

Ecosystem Approaches to Fisheries Management: Why the Interest and Aren't We Doing this Already?

- **Why do we need more focus on ecosystems?**
- **What are the important objectives of an Ecosystem Approach to Fisheries (EAF)?**
- **To what extent are they addressed now by the NOAA and the Councils?**
- **Some ongoing efforts to coordinate science & management**



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New Council Member Training
October 21, 2008

What is an ecosystem?

NOAA's Ecosystem Definition

A geographically specified system of organisms (including humans), and the environment and the processes that control its dynamics.

The environment is the biological, chemical, physical and social conditions that surround organisms



What is an ecosystem approach to management?

- An **ecosystem approach to management (EAM)** is one that is **geographically specified**, adaptive, takes account of ecosystem knowledge and uncertainties, considers multiple external influences, and strives to balance diverse social objectives
- Implies expanding mandates of existing institutions, better coordination among them, or creation of new ones, to address broader suites of societal goals



NOAA Fisheries Service - Mission



Stewardship of living marine resources through science-based conservation and management and the promotion of healthy ecosystems

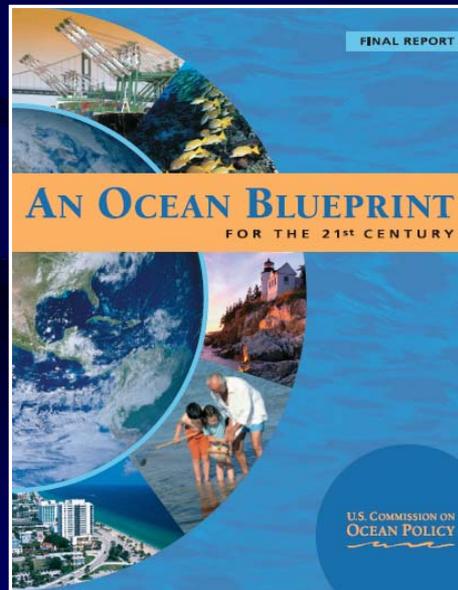


Why an Ecosystem Approach to Management?

**Oceans Act
2000**



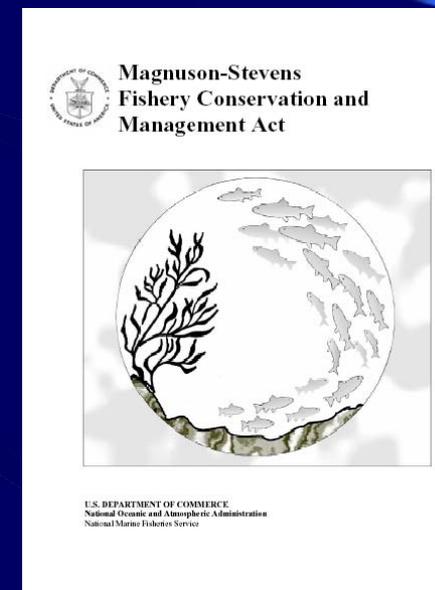
**USCOP Report
2004**



**Admin Response
2004**



MSA 2007



Why Do We Need More Emphasis on Ecosystems in Fisheries Management?

- **more credibility in “non-fisheries” governance forums and with wider groups of stakeholders**
- **get “credit” for what councils are already doing**
- **better, more integrated management**
- **leverage more and different resources to understand complex relationships affecting fisheries**

Objectives for EAF, continued...

➤ **Account for Feedback Effects**

- *predator-prey relationships, gear impacts on habitat productivity, irreversibility of fishing impacts, harvesting-induced regime change*

➤ **Establish Appropriate Ecosystem Boundaries**

- *allows for interconnections between adjacent ecosystems, allows for imports and exports, includes multiple spatial scales depending on issue*

➤ **Maintain Ecosystem Productivity, Balance Ecosystem Structure**

- *evaluate ecosystem carrying capacity, maintain resilience/resistance to perturbations, attain trophic balance*

Operational Objectives for EAF

➤ **Conserve and Manage Species**

- *Target species, assemblages, non-target species, PET* species, biodiversity protection*

➤ **Minimize Bycatch**

- *target, non-target & PET species, and minimize waste*

➤ **Manage Tradeoffs**

- *among fisheries sectors, optimize fishery benefits, prevent sequential depletion/effort transfer, use management processes that are fair, equitable and transparent, consider cumulative impacts, evaluate impacts of non-fishery sectors, include diverse stakeholder views*

* PET = Protected, Endangered or Threatened Species

Objectives for EAF, continued.

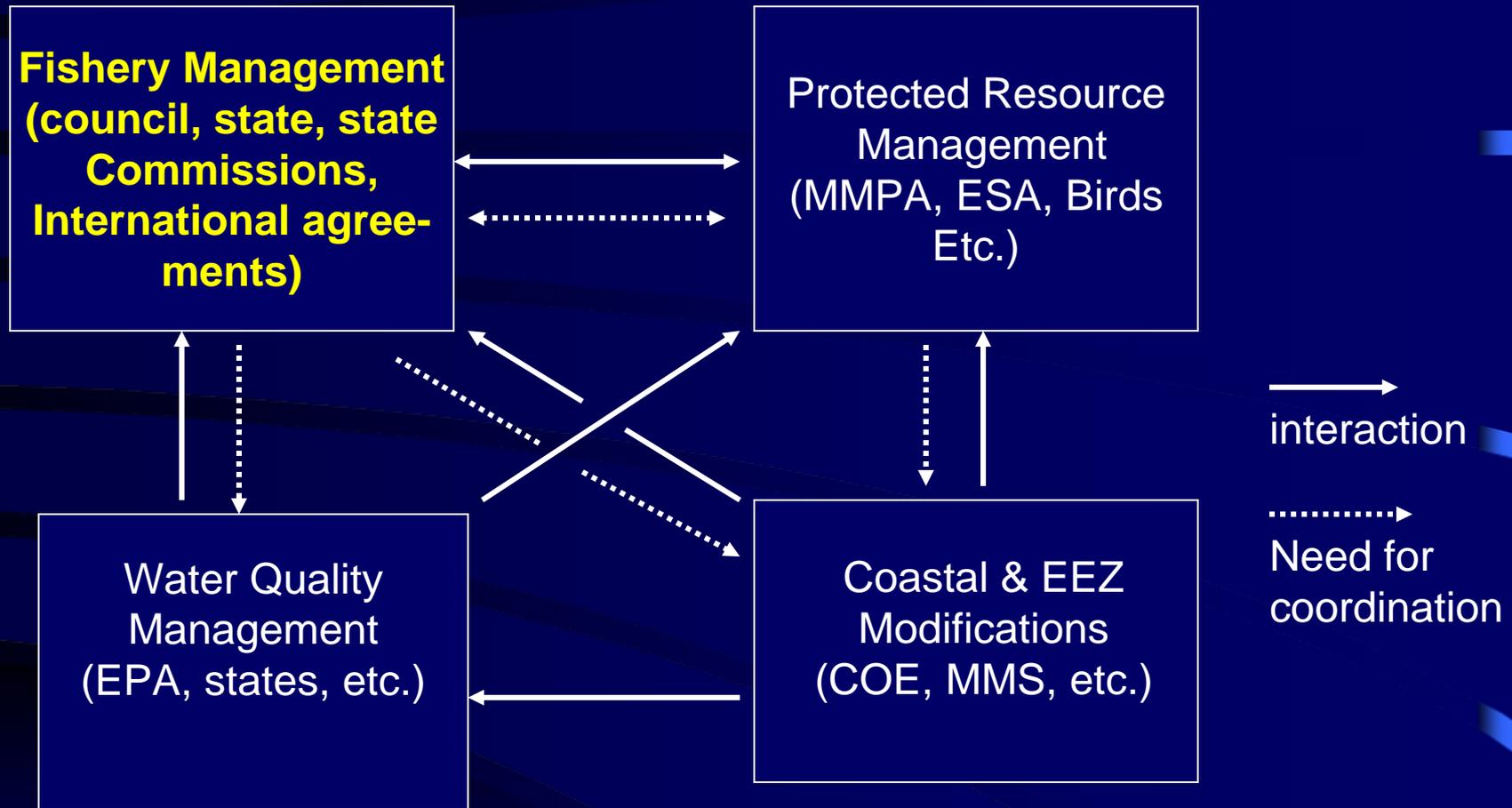
➤ **Account for Climate Variability**

- *low-frequency variation (decadal scale changes), High-frequency variation (year-to-year or more frequent), climate-based regime change*

➤ **Use Adaptive Approaches to Management**

- *consider multiple causes for observed changes and sources of uncertainty in assessment & prediction, reverse burden of proof where consequences are great, imbed experiments in management approaches to increase ecosystem knowledge*

Elements of Regional Ecosystem Governance



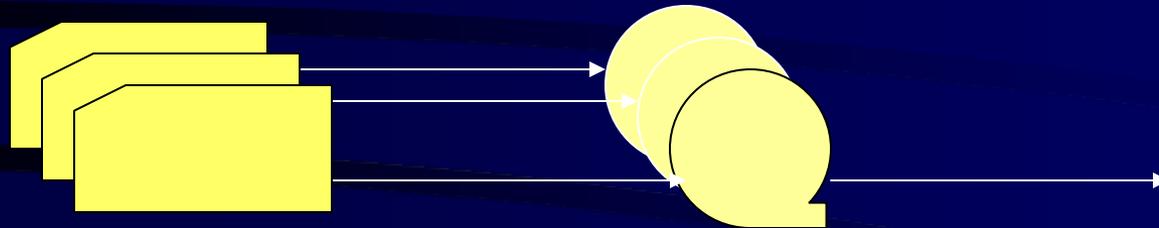
Other management authorities for navigation, food quality/safety, International agreements, climate change, etc.

Science Support: Integrating Data, Assessments, Models & Forecasts: A priority supporting EAM

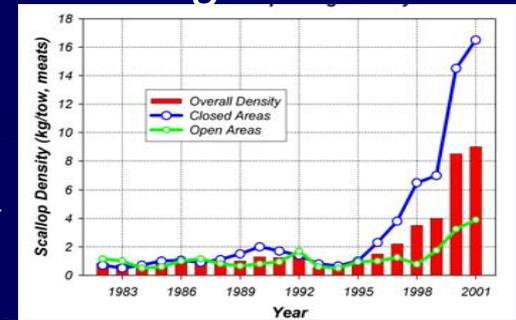
NOAA's Current Ecosystem Data Streams

Each with individual data archives

Serving specific Management needs

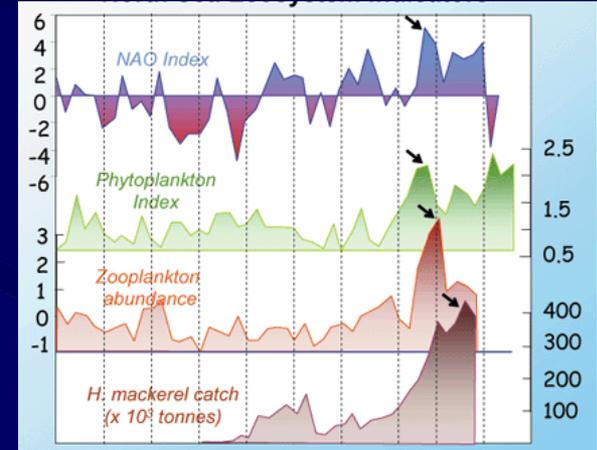


Ecosystem Vision:



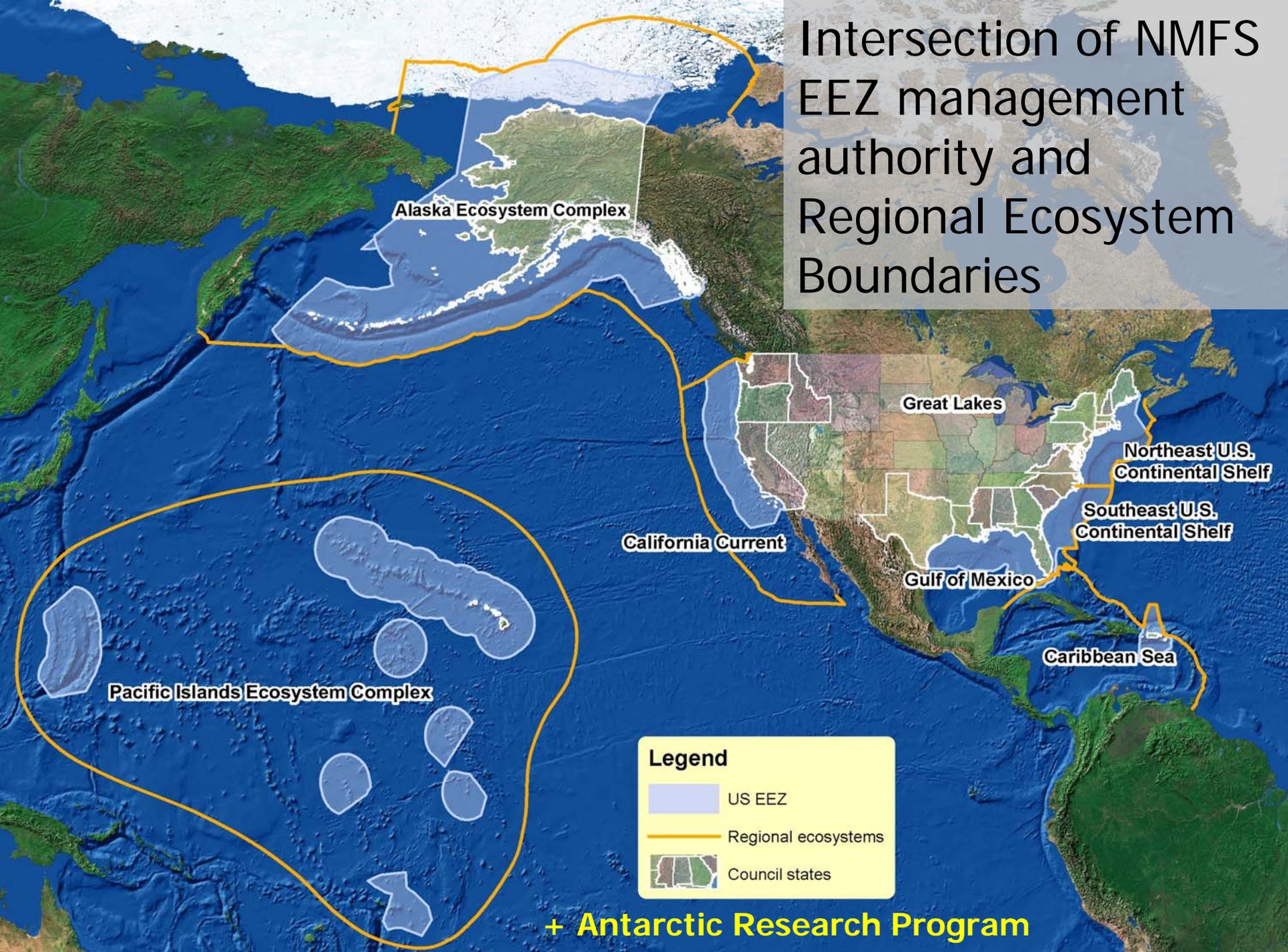
Integrated regional data prioritization, collection & archival

Enabling: Regional Integrated Ecosystem assessments



Supporting: enhanced Modeling & forecasting

Intersection of NMFS EEZ management authority and Regional Ecosystem Boundaries



How are Councils Implementing EAM Now?

- management of target species
- minimization of bycatch
- consider habitat impacts
- consult with diverse groups
- understand and incorporate species interactions

EAF in Alaska



Ecosystem-based Management Actions

- TAC less than ABC for individual stocks.
- OY Cap on total groundfish yield.
- No target fisheries on forage species.
- Short-tailed albatross take restrictions, Seabird bycatch mitigation devices.
- No fishing in Steller sea lion foraging area and minimum biomass threshold for sea lion prey.
- Trawl closures, bottom trawling restrictions.
- Bycatch and discard controls.

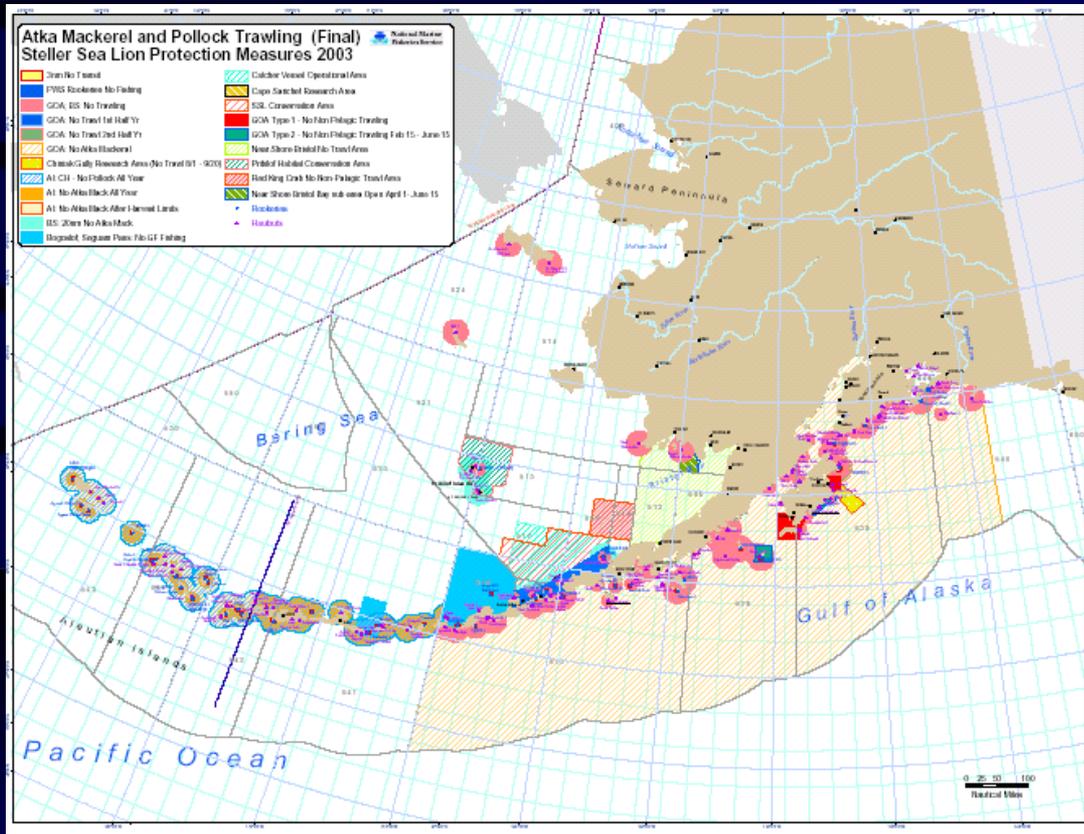


**CAP on TOTAL TARGET CATCH
BSAI Total Yield < 2 million mt**



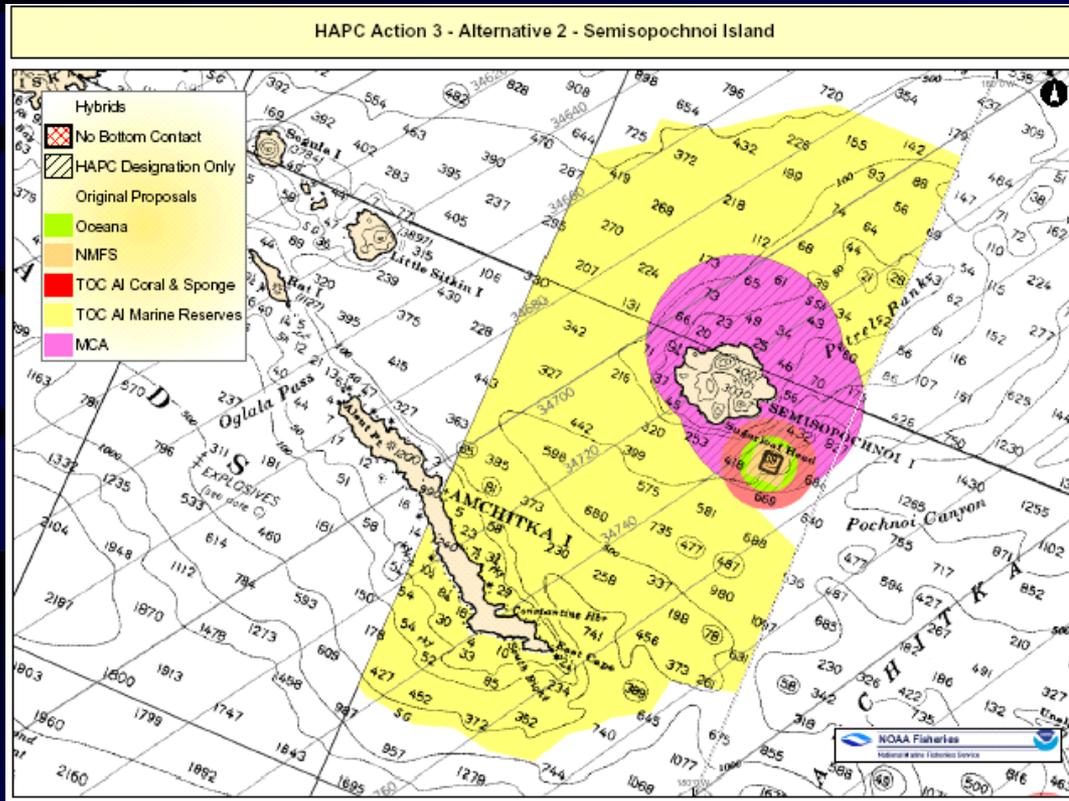
Conservative single-species targets

Steller Sea Lion Protection Measures



No Trawl Areas and Seasonal Closures

Cold-water Coral Research and Protection

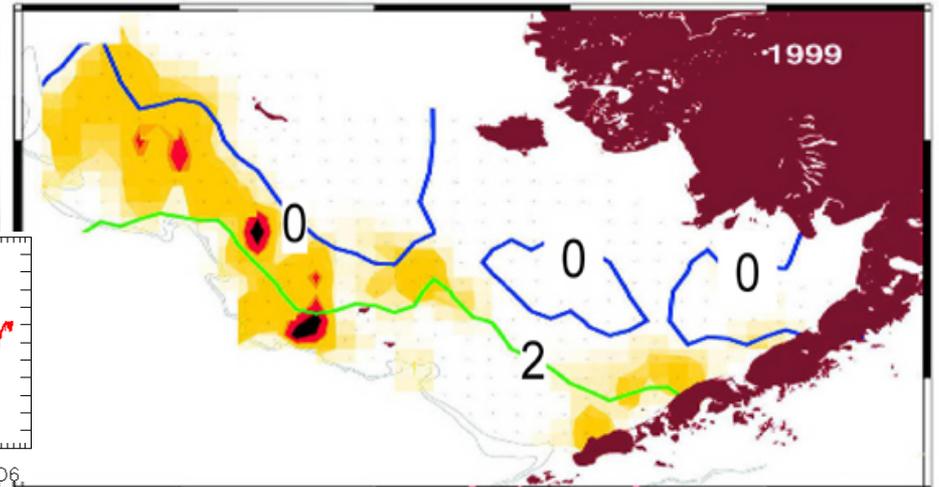
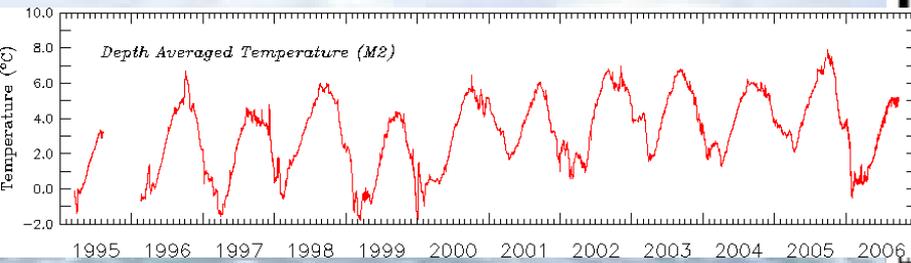


Habitat of Particular Concern

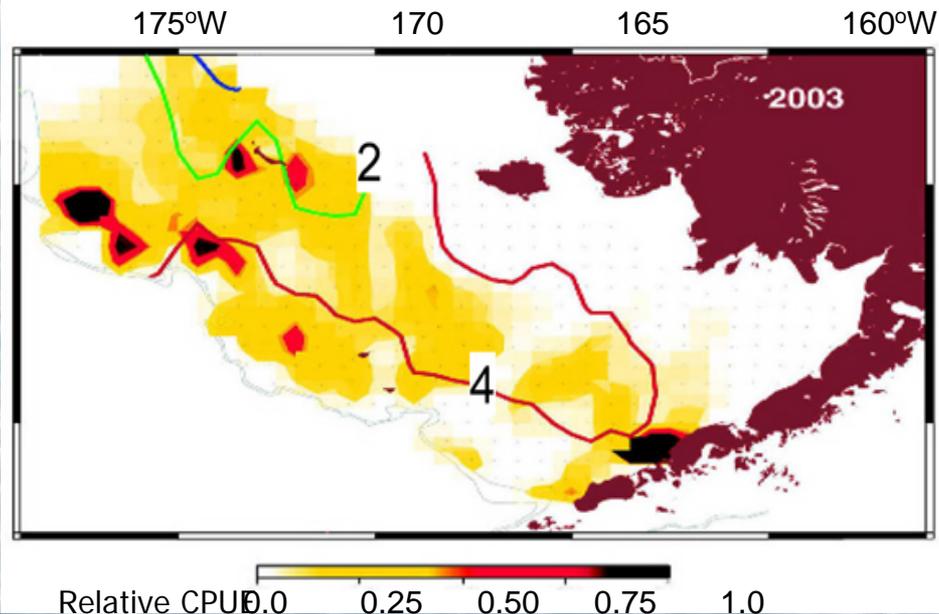
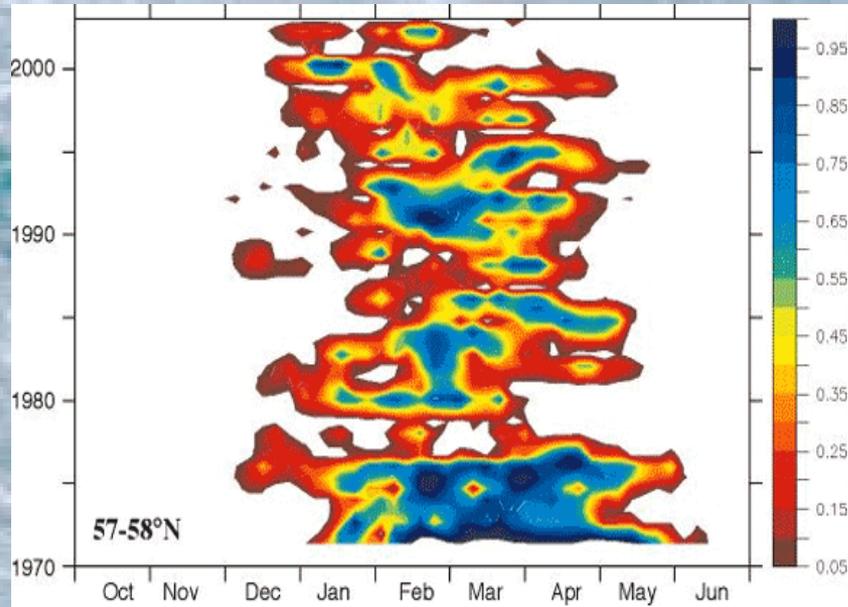
Climate Effects

Ocean conditions determine the abundance, distribution and condition of marine animals

Bering Sea Pollock and Bottom Temperature



60°N
58°N



60°N
58°N

Relative CPU 0.0 0.25 0.50 0.75 1.0

Integrated Assessment Reports for Alaska Groundfish Ecosystems

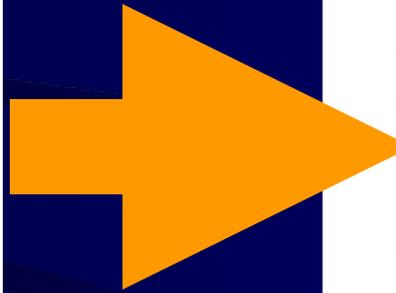
Bering Climate
[Home](#) [About](#) [Data](#) [Science](#) [Essays](#) [Info](#)

Data Information: [Description](#) [Relevance](#) [Recent Trend](#) [All Info](#) [Reset](#)

Data Access: [List Data](#) [Display](#) [Download](#) [Correlation](#)

Climate Indices	Atmosphere	Ocean	Fishery	Biology
<input type="checkbox"/> AOI	<input type="checkbox"/> SAT_Priblofs_winter	<input type="checkbox"/> Ice cover	<input type="checkbox"/> Pollock	<input type="checkbox"/> Zooplankton
<input type="checkbox"/> ALPI	<input type="checkbox"/> SAT_Priblofs_annual	<input type="checkbox"/> Ice retreat	<input type="checkbox"/> Pacific cod	<input type="checkbox"/> Jellyfish
<input type="checkbox"/> PDOI_winter	<input type="checkbox"/> Wind_Priblofs	<input type="checkbox"/> SST_Priblofs_winter	<input type="checkbox"/> Yellowfin sole	<input type="checkbox"/> Invertebrates
<input type="checkbox"/> PDOI_summer	<input type="checkbox"/> Wind mixing_Priblofs	<input type="checkbox"/> Surface temperature_M2	<input type="checkbox"/> Greenland turbot	
<input type="checkbox"/> PDOI_annual	<input type="checkbox"/> Favorable wind_M2	<input type="checkbox"/> SST in May	<input type="checkbox"/> Arrowtooth flounder	
<input type="checkbox"/> NPI-GPC	<input type="checkbox"/> Wind mixing_M2	<input type="checkbox"/> SST in May	<input type="checkbox"/> Rock sole	
<input type="checkbox"/> NPI-NCAB	<input type="checkbox"/> Strong wind_M2	<input type="checkbox"/> Bottom temperature_summer	<input type="checkbox"/> Flathead sole	
<input type="checkbox"/> EPI_Dec-Mar	<input type="checkbox"/> Wind mixing_M2		<input type="checkbox"/> Alaska plaice	
<input type="checkbox"/> EPI_Apr-Jul	<input type="checkbox"/> Wind stress_Uniform_Nov-Apr		<input type="checkbox"/> Pacific perch	
<input type="checkbox"/> WPI_winter	<input type="checkbox"/> Wind stress_Uniform_May-Jun		<input type="checkbox"/> Herring	
<input type="checkbox"/> WPI_spring	<input type="checkbox"/> Wind stress_Uniform_May-Jun		<input type="checkbox"/> Salmon	
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<input type="checkbox"/> St				
<input type="checkbox"/> AI				
<input type="checkbox"/> SAI				

- Mouseover dataset name
- Click on dataset name
- Access data, metadata, desired functionality.



November 2004 Ecosystem Considerations

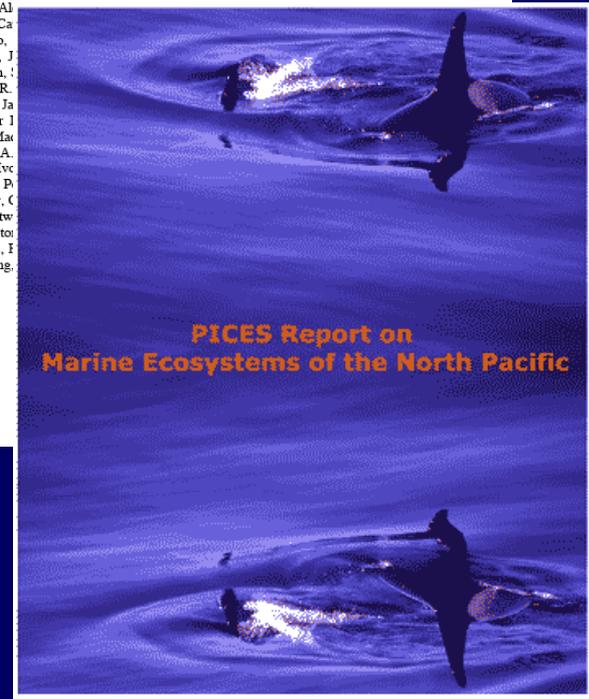
APPENDIX C

Ecosystem Considerations for 2005

Reviewed by
 The Plan Teams for the Groundfish Fisheries
 of the Bering Sea, Aleutian Islands, and Gulf of Alaska

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What are Integrated Ecosystem Assessments?

Integrated Ecosystem Assessment (IEA):

- “A synthesis and quantitative analysis of information on relevant physical, chemical, ecological and human processes *in relation to specified ecosystem management objectives*”.

An IEA:

- Incorporates multiple indicators of the physical environment, human factors affecting ecosystems, and the abundance and production of ecosystem goods and services,
- Is geographically specified,
- Establishes target levels and thresholds for important ecosystem components,
- Evaluates the impacts of management options and risks of not attaining target ecosystem states.

Components of an IEA

- An IEA typically consists of the following components:
 - Assessment of ecosystem baseline conditions (States)
 - Assessment of stressors on the ecosystem (Drivers, Pressures)
 - Prediction of the ecosystem status with no change in management actions (status quo response)
 - Prediction of the ecosystem status under different management strategies to meet target states (optional responses)
 - Evaluation of the success of management actions (update states relative to targets and thresholds)

N.B. Ecosystem status reports ARE NOT integrated ecosystem assessments (DPSIRs)

Types of Indicators and Issues considered in IEAs

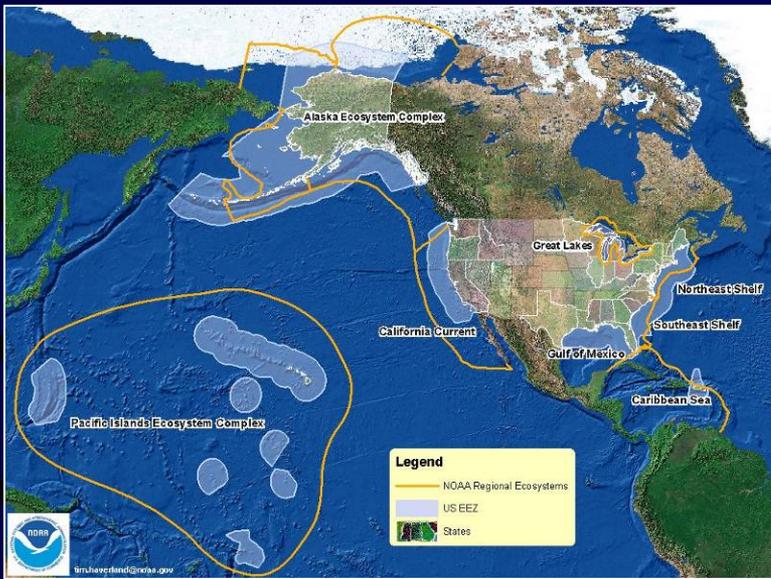
Drivers &
Pressures



States &
Impacts

<u>Physical</u>	<u>Human-Related</u>	<u>Conditions</u>	<u>Goods & Services</u>
air temperature	nutrient input	extent of hypoxia	species
sea temperature	contaminants	HAB events	-abundance
weather patterns	microbiological inputs	invasive species interactions	-biomass
waves	radioactive input	primary production	-recruitment
salinity	hydrocarbons	secondary production	fishery catch
pH	atmos. deposition	benthic production	fishery revenue
circulation	wetlands change	species richness	recreational use
sea level	fishing effort	species diversity	aquaculture production
decadal indices	vessel traffic	protected species status & mortality	non-consumptive uses
upwelling	bycatch	overfishing status	social use and Importance
wind stress	non-native species introductions	trophic balance	transportation
sediment transport	marine debris	body burden of contaminants	commerce
freshwater input	coastal & seabed modifications	distributions of biota	energy
sea ice cover	marine sound	human factors	
extreme events			

What are the appropriate geographical scales for IEAs?



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

National

National Overview

+ International collaborations

Hierarchical Structure of IEAs

Regional

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

Local

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



MSA Section 406 (2007)

(1) STUDY.—The Secretary shall undertake and complete a study on the state of the science for advancing the concepts and integration of ecosystem considerations in regional fishery management. The study should include—

- (A) recommendations for scientific data, information and technology requirements for understanding ecosystem processes, and methods for integrating such information from a variety of federal, state, and regional sources;
- (B) recommendations for incorporating broad stake holder participation;
- (C) recommendations to account for effects of environmental variation on fish stocks and fisheries; and
- (D) a description of existing and developing council efforts to implement ecosystem approaches, including lessons learned by the councils.

(2) AGENCY TECHNICAL ADVICE AND ASSISTANCE, REGIONAL PILOT PROGRAMS.—The Secretary is authorized to provide necessary technical advice and assistance, including grants, to the Councils for the development and design of regional pilot programs that build upon the recommendations of the advisory panel and, when completed, the study.

FMC Efforts Towards EAM

- Holding workshops to introduce EAM concept and gather stakeholder feedback
- Moving from FMPs to FEPs
- Holding ecosystem modeling workshops
- Creating white papers that address issues surrounding EAM
- Creating maps and habitat descriptions of benthic areas (CFMC, SAFMC)
- Many management efforts incorporate ecosystem principles: bycatch reduction, area closures, EFH and HAPC protection, protection of forage species, marine mammals, and sea birds, gear restrictions

FMC Partnerships With Others

- Working with other entities to create benthic maps and habitat descriptions:
 - CFMC has partnered with WHOI, UPR, UVI, NOS, and NASA
 - SAFMC partnering with Florida Wildlife Research Institute
- Developing Ecosystem Information Systems:
 - SAFMC has partnered with NMFS Habitat Conservation, South Atlantic States, SECOORA, local and federal agencies, universities, conservation groups, fishermen
- CFMC is developing EBM plan for Navassa
 - Collaborating with DOI, SWFSC, UPR, and others

Summary

- **Trend to more ecosystem issues in fisheries management**
- **Need to work with more diverse communities of interests**
- **NOAA and other federal agencies will work towards this goal**
- **Key is regional approaches that work**

Questions?