Data needs for Integrated Ecosystem Assessments: an end-to-end modeling perspective

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Ocean Biological & Chemical Data

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Integrated Ecosystem Assessment

Scoping
Identify goals of EBM and threats to achieving goals

Develop ecosystem indicators and targets

Risk Analysis

Assessment of ecosystem status relative to EBM goals

Management Strategy Evaluation

Implementation of Management Action

Monitoring of Ecosystem Indicators And Management Effectiveness

Adaptive Management and Monitoring

5 regions throughout the US
http://www.st.nmfs.noaa.gov/iea/

Inspired by the work of Sainsbury, Smith and probably others
Examples from 2011 California Current Integrated Ecosystem Assessment

• Provided as presentations and briefing report to Pacific Fishery Management Council and advisory bodies

• Also published as Levin and Schwing 2011. NOAA Tech. Memo., NMFS-NWFSC-109

• Includes a diverse array of data and modeling approaches

• Integrated Ecosystem Assessment for 2012 is underway

• Effort to expand beyond fisheries to include climate change, acidification, pollution, protected resources
Time series and risk scores for 16 Non-Fisheries Threats

Example: Ocean-based Pollution

Data: NCEAS California Current Threats Mapping (Halpern et al. 2009)
Risk from non-fisheries threats:

Spatially expansive threats (high exposure) overshadow point source threats as sensitivity scores among groundfish are similar.

Data: NCEAS California Current Threats Mapping (Halpern et al. 2009)
Indicators:

Time series of Prey and Predators

Example: Prey of canary rockfish

Data: 86 time series from groundfish, midwater, and plankton trawl surveys, and stock assessments
Translating IEAs to management: Pacific Hake in an Ecosystem Context

Data include CalCOFI and GLOBEC plankton data, NOAA trawl surveys and stock assessments.

Models: Atlantis, Ecoviz, and Qualitative Modeling.
End-to-end “whole of ecosystem” models

IEA
Applications of Atlantis ecosystem model

89 functional groups
- 48 fish
- 22 invertebrates
- 4 mammals
- 3 turtles, 2 birds
- 7 primary producers
- bacteria & detritus

Commercial importance
Conservation interest
Ecological importance
2710 species total

66 polygons with 7 depth layers
**Data sources**

**Biomass**

- Assemblage biomass estimated from physical habitat variables using Generalized Additive Model
- Data sources (Gulf of Mexico Data Atlas and SEA MAP cruises)

*Habitat and physical oceanography data sources*

**Diet**

Gulf of Mexico Trophic Interactions Database (James Simons NCDDC, in prep)
Here are the WebEx details for your session May 16:

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