Data & Research Issues

Steve Murawski
Office of Science & Technology

NOAA FISHERIES
NATIONAL MARINE FISHERIES SERVICE

Topics for Consideration

- Proposal for National Data Workshop
- Overview of Federal Cooperative Research Programs
- Update on 3 High-Profile National Research Council Studies Currently in Progress:
  - Recreational Fishery Data
  - Ecosystem-Level Effects of Fishing
  - Benefits and Risks of Seafood Consumption

Update on National Research Council Studies

(1) Recreational Fisheries Data Collection (Ocean Studies Board)

(2) Ecosystem Effects of Fishing: Phase II – Assessments of the Extent of Ecosystem Change and the Implications for Policy (Ocean Studies Board)

(3) Benefits and Risks of Seafood Consumption (Institute of Medicine, Food and Nutrition Board)

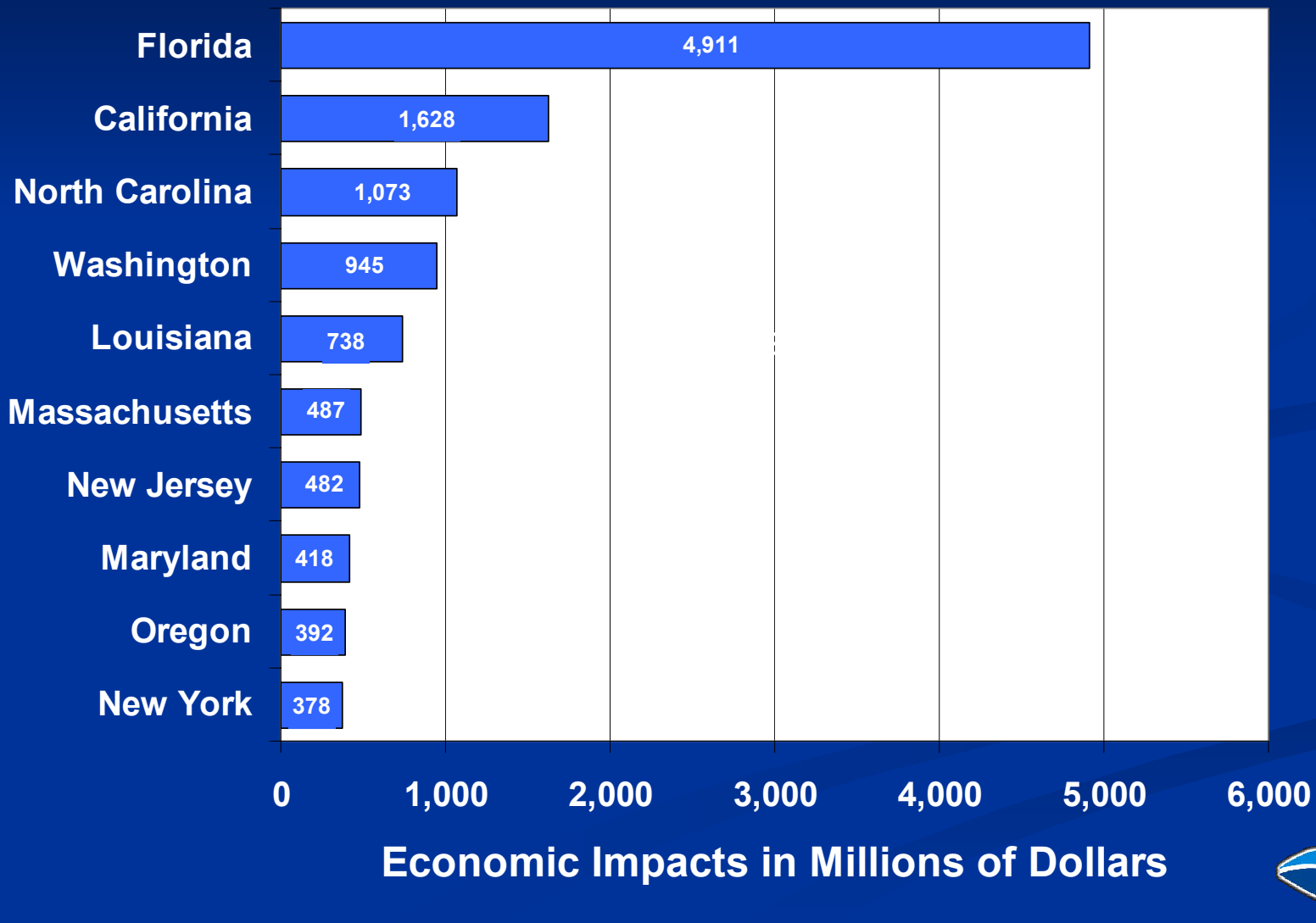
Review of Recreational Fishery Survey Methods

- How suitable are current survey methods for monitoring different types of recreational fishing?
- Do current methods provide statistical quality needed to support current temporal/geographic frames for management?
- How should frames for management be limited by choice of survey method, stratification scheme, and/or sample sizes?
- Are there alternative methods or changes to current methods that could improve the quality and utility of fishery statistics?

U. S. Marine Recreational Fisheries in Context

- Over 17 million participants per year
- Over 65 million fishing trips per year
- Over 135,000 metric tons landed per year
- Economic impact of more than $30 billion
- Over $22 billion in related expenditures
- More than 349,000 jobs supported
- Over $12 billion in related personal incomes

U.S. Marine Recreational Fishery Economic Impacts Top Ten States



The Challenges of Recreational Fishery Sampling

- large number and variety of target species (some rare events, some common)

- incomplete sampling frames (e.g., license programs by states)

- recreational discards ~60% of catch (and increasing)

- sampling designs created long before many management needs were developed

- increasing need to provide credible, precise estimates at the stratum level for stock assessment, allocation, and compliance needs

Recreational Challenges, continued…

- Difficulty in meeting harvest targets for recreational fisheries due to implementation errors using bag limits, seasons and other indirect controls
- Number of fishers varies with fishing success
- General distrust of statistical estimates vs. censuses (in many venues, not just fisheries)
- Variations in catch estimates owing to typical problems with highly stratified estimates (effort X catch rate)
- Some issues with QA/QC that have occurred
- Possible biases (night fishing, tournaments, private access)

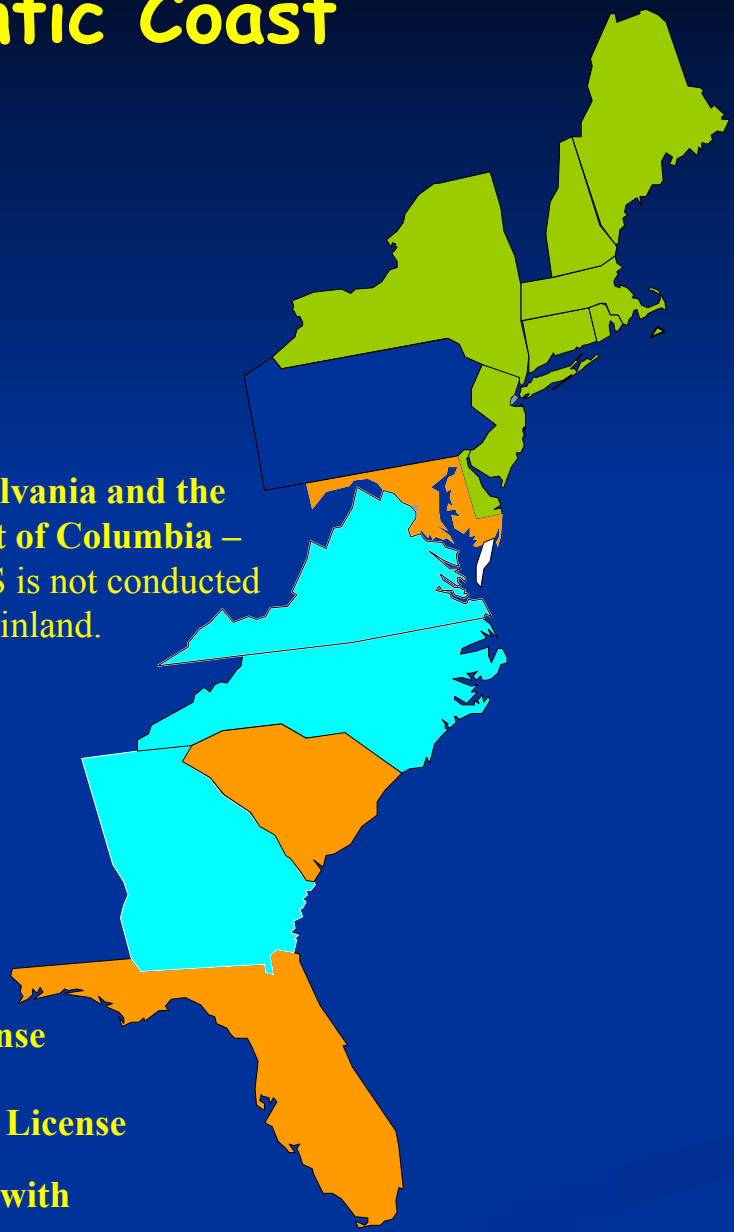
Recreational Challenges, continued…

- Increasing USA population and interest in leisure activities means increasing numbers of anglers
- Perception of mixing census information for commercial fisheries with statistical estimates for recreational fisheries
- Difficulty of independent verification of fishing success (e.g., dealer logs for commercial fisheries)
- Diffuse points of landings make logistics of interview sampling difficult
- In some states, poor prospect for marine angling license programs
- Continuing funding issues associated with maintaining sampling intensity in intercept and effort parts of survey

Saltwater Licensing Challenges

- None of the Atlantic states north of Virginia license all recreational saltwater activity.
- South Atlantic states each have a license but with various exemptions and confidentiality restrictions
- Gulf states are licensed and have similar exemptions
- Pacific states are license and also have similar exemptions, with the exception of Hawaii, which has no license
- Administration's Ocean Action Plan – Help implement state licenses

Atlantic Coast



Pennsylvania and the District of Columbia – MRFSS is not conducted this far inland.

No License

Limited License

License with exemptions

Maine – No licensing.

New Hampshire – Licensing for smelt, trout, shad, salmon, and any ice fishing activity.

Massachusetts – No licensing.

Rhode Island – No licensing.

Connecticut – Licensing for recreational gillnet fishing for menhaden (personal use).

New York – No licensing.

New Jersey – No licensing.

Delaware – Licensing for recreational use of gillnets.

Maryland – Licensing for Chesapeake Bay only.

Potomac River Fisheries Commission – Licensing for all fishing in the Potomac River but not for shore or pier.

Virginia – Licensing for use of hook and line, hand-line, spear, or gig.

North Carolina – Implementing a license for all recreational saltwater fisheries.

South Carolina – Licensing for oysters or clams or fishing for marine finfish from boats and piers. Shore fishing is unlicensed.

Georgia – One license for fishing (fresh and saltwater) and hunting except for duck.

Florida – Licensing for fishing for marine finfish from boats. Shore and pier fishing for Florida residents is unlicensed.

Terms of Reference: Ecosystem Effects of Fishing Study

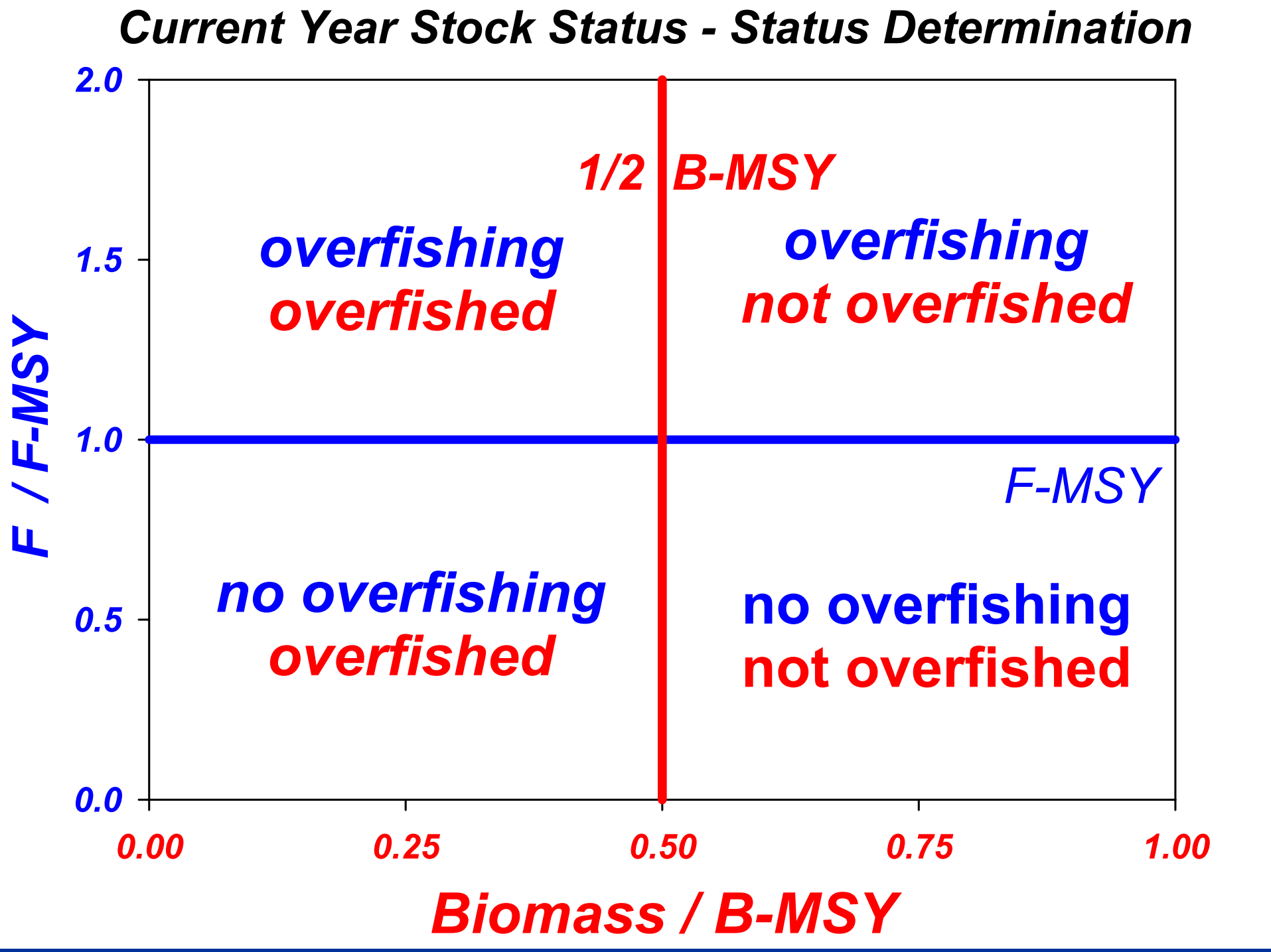
- Evaluate the evidence for fishing-induced ecosystem effects,
- Comment on the quality of data and models available to evaluate long-term ecosystem effects,
- Evaluate the implications of ecosystem effects of fishing for society & science, given uncertainty of information. Focus on characteristics of ecosystems providing sustainable production of goods and services in relation to those from pristine ecosystems,
- Propose appropriate research strategies to better evaluate ecosystem effects of fishing and the provision of policy guidance.

Overarching Ecosystem Issues for Fisheries

- Evidence for reversibility of fishing effects
- Evidence for ecosystem change due to predator overfishing
- Fishing Impacts on System-wide Productivity
  - Sequential fishing down trophic levels
  - Trophic Cascades
  - Control hypotheses for fishery ecosystems
  - Fishing-Induced regime change
- Shifting Baselines – pristine, utilized, degraded ecosystems
- Evidence for genetic effects of fishing
- Global syntheses (& generalities) regarding fishery effects
- Effectiveness of MPAs for ecosystem objectives and fishery management
- Adequacy of data, indices & models

Evidence for reversibility of fishing effects

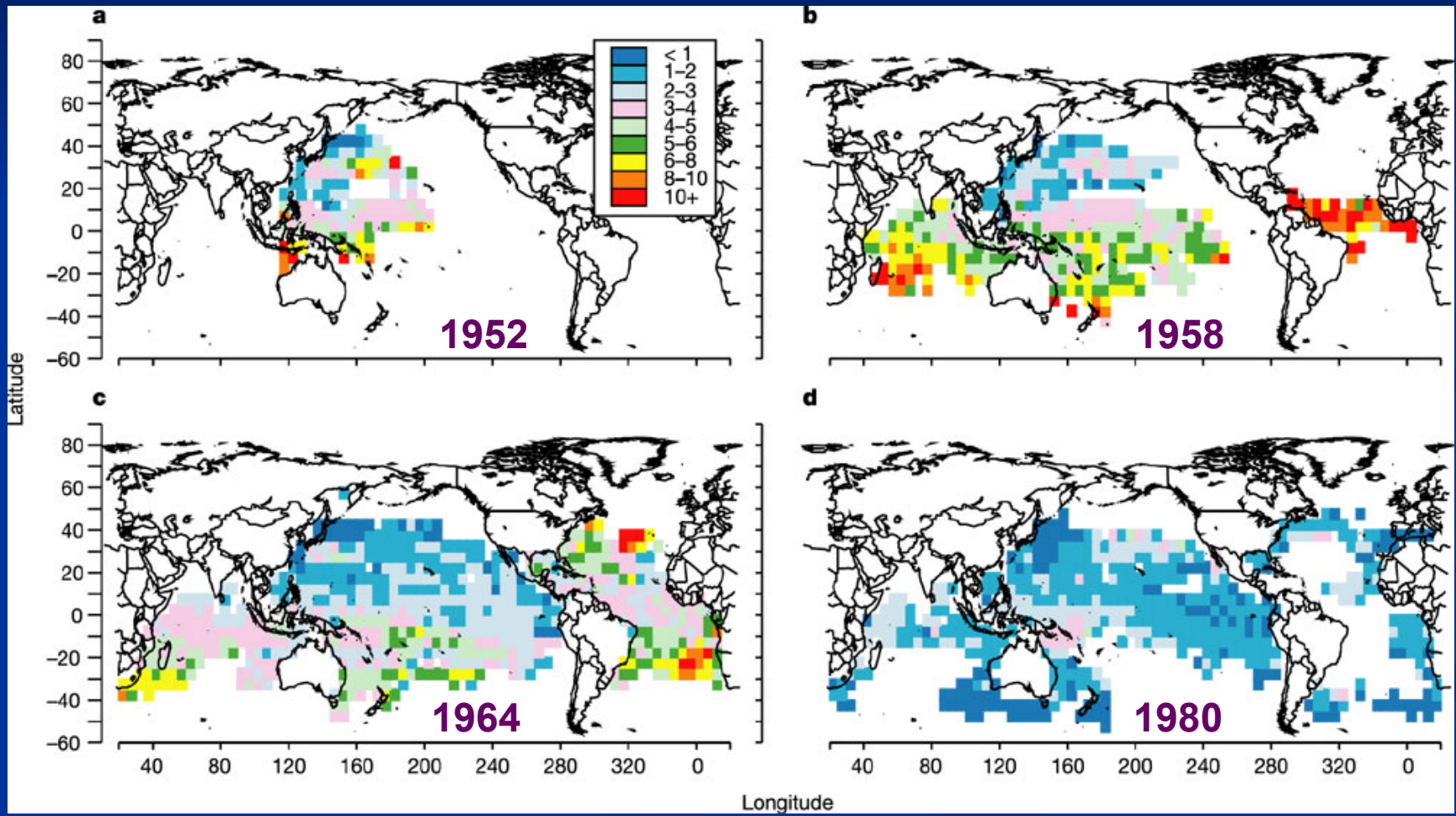
- Myers, R.A., N. Barrowman, J. Hutchings, & A. Rosenberg. 1995. Population dynamics of exploited fish stocks at low population levels. *Science* 269: 1106-1108.
- Hutchings, J.A. 2000. Collapse and recovery of marine fishes. *Nature* 406, 882-885.
- Hutchings, J.A. 2001. Influence of population decline, fishing, and spawner variability on the recovery of marine fish. *Journal of Fish Biology* 59: 306-322.
- Hutchings, J.A., and J.D. Reynolds. 2004. Marine fish population collapses: Consequences for recovery and extinction risk. *Bioscience* 54(4): 297-309.
- Mace, P.M. 2004. In defense of fisheries scientists, single-species models and other scapegoats: confronting the real problems. *Marine Ecology Progress Series* 274: 285-291.
- Caddy, J.F., and D.J. Agnew. 2004. An overview of recent global experience with recovery plans for depleted marine resources and suggested guidelines for recovery planning. *Reviews in Fish Biology and Fisheries* 14: 43-112.


Current Year Stock Status - Status Determination
2.0
1.5
1.0
0.5
0.0
F / F-MSY
1/2 B-MSY
overfishing
overfished
overfishing
not overfished
F-MSY
no overfishing
overfished
no overfishing
not overfished
0.00
0.25
0.50
0.75
1.00
Biomass / B-MSY

Evidence for ecosystem change due to predator overfishing

- Myers, R.A., and B. Worm. 2003. Rapid worldwide depletion of predatory fish communities. *Nature* 423: 280-283.
- Walters, C. 2003. Folly and fantasy in the analysis of spatial catch rate data. *Canadian Journal of Fisheries and Aquatic Sciences* 60: 1433-1436
- Hampton, J., J.R. Sibert, and P. Kleiber, 2003. Comments on Myers & Worm (*Nature*, 423:280-283, 15 May 2003)
  http://www.soest.hawaii.edu/PFRP/large_pelagics/Myers_comments.pdf (to appear in Nature)
- Maunder, M. and S. Harley. 2004. Are pelagic fisheries managed well? A stock assessment scientists perspective. *Proceedings of the Mote Symposium.* In press.

Myers, R.A., and B. Worm. 2003. Rapid worldwide depletion of predatory fish communities. *Nature* 423: 280-283.



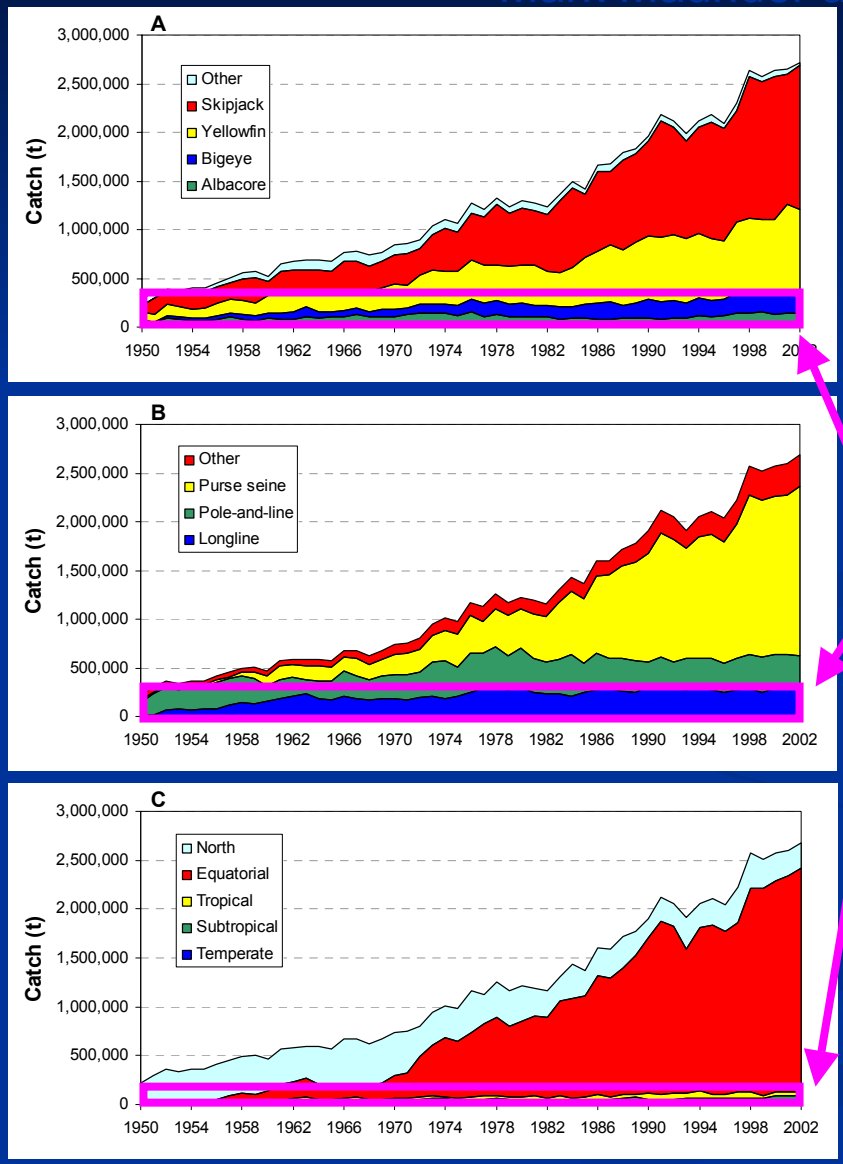
Pacific Ocean Tuna Catch Data

Mark Maunder and Shelton Harley

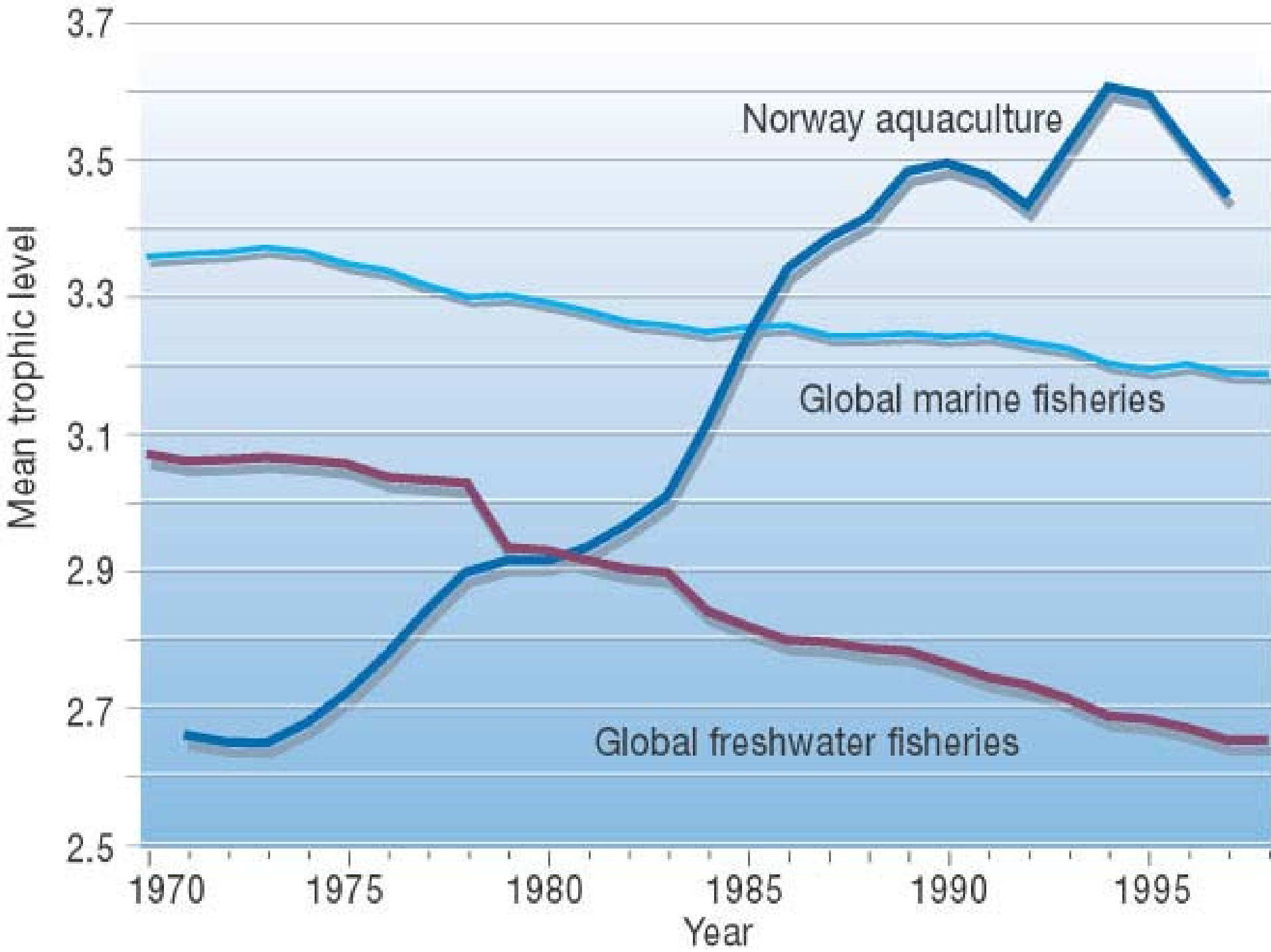
By species

By method

By area



Myers and Worm data


Norway aquaculture
Global marine fisheries
Global freshwater fisheries
Mean trophic level
3.7
3.5
3.3
3.1
2.9
2.7
2.5
1970
1975
1980
1985
1990
1995
Year

Shifting Baselines – Issues is: pristine, utilized, vs. degraded ecosystems

- Jackson, J., and 18 co-authors. 2001. Historical overfishing and the recent collapse of coastal ecosystems. *Science* 293: 1589-1591
- Roman, J., and S.R. Palumbi. 2003. Whales before whaling in the North Atlantic. *Science* 301: 508-510.
- Rosenberg, A.A., W.J. Bolster, K.E. Alexander, W. B. Leavenworth, A.B. Cooper, and M.G .McKenzie. 2005. The history of ocean resources: modeling cod biomass using historical records. *Front Ecol Environ* 3(2): 84–90.
- Lotze, H.K., and I. Milewski. 2004. Two centuries of multiple human impacts and successive changes in a North Atlantic food web. *Ecological Applications* 14(5): 1428-1447.
- Myers, R.A., and J.K. Baum. 2004. Shifting baselines and the decline of pelagic sharks in the Gulf of Mexico. *Ecology Letters* 7(2): 135-145

Effectiveness of MPAs for ecosystem objectives and fishery management

- Roberts, C.M., J.P. Hawkins, and F.R. Gell. The role of marine reserves in achieving sustainable fisheries. *Philosophical Transactions of the Royal Society B-Biological Sciences* 360: 123-132.
- Sale, P.F., R.K. Cowen, B.S. Danilowicz, G.P. Jones, J.P. Kritzer, K.C. Lindeman, S. Planes, N.V.C. Polunin, G.R. Ruse, Y.J. Sadvoy, and R.S. Steneck. 2005. Critical science gaps impede use of no-take fishery reserves. *TREE* 20(2): 74-80.
- Numerous other MPA papers

Committee on Nutrient Relationships in Seafood: Selections to Balance Benefits and Risks

- Seafood Consumption involves substantial Benefits for human health (dietary, circulatory), as well as risks from contaminants
- Study will update information on risks, especially from methyl mercury accumulating in fish tissues
- Balance of benefits/risks based on sum-population risk factors (e.g., demographics, child bearing status, etc.
- Study will propose optional consumption options for human subpopulations

Fish Consumption Advisories

- Confusing
- Complex
- Some sub-populations are at risk

Challenge:

> "Properly inform sub-populations at risk without alarming individuals not at risk to cease availing themselves to the nutritional benefits of fish and shellfish consumption."

Statement of Work primary task:

- What seafood dietary scenarios (e.g., amount, species, type, meal frequency, etc.) provide the greatest health benefits while minimizing negative health effects from toxicants and contaminants for the U.S. population and U.S. sensitive at-risk sub-populations (e.g., women who may become pregnant, pregnant women, nursing mothers, young children, and other sub-populations of concern where sufficient data exists to make a determination)?