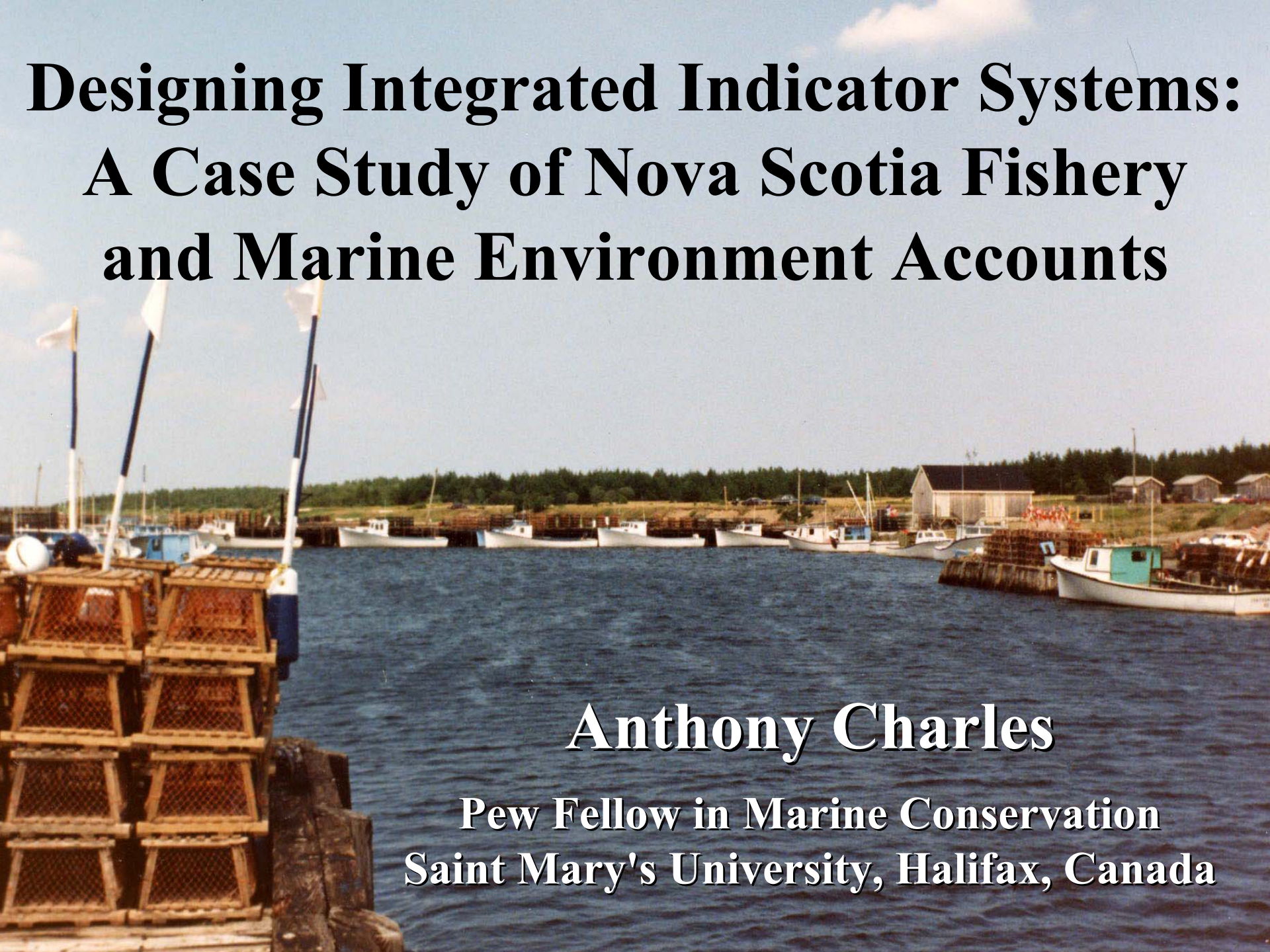
Designing Integrated Indicator Systems: A Case Study of Nova Scotia Fishery and Marine Environment Accounts



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Coming Up…

- Design Issues: Structural, Content
- Integrated Indicator Systems
  - The GPI Atlantic Approach
- Fishery & Marine Environment Accounts
  - Ecological Indicators
  - Socioeconomic Indicators
  - Community Indicators
  - Institutional Indicators

Indicator Design Issues

Structural Issues:

Comprehensiveness

Level of Aggregation

Content Issues:

Quantitative vs. Qualitative

Level of Uncertainty

Structural Issues

Comprehensiveness:

- Focus on one component (e.g. ecological)
- Integrated approach (all components)

Level of Aggregation:

- Multiple indicators with no aggregation
- Partial aggregation (e.g., in ‘indices’)
- Single “index” (e.g., GPI vs. GDP)

Content Issues

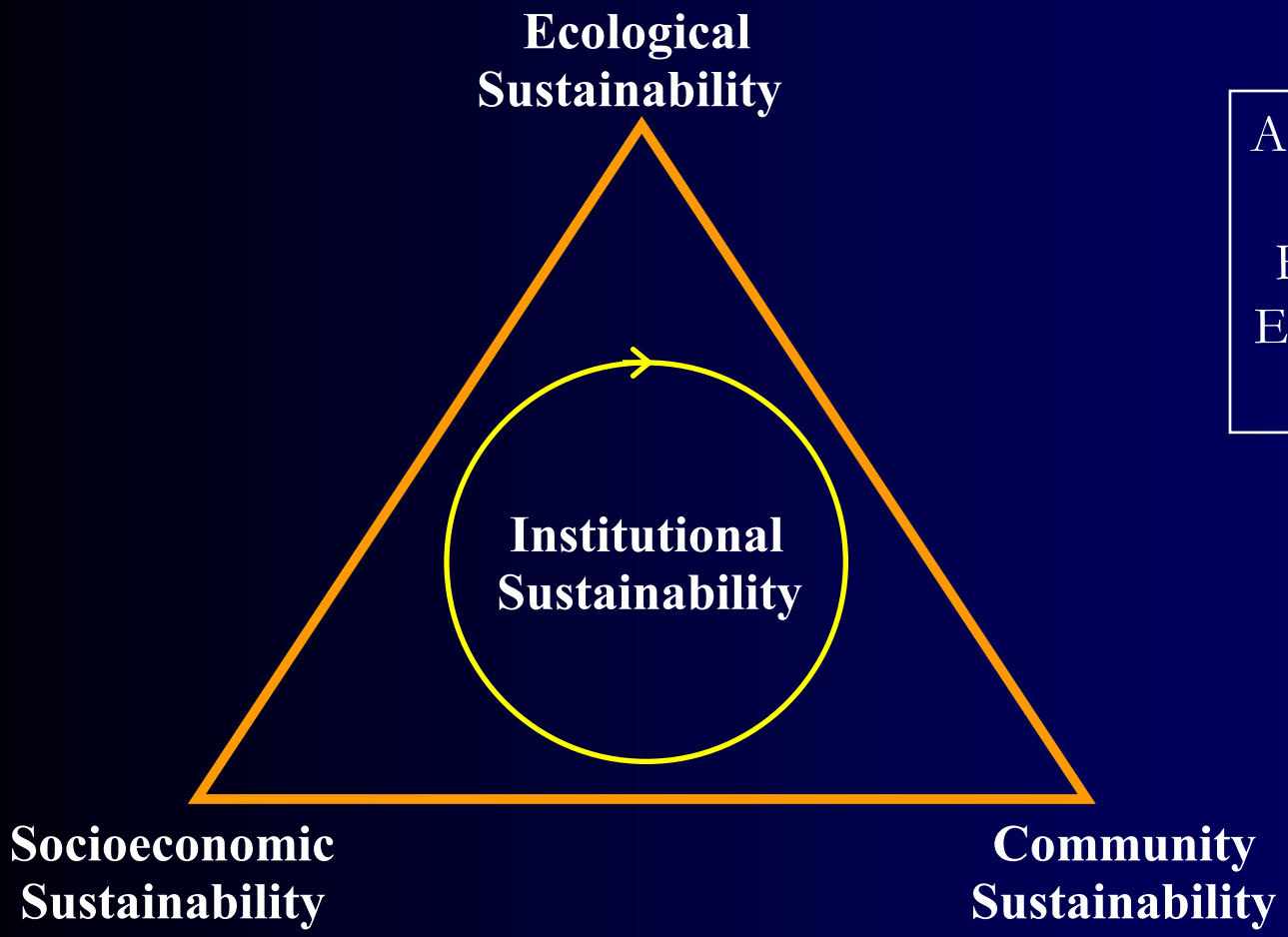
Quantitative vs. Qualitative:

- Must all indicators be quantitative? Numerical?
- Or are qualitative indicators allowed?

Level of Uncertainty:

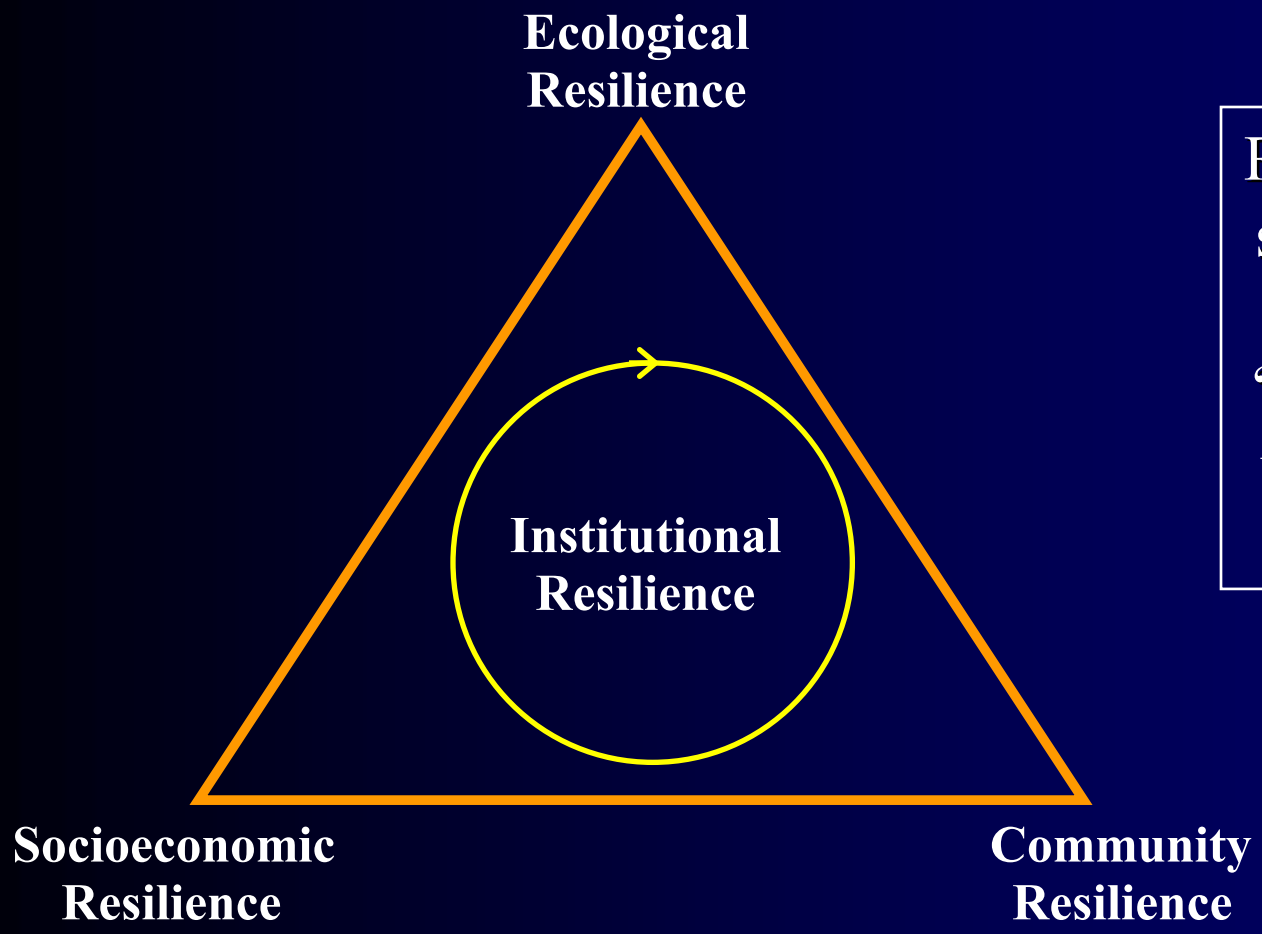
- Are the indicators simply reported ‘as is’?
- Or is the level of uncertainty incorporated?

Integrated Sustainability Indicators



A.T. Charles: "Toward Sustainability: The Fishery Experience" Ecological Economics (1994)

The Resilience Parallel



Resilience reflects a system's capability to persist or 'bounce back' from unexpected shocks - Holling

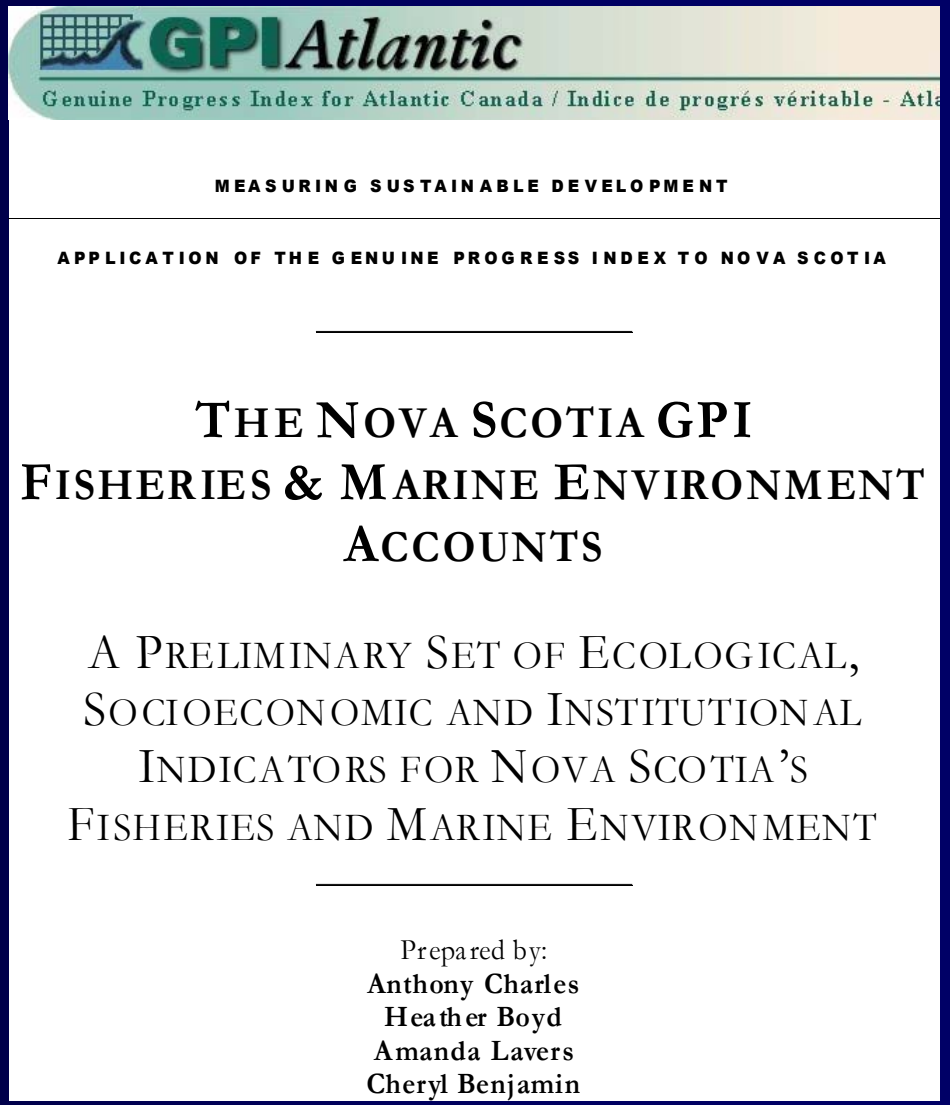
Indicators: GPI Atlantic Approach (www.gpiatlantic.org)

Natural Resource & Environmental Accounts:

- Fisheries and Marine Environment
- Soils and Agriculture
- Forests
- Nonrenewable Subsoil Assets
- Greenhouse Gas Emissions
- Sustainable Transportation
- Ecological Footprint Analysis
- Air Quality, Water Quality, Solid Waste

Indicators: A Case Study

- Ecological Indicators
- Socioeconomic Indicators
- Community Indicators
- Institutional Indicators
- Incl. Resilience Indicators



GPI Atlantic

Genuine Progress Index for Atlantic Canada / Indice de progrés véritable - Atla

MEASURING SUSTAINABLE DEVELOPMENT

APPLICATION OF THE GENUINE PROGRESS INDEX TO NOVA SCOTIA

THE NOVA SCOTIA GPI
FISHERIES & MARINE ENVIRONMENT
ACCOUNTS

A PRELIMINARY SET OF ECOLOGICAL, SOCIOECONOMIC AND INSTITUTIONAL INDICATORS FOR NOVA SCOTIA'S FISHERIES AND MARINE ENVIRONMENT

Prepared by:
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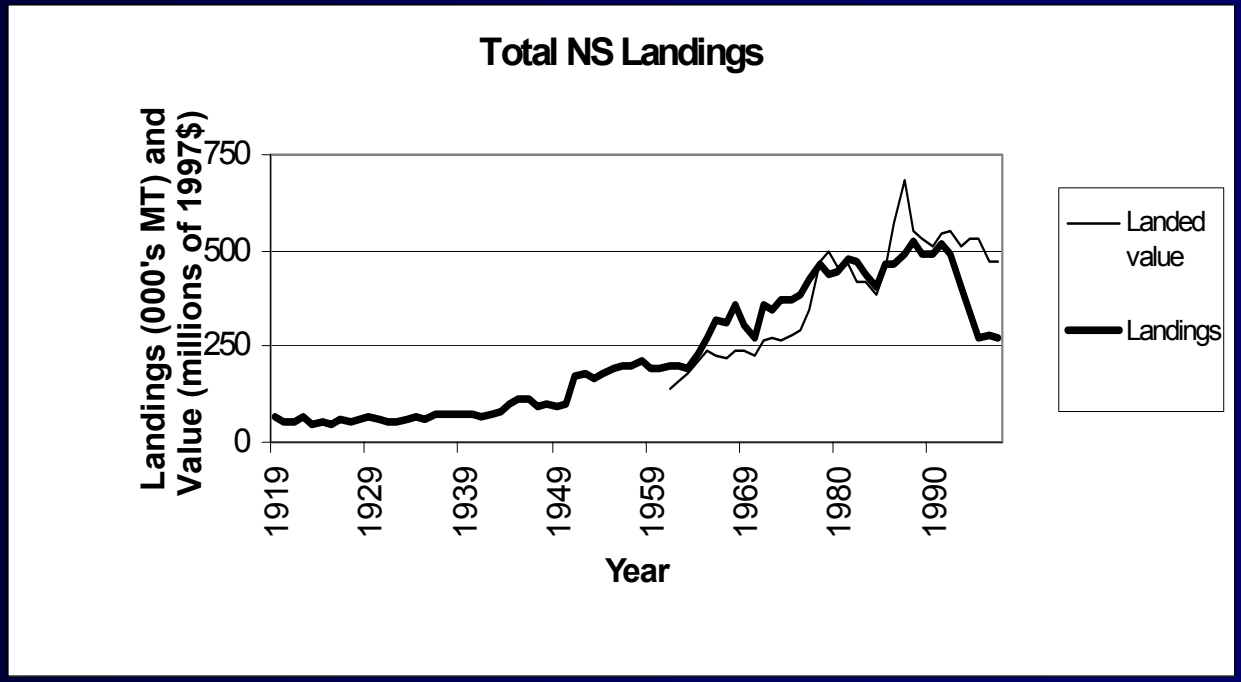
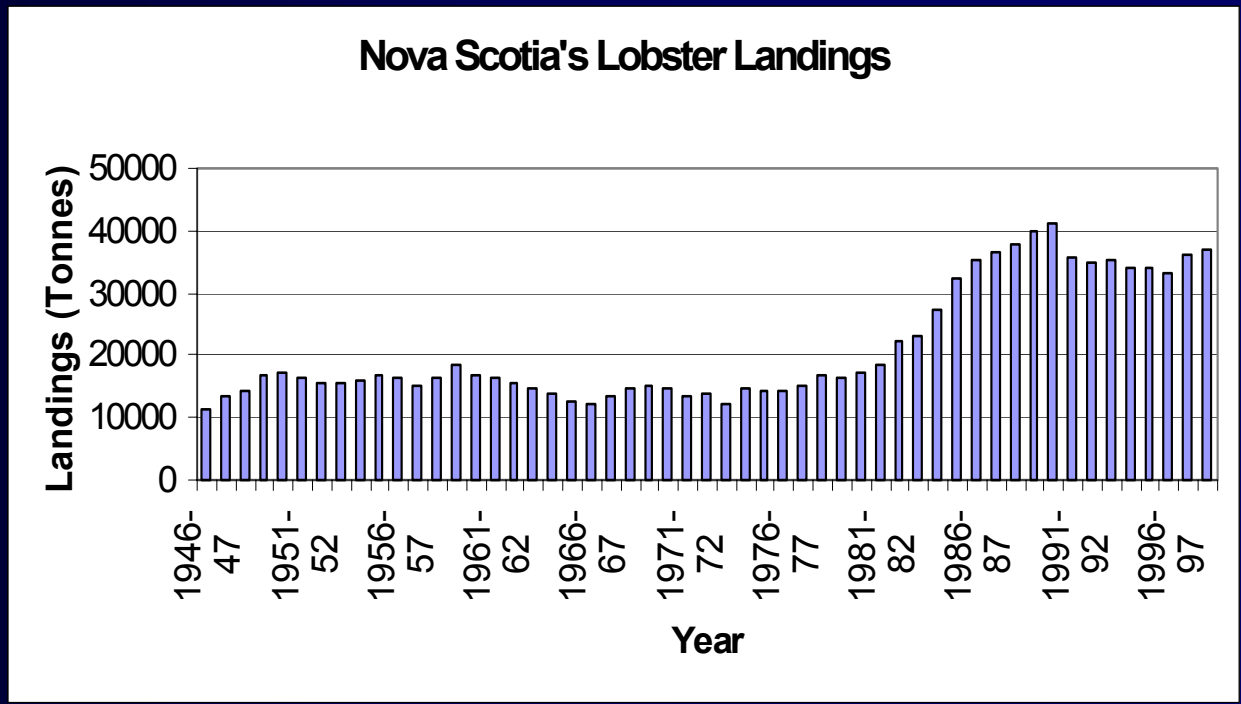
Ecological Indicators

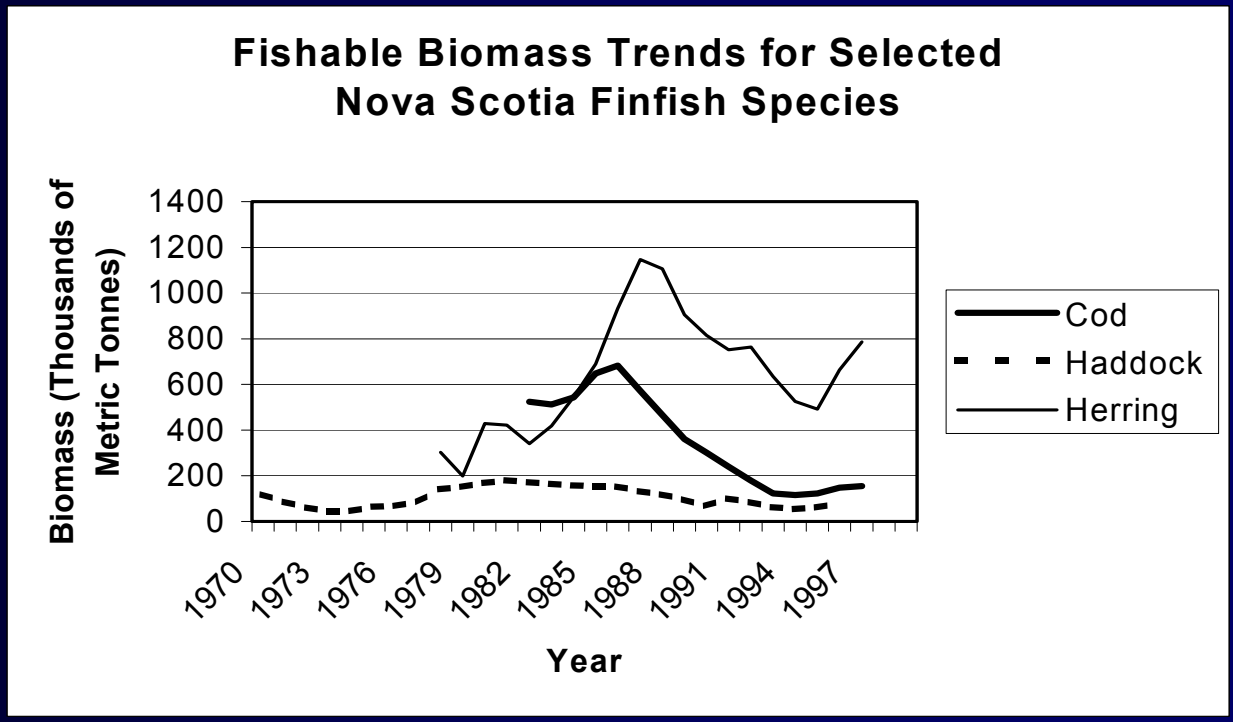
- *Primary Commercial Species*
  - Fishable Biomass, Catch Level
  - Fish Size at Age, Age Structure
- *Non-Target Species*
  - Discard Rates
  - Right Whales: Population and Reproduction
- *Resilience*
  - Biodiversity and Shannon-Weiner Index
  - Area of Bottom Habitat Impacted
- *Marine Environmental Quality*
  - Contaminants in Seabird Eggs, Mussels
  - Area of Shellfish Closures

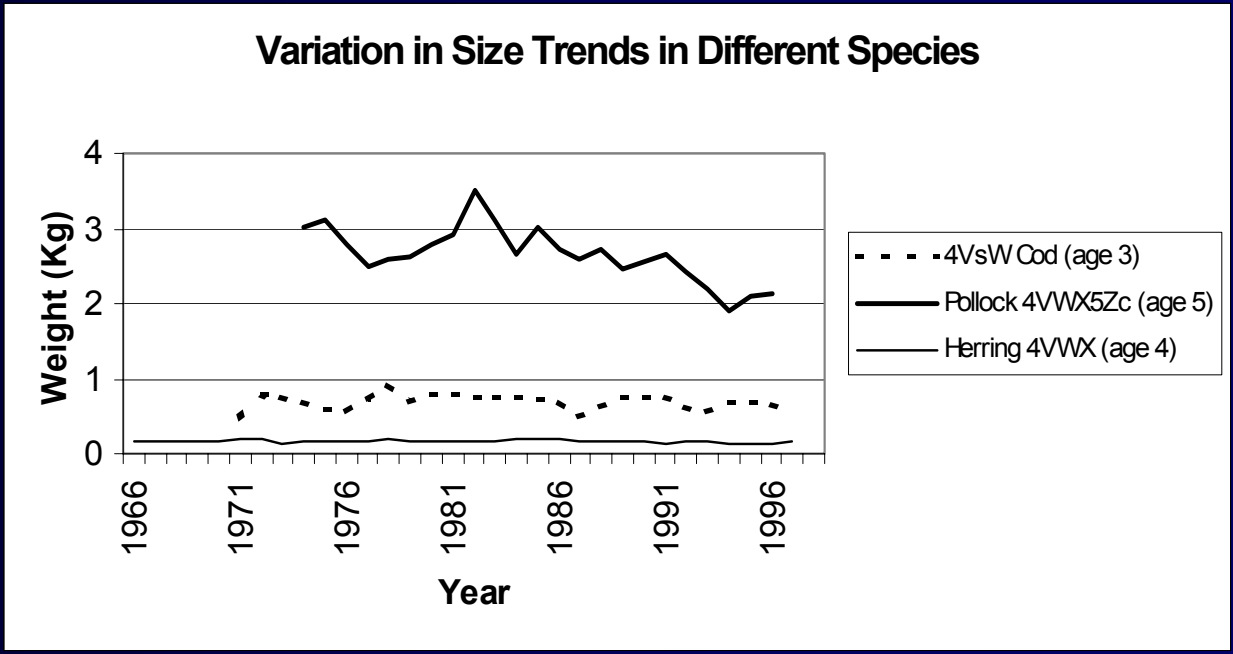
Fish Catch Levels: A Traditional Measure of Success



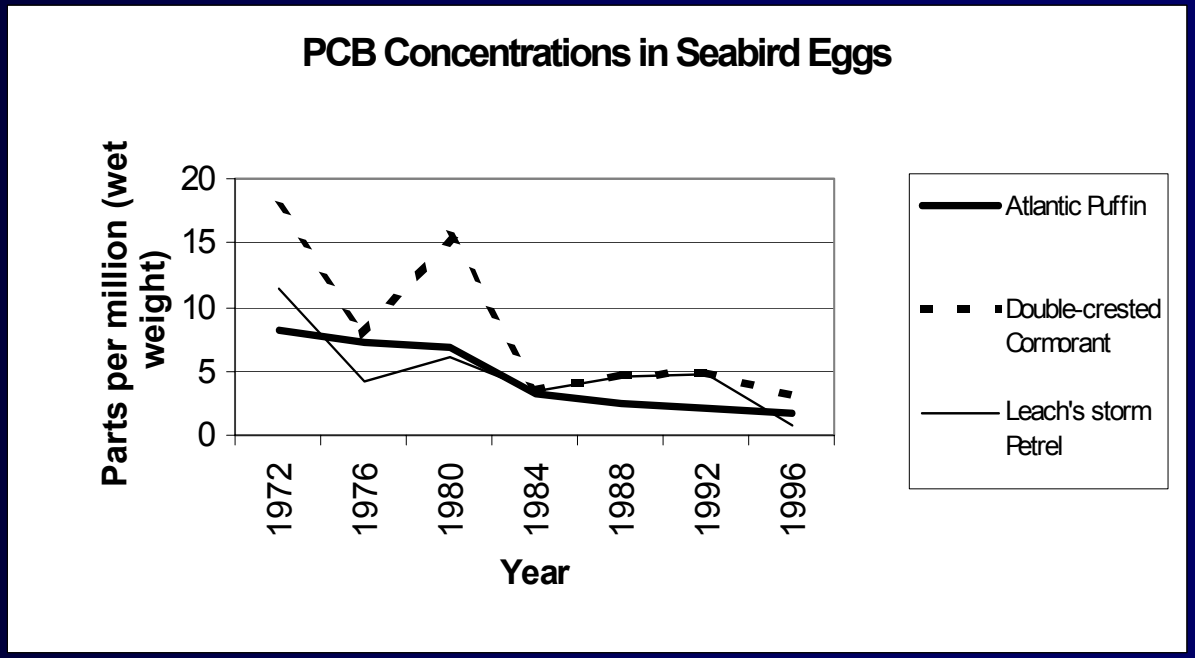


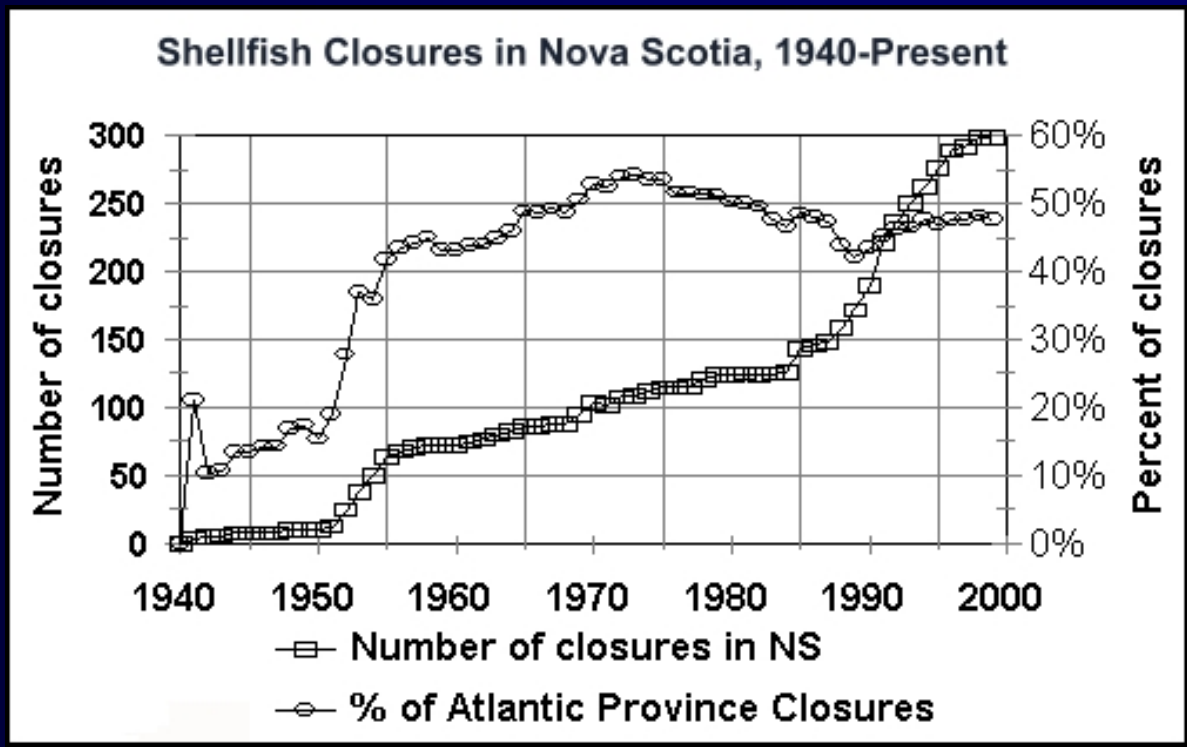
Resource Status Indicators: Biomass, Fish Size



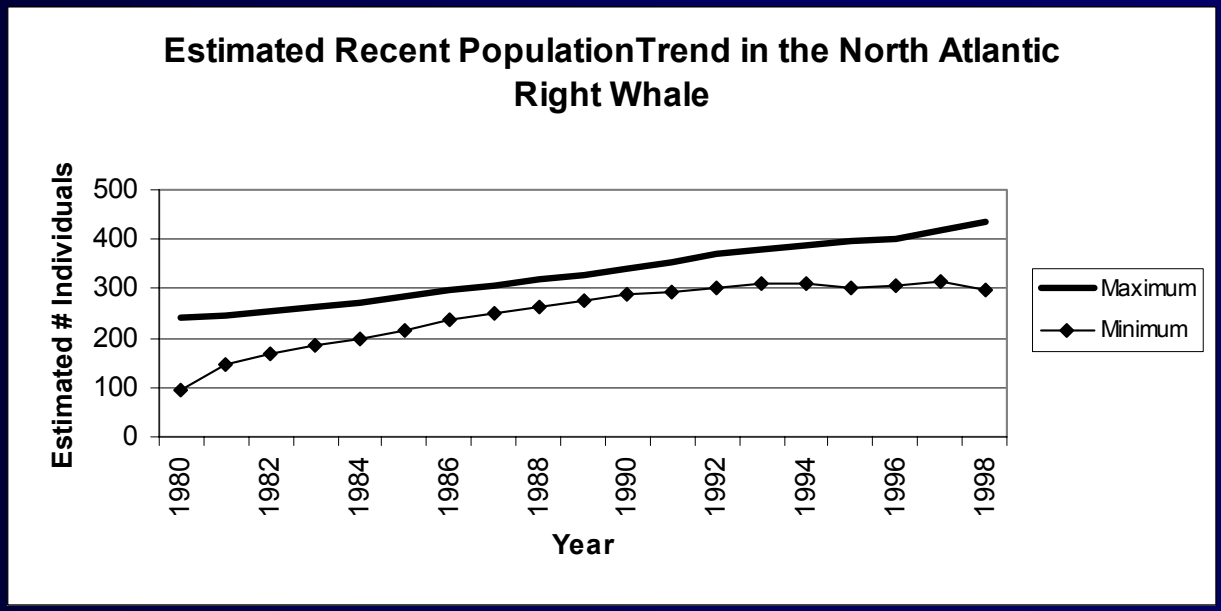


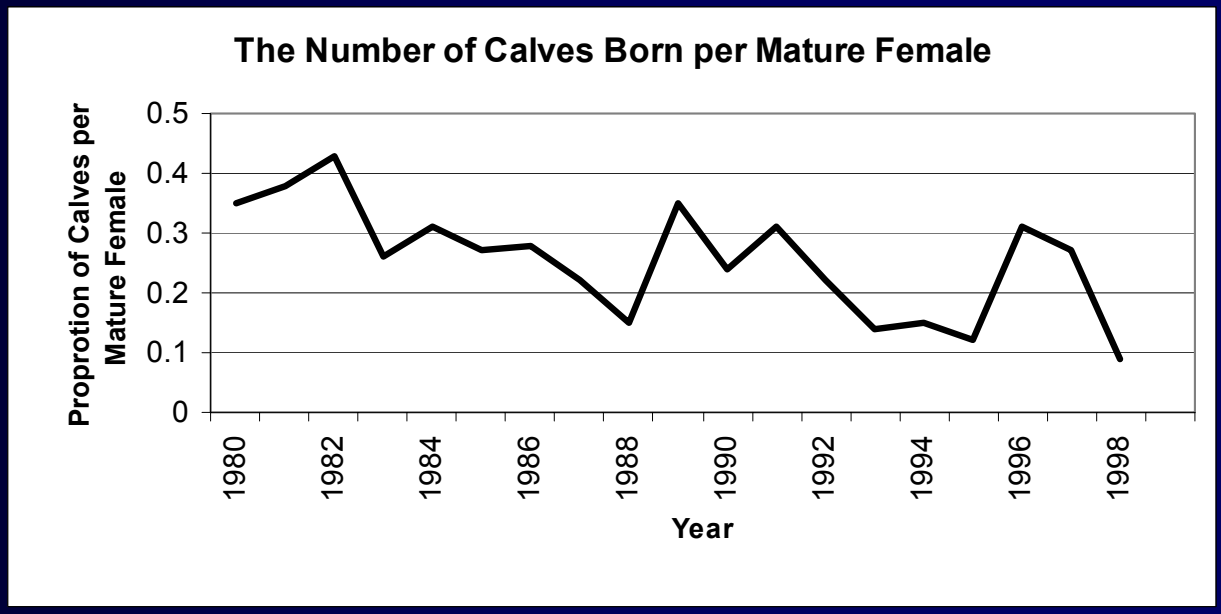
Marine Env'l Quality





North Atlantic Right Whales

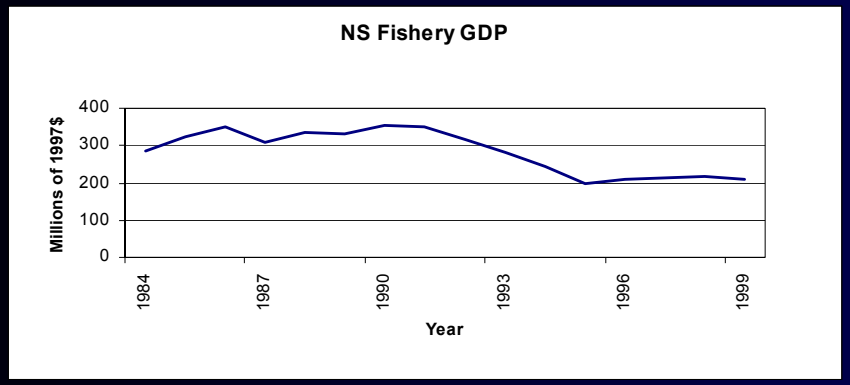


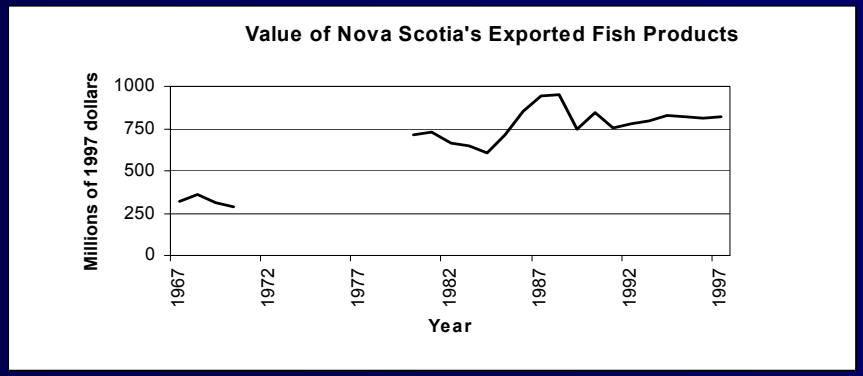


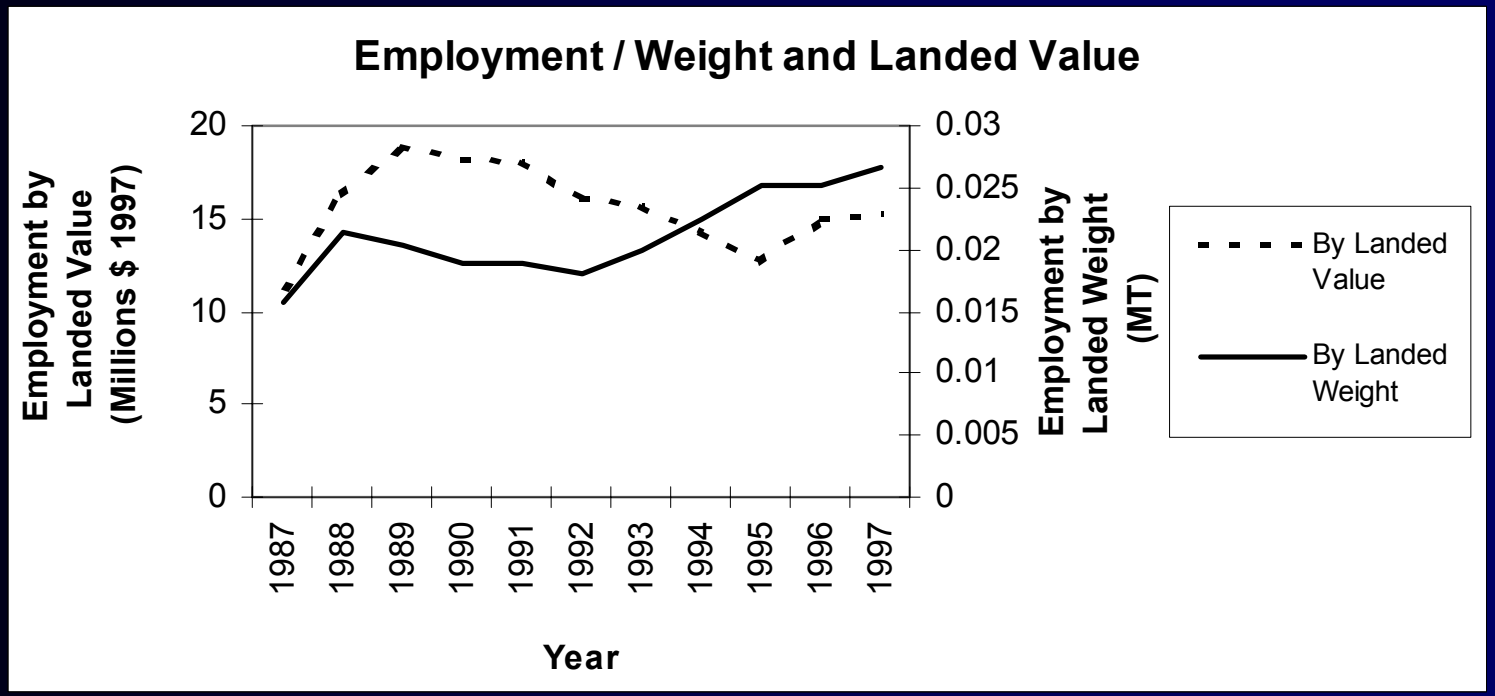
Socio-Economic Indicators

- *Traditional Economic Measures*
  - Total Landed Value
  - Fishery Gross Domestic Product (GDP)
  - Value of Fishery Exports
  - Employment (per fish, per $)
  - Market Price
- *Natural Capital and Distribution*
  - Fish Stock Value
  - Annual Depreciation in Natural Capital
  - Value of Marine Ecosystem Services
  - Distribution of Access, Catch, Landed Value

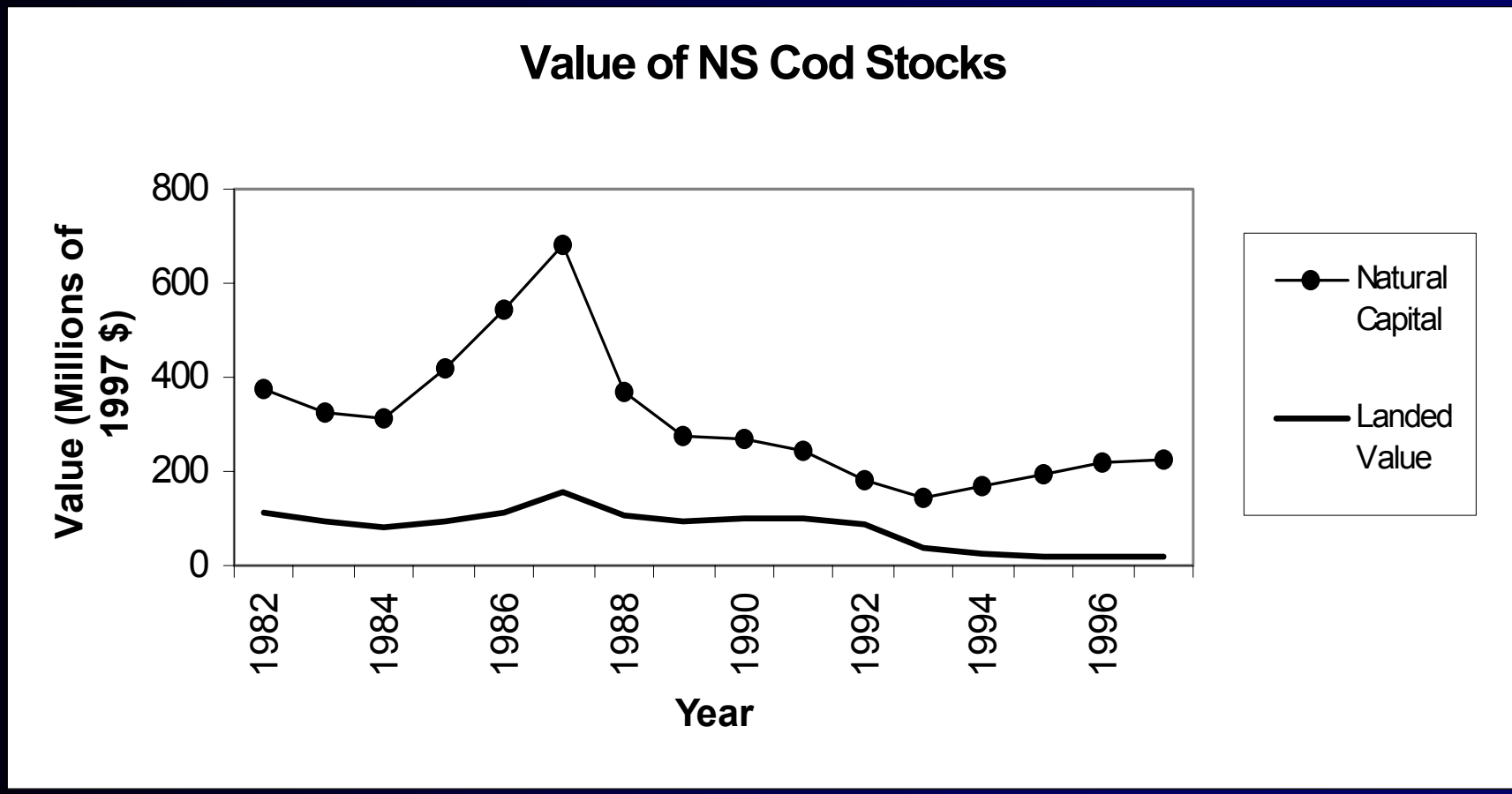
Traditional Economic Measures







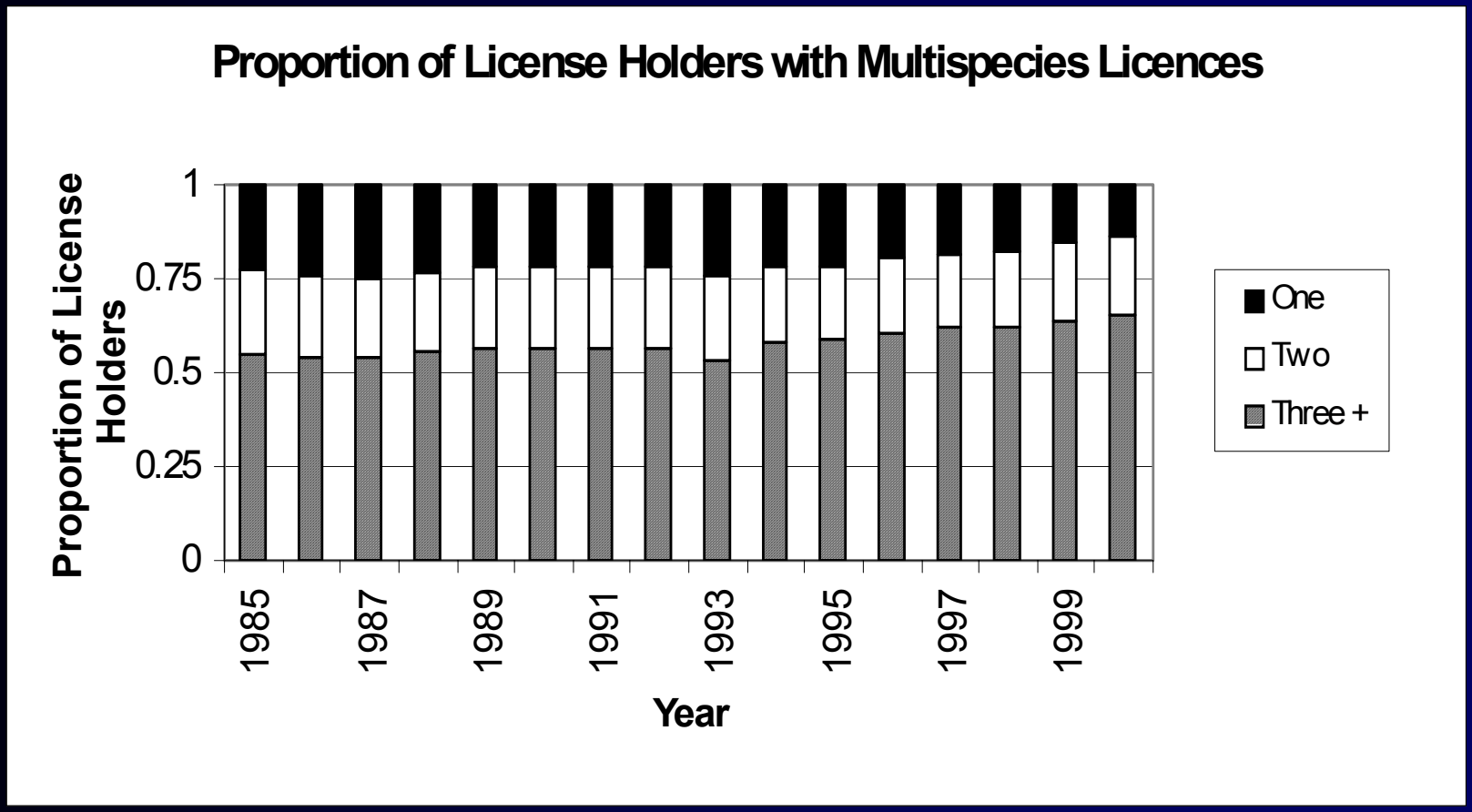
Natural Capital vs. Catch Value



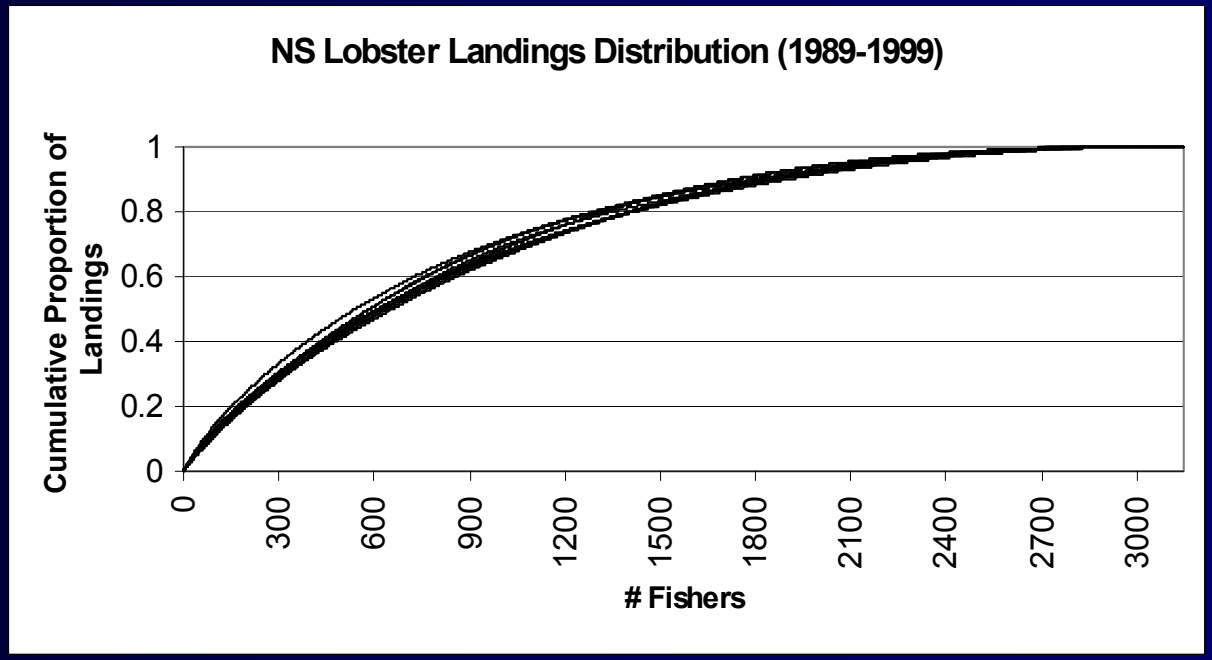
Community Indicators

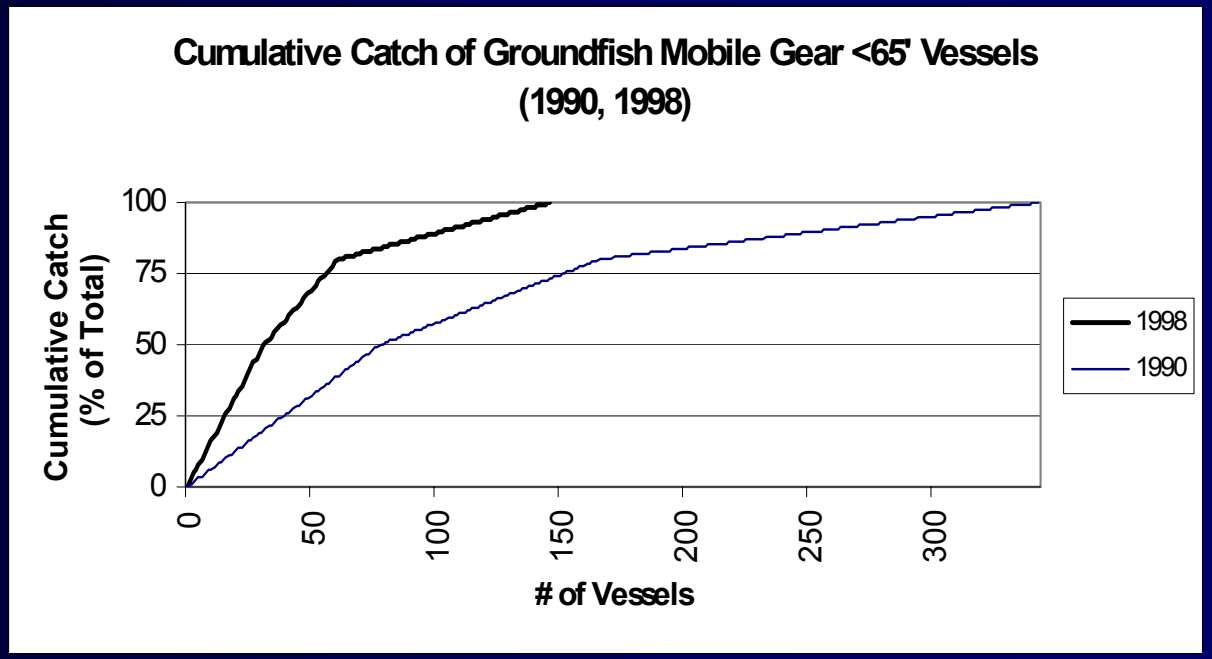
- *Resilience*
  - Age Distribution of Fishers
  - Proportion of Fishers with Multiple Licenses
  - Diversity of Employment Sources
  - Economic Diversity in the Community
  - Debt Levels among Fishers, Bankruptcies
- *Other Indicators*
  - Distribution of Landed Value across Species
  - Accident Claims

Resilience: Multi-Fishery Access



Distribution of Benefits: Lobster and Groundfish Fisheries

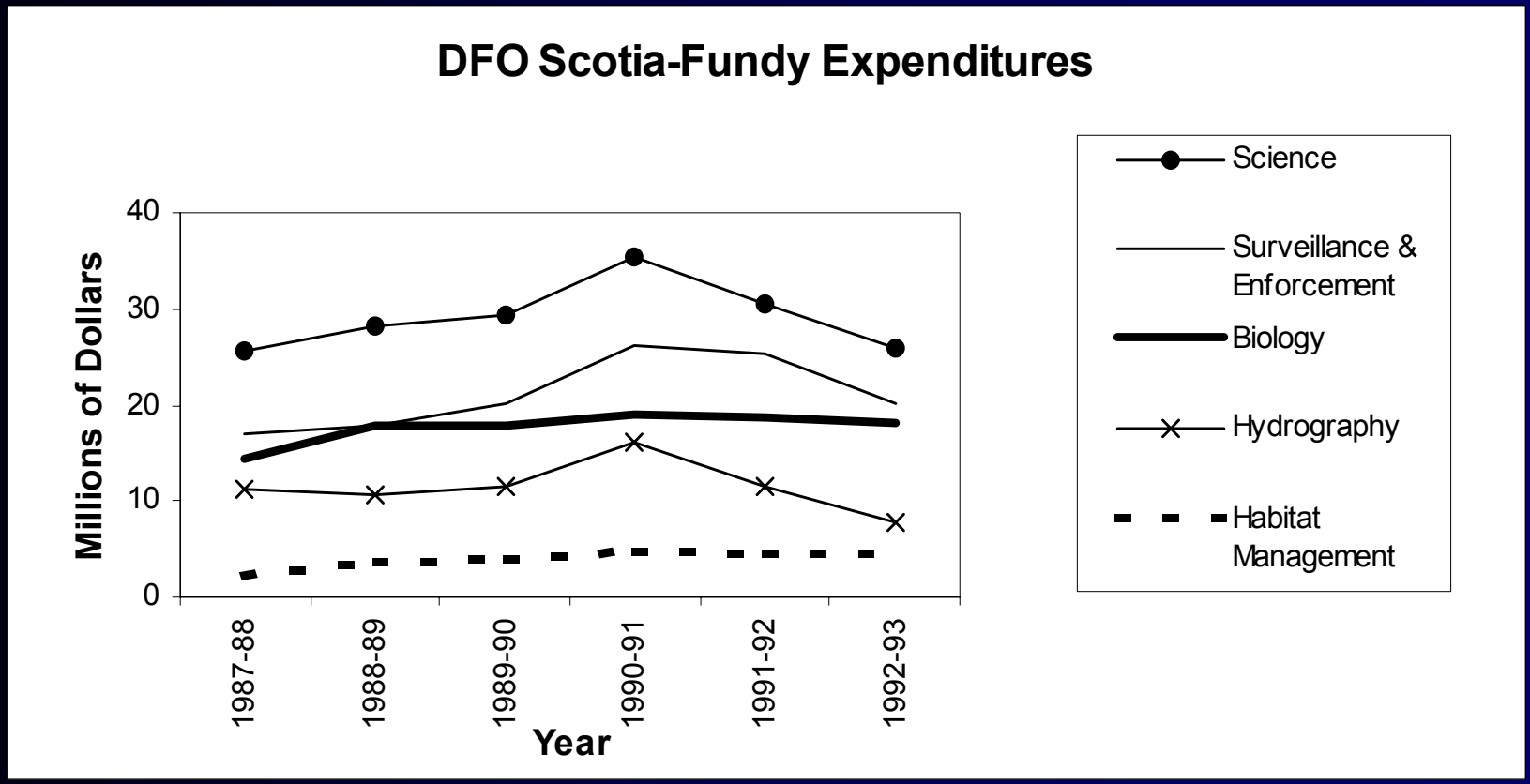




Institutional Indicators

- sufficiency of resources for effective management;
- acceptability of management by public / stakeholders;
- level of financial and organizational viability;
- % of resources allocated for science & conservation;
- priority placed on sustainability in management;
- degree of co-operation, co-management (power sharing);
- degree to which traditional methods & local input utilized.

Institutional Resource Allocation



The Future of Indicators?

- The desire for indicators seems ubiquitous
- There is a need for continuing intellectual, conceptual and theoretical development
- There is a need for 'meta-analysis' of indicator approaches: what works, what doesn't & when?
- In particular, there is an important issue of scale: what works best at community, regional, national, international levels?

Some References

- A.T. Charles, Living with Uncertainty in Fisheries: Analytical Methods, Management Priorities & the Canadian Groundfishery Experience, Fisheries Res. 37:37-50 (1998).
- A.T. Charles, Sustainable Fishery Systems, Blackwell Science, Oxford UK (2001).
- A.T. Charles et al., The Nova Scotia GPI Fisheries and Marine Environment Accounts: A Preliminary Set of Ecological, Socioeconomic and Institutional Indicators for Nova Scotia's Fisheries and Marine Environment. GPI Atlantic, Tantallon NS Canada (2002).
- A.T. Charles, The Precautionary Approach and 'Burden of Proof' Challenges in Fishery Management, Bulletin of Marine Science 70(2):683-694 (2002).