Implementing an Ecosystem Approach to NOAA's Sustainability Mandates

- NOAA's Mandates for Sustainability
- Transiting to Ecosystem Approaches to Management (EAM) - Ecosystem-Based Management (EBM)
- Integrated Ecosystem Assessments as a Decision Support Tool enabling EAM/EBM

Steven Murawski
Director of Scientific Programs & Chief Science Advisor
NOAA Fisheries Service &
NOAA Ecosystem Goal Team Lead
Silver Spring, MD

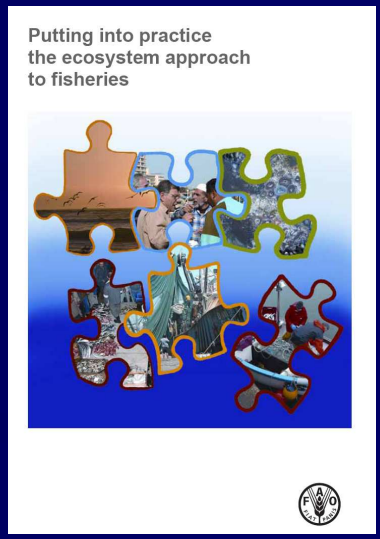
NOAA's Regulatory Mandates for Sustainability

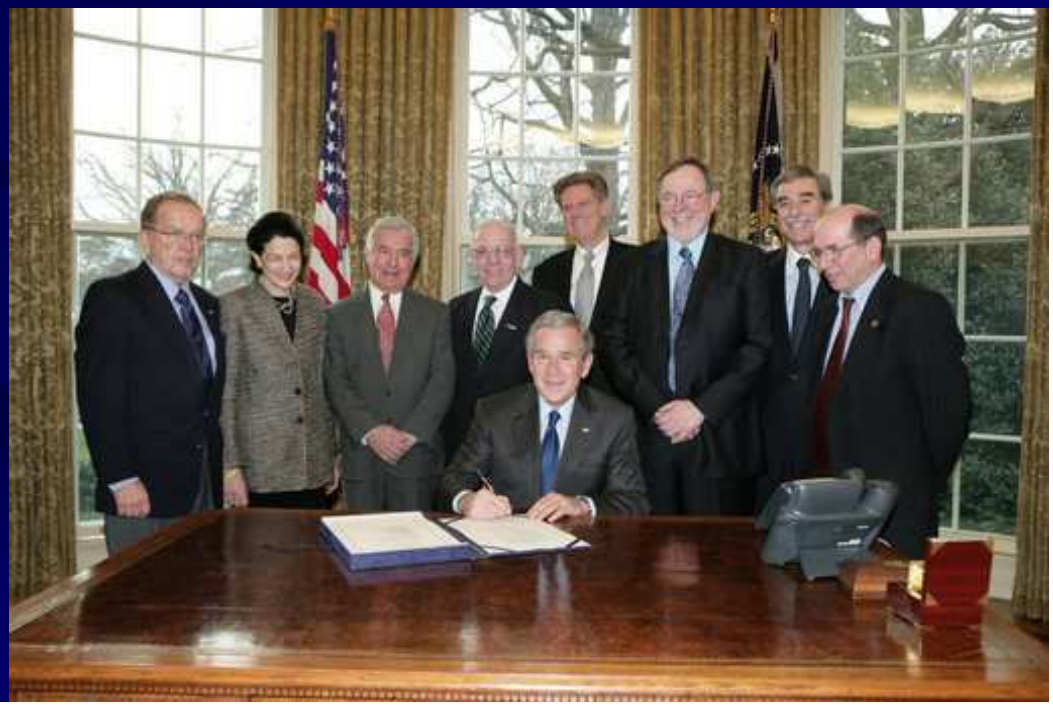
- Magnuson Stevens Fishery Conservation and Management Reauthorization Act (2006) – Eliminates overfishing by 2011 and rebuilds fishery stocks to biomass levels producing

  Maximum

  Sustainable Yields

  (MSY)





Domestic Seafood Industry worth $60 billion/yr, Recreational fishing $10 billion/yr

January 2007

Some Additional NOAA Mandates

- Marine Mammal Protection Act (minimizes "takes" of all marine mammal populations in the USA regardless of stock status)
- Endangered Species Act (protects species, distinct population segments, and habitats)
- Coastal Zone Management Act (increase resiliency of built and natural environments, partnership with the states to protect coasts and watersheds)
- Coral Reef Conservation Act (protects reef ecosystems in the USA, sets up multiagency taskforce)
- National Marine Sanctuaries Act (place-based management of special areas)

+ about 90 other relevant statutes in the ecosystem realm

NB: no overarching ecosystem management statute, but implied…

What is an Ecosystem Approach to Management (EAM)?

"Look at the whole picture, not just the parts."

Dave Goethel
New England Fishery Management Council
SIMOR Fisheries Constituent Listening Session - October 2006

***"An ecosystem approach to management is one that provides a comprehensive framework for living marine resource decision making. In contrast to individual species or single issue management, EAM considers a wider range of relevant ecological, environmental, and human factors bearing on societal choices regarding resource use."*……NOAA EGT**

The #1 *Myth* Concerning EAM*:*

"Ecosystem approaches to ocean resource management are not well defined and we do not know how to implement them"

UN Law of the Sea Meeting, April 2006

Operational Objectives for EAM

(1) Develop broad Stakeholder-Based Governance system (tradeoffs, social sciences)

(2) Conserve essential Parts of the ecosystem

(3) Conserve essential ecosystem Processes

Question, if (2) is done well, is (3) necessary?

Many Recent Publications Proposing General Objectives for EAM, EBM

Account for Ecosystem Processes

- **Evaluate & Inform Feedback Effects**

  - predator-prey relationships, impacts on habitat productivity, irreversibility of direct impacts, harvesting-induced regime change consider cumulative impacts, evaluate impacts of non-consumptive sectors

- **Maintain Ecosystem Productivity, Balance Ecosystem Structure**

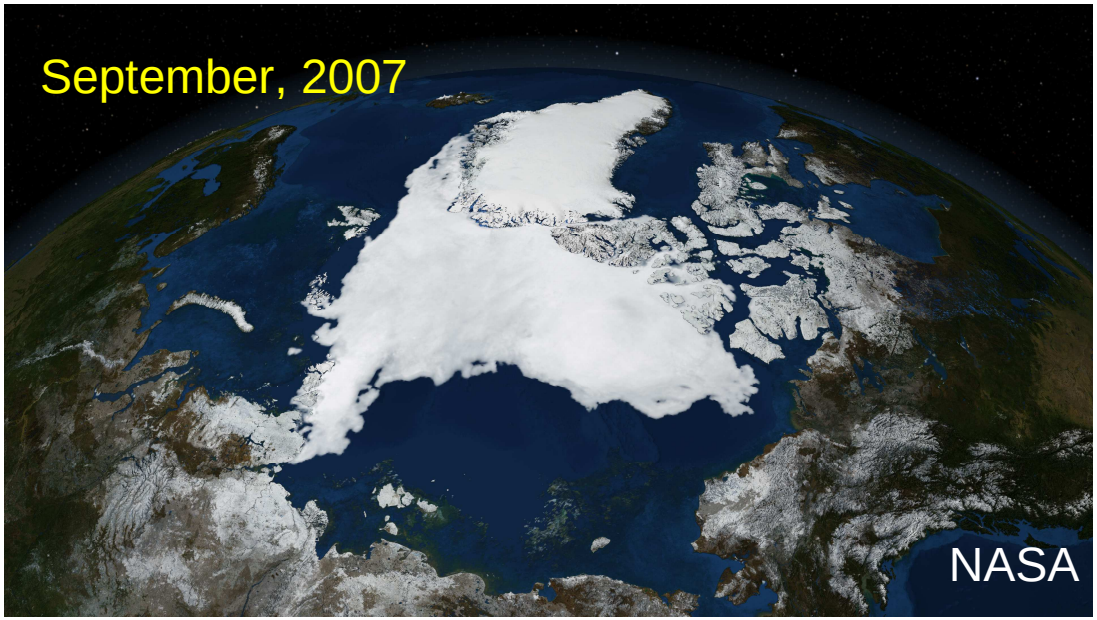
  - evaluate ecosystem carrying capacity,

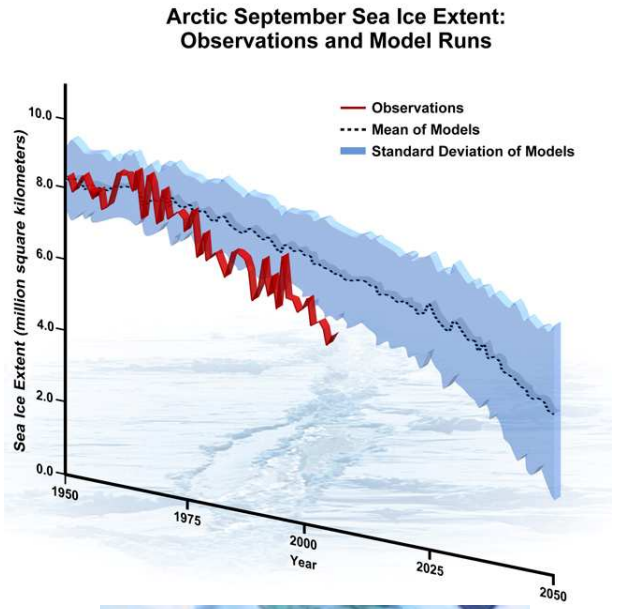
  maintain resilience/resistance to perturbations, attain trophic balance

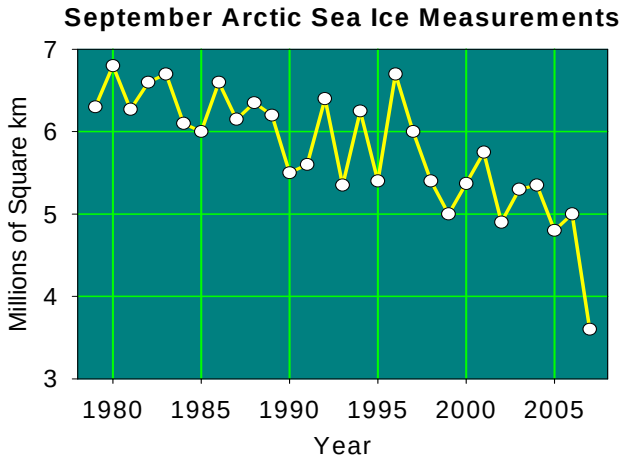
- **Account for Climate Variability**

  - low-frequency variation (decadal scale changes), High-frequency variation (year-to-year or more frequent), Emerging threats (ocean acidification, SLR, sea ice loss, fresh water issues, decadal variability vs. long term trends)

Loss of Arctic Sea Ice – Ecological Implications



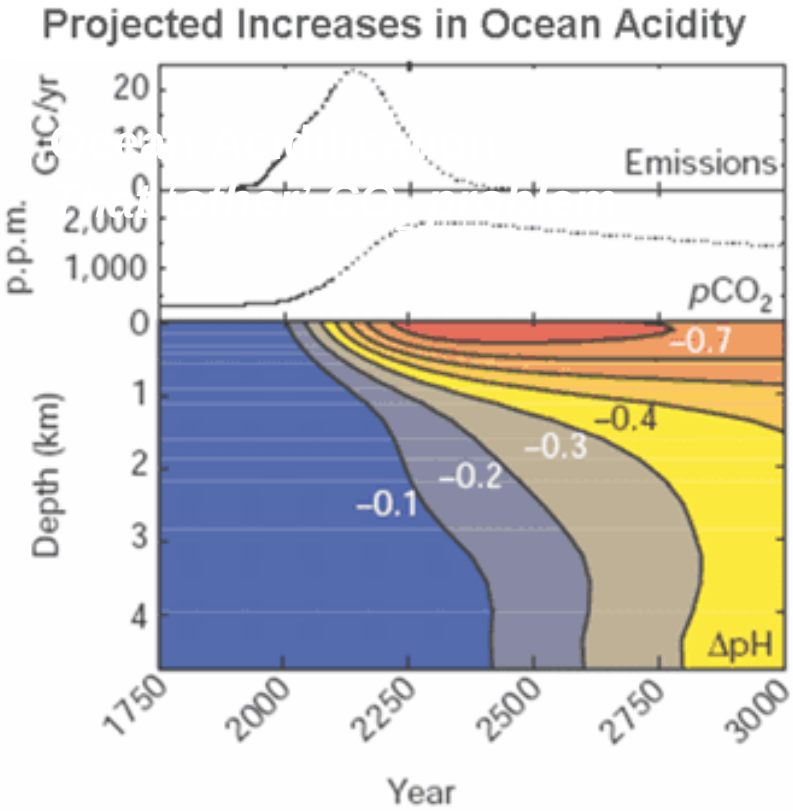


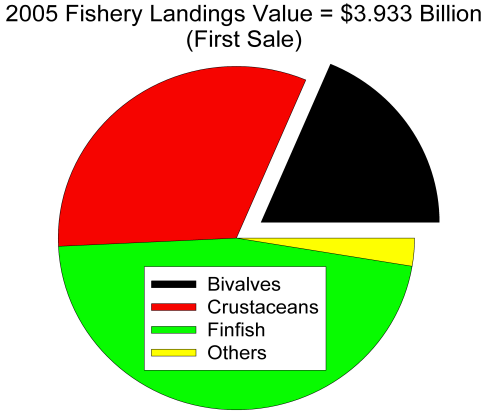


NOAA Trust Resources MMPA

Ringed, Ribbon, Spotted Seals

Ocean Acidification: A Consequence of Human Production of Greenhouse Gasses – Ocean Impacts





Value:
Bivalves: $732M ex-vessel commercial value
Crustaceans: $1,265M ex-vessel commercial value
Combined : $1,997M ex-vessel commercial value (51% of commercial catch by $)

As ocean calcium carbonate saturation state decreases, a concomitant reduction in calcification rates by marine organisms can occur.

- reduced calcification rates for bivalves, crustaceans, corals, phytoplankton?
- possibility of dissolution

Key Science Needs Supporting EAM

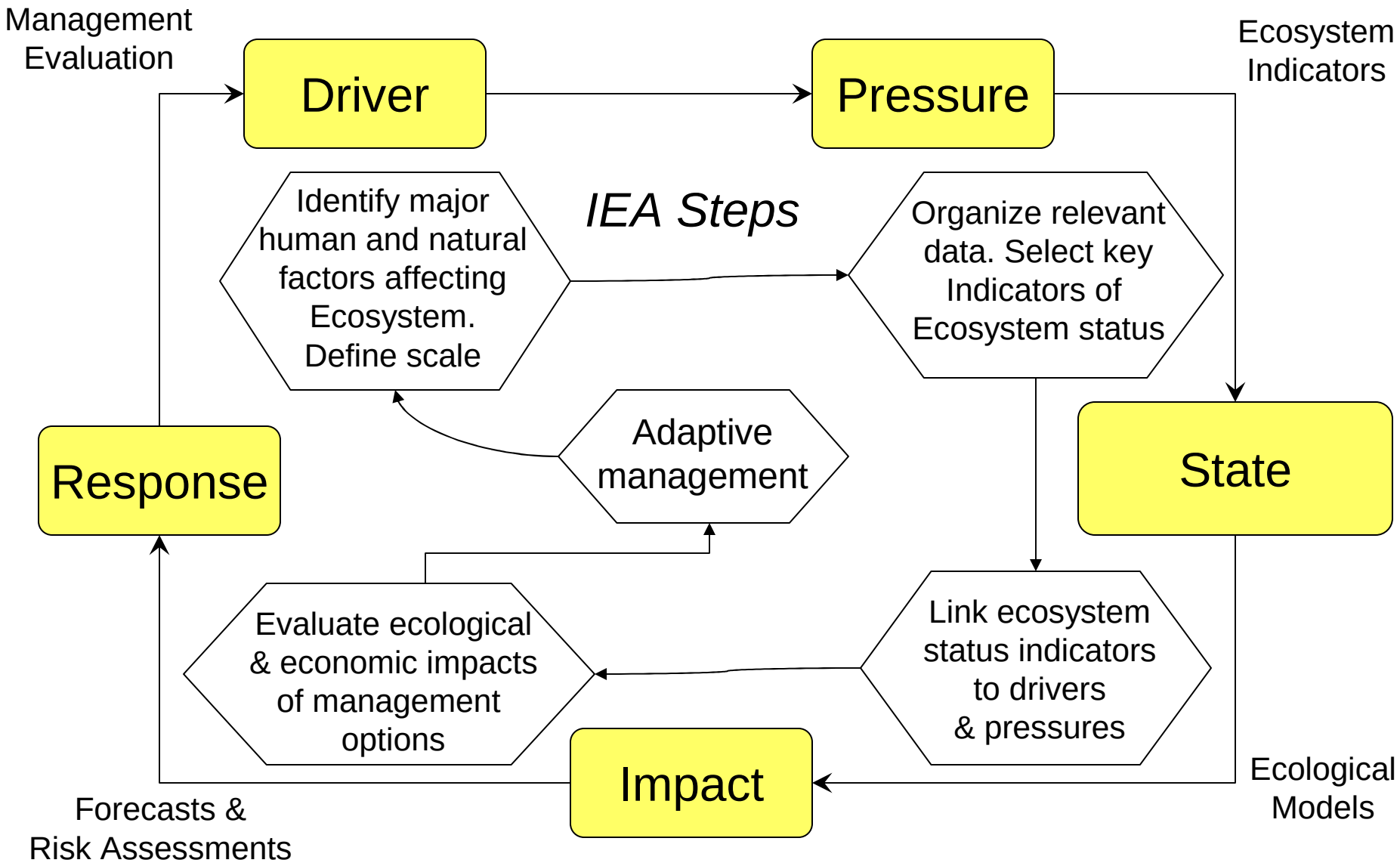
- ***Operational Ocean Observation System integrating biology, physical oceanography, chemistry, ocean-atmosphere links and socio-economic data (at appropriate geographic scales)***

- ***Systematic reporting on the status of marine and coastal ecosystems through Integrated Ecosystem Assessments (IEAs), including key indicators of pressures on ecosystems and their state***

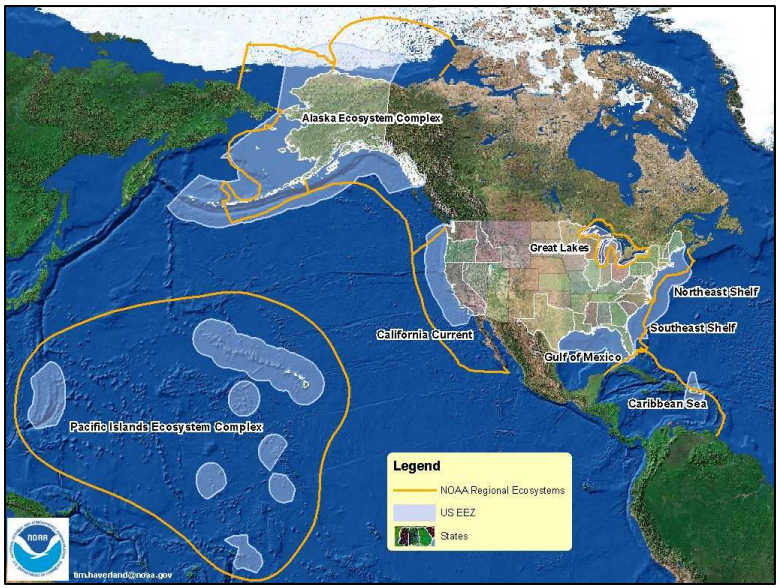
- ***Ecosystem research plan that enables linking of human activities to incremental change in ecosystem state indicators***

- ***Modeling, experimental ecology, and observation systems linked to support adaptive approaches to human uses of marine ecosystems consistent with goals of sustainable use***

Key Issues in developing IEAs: Scope & Scale



What are the appropriate scales for IEAs?



Assessing the Status of Ocean and Coastal Ecosystems of the United States

National Overview

Extra-basin assessments

Heirarchical Structure

Basin-Wide

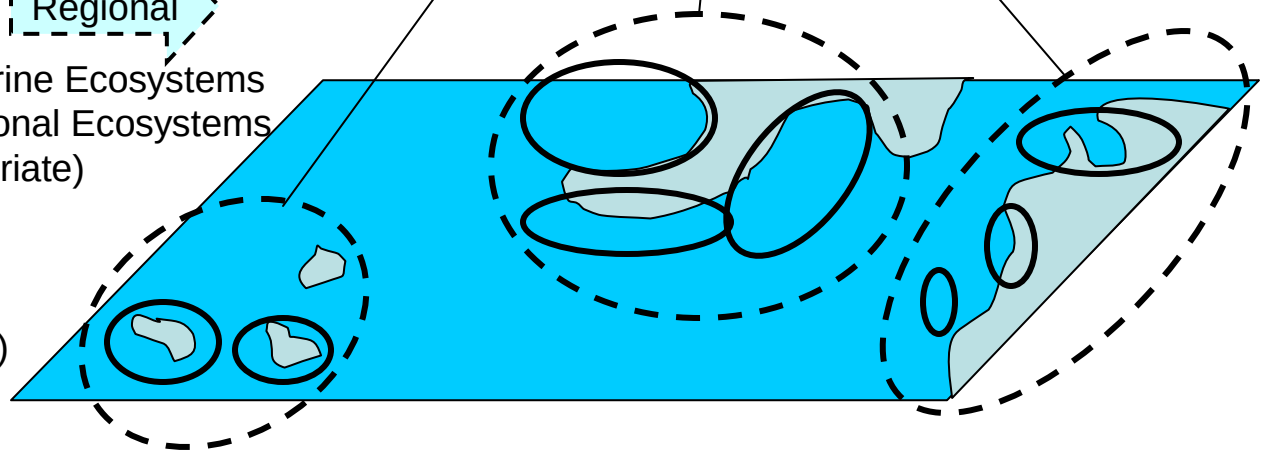
-National jurisdictions
-International collaborations

Regional

-Large Marine Ecosystems
-Sub-Regional Ecosystems
(as appropriate)

Local

-Place based
(e.g., sanctuaries, NERRs)
-Bays, Harbors, Estuaries




Protected species
Climate variability – PDO
Public access
Fishing gear impacts/ bycatch
Habitat Loss
Pacific salmon recovery
IEAs:
Paper or Plastic?
Ocean observations and research
Pollution
Tourism
Upwelling down-welling
Invasive Species
Overfishing
Coastal development and erosion
Ports
Marine Protected Areas management
Fish Stock enhancement
California Current Regional Ecosystem