

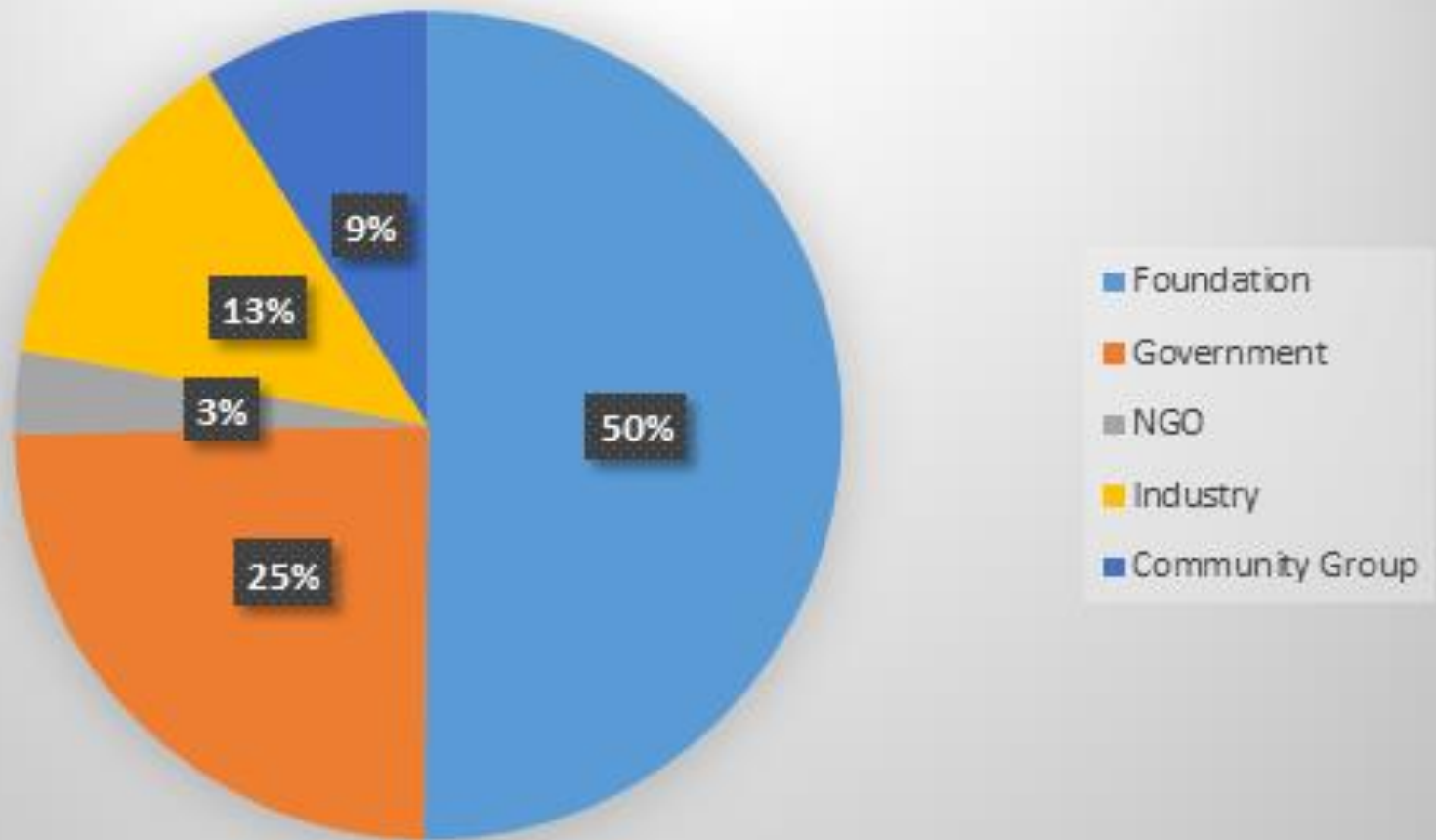


# Sustainability of fisheries: Myths & Reality

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School of Aquatic and Fishery Sciences  
University of Washington

# Full disclosure of funding

Hilborn Research Funding



# Science 2006



## Seafood May Be Gone by 2048, Study Says

John Roach  
for [National Geographic News](#)  
November 2, 2006

Unless humans act now, seafood may disappear by 2048, concludes the lead author of a new study that paints a grim picture for ocean and human health.

According to the study, the loss of ocean biodiversity is accelerating, and 29 percent of the seafood species humans consume have already crashed. If the long-term trend continues, in 30 years there will be little or no seafood available for sustainable harvest.

# The Myths

- Stocks worldwide are declining
- Most fisheries are unsustainably managed
- The act of fishing destroys the environment

# A new consensus on stock status



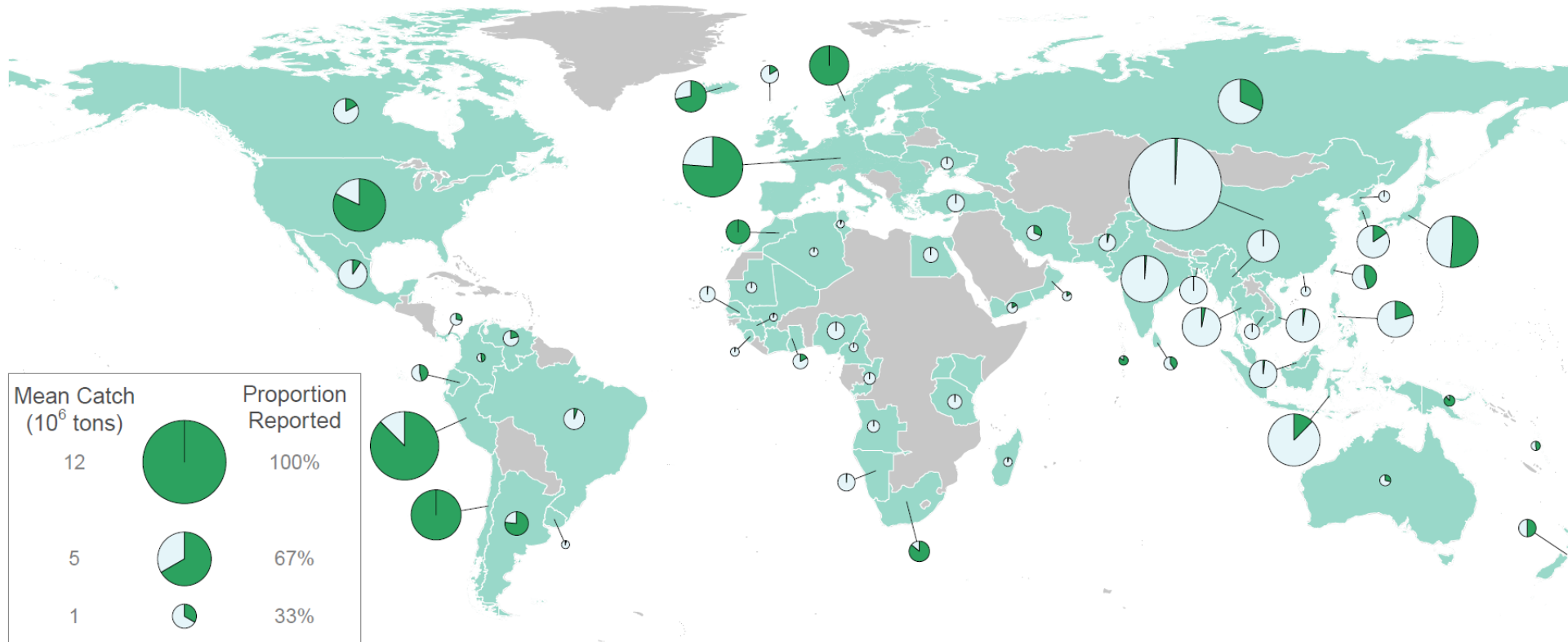
## RESEARCH ARTICLES

### Rebuilding Global Fisheries

Boris Worm,<sup>1\*</sup> Ray Hilborn,<sup>2\*</sup> Julia K. Baum,<sup>3</sup> Trevor A. Branch,<sup>2</sup> Jeremy S. Collie,<sup>4</sup> Christopher Costello,<sup>5</sup> Michael J. Fogarty,<sup>6</sup> Elizabeth A. Fulton,<sup>7</sup> Jeffrey A. Hutchings,<sup>1</sup> Simon Jennings,<sup>8,9</sup> Olaf P. Jensen,<sup>2</sup> Heike K. Lotze,<sup>1</sup> Pamela M. Mace,<sup>10</sup> Tim R. McClanahan,<sup>11</sup> Cólín Minto,<sup>1</sup> Stephen R. Palumbi,<sup>12</sup> Ana M. Parma,<sup>13</sup> Daniel Ricard,<sup>1</sup> Andrew A. Rosenberg,<sup>14</sup> Reg Watson,<sup>15</sup> Dirk Zeller<sup>15</sup>

models are often used to determine the exploitation rate  $u_{MSY}$  that provides the maximum sustainable yield (MSY) for a particular stock. Fishing for MSY results in a stock biomass,  $B_{MSY}$ , that is substantially (typically 50 to 75%) lower than the unfished biomass ( $B_0$ ). It has been a traditional fisheries objective to achieve single-species MSY, and most management regimes have been built around this framework. Recently this focus has expanded toward assessing the effects of exploitation on communities and eco-

# Most assessed stocks in North America, South America, Europe and Oceania



Source: Global Assessment Database ([ramlegacy.org](http://ramlegacy.org))

# The big picture

- Stocks are stable or increasing when fisheries management is applied
- Stocks generally decreasing or at low abundance in the absence of effective fisheries management

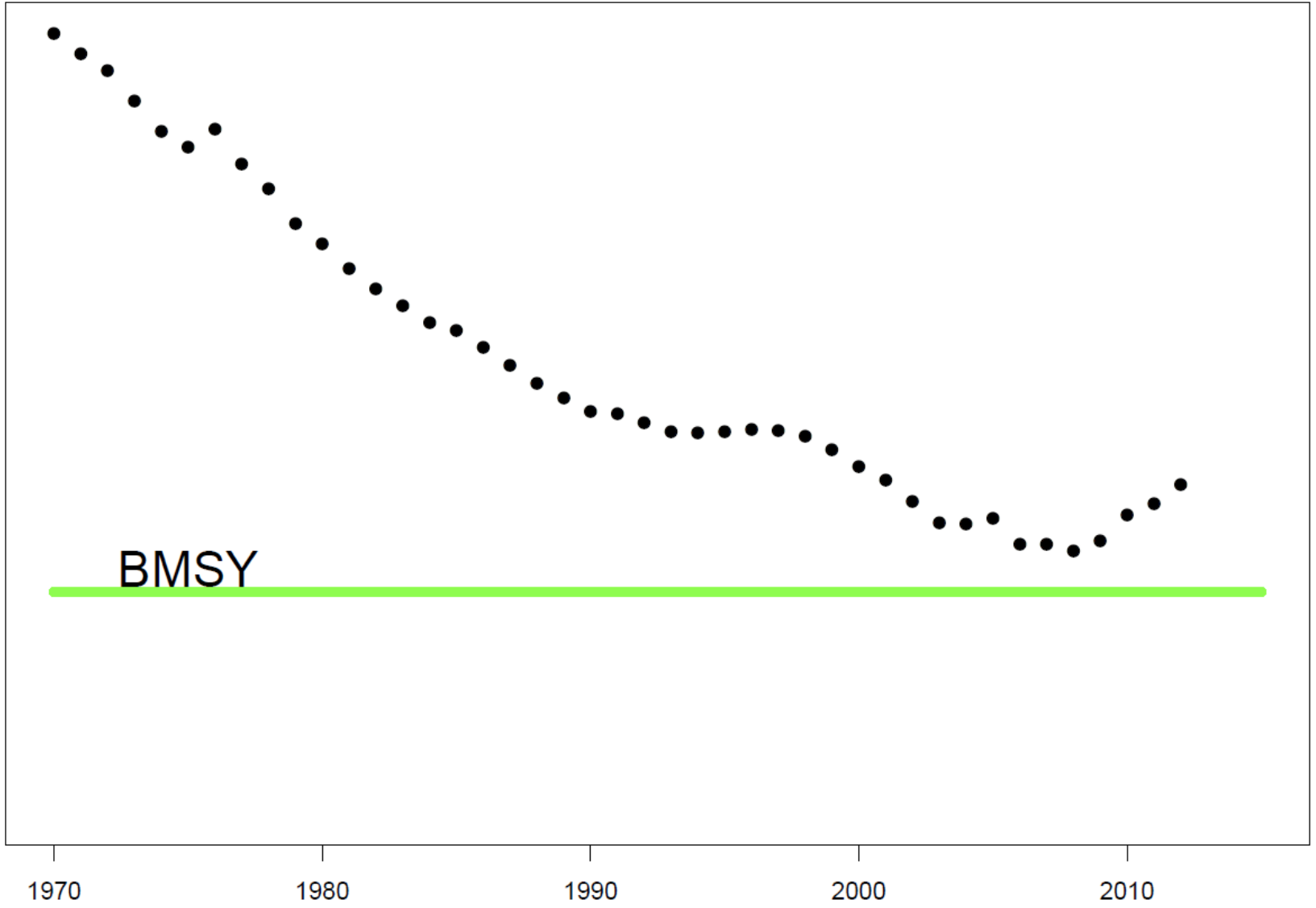
# Three kinds of histories

- Regions never subject to widespread overfishing
- Regions where overfishing was common but now rebuilding
- Regions where overfishing is presently common



# New Zealand

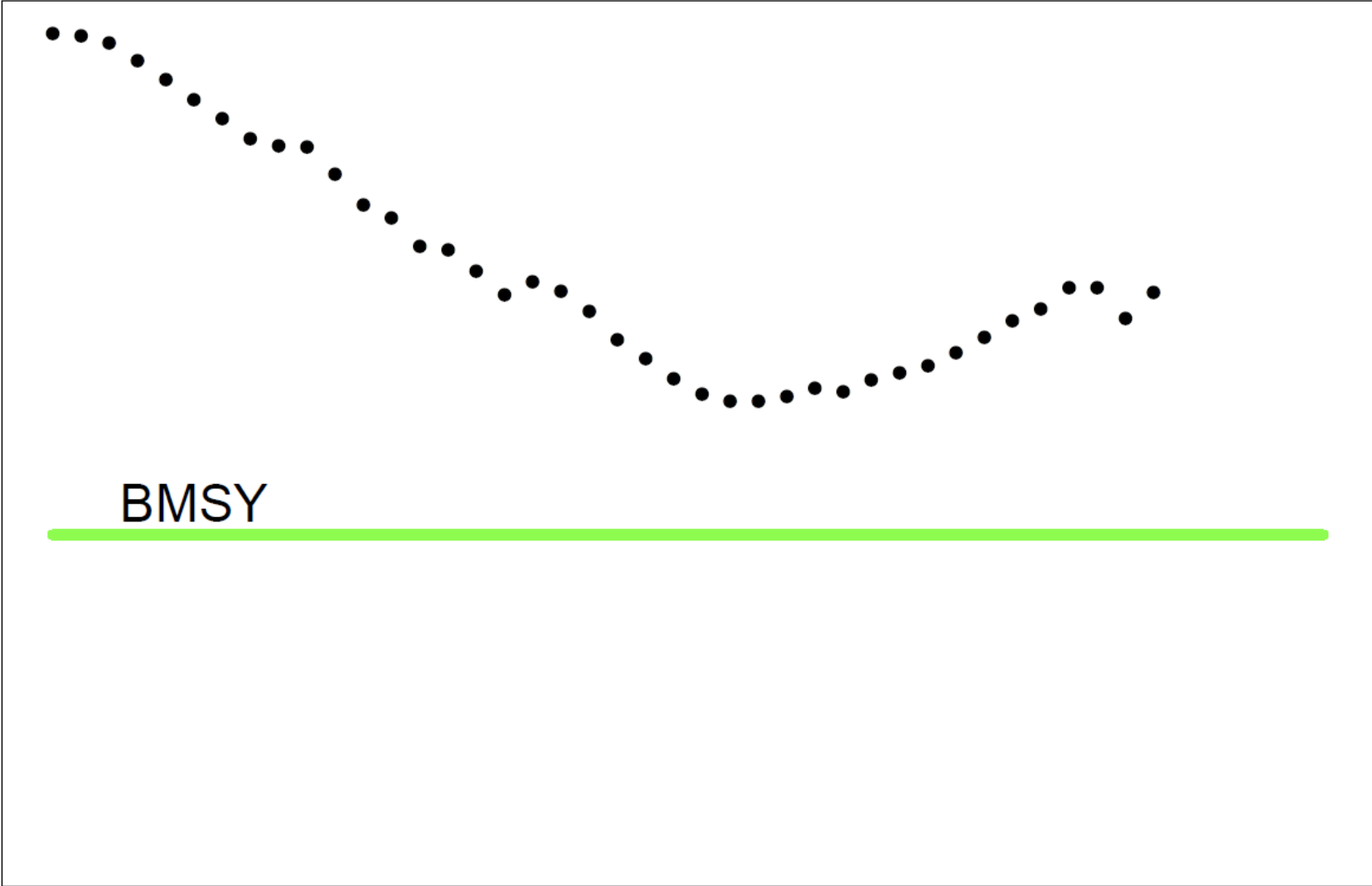
Relative Biomass



BMSY

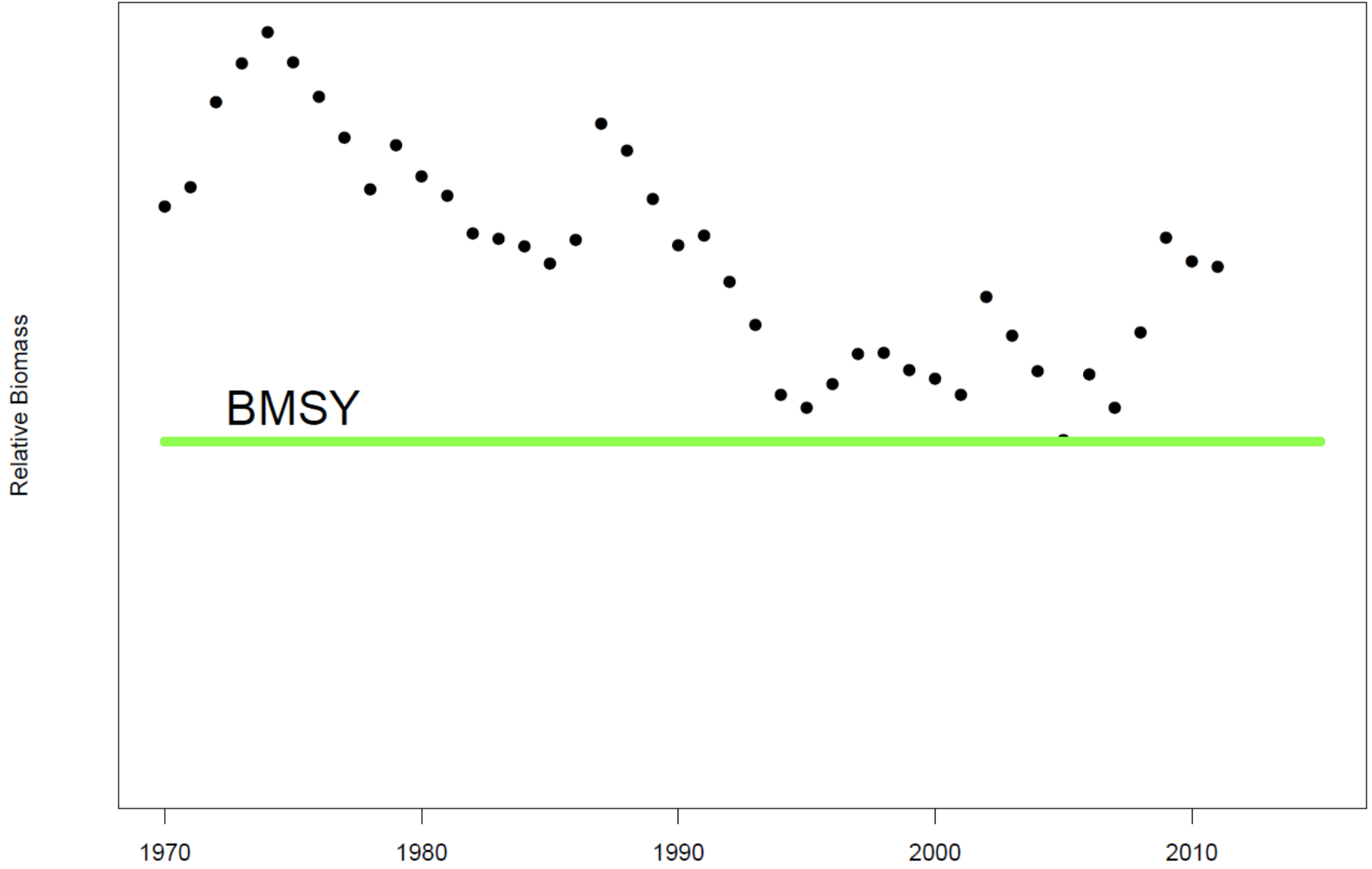
# US West Coast

Relative Biomass



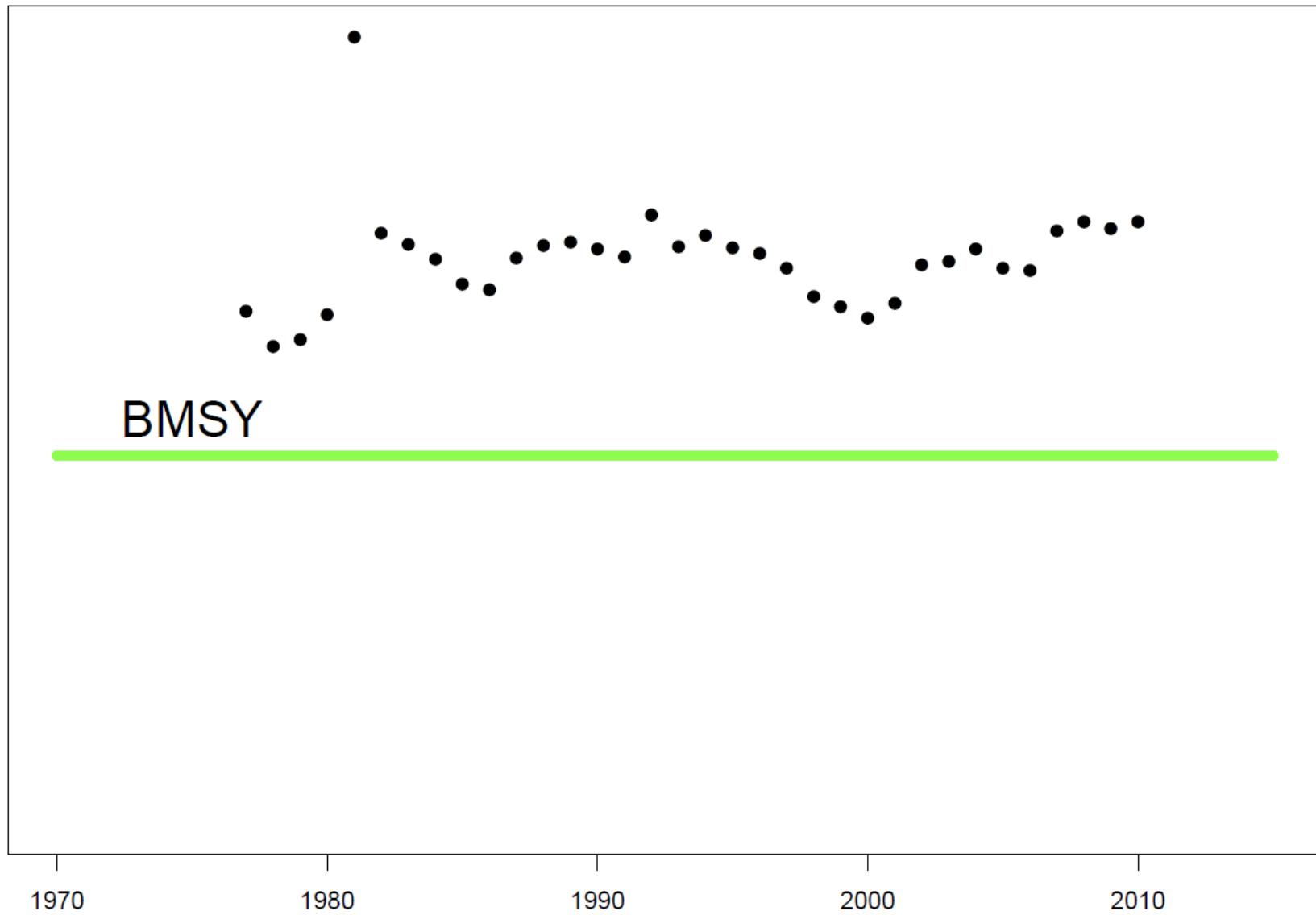
BMSY

# Canada West Coast



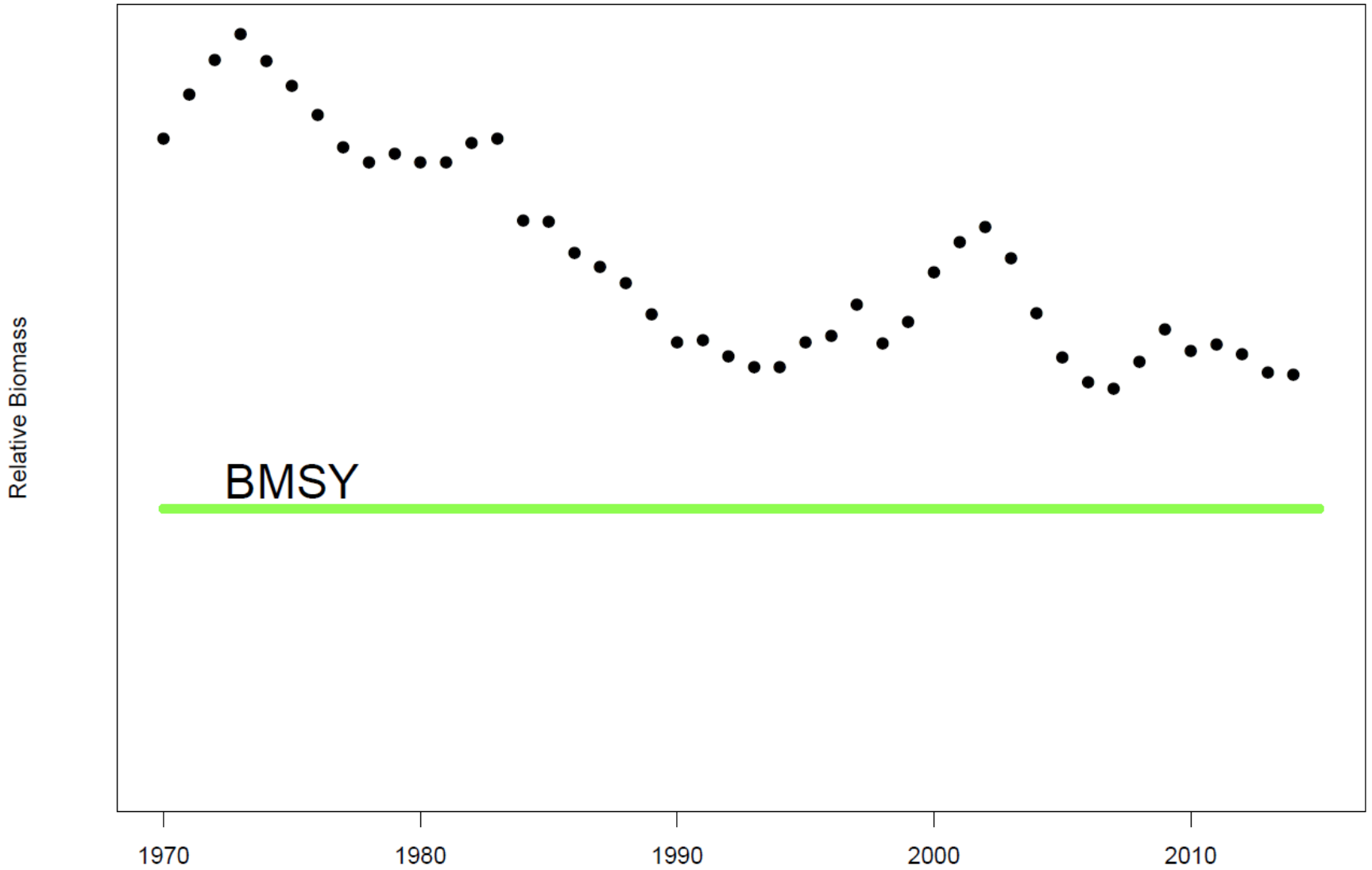
# US Alaska

Relative Biomass



BMSY

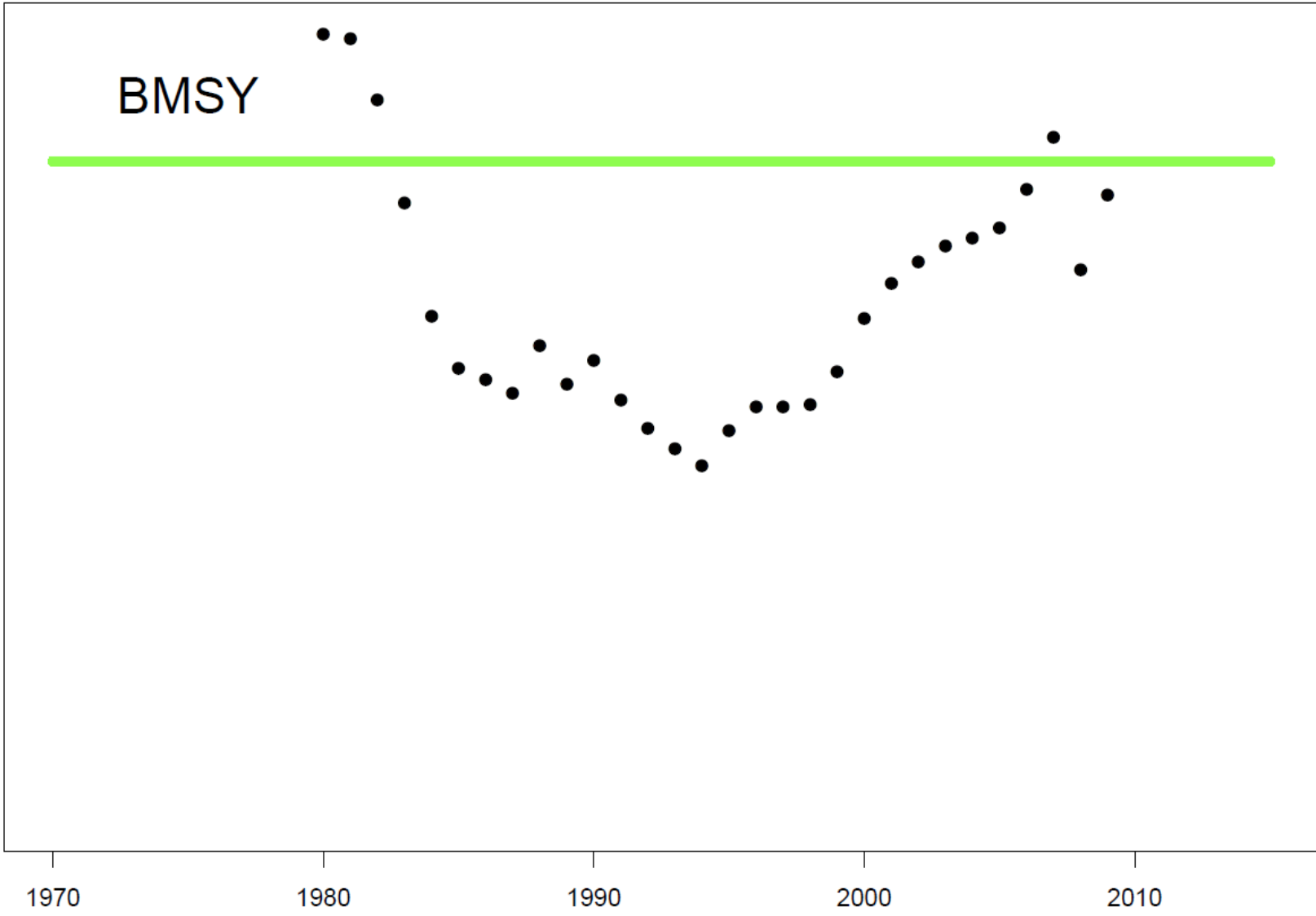
# South Africa



# US East Coast

BMSY

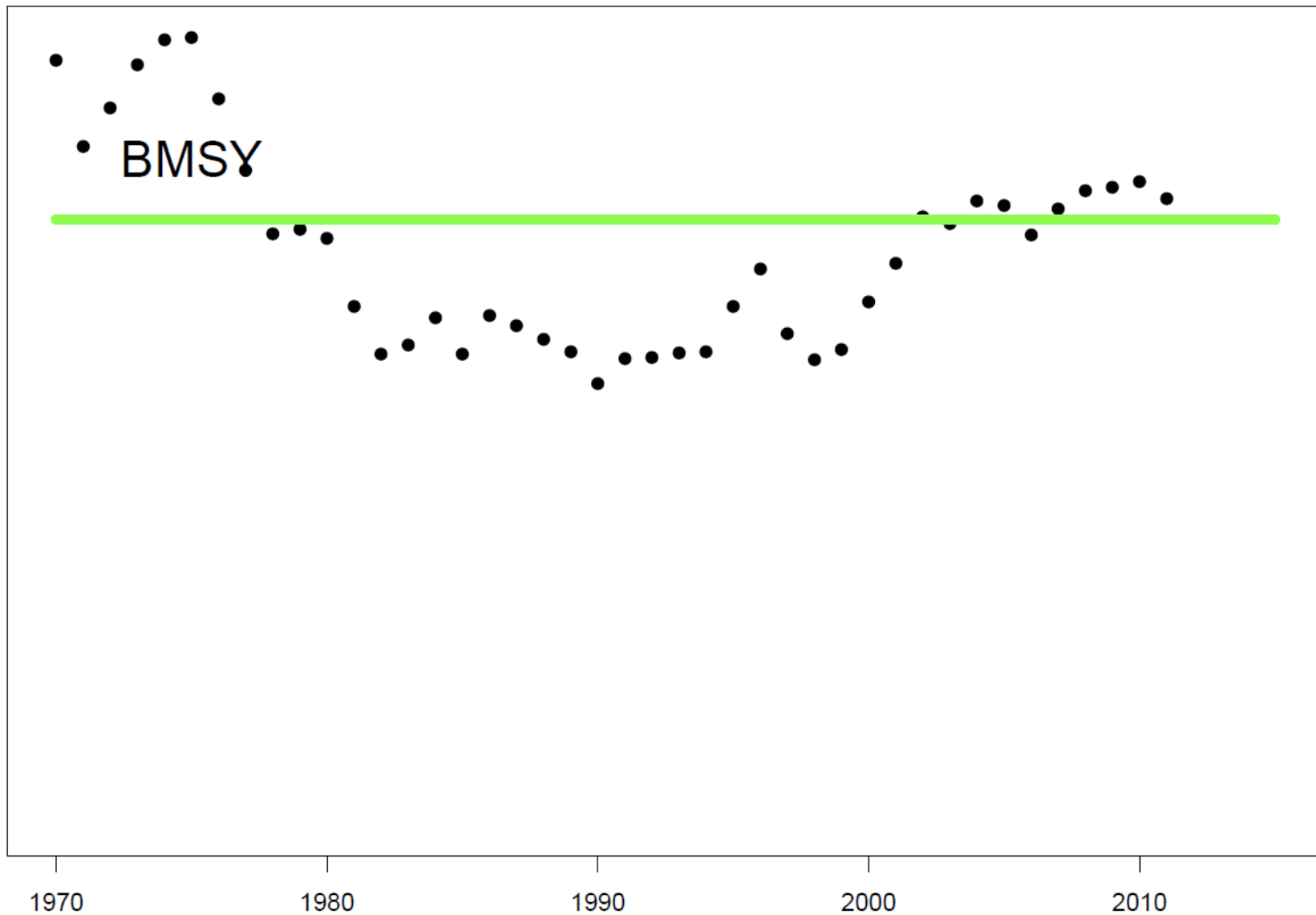
Relative Biomass



# Norway Iceland Faroe Islands

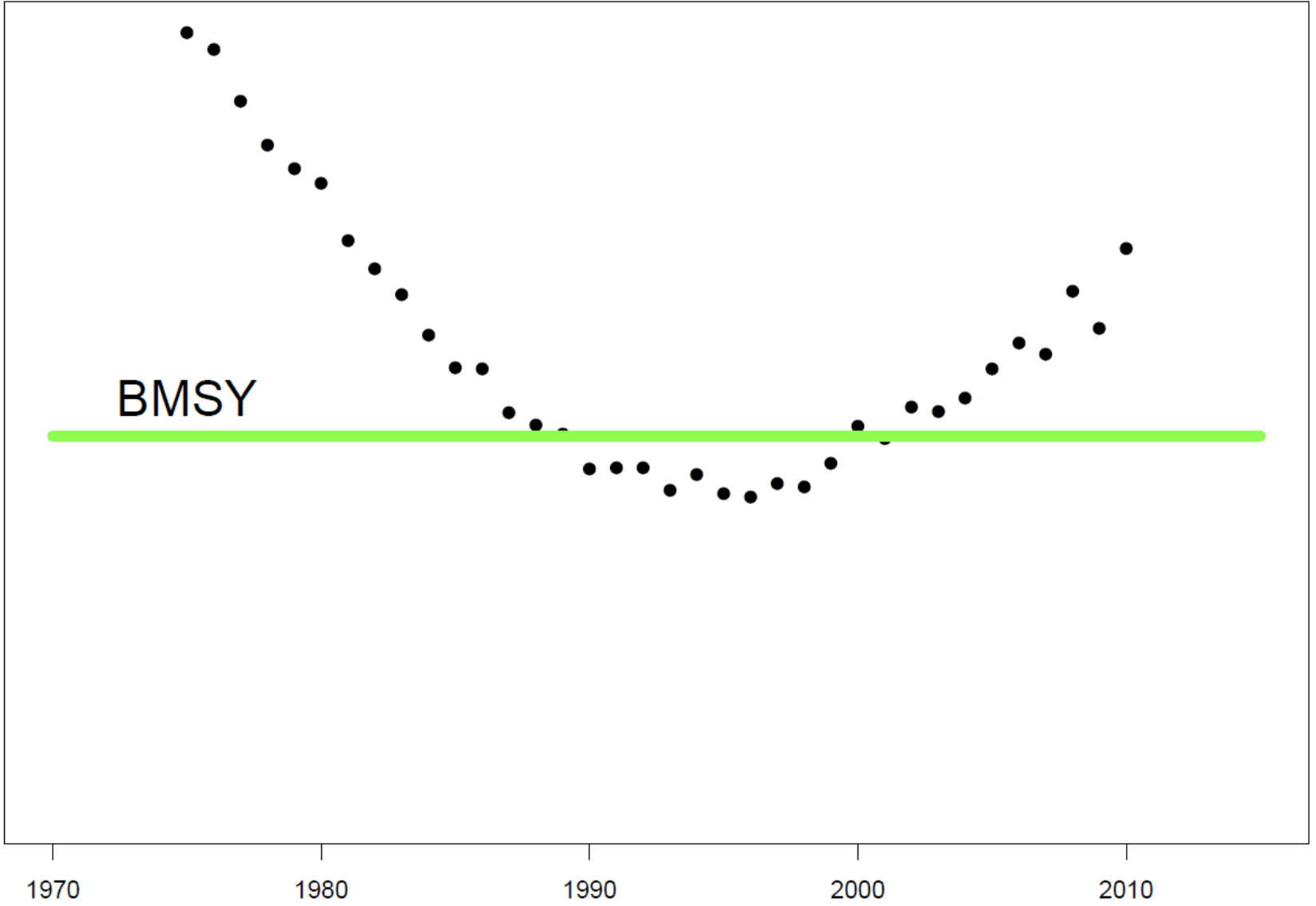
Relative Biomass

BMSY



# US Southeast and Gulf

Relative Biomass

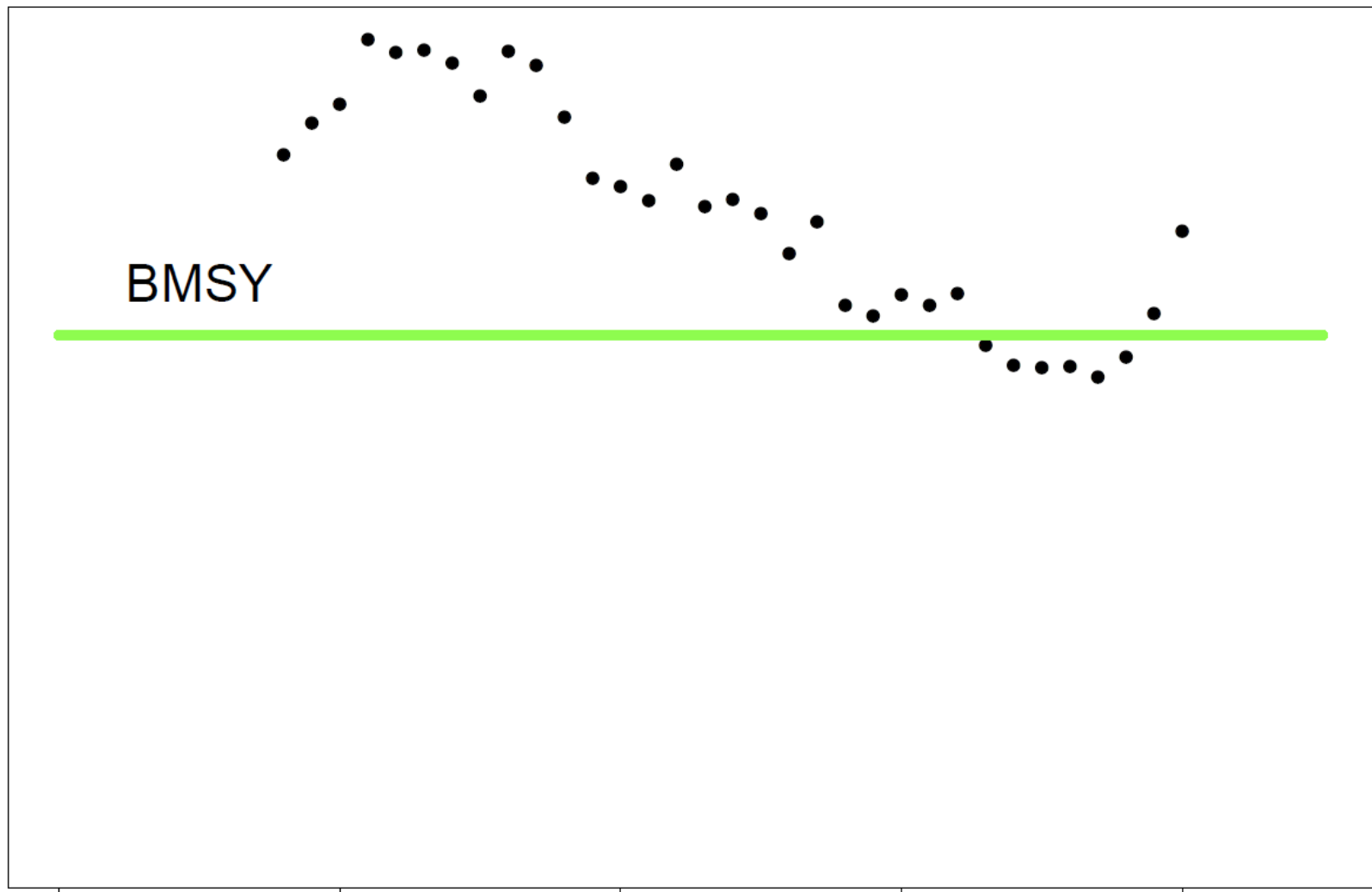




# European Union

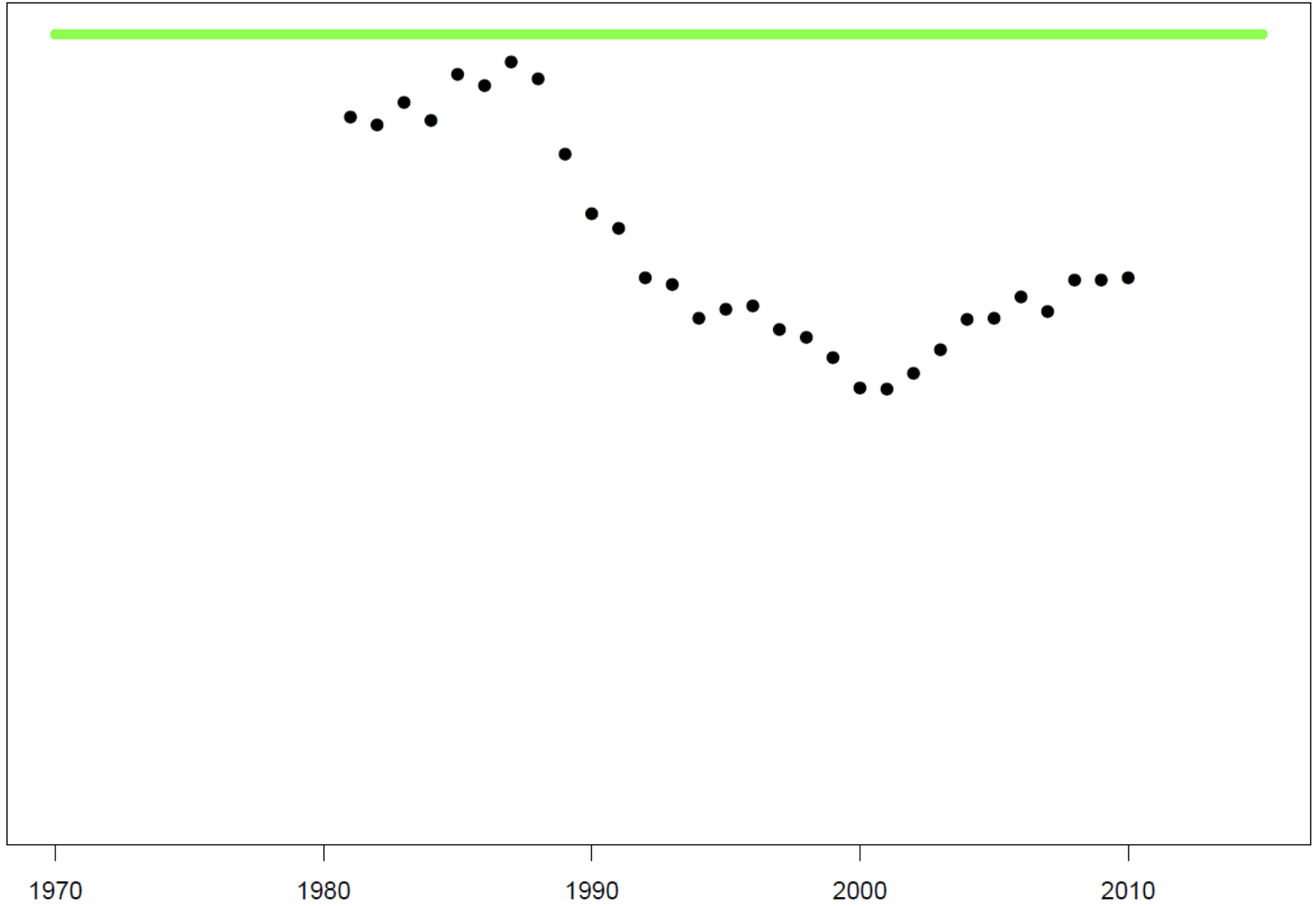
Relative Biomass

BMSY



# Russia Japan

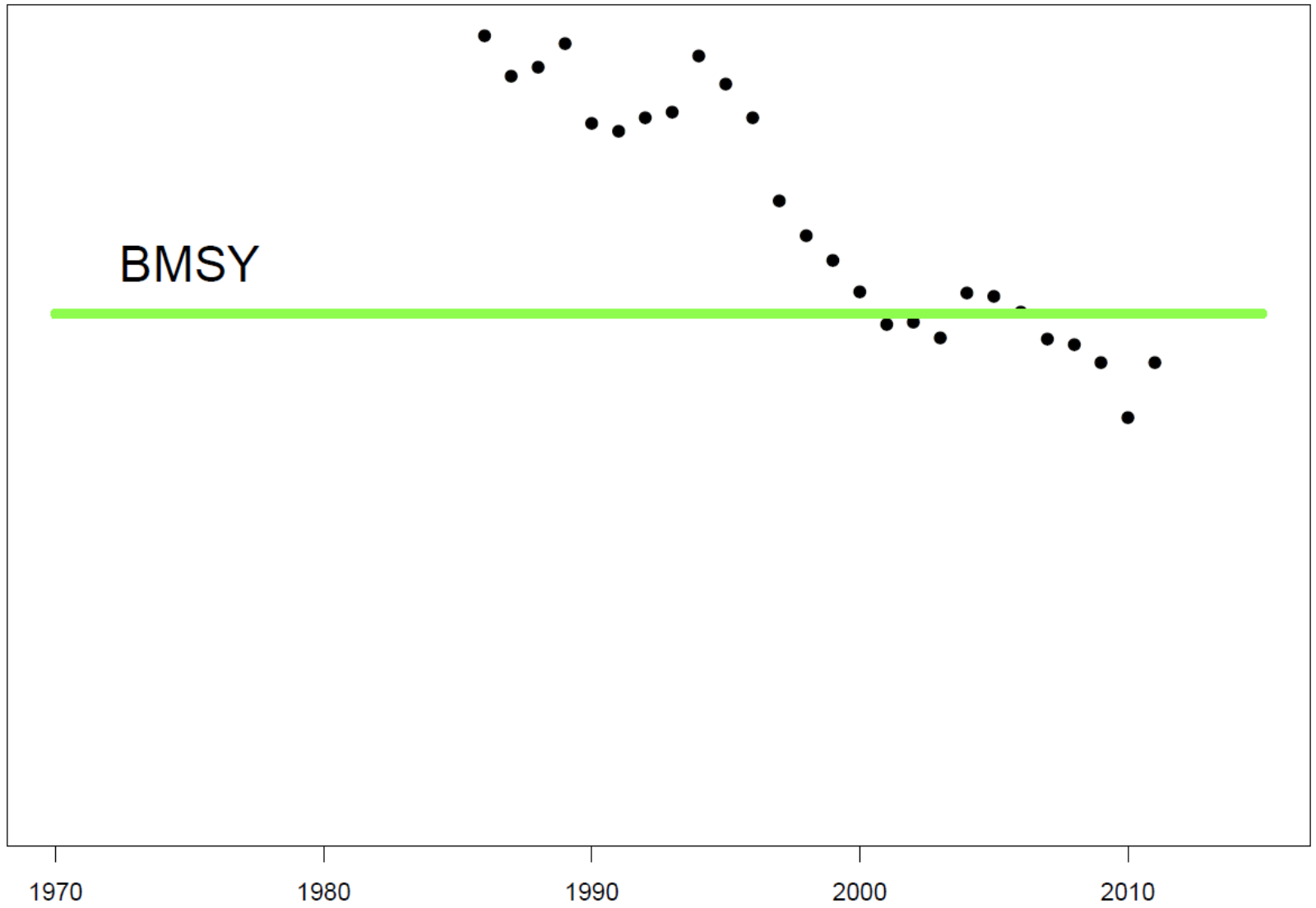
Relative Biomass



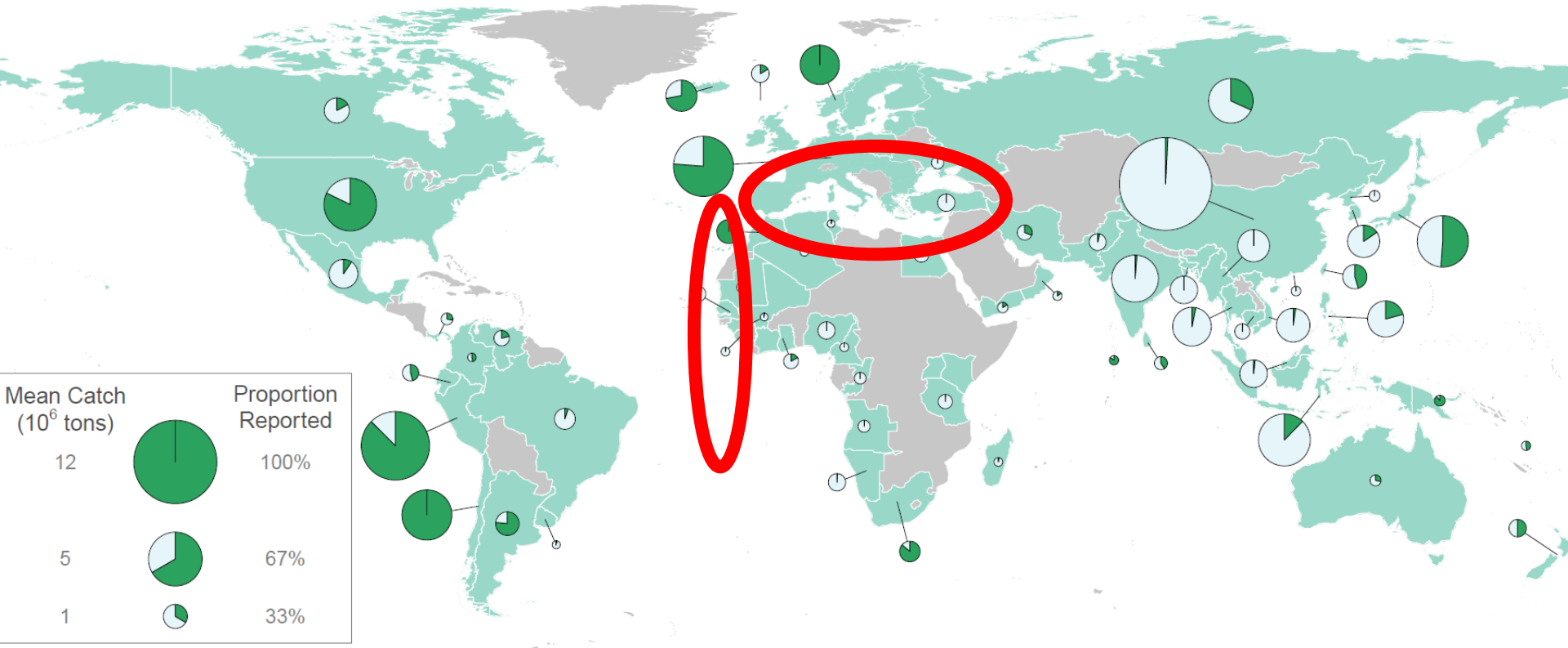
# South America

Relative Biomass

BMSY



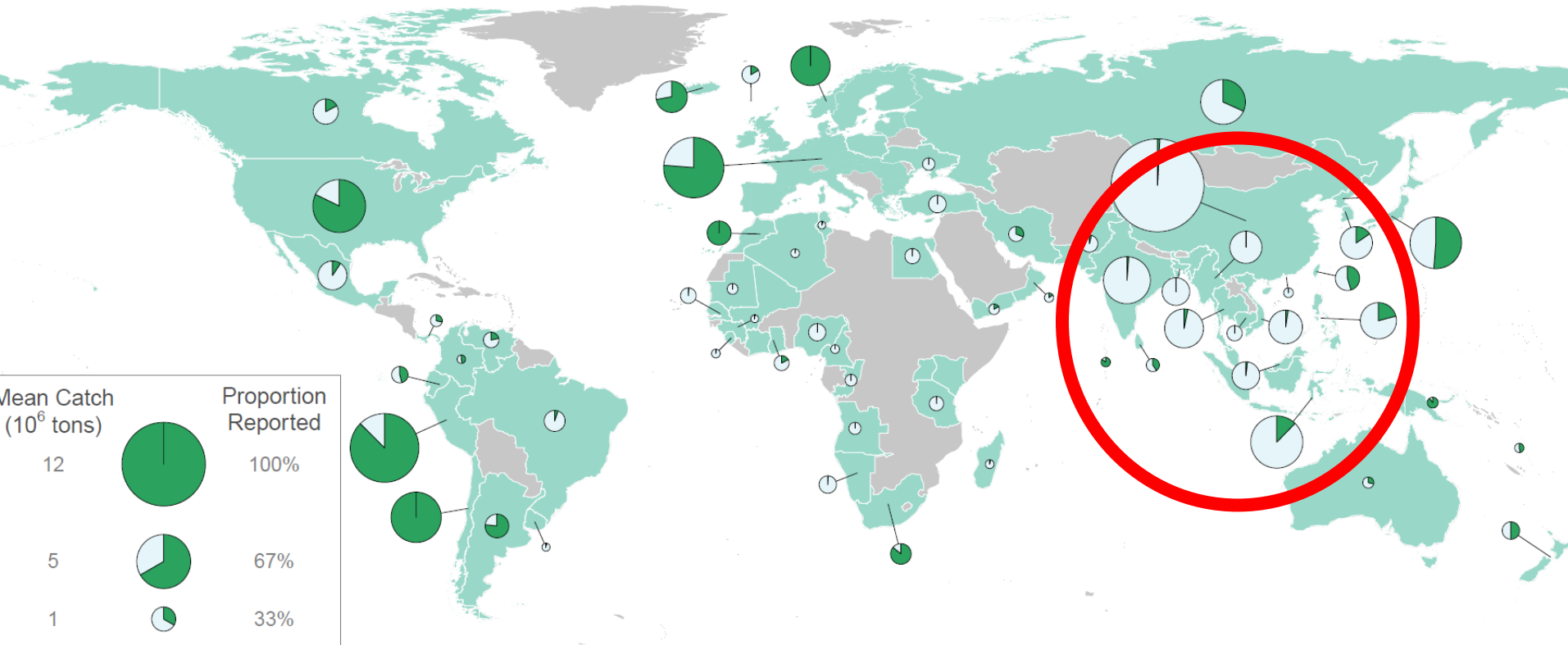
# Where we know things are bad



Source: Global Assessment Database ([ramlegacy.org](http://ramlegacy.org))

[www.ramlegacy.org](http://www.ramlegacy.org)

# Where we don't have assessments



Source: Global Assessment Database ([ramlegacy.org](http://ramlegacy.org))

[www.ramlegacy.org](http://www.ramlegacy.org)

# Are there plenty of fish in the sea?

## By country

- Particularly good: US, Iceland, Norway, New Zealand
- Improving rapidly: European Atlantic
- Of concern: Japan, Latin America
- Particularly bad: Mediterranean
- Unknown but probably bad: Most of S and SE Asia

# Bottom Trawling



Wipes Out Everything in Its Path

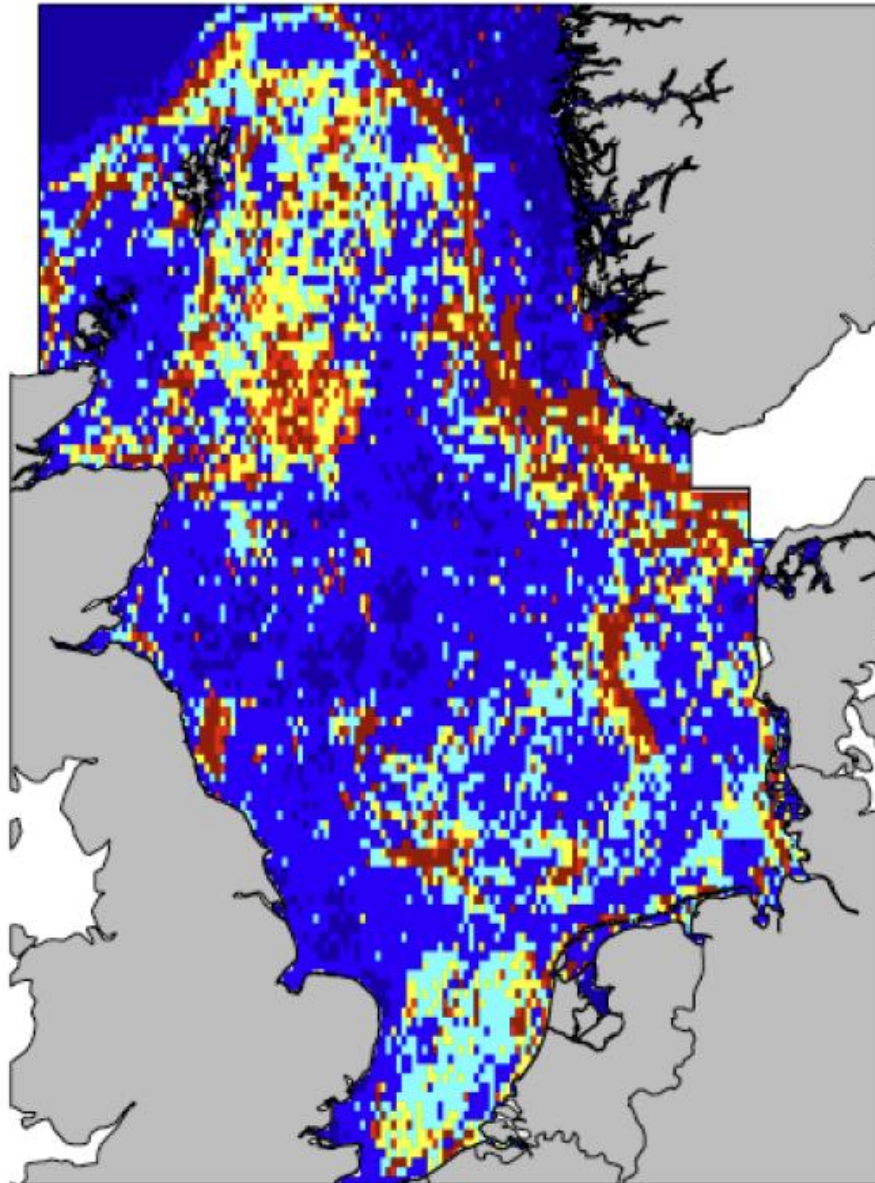
# Motivation and funding



- Walton Foundation and Packard Foundation proposed the study in consultation with National Fisheries Institute
- We assembled the international team
- Funding for 4 meetings, and 2 post-docs
- Additional funding from CSIRO (3 year post-doc), NOAA, FAO, ICES, and 10 fishing companies.



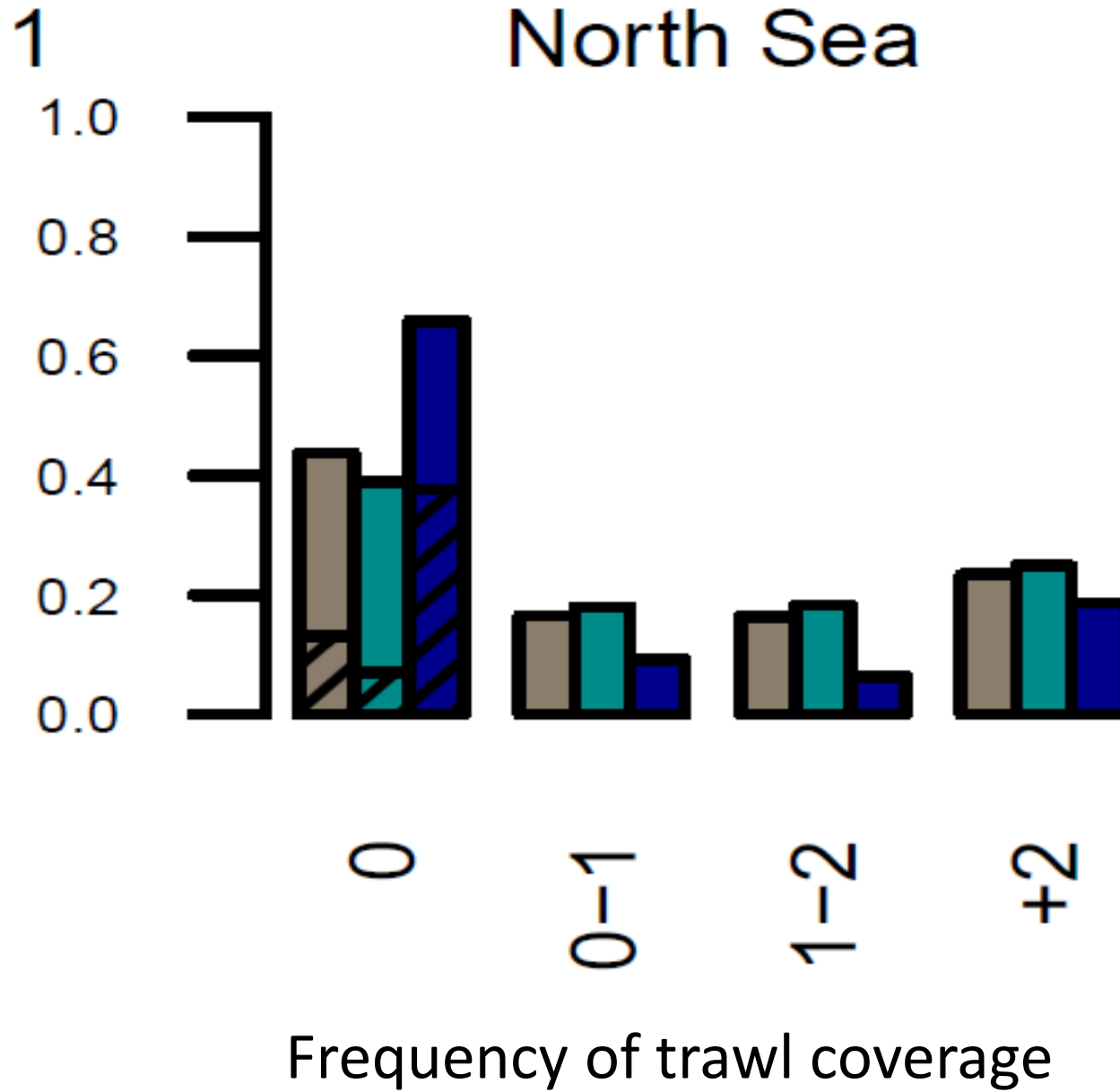
# North Sea



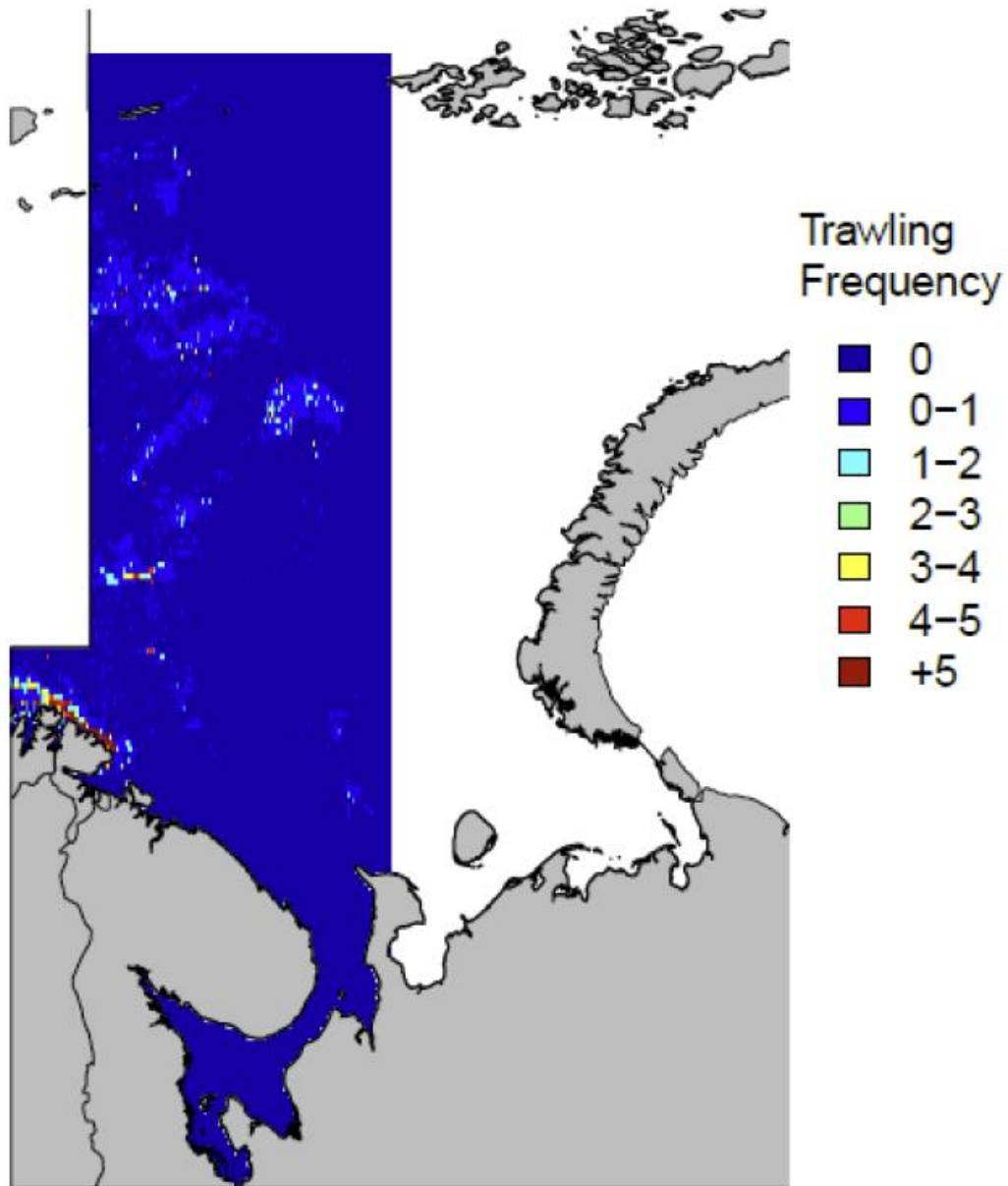
Trawling  
Frequency



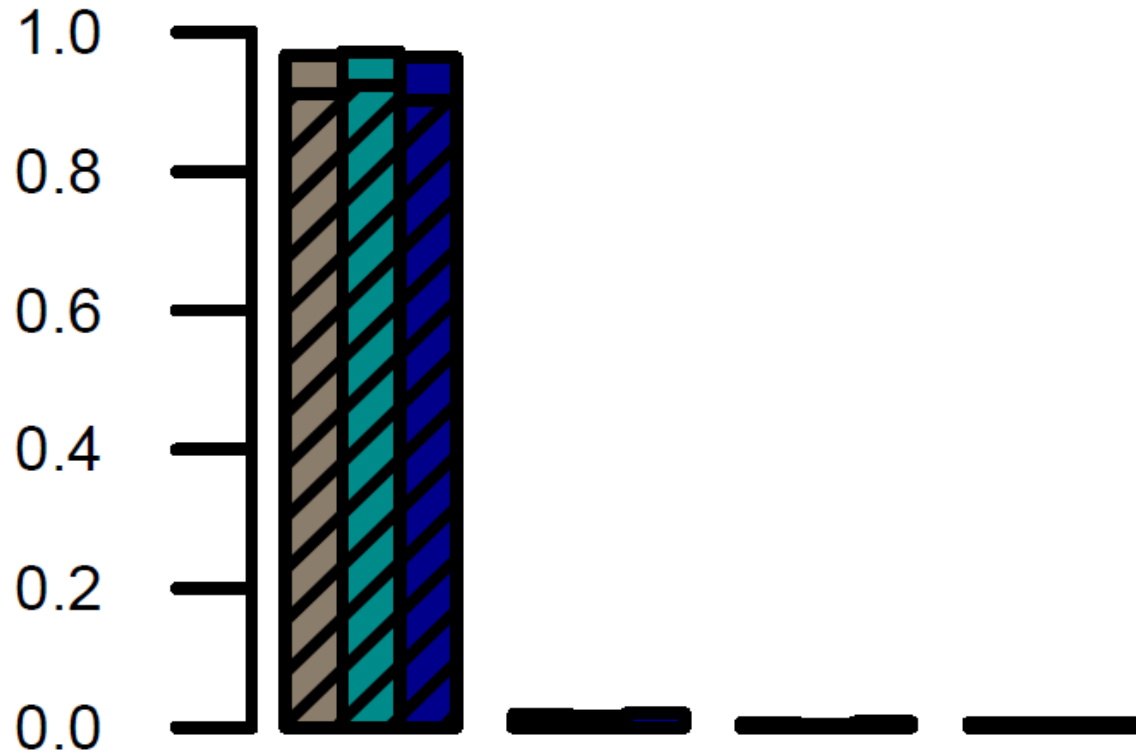
# North Sea



# Barents Sea (ICES I)

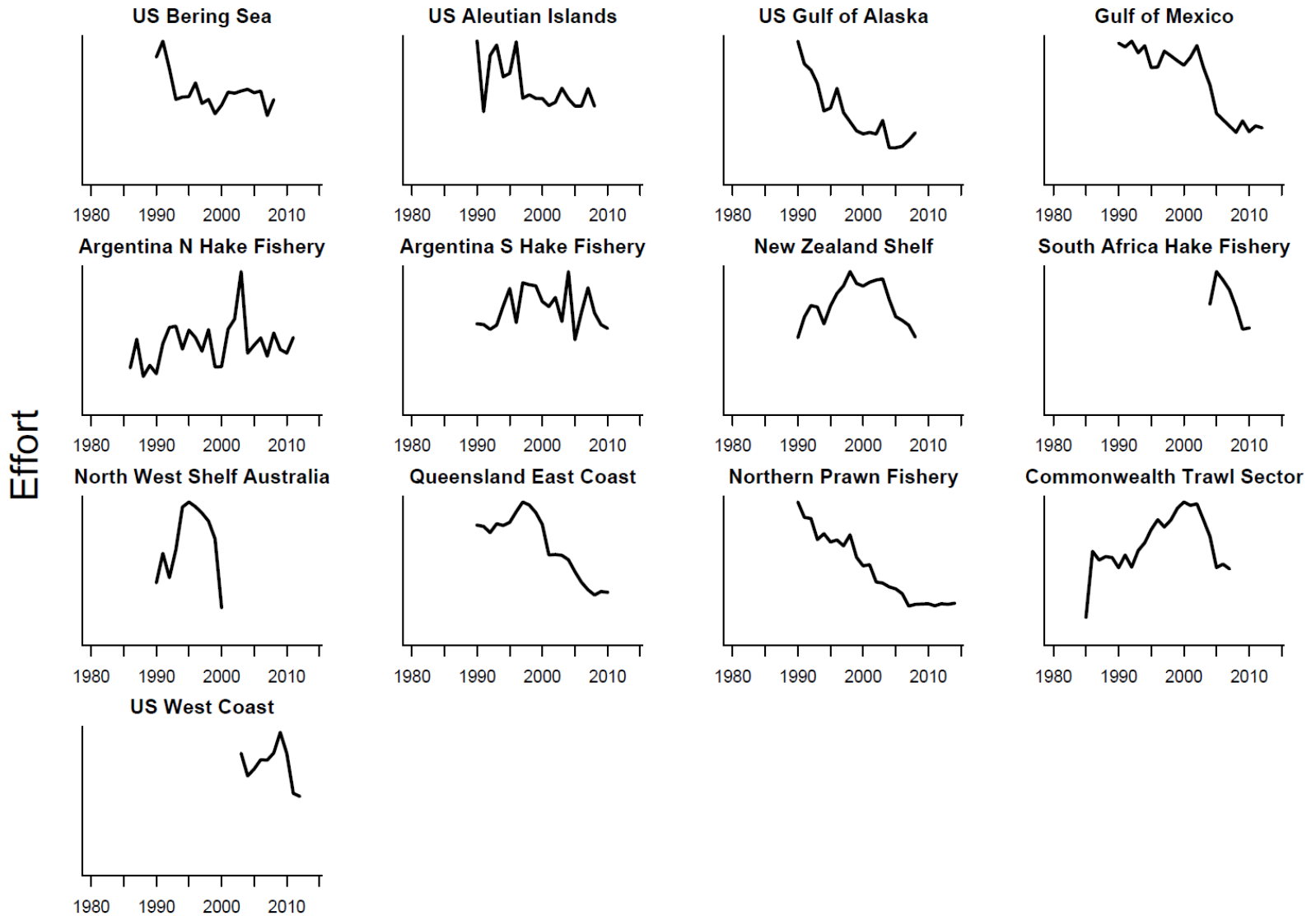


# Barents Sea (ICES I)



Frequency of trawl coverage

# Trends in effort



# Phase II

Aggregated effects of different fishing gears across all habitat types.

A rank order of impact emerges:

1. Scallop dredging
2. Beam trawling
3. Otter trawling

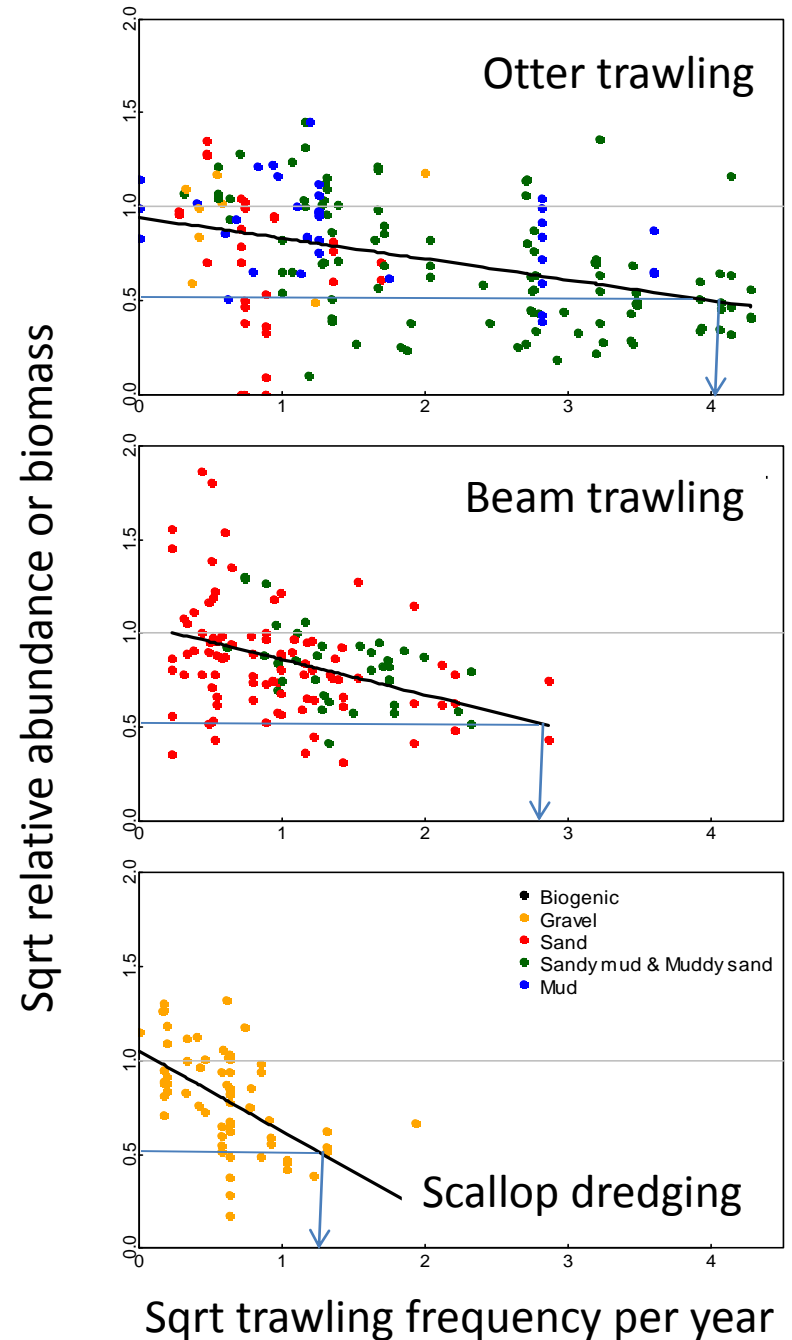


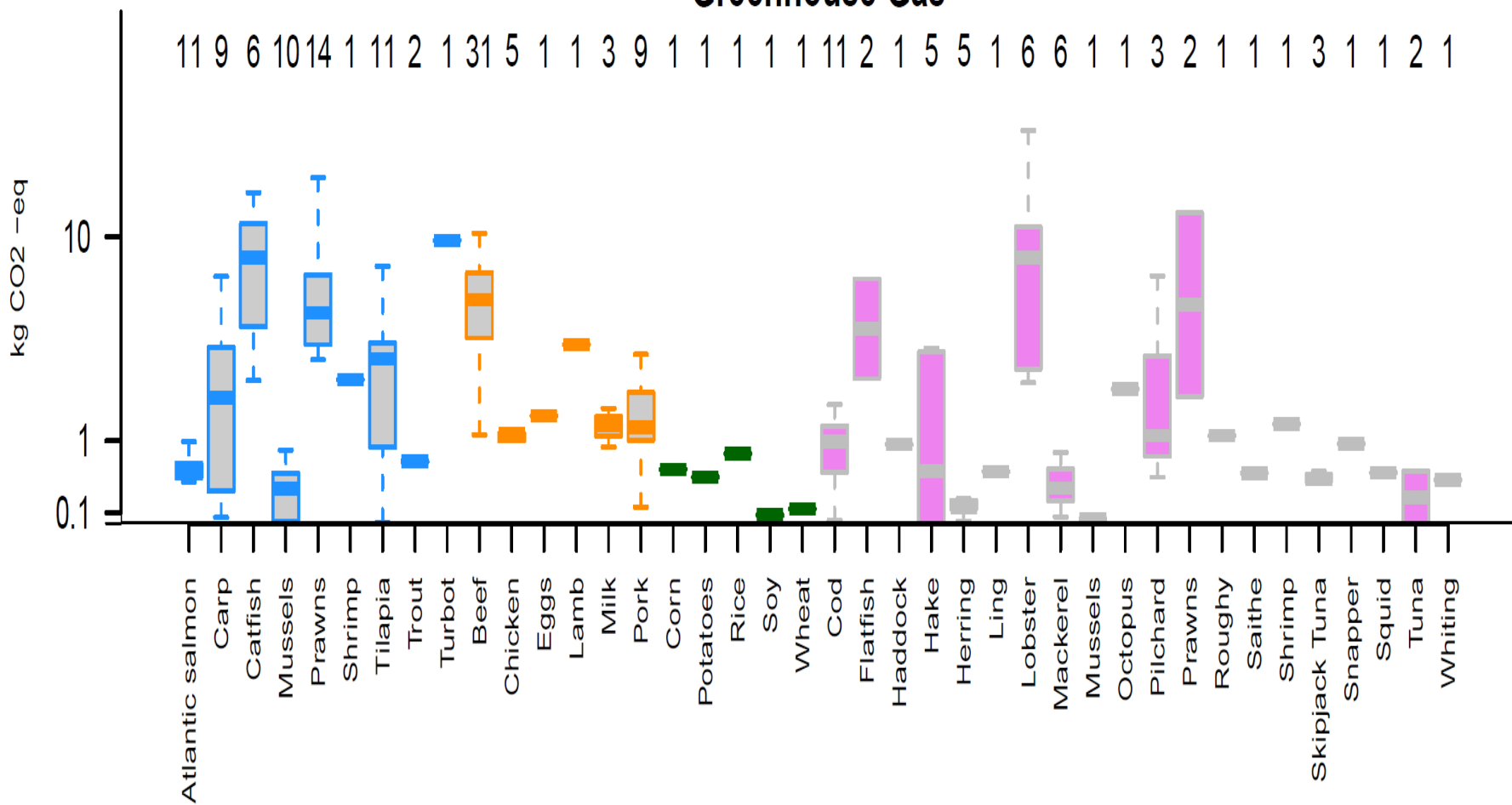
Figure by Jan Hiddink

# Should you eat fish?



What is the environmental cost of the alternative?

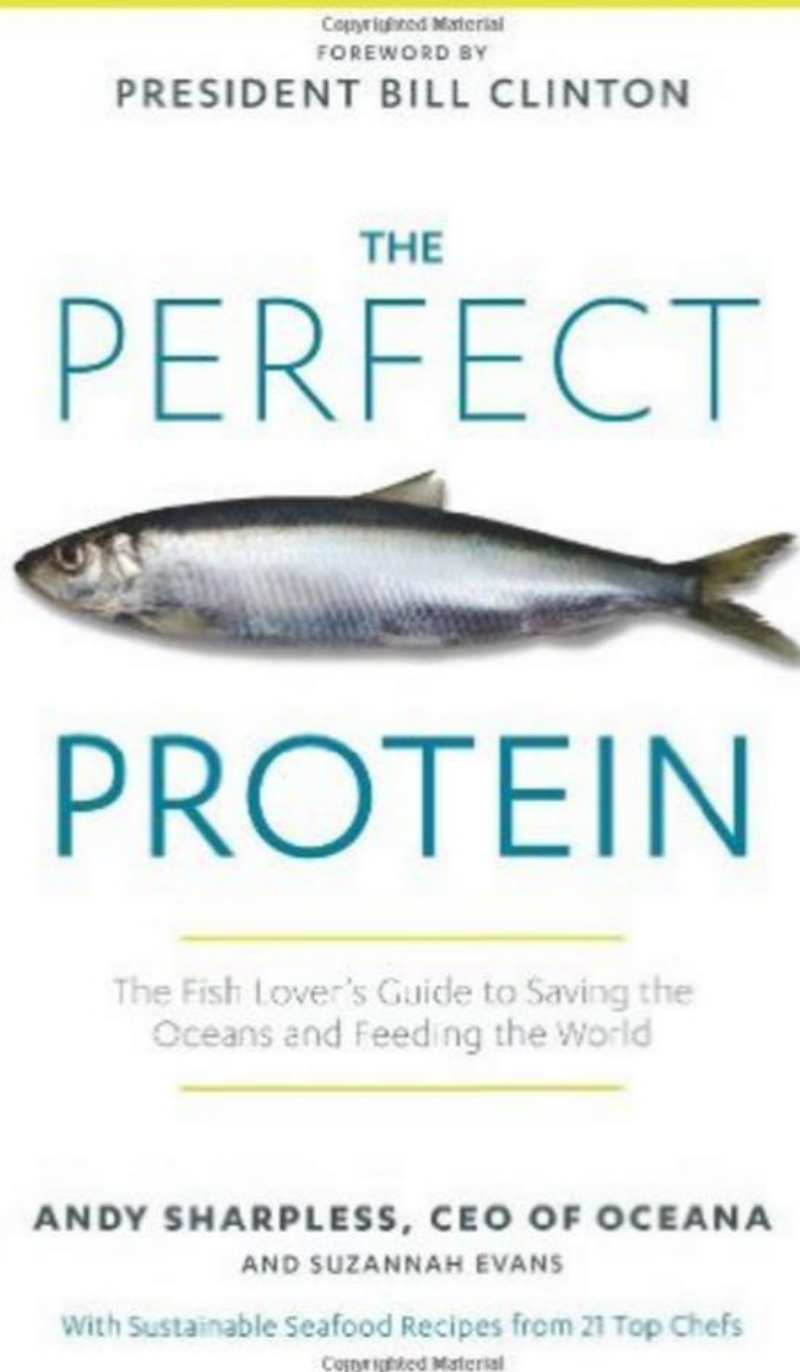
# Greenhouse Gas





Imag

- Without
- Without
- Without
- Without
- Without



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Organic vegetable field my wife farmed





# The Myths

- Stocks worldwide are declining

# Reality

- Stocks are rebuilding in many places

# The Myth

- Most fisheries are unsustainably managed

# Reality

- Many fish stocks are sustainably managed, but many are not

# Myth

- The act of fishing destroys the environment



# Reality

- Most trawled areas are not particularly sensitive to bottom contact
- Much of the seafloor is not trawled

# www.cfooduw.org



## Ethical Issues in the Gulf Snapper Fishery

Posted on February 9, 2016

In 2007 the Gulf snapper fishery moved to an individual fishing quota management system (IFQ). Under this system, each fisher was allocated a certain amount of fish for the year instead of having a fishing season and race to fish. Kingpins of the Gulf make millions off red snapper harvest without ever going fishing by [1]

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# OVERFISHING

WHAT EVERYONE NEEDS TO KNOW

RAY HILBORN, WITH ULRIKE HILBORN

Oxford University Press  
publication  
Available in English,  
Japanese and Chinese