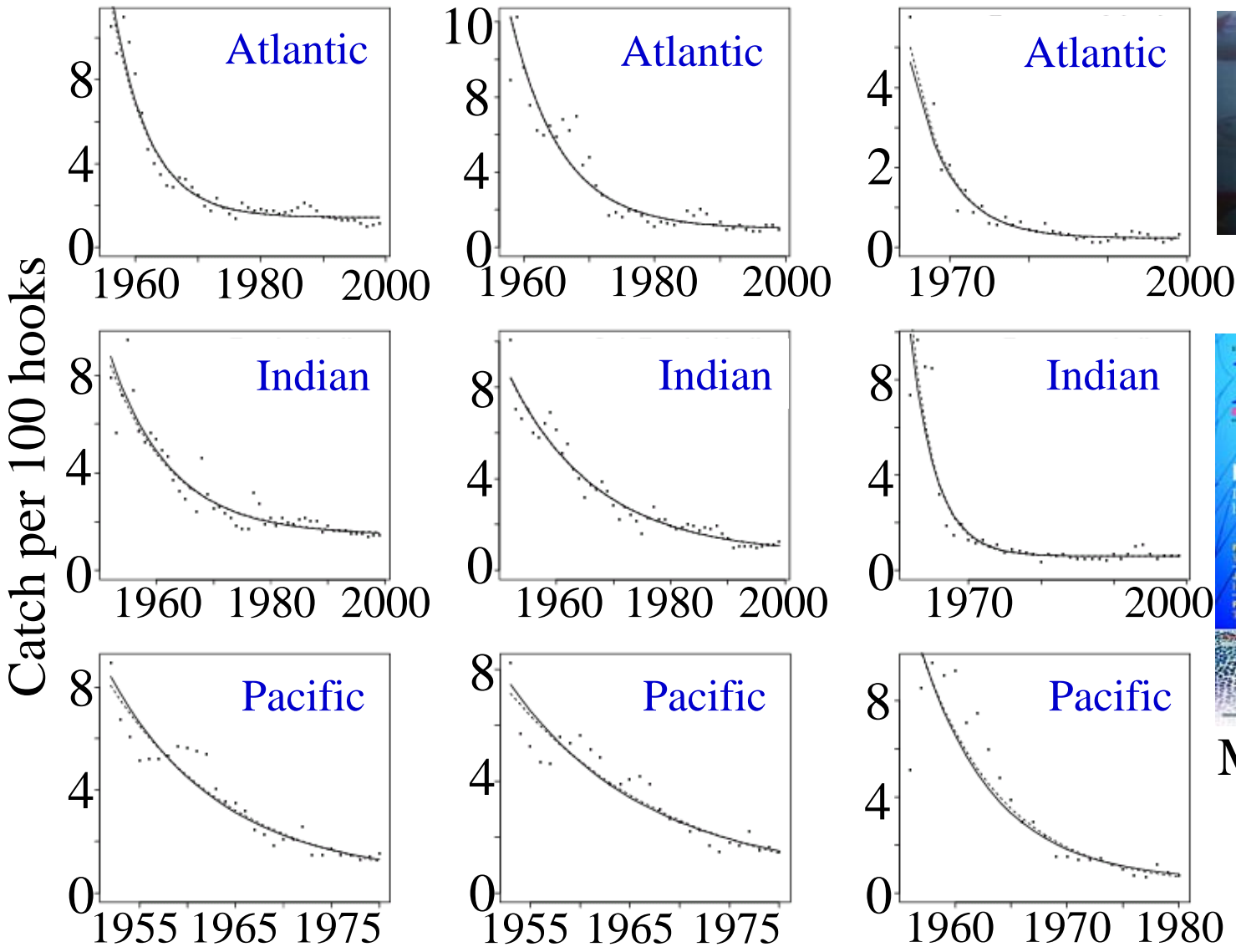
# It is only the data that matters

- The fact that 100 entrenched scientist say you are wrong is simply not information unless they have the data.





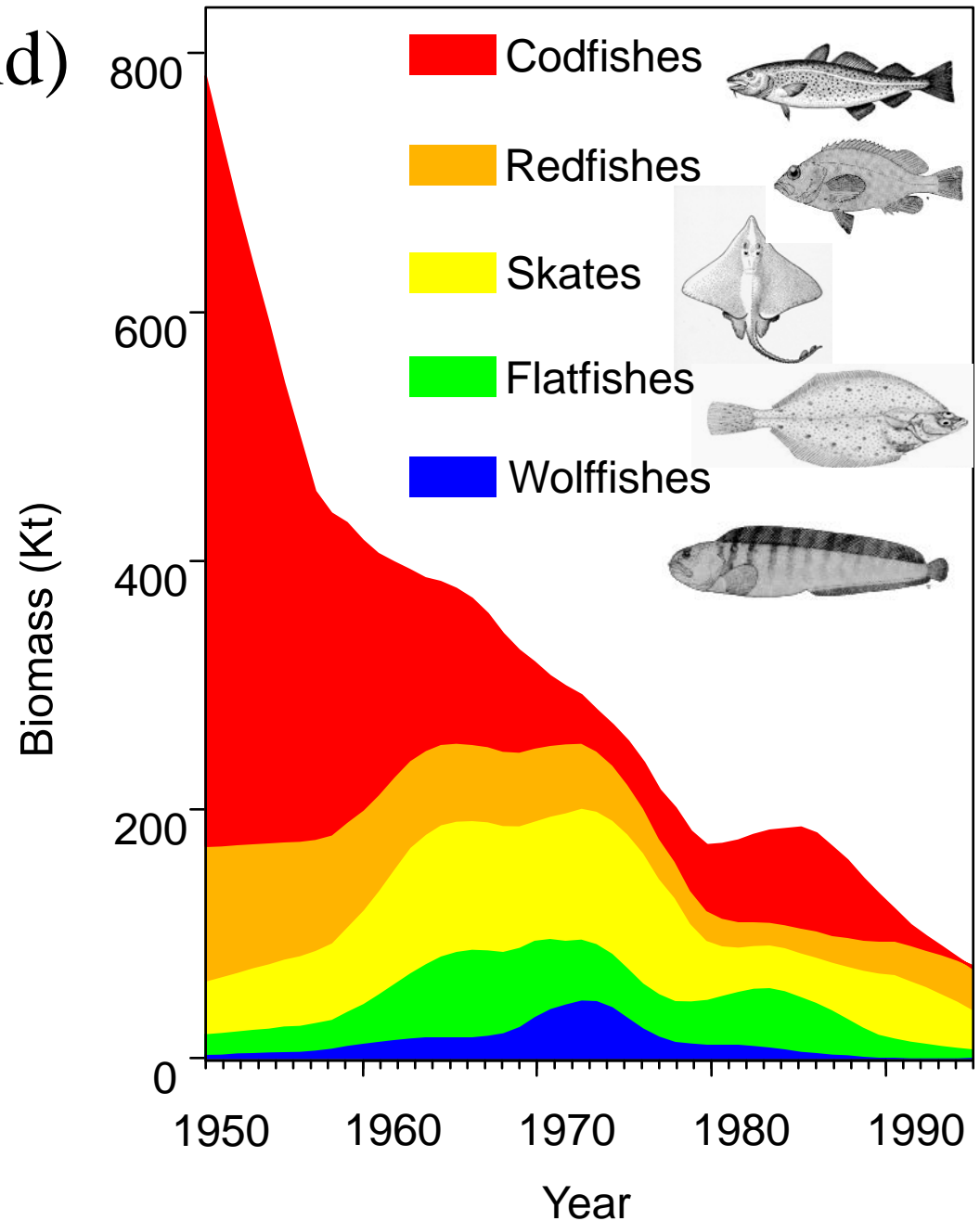
# Common patterns of decline



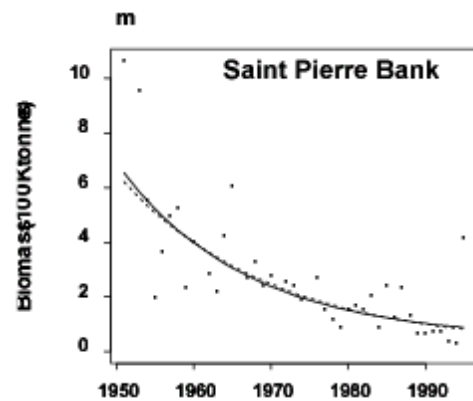
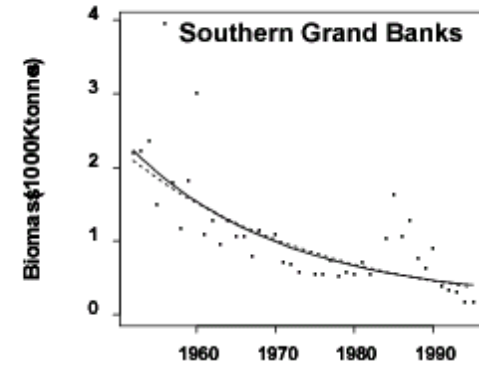
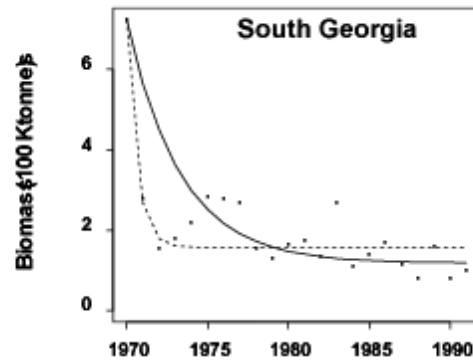
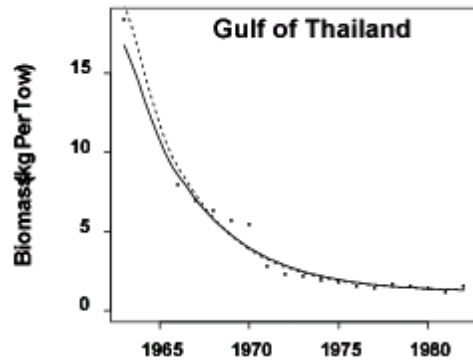
Myers and Worm (2003)

# St. Pierre Bank (south of Newfoundland)

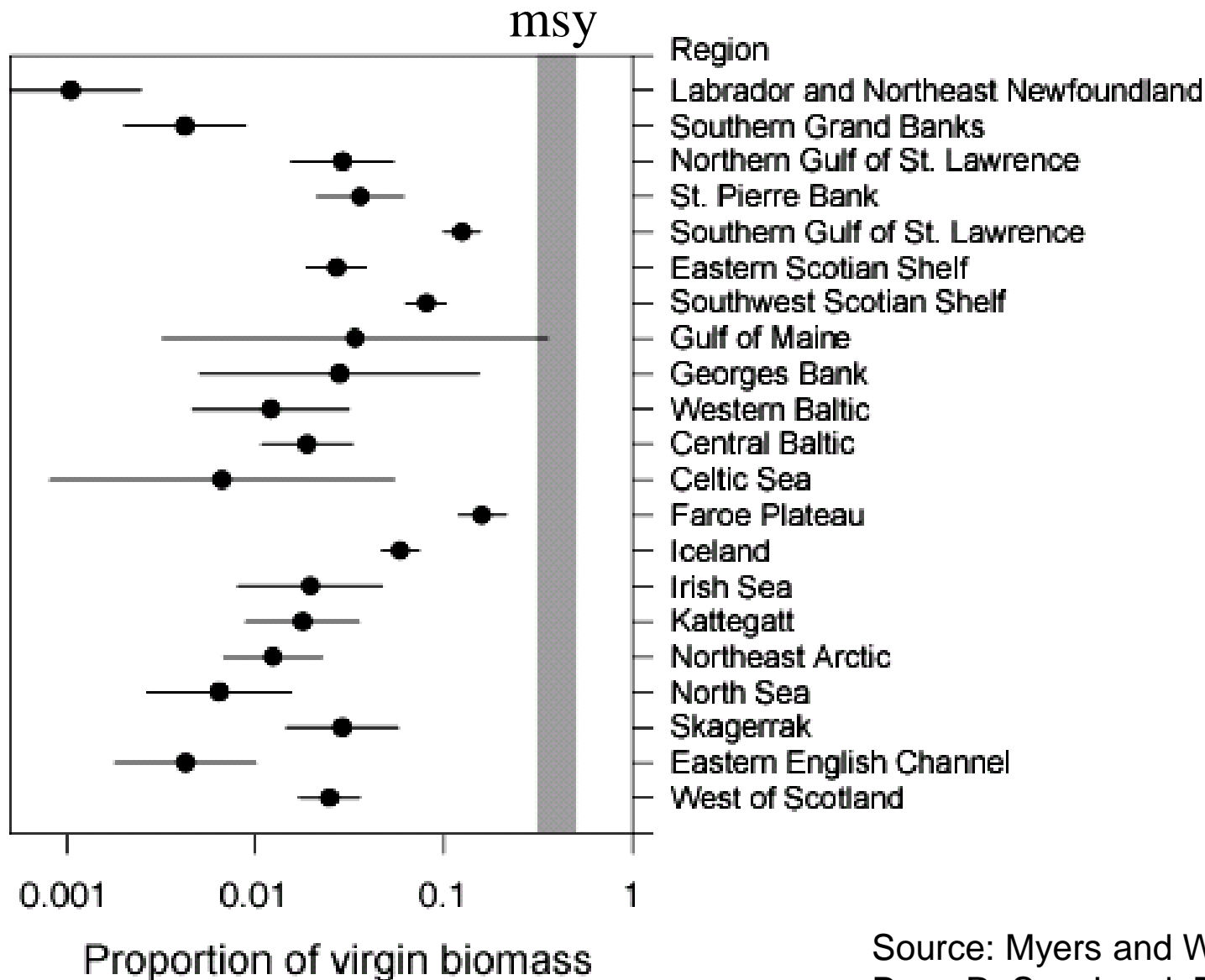
- 90% decline in numbers
- Approx. 50% decline in size
- Large changes in species composition



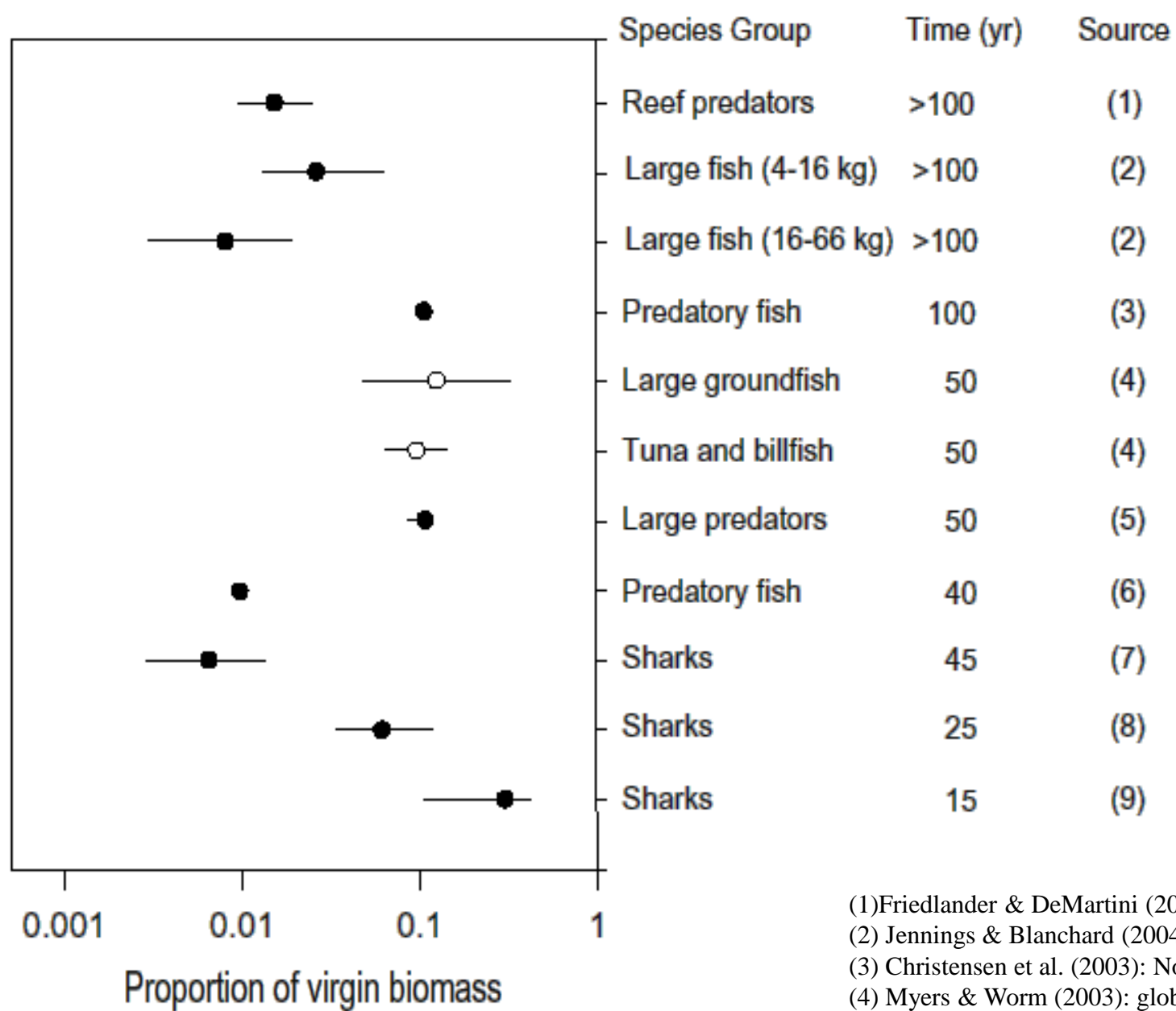
# Shelf seas



# There is much less than 10% of cod left -



Source: Myers and Worm 2004.  
Proc. R. Soc. Lond. B (in press)



- (1) Friedlander & DeMartini (2002): Hawaiian reefs;  
 (2) Jennings & Blanchard (2004): North Sea;  
 (3) Christensen et al. (2003): North Atlantic;  
 (4) Myers & Worm (2003): global;  
 (5) Ward & Myers (2003): North Pacific;  
 (6) Tang et al. (2003): Bohai Sea;  
 (7) Baum & Myers (2004): Gulf of Mexico;  
 (8) Vacchi et al. (2000): Mediterranean Sea;  
 (9) Baum et al. (2003): Northwest Atlantic.

Source: Myers and Worm 2004.  
 Proc. R. Soc. Lond. B (in press)

## Step 3: Expose your analysis widely to find any potential flaws.

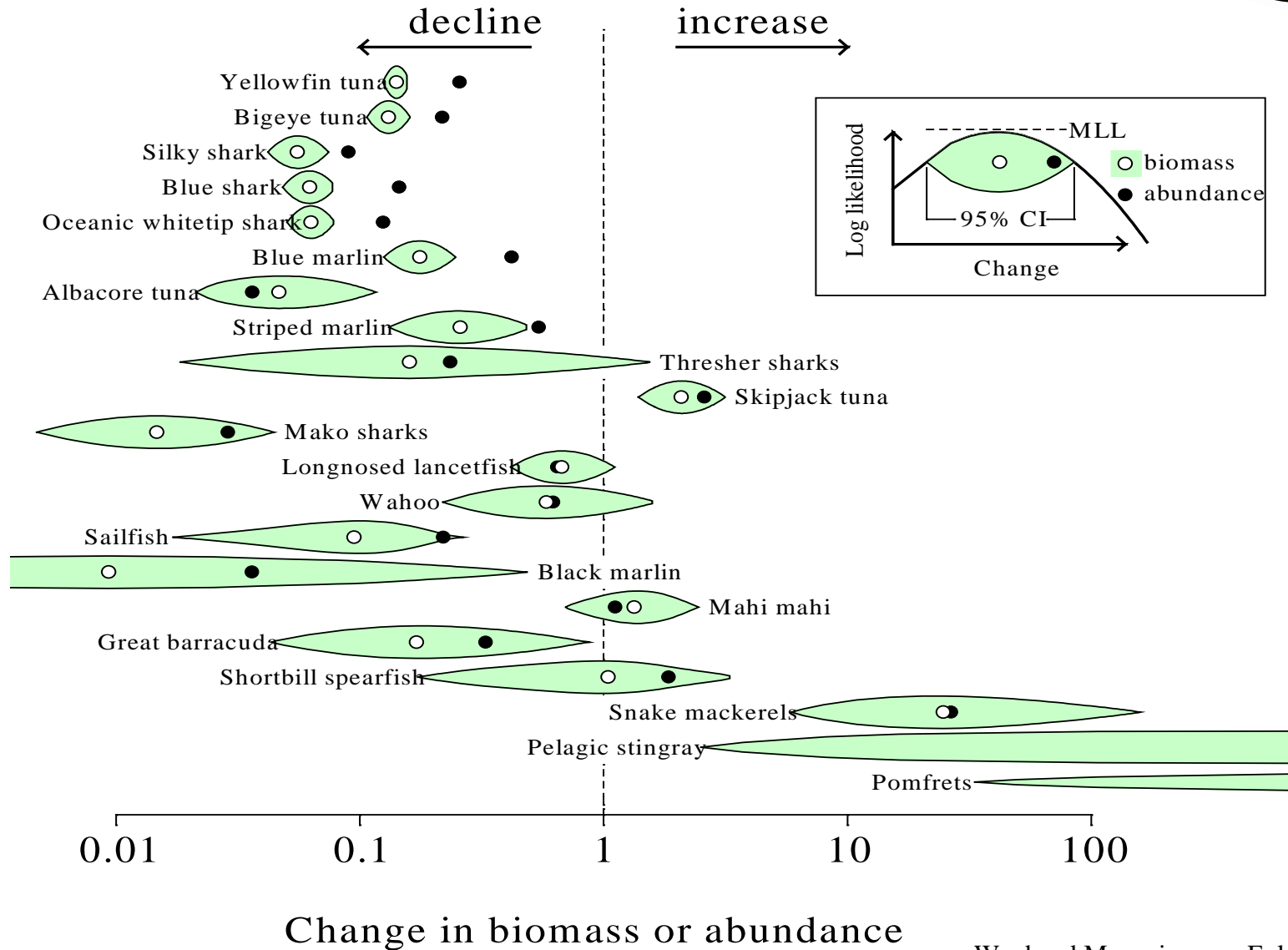
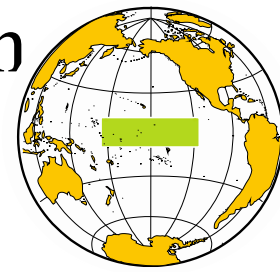
- Virtually every tuna/billfish biologist saw our Nature paper before it was published, and could not come up with any papers that showed it was wrong (or even seriously addressed the issue).
- We tried to look at all possible angles on the issue and solicited comments from all sides.

## Step 4. Willingness to do what ever it takes to do the job.

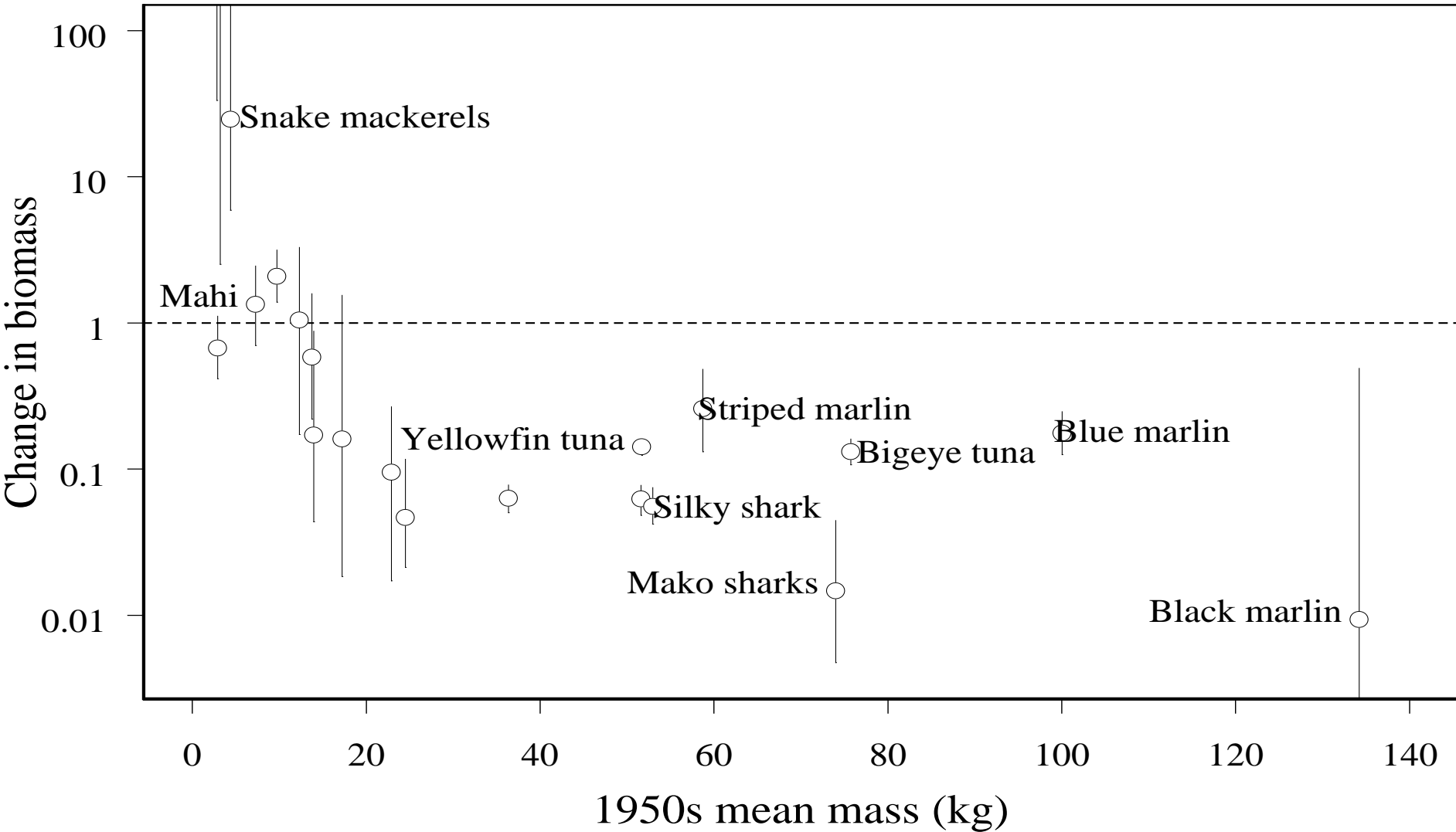
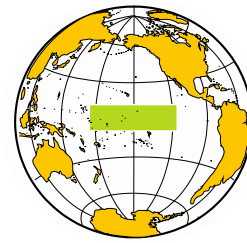
- Jeff Hutchings and I have published over 40 papers on cod (not that it did them any good).
- My students and I will publish 20 papers on sharks and tunas over the next few years.



# Analysis repeated using independent research data



All species  $> 18$  kg declines by a factor of 10



Oceanic Whitetip declared critically endangered by ICUN shark specialist working group last week.

- Last year it was “species of least concern”.
- This change was not because we published one paper in Science, but papers based upon 3 independent datasets (plus 2 math/stats technical papers).
- Skeptics remain – more analyses are in prep from scuba surveys of jellyfish (one notices large sharks while diving in the clear open ocean).

## Step 5: Colleagues to work with.

- It is almost impossible to sustain long-term action without colleagues to work with.

Step 6: You need inside sources to be preemptive (head them off at the pass).

# Ottawa to reopen cod fishery

Scientists condemn plan as political, see no clear sign number of fish is recovering

BY STEPHEN STRAUSS  
The Globe and Mail

TORONTO — The federal government will partly reopen the East Coast cod fishery — a move already being condemned by fisheries scientists who say there has been no material change in the size of cod stocks since commercial fishing was suspended in 1993.

Fisheries and Oceans Minister Fred Mifflin is scheduled to make the announcement tomorrow.

"I don't think there is any basis for reopening the fisheries at this time. It is very clear that the stocks are at a very low level," said Ransom Myers, professor of Ocean Studies at Dalhousie Uni-

versity and until very recently a scientist with the Department of Fisheries and Oceans.

This view was echoed by another DFO scientist, who asked not to be identified: "There is not any clear sign the stock is on the road to recovery; there is not any clear reason for the fishery to be opened except political."

A spokesperson for Mr. Mifflin's office said yesterday no one was available to respond to the scientists' concerns.

The reopened fishery will allow 10,000 tonnes of cod to be taken from stocks off the southern coast of Newfoundland. In this area, the allowable catch in the early 1980s

was about 40,000 tonnes and in 1992 it was about 35,000 tonnes.

Fishermen in the northern Gulf of St. Lawrence will be allowed to take 6,000 tonnes. In the early 1980s, the allowable catch in this area was about 100,000 tonnes and just before the ban it was about 40,000 tonnes.

A so-called sentinel fishery of 2,000 tonnes to monitor changes in the cod stock will be allowed in the southern Gulf.

These catch numbers roughly correspond to the maximal numbers put forward last year by the Fisheries Resource Conservation Council, an independent body comprising representatives of the

fishing industry, scientists and other interested parties who advise the government on fishery conservation issues. The FRCC recommended closing the cod fisheries in 1993.

"You have to tightly, tightly, tightly control this fishery," said Katrina Tapley, executive director of the FRCC.

She added that her organization was concerned that the minister might "cherry pick" her group's recommendations, that is, adopt its catch number but ignore many of the extensive precautionary measures it felt justified opening a limited fishery.

Please see Plan / A6

Step 6: (Example 2) You need inside sources to be preemptive (head them off at the pass).

26 MARCH 2004 VOL 303 SCIENCE

# POLICY FORUM

ECOLOGY

## Hatcheries and Endangered Salmon

Ransom A. Myers,<sup>1</sup> Simon A. Levin,<sup>2</sup> Russell Lande,<sup>3</sup>  
Frances C. James,<sup>4</sup> William W. Murdoch,<sup>5</sup> Robert T. Paine<sup>6</sup>

Step 7: Be fearless.

**“Take all of these scientists if they feel constrained working within government and make them free,” he said. “Scientists are as capable of being prima donnas and as petulant and pompous as anybody else.”**

Former fisheries minister Brian Tobin. Globe and Mail  
Aug. 23, 1997.

Step 8: Emotional support. Support from colleagues and family is essential. You cannot do it (for long) by yourself.

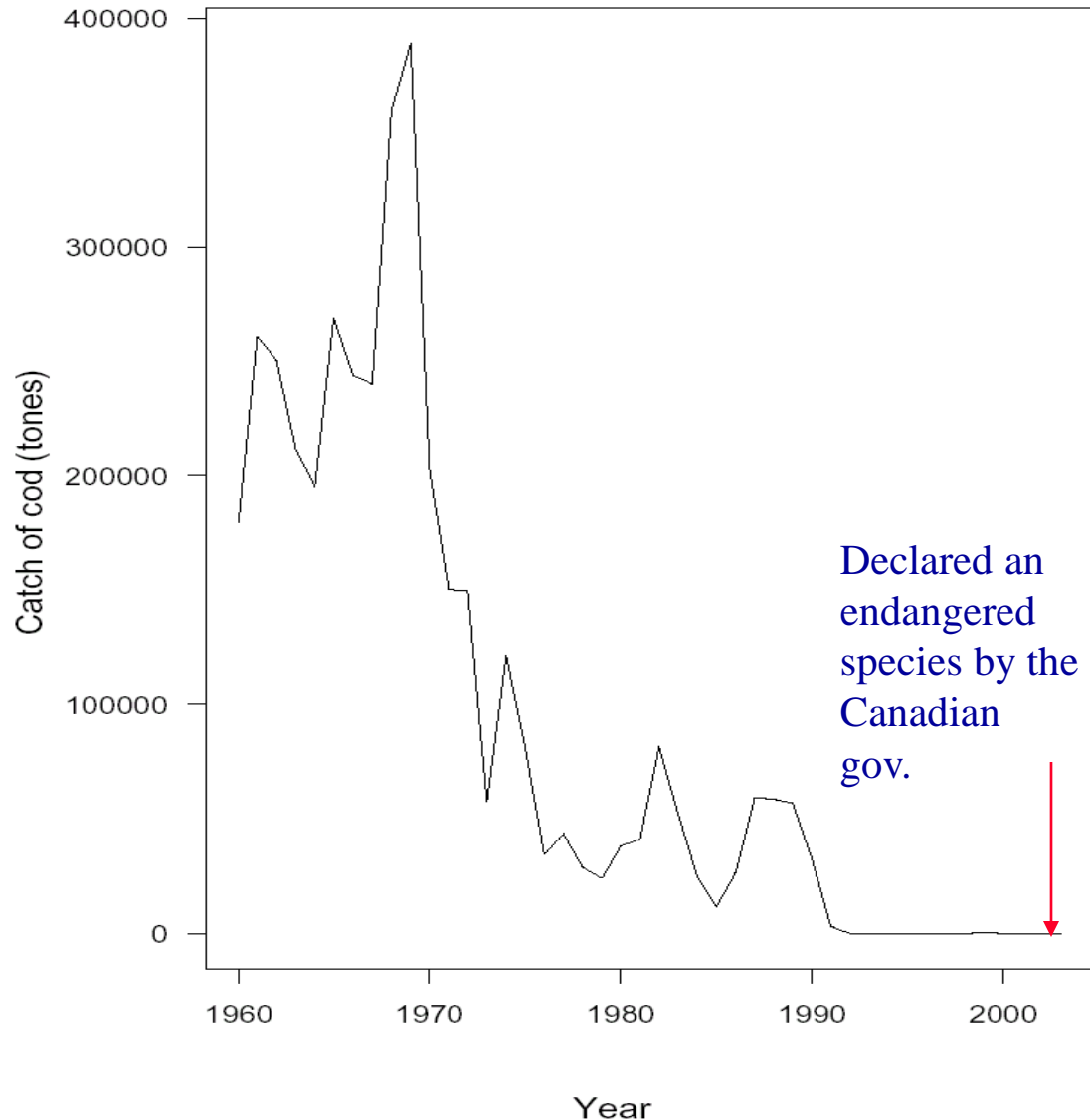


Step 9: Willingness to argue endlessly. No matter how obvious a conservation problem is, you will have to fight for the issue at every point.

## Newfoundland cod

The loss of an industry that employed 40,000 people, and had sustained a culture for 400 years.

Cod in Newfoundland declared endangered in 2003.



## Step 10: Don't make more enemies than you have to.

- Don't worry if people are mad at you, don't rub it in that they are wrong.
- Simply produce so much evidence that your "enemies" will eventually say that they believed it all along.

## Step 11: Plan and think ahead.

- If you want to change opinions, you have to think of all possible interpretations of the data.
- If you get sued, you better have very good records.
- If you want to make an impact, you have to have better planning and media organization than NASA.
- If you think you may have to resign in protest, you better have a way to support your family.

*Over the past month, there has been significant media coverage on global overfishing, which has helped to raise the nation's overall awareness of the condition of global fisheries. The message is our oceans are in danger and we need to take immediate action to protect them.*

- McCain, June 2003

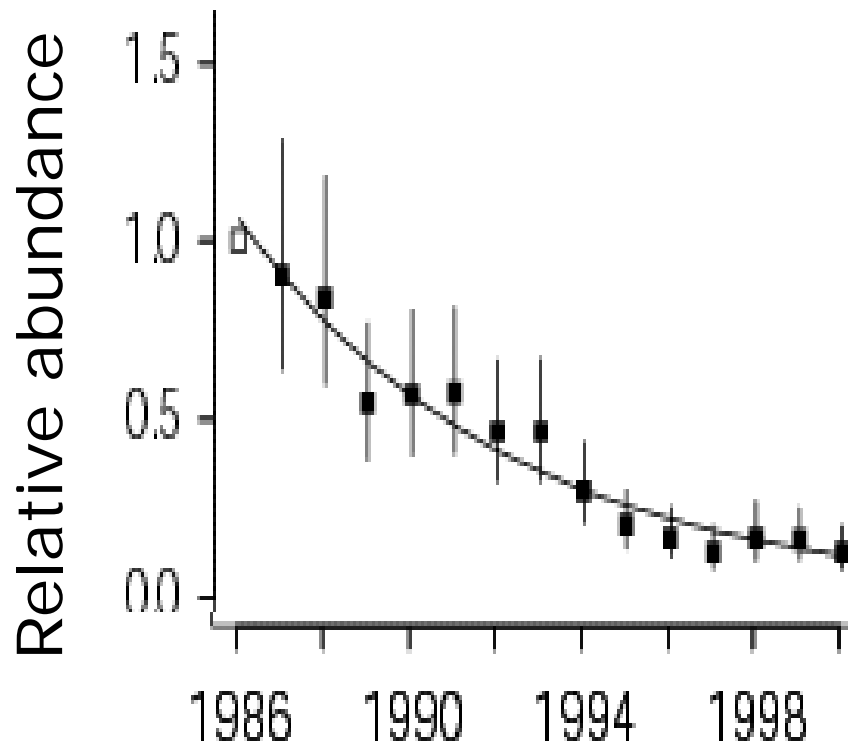
## Step 12: Care about the future

- The great sharks of the world are going extinct and my 6 year old son, Carlo, is really ticked off about this.

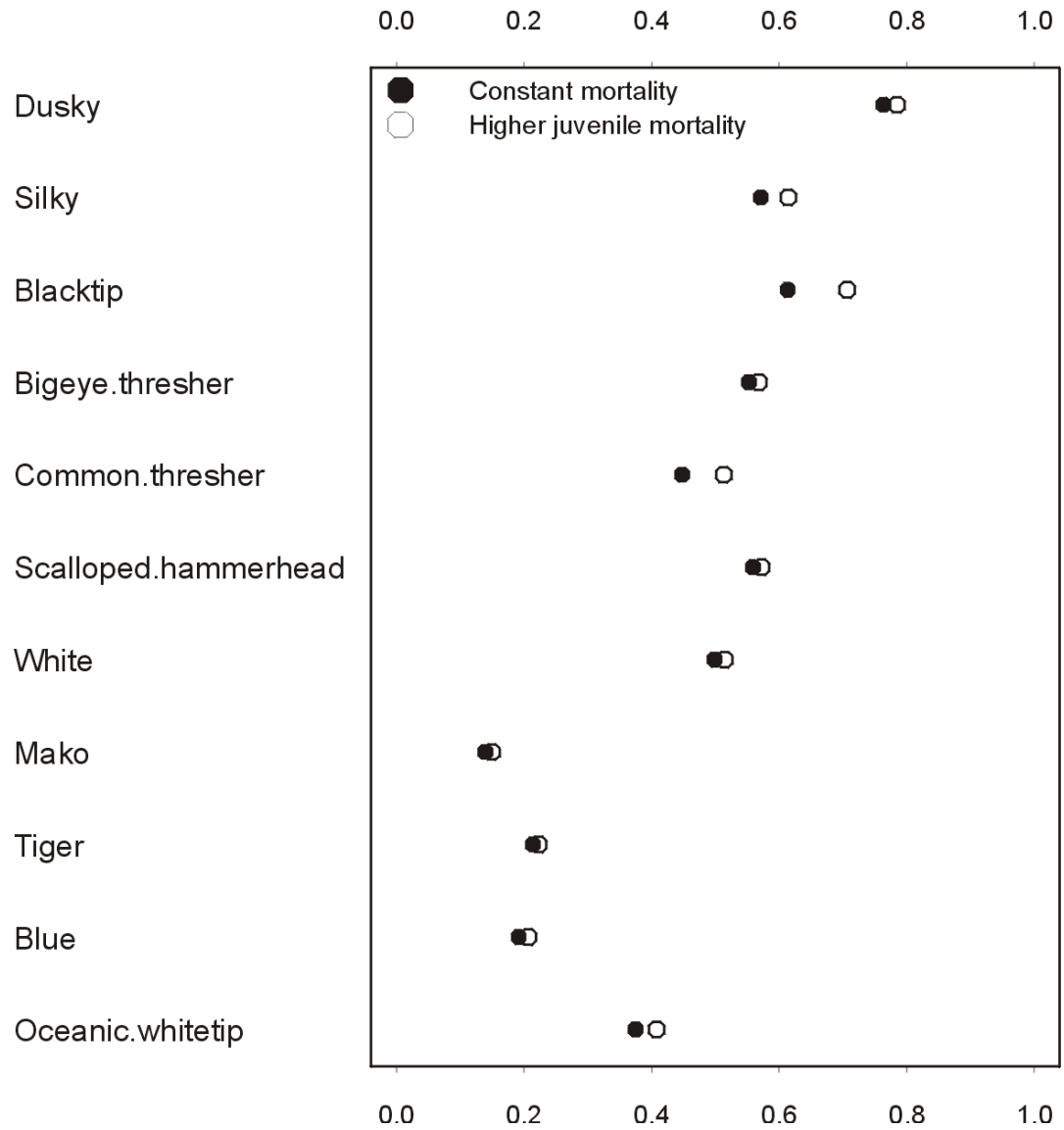


# Hammerhead sharks

*Sphyrna lewini*



# Proportional reduction in current fishing mortality needed to ensure survival of shark populations



***The First Collective Act of  
Humanity was to save the  
great whales –***

***despite massive denial***

***– we can do  
the same for the remaining  
virgin areas of the oceans  
and for the great sharks.***



Political action is  
costly for any  
scientist.

However, it also  
has great benefits.

To act is to live.

To be suppressed  
is to die.



