Oyster Reef Conservation & Restoration: TNC Perspectives

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The Nature Conservancy Global Marine Team

Overview of Presentation

- National Shellfish Restoration Strategy
  - Situation analysis and logic-based models
  - Recent advances
- Ecosystem services
- Shellfish Reefs at Risk
  - Key recommendations
- Example projects: TNC-NOAA CRP Partnership

Loss Statistics

- Coral Reefs – 20% loss globally

  (Wilkinson 2002)

- Marshes and Mangroves – 50% loss globally

  (Burke et al. 2001; Valiela and Bowen 2001; Zedler and Kercher 2005)

- Oyster Reefs – *85% loss globally*

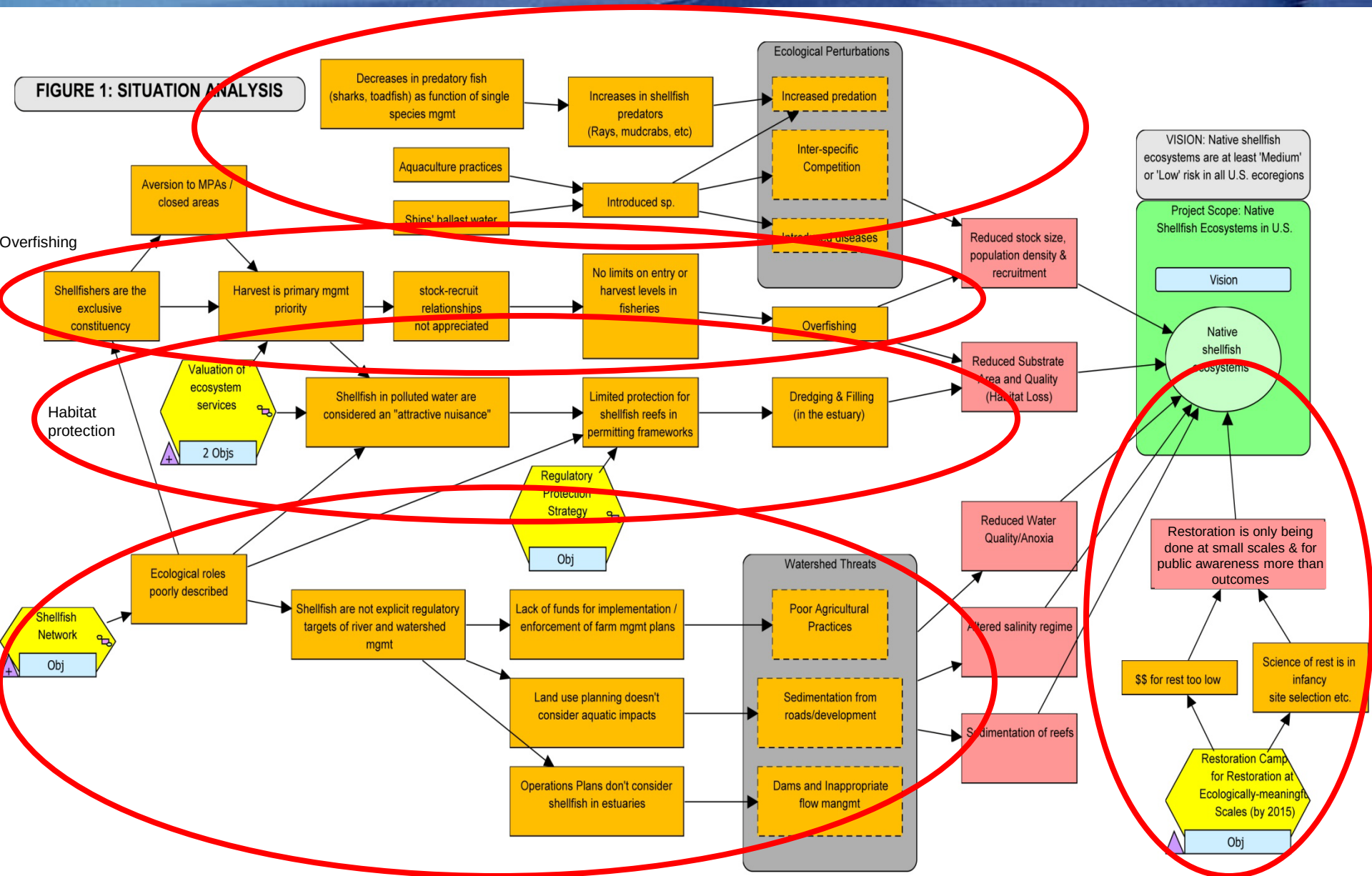
  > the most imperiled marine habitat on Earth!

  (Beck et al., 2009; Shellfish Reefs at Risk: A Global Analysis of Problems and Solutions)

A Coherent National Strategy is Needed

- Limited perception of problem
- Much of the decline occurred > 100 years ago (beware of shifting baselines…);
- Data are scarce – and little or no spatial data;
- Limited documentation of quantity and value for the many ecosystem services provided by shellfish;
- Management still tends to focus on only one service - fisheries and extraction;
- Need protection for remaining habitat (because…)
- Funding currently limits the scale of restoration (at $10 – 100K / acre to restore reef habitat, restoration is quite costly);

Situation Analysis – National Shellfish Strategy



Early Outcomes: TNC and Partners

- Shellfish treated as a distinct strategy (national scale)
  - TNC and other NGO'S
  - NOAA Restoration Center
  - NFWF
  - EPA
- Numerous state and local organizations:
- Most elements of the strategy being pursued:
- ISSC interaction is an important part of a larger collaboration
  - Not just opportunistic oyster gardening

Ecosystem Services Provided by Shellfish

Regulating

- Protection of beaches and coastlines from storm surges and waves.
- Water quality maintenance
- Reduction of marsh shoreline erosion
- Stabilization of submerged land by trapping sediments

Provisioning

- Recreational, Subsistence and commercial fisheries
- Aquaculture
- Fertilizer and building materials (lime)
- Jewelry and other decoration (shells)

Photo: Diana Garland, TNC Volunteer

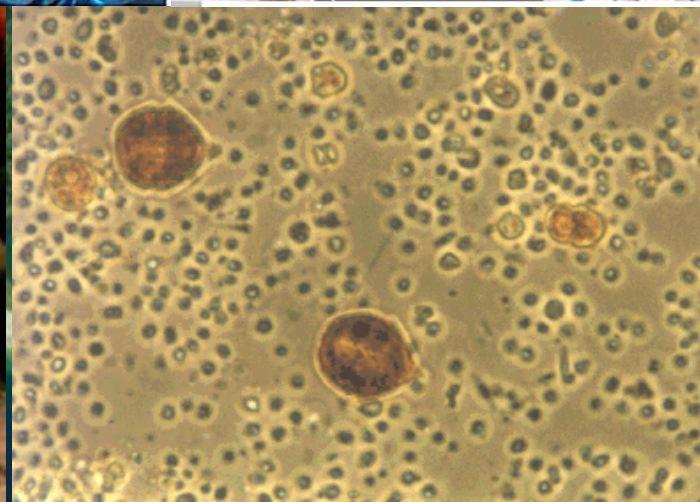
Supportive

- Cycling of nutrients
  Denitrification
- Nursery habitats
- Biodiversity & habitat use

Cultural

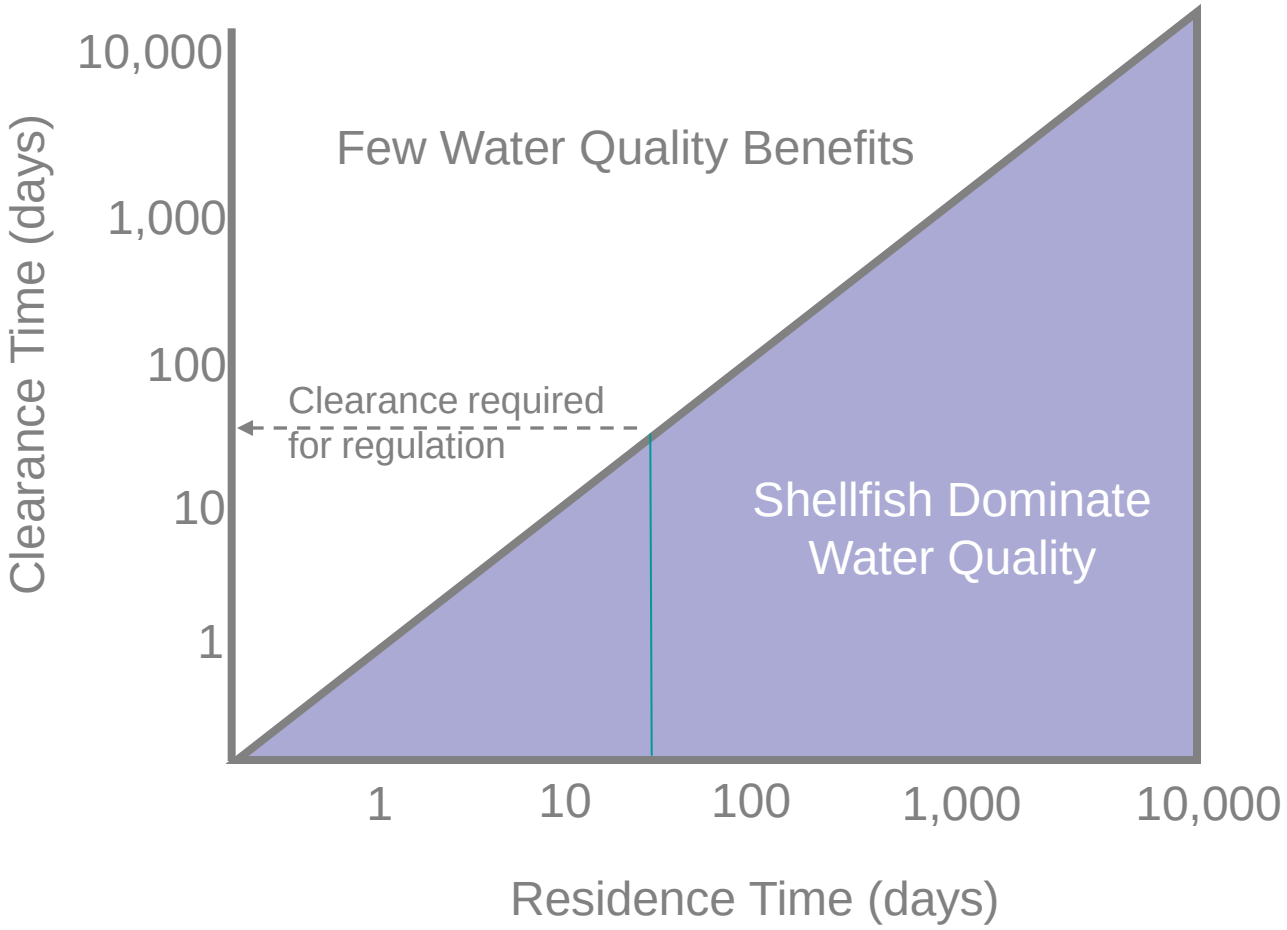
- Tourism and recreation
- Symbolic of coastal heritage

Regulating
With nutrients entering in increasing amounts, shellfish are particularly important living filters



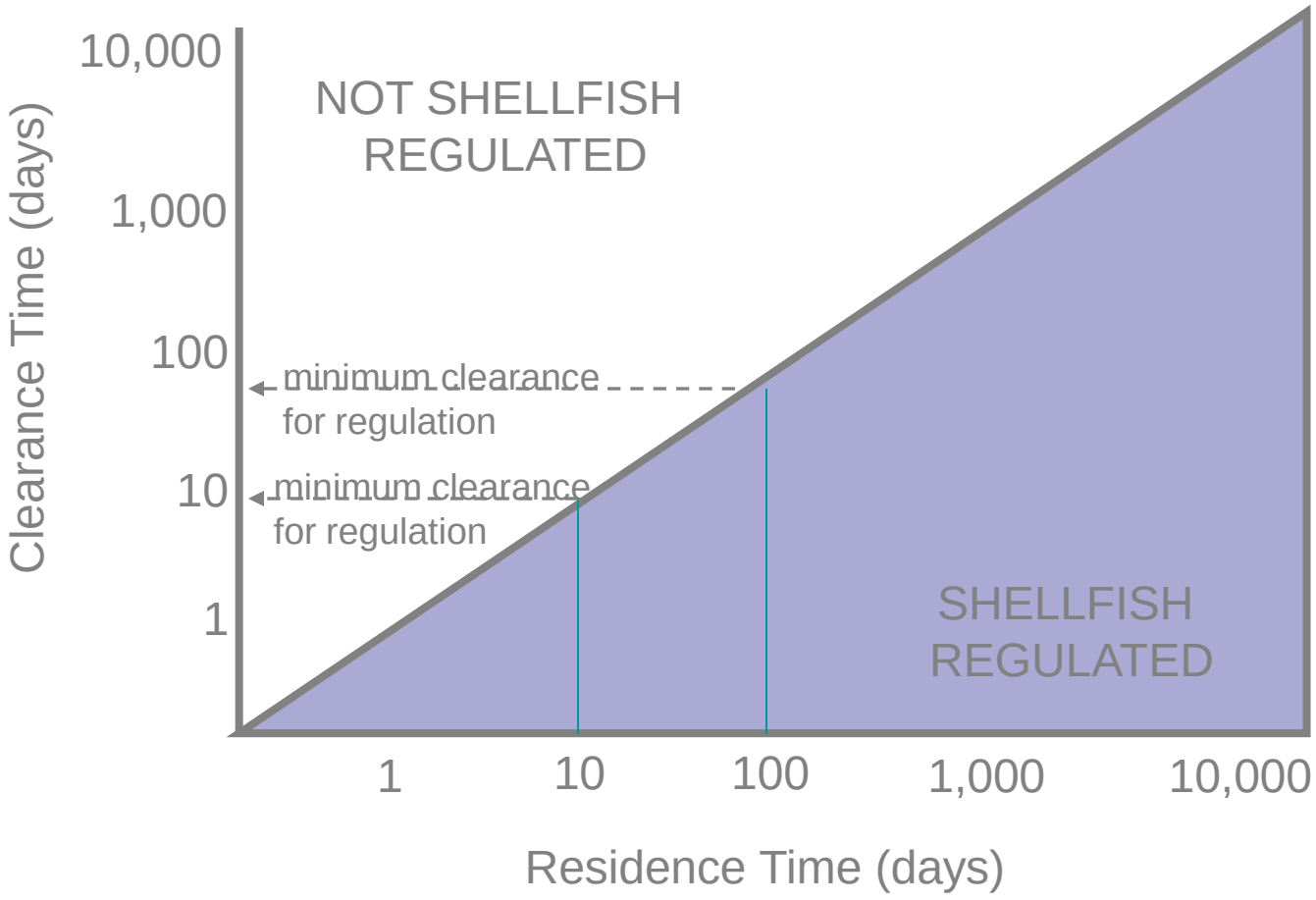
Cerrato et al, 2004

WATER QUALITY "REGULATION" BY SHELLFISH IS FUNCTION OF ABUNDANCE



Adapted from: R. Dame, 1996. Ecology of Marine Bivalves: An Ecosystem Approach

WATER QUALITY "REGULATION" BY SHELLFISH IS FUNCTION OF RESIDENCE TIME



Residence Times

SF Bay:	11
Ches Bay:	22-45
Narragansett:	27
Delaware Bay:	97

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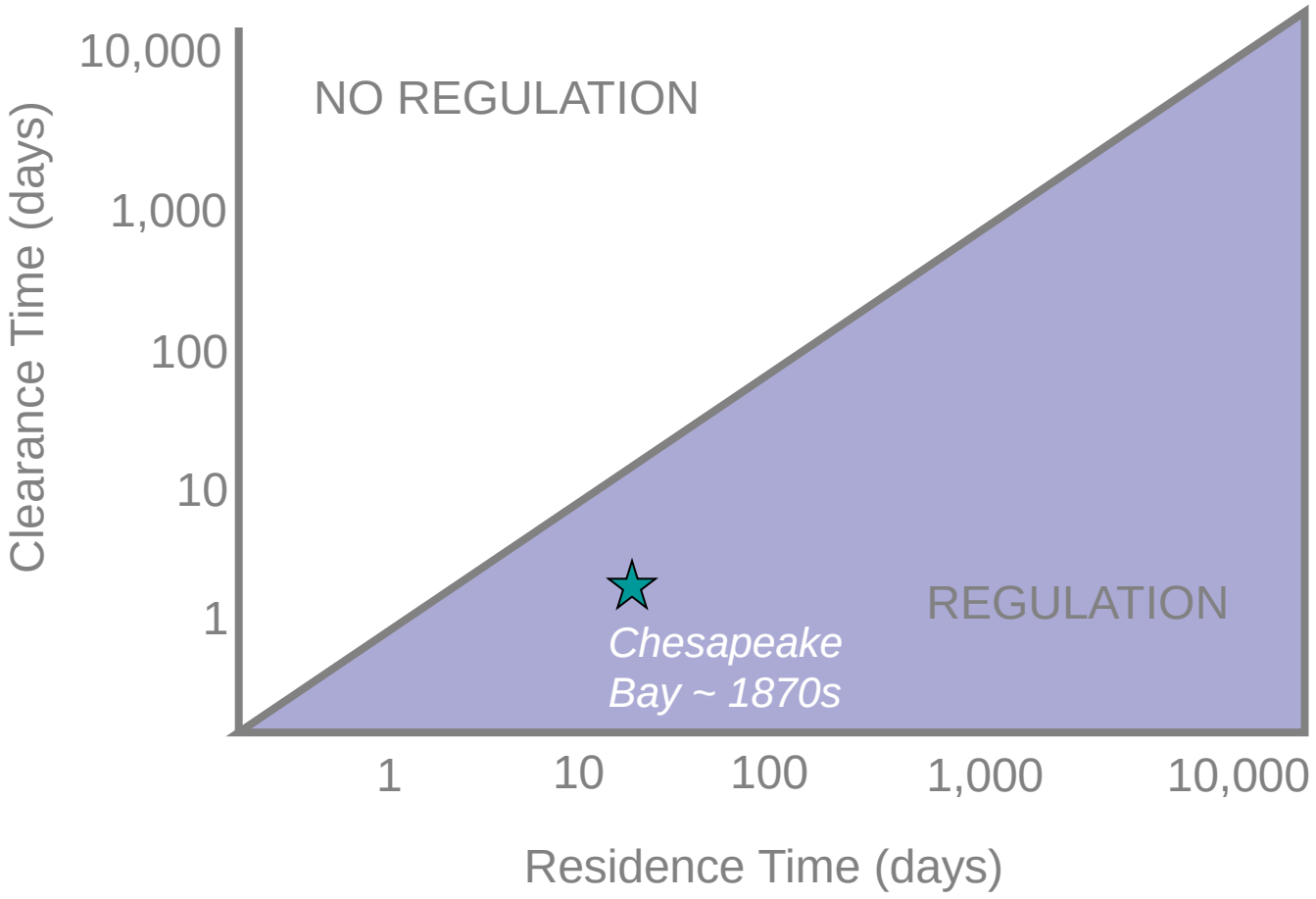

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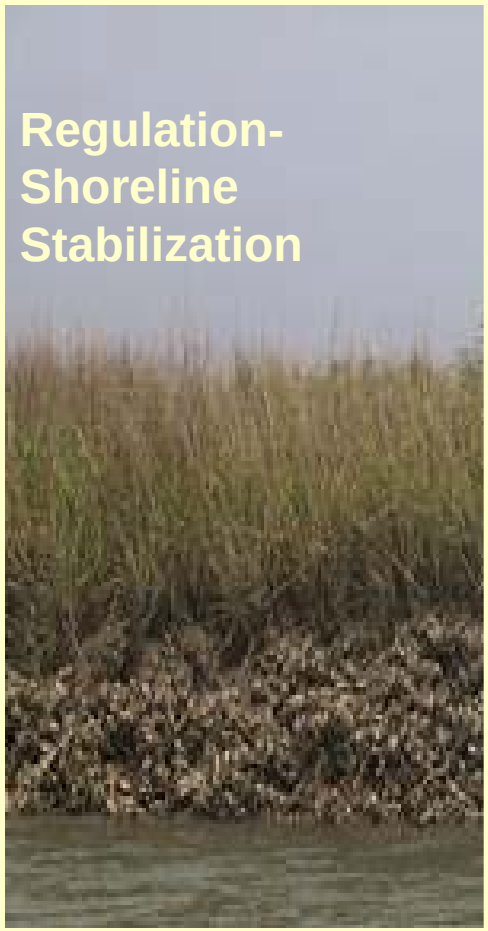
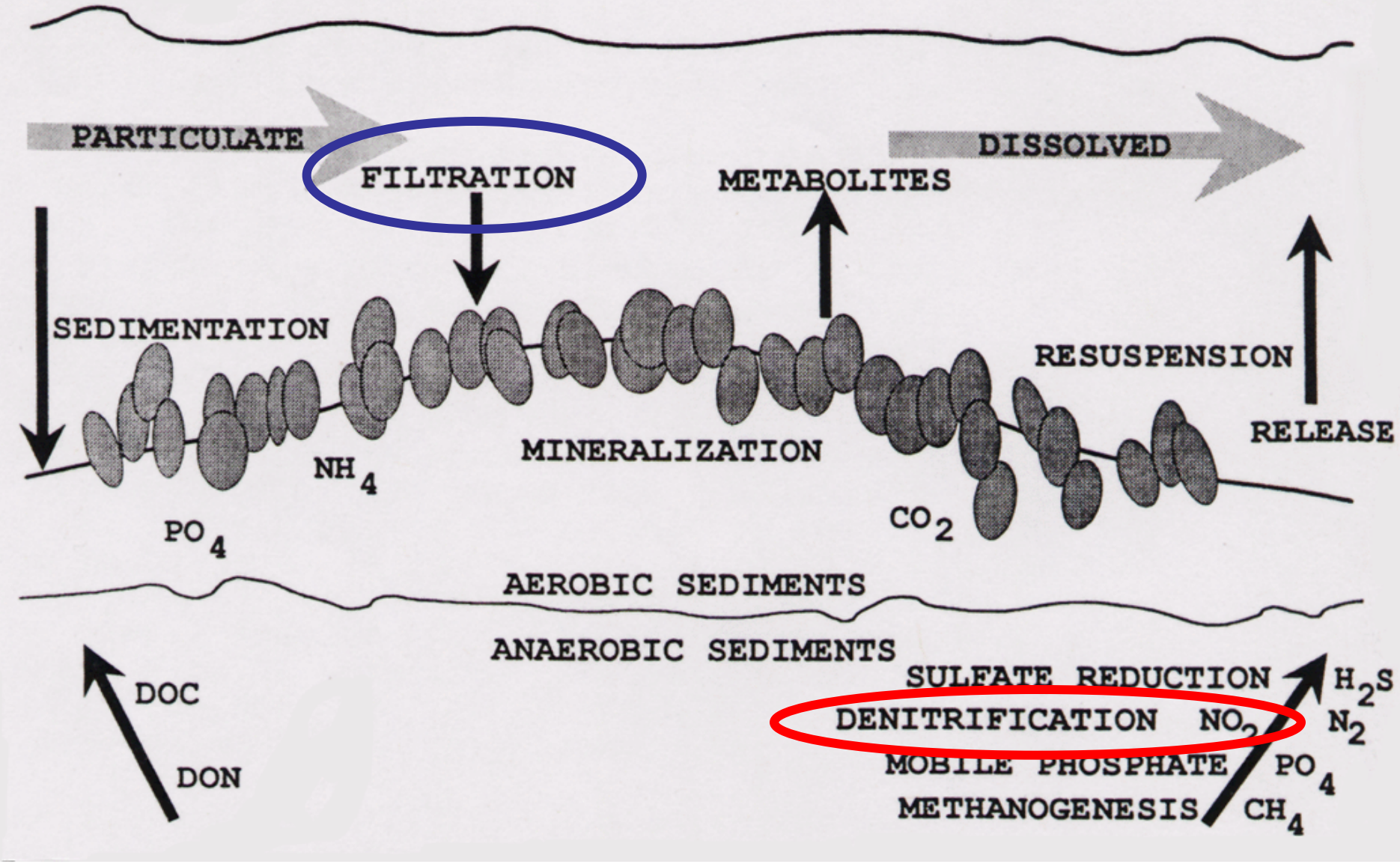
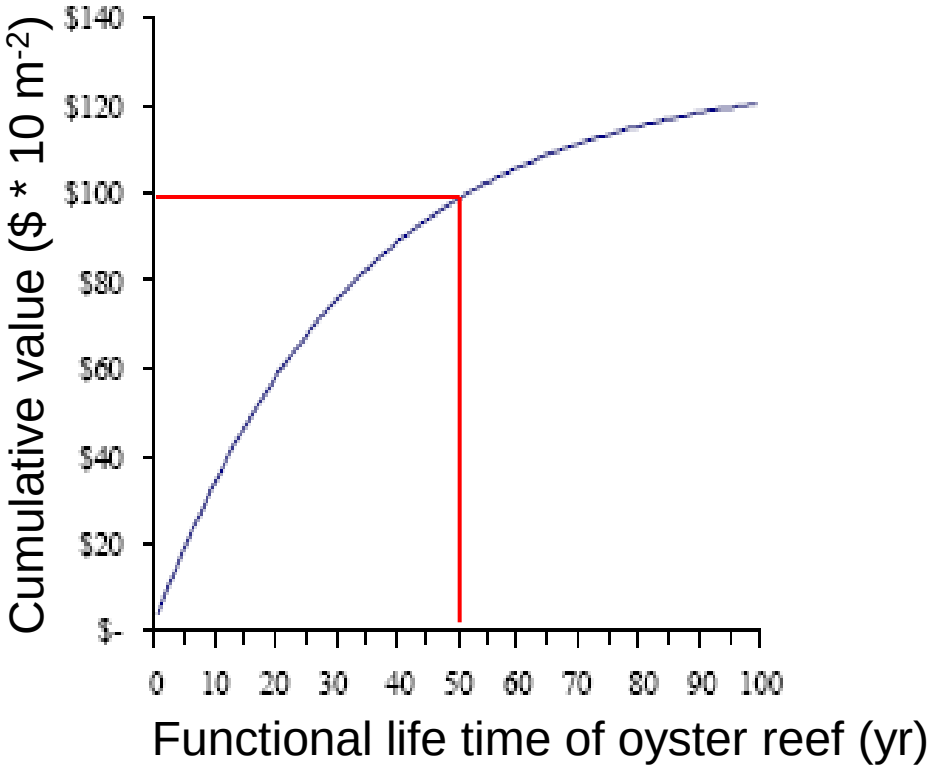
Other Ecosystem Services



Supportive - nutrient cycling



Supportive - ‘Essential Fish Habitat’

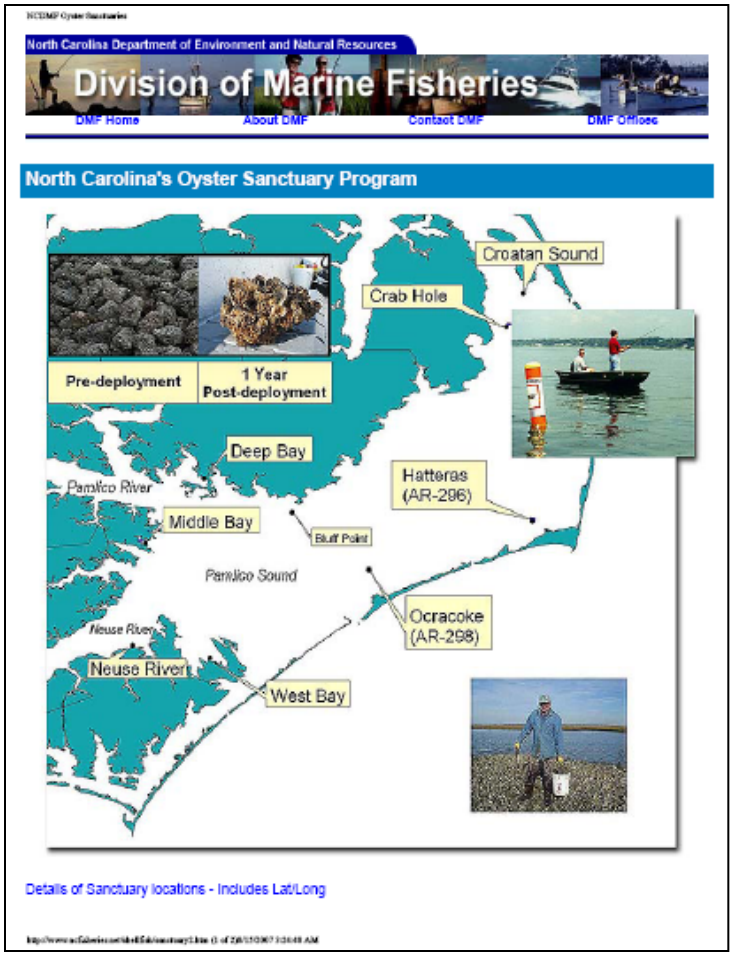


Grabowski and Peterson, 2007

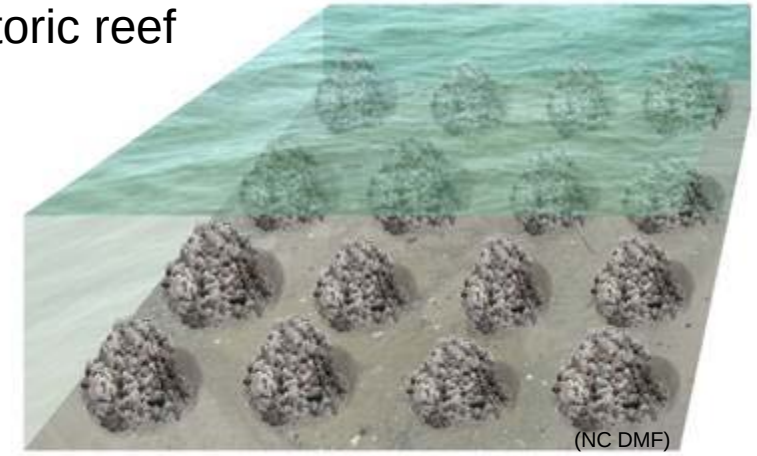
Value of oysters was estimated to be 35% less than the value of the fish

Ecosystem service measures are critical
Need refining and field examples

Supportive – Biodiversity and habitat use
State-managed sanctuary-based restoration



3-Dimensional reefs mimic historic reef habitat



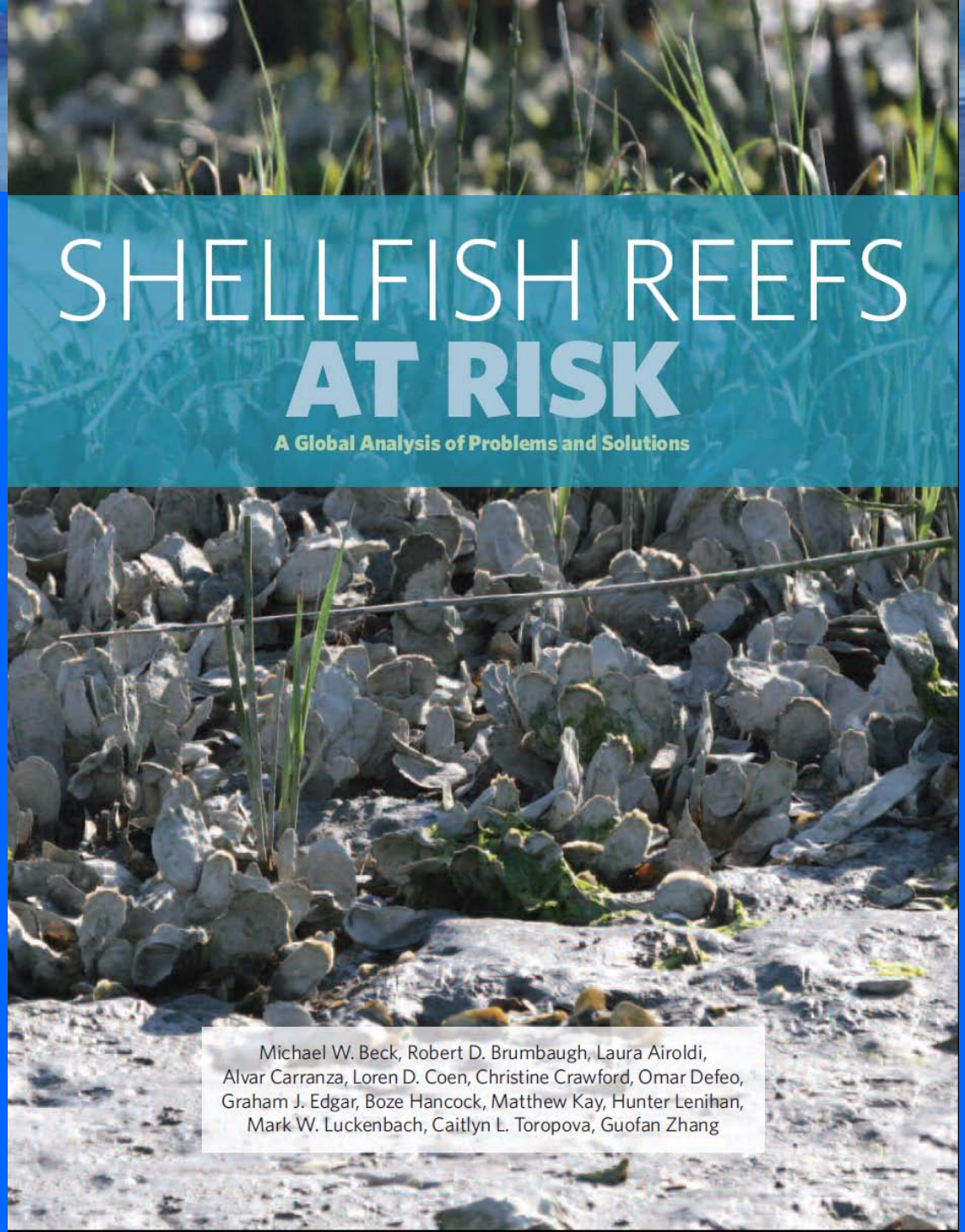
Finfish production

North Carolina DMF & Texas P&W Division

- Pamlico Snd and Galveston Bay fish habitat
- TX Program in closed waters

Study released
at IMCC
May 2009

Copies available



Many Collaborators

Mike Beck[1], Rob Brumbaugh[1], Laura Airoldi[2], Alvar Carranza[3], Loren Coen[4], Christine Crawford[5], Omar Defeo[3], Graham Edgar[5], Boze Hancock[1], Matthew Kay[6], Hunter Lenihan[6], Mark Luckenbach[7], Caitlyn Toropova[1], Guofan Zhang[8], Jeffrey Vincent[9]

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- [3] Marine Science Unit, Faculty of Sciences, Montevideo, Uruguay
- [4] Sanibel-Captiva Conservation Foundation, FL USA
- [5] Tasmanian Aquaculture and Fisheries Institute, University of Tasmania, Hobart, Australia
- [6] University of California, California USA
- [7] Virginia Institute of Marine Science, College of William & Mary, Virginia USA
- [8] Institute of Oceanology, Chinese Academy of Sciences, Qingdau, China
- [9] Jackson School of Geosciences, University of Texas at Austin, TX USA

Determine condition

Looked at

Native, Habitat Forming spp.

Focus on Oysters, Mussels

- Few data on mussels
- Better assessment of oysters

Developed Estimates of Abundance

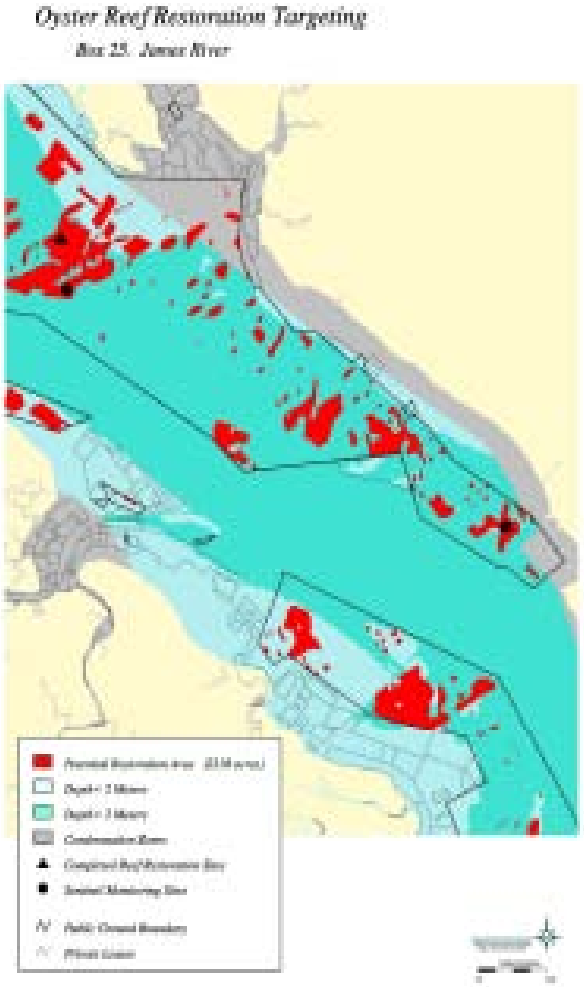
Bay by Bay

- Using historic data;
- Maps, surveys, fisheries landings, expert surveys

Published data only

Bay-wide estimates averaged to get condition estimates by Ecoregion

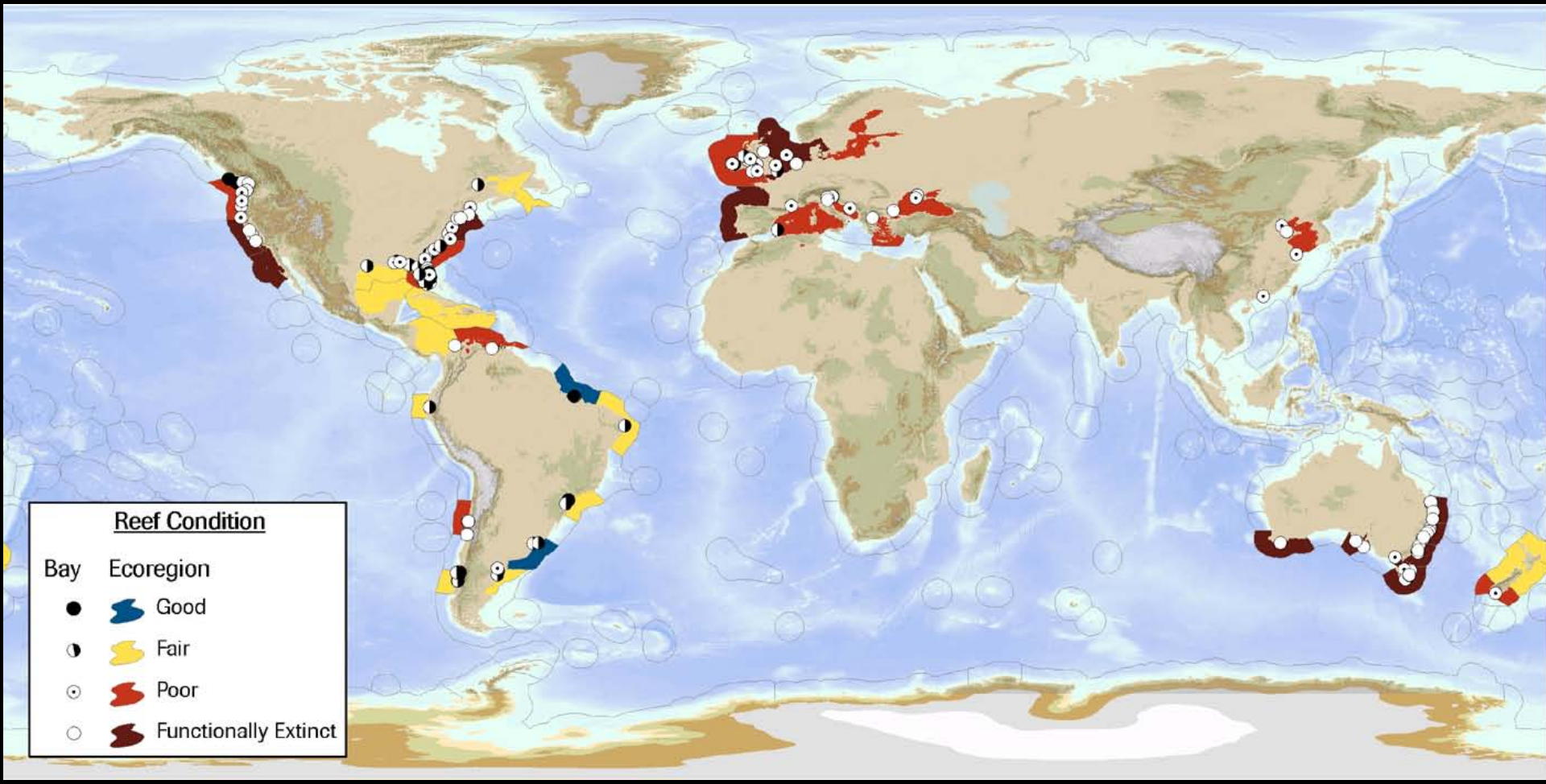
Literature and maps



Berman et al, 2002

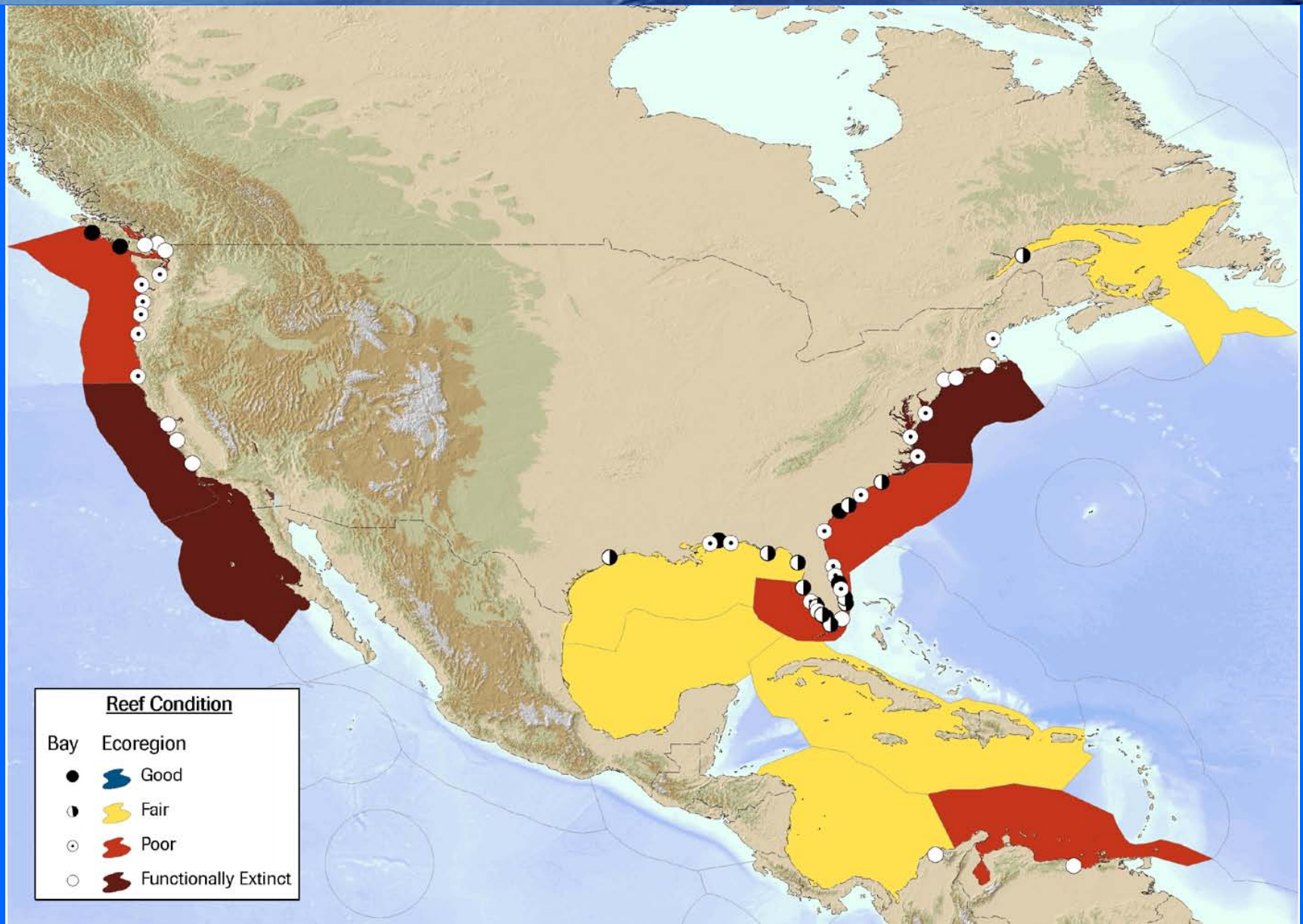
Oyster Reefs at Risk

By Ecoregion

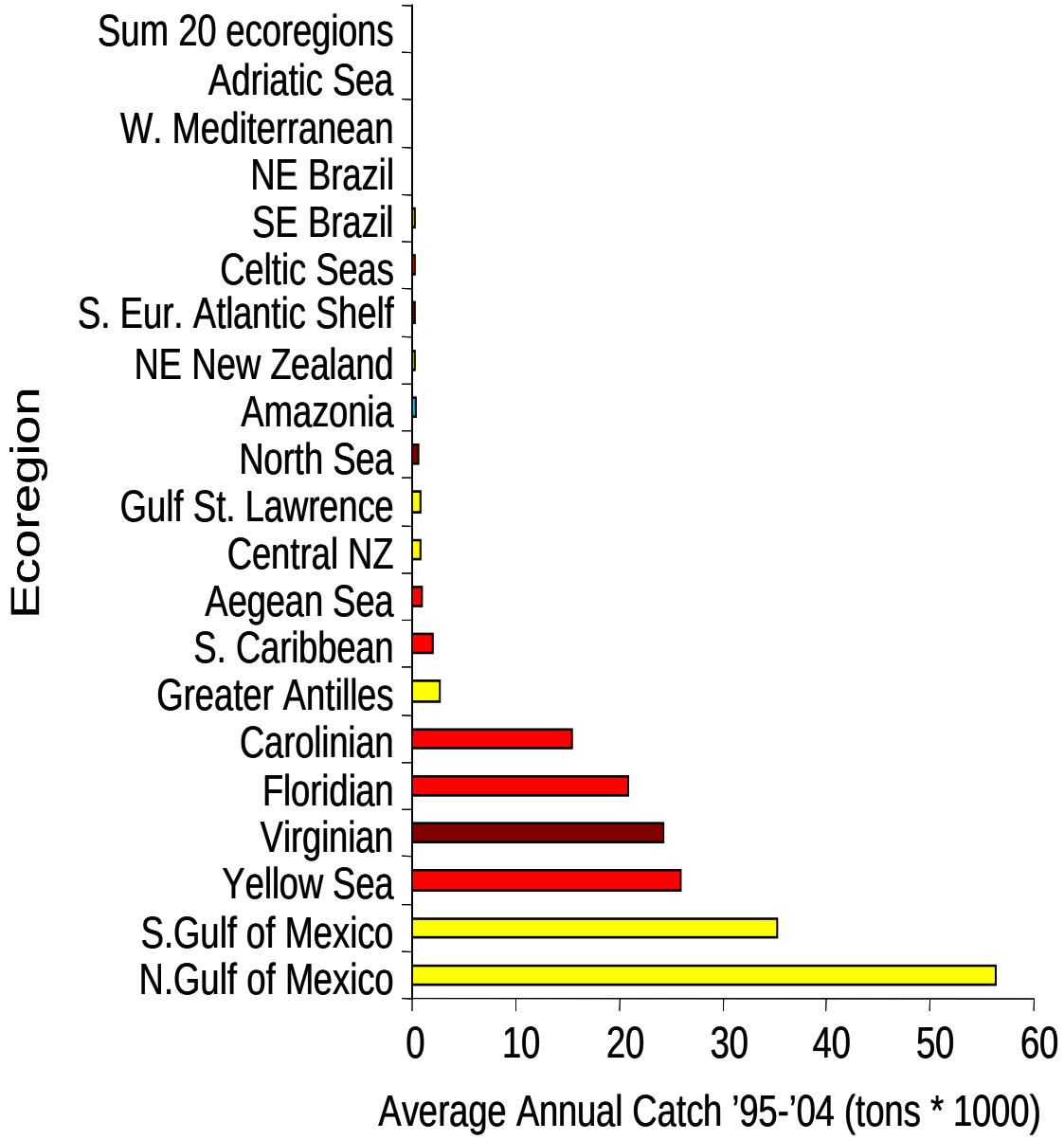


85% loss of oyster reef ecosystems in bays and ecoregions; mangrove and saltmarsh (~50%) and coral reef (~20%)

North America



Fishery Management & Conservation



- Fishing pressure on wild Gulf of Mexico stocks is now highest in the world, but reefs are only in fair condition (and many bays in poor condition)
- Fishing pressure remains very high even in ecoregions with reefs in poor or extirpated condition
- Suggests little recognition of the global situation

= extirpated (<1%)
= poor (1-10%)
= fair (11-50%)
= good (>50%)

Primary Recommendations

- Manage for more than just fisheries – stop damaging fishing practices and overfishing
- Conserve healthy reefs
- Elevate oyster reefs as ‘under-represented wetland type’ (multinational conventions, e.g., Ramsar, EU’s Natura 2000)
- Expand the scale of restoration with new funding (e.g., markets for ecosystem services)
- Watershed-based management- include shellfish (i.e. not just local waterways, but downstream impacts as well)
- Reduce the impact and spread of non-native oysters

Conclusions

- Oyster reefs the most impacted of any marine habitat (*85% loss*)
- Oyster reef loss continues today – it is not just an historic problem
- Management should place a greater emphasis on the full array of ecosystem services as specific management objectives
- Oyster reefs have many attributes that make them amenable to sustainable management:
  - i) Opportunities for private action (e.g., leasing, markets)
  - ii) Near-shore and ‘easy’ to police
  - iii) Clear links between the species and ecosystem structure

Shellfish Restoration and Conservation
TNC-NOAA CRP Partnership

- Nine years, 95 projects, 48 involving shellfish restoration
- Many in unapproved waters
- Would like to be working with ISSC to ensure compatability

Recommendations

- ISSC helps to promote conservation and restoration of shellfish habitat in all estuarine waters (not just harvestable waters)
- Joint development of ‘best practices’ for restoration in closed waters that enable protection of both public & estuarine health
- Promote appropriate mechanisms for enforcement

Questions?