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

**NOAA Environmental Data Management Conference 2012**
Ocean Biological & Chemical Data

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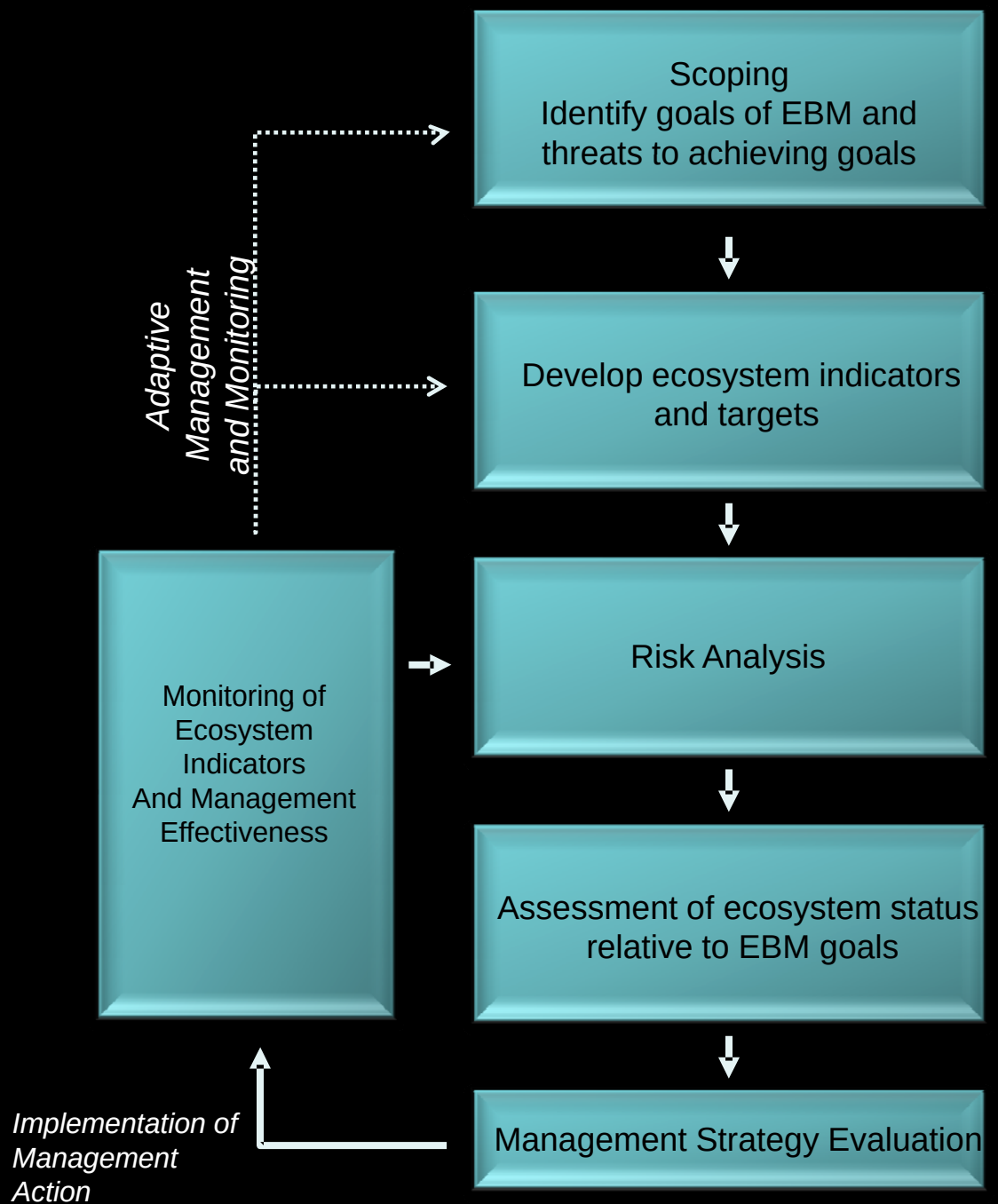
# Integrated Ecosystem Assessment



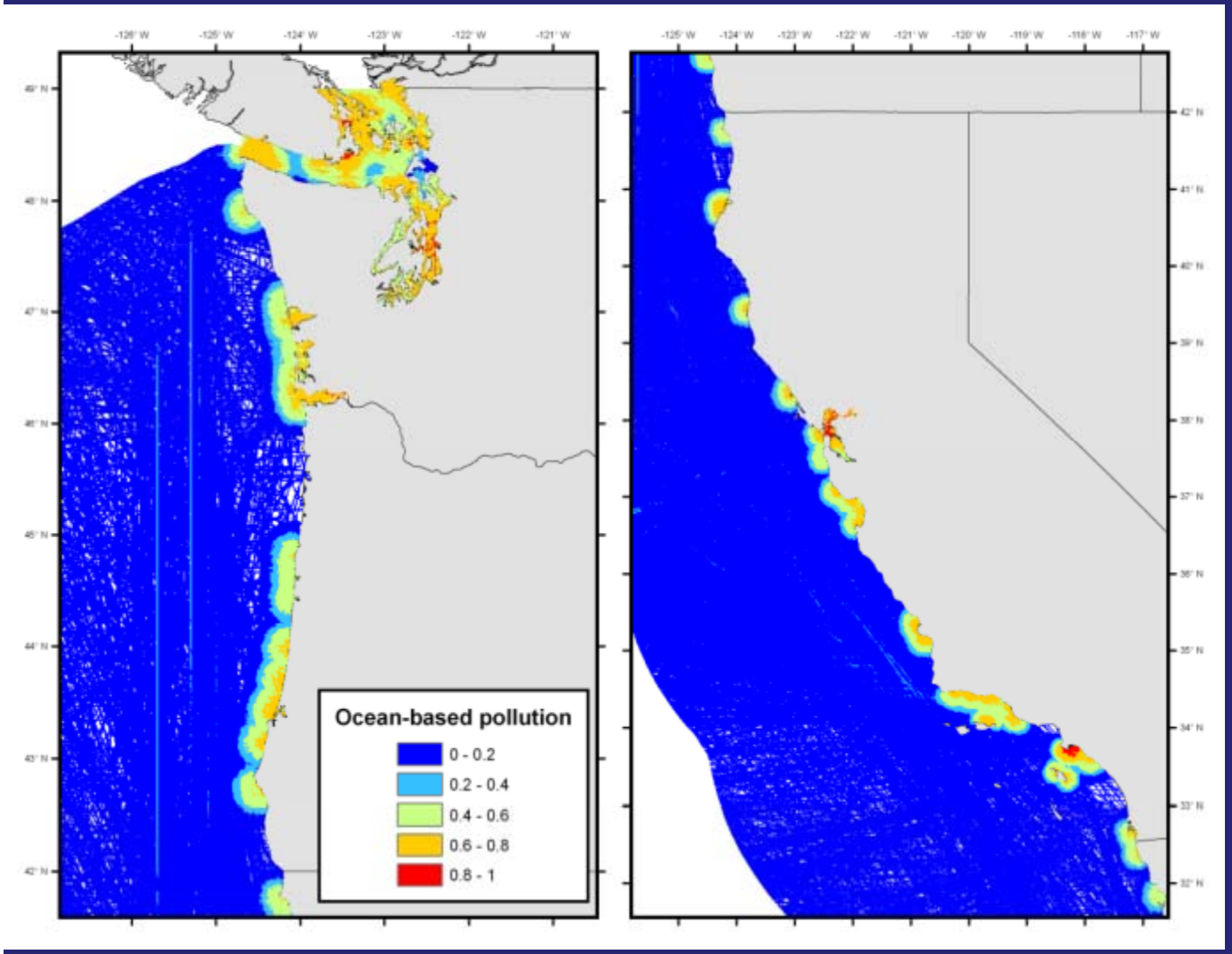

5 regions throughout the US
http://www.st.nmfs.noaa.gov/iea/

Levin et al. PLoS Biology 2009

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

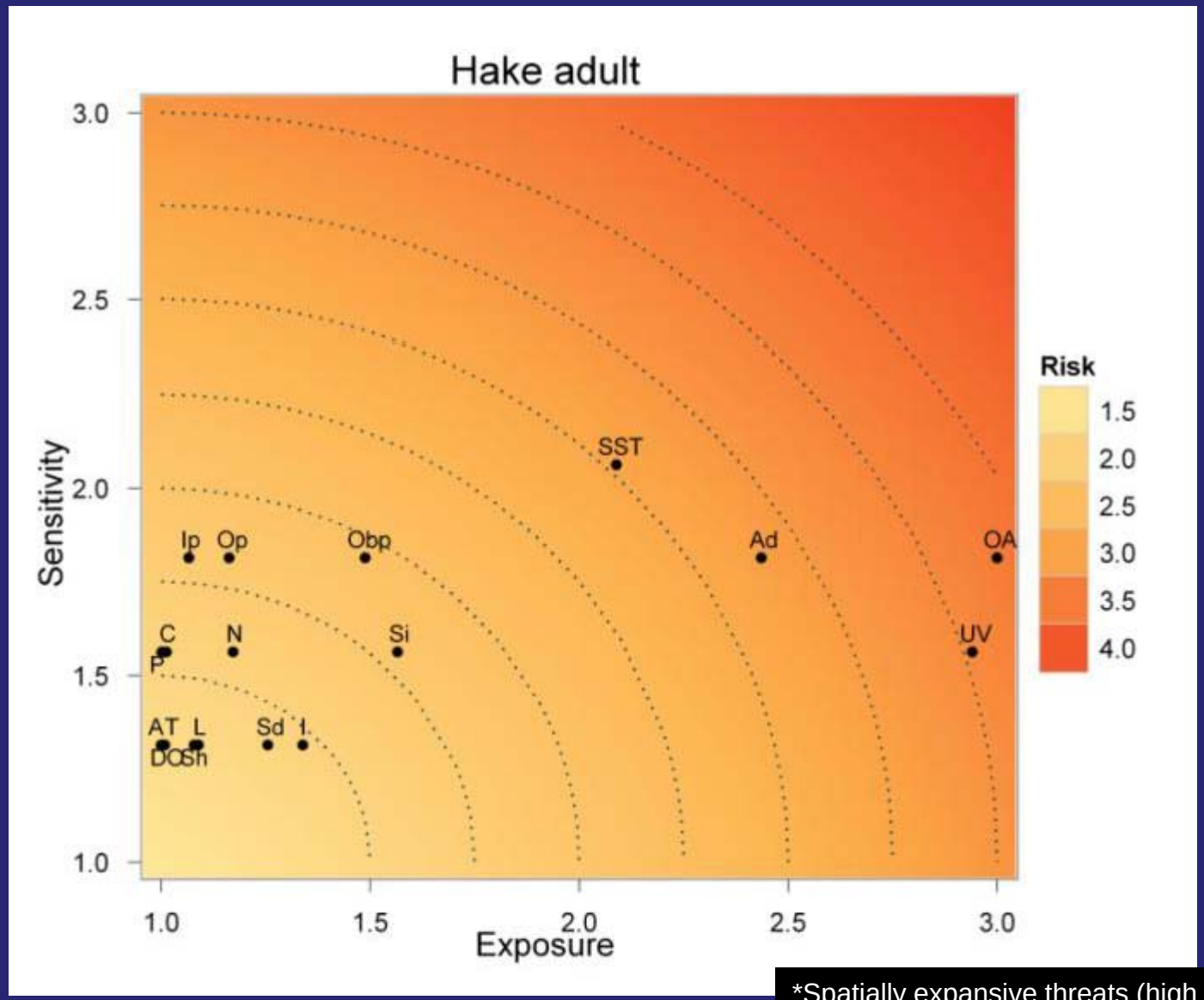



Time series and risk scores for 16 Non-Fisheries Threats

Example: Ocean-based Pollution

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

# Risk from non-fisheries threats:

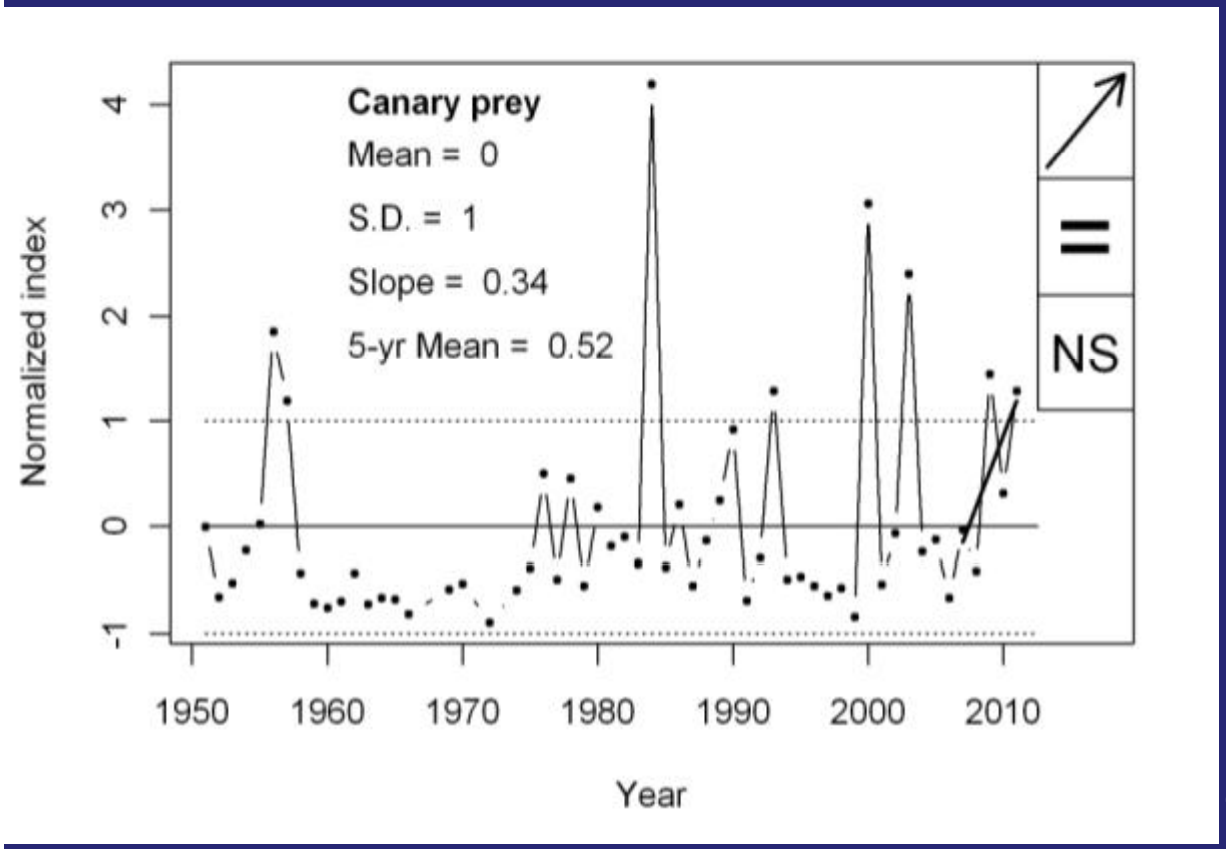



**Non-fisheries threats**

A – Aquaculture
Ad – Atmospheric deposition
C – Coastal engineering
D – Direct human impacts
Ip – Inorganic pollution
L – Light pollution
N – Nutrient input
Obp – Ocean based pollution
Op – Organic pollution
O – Oil rigs
P – Power plants
Sd – Sediment decrease
Si – Sediment increase
Sh – Shipping activity
I – Species invasions
T – Trash
OA – Ocean Acidification
SST – Sea Surface Temp
UV – UV Radiation

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

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



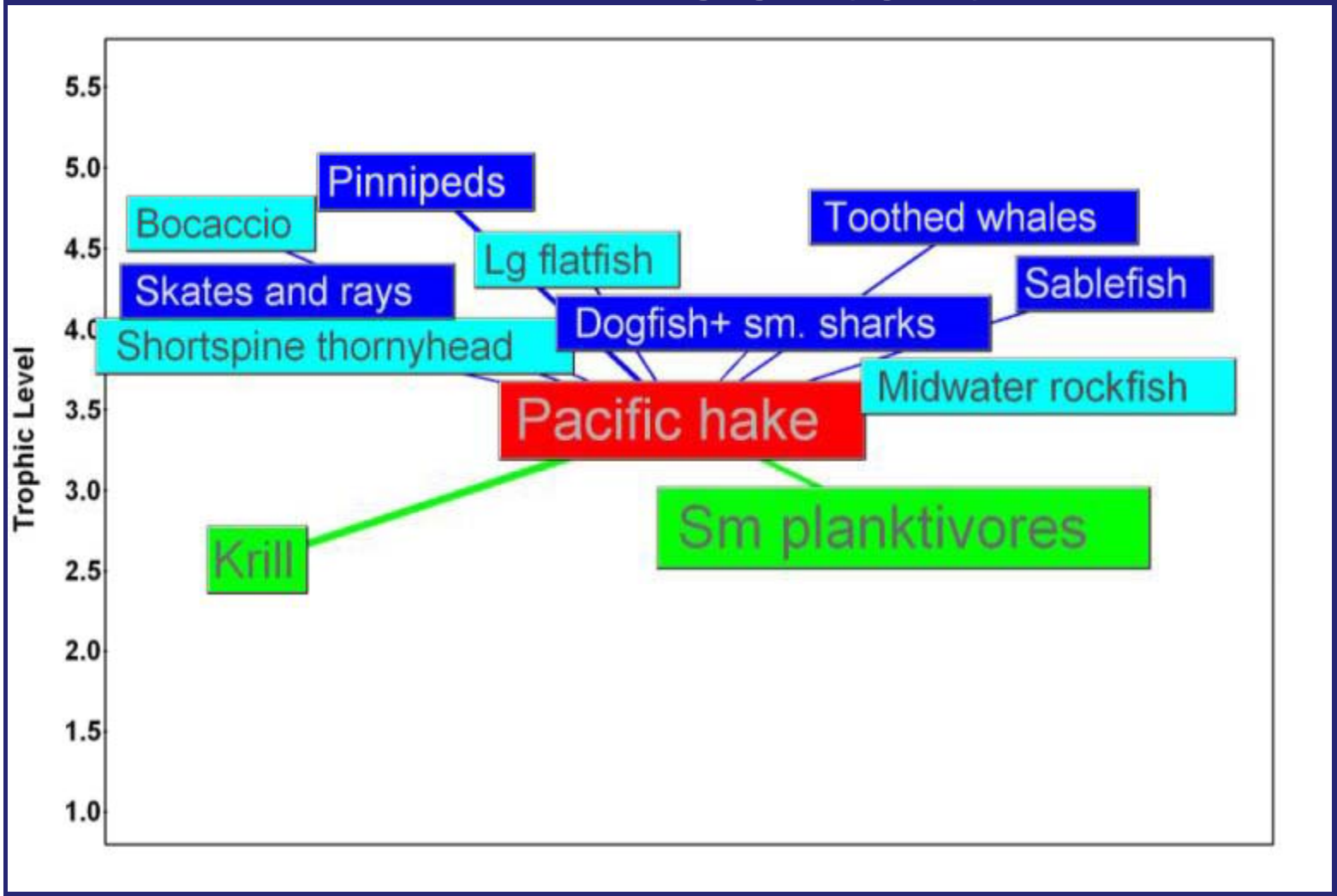

# Indicators:

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

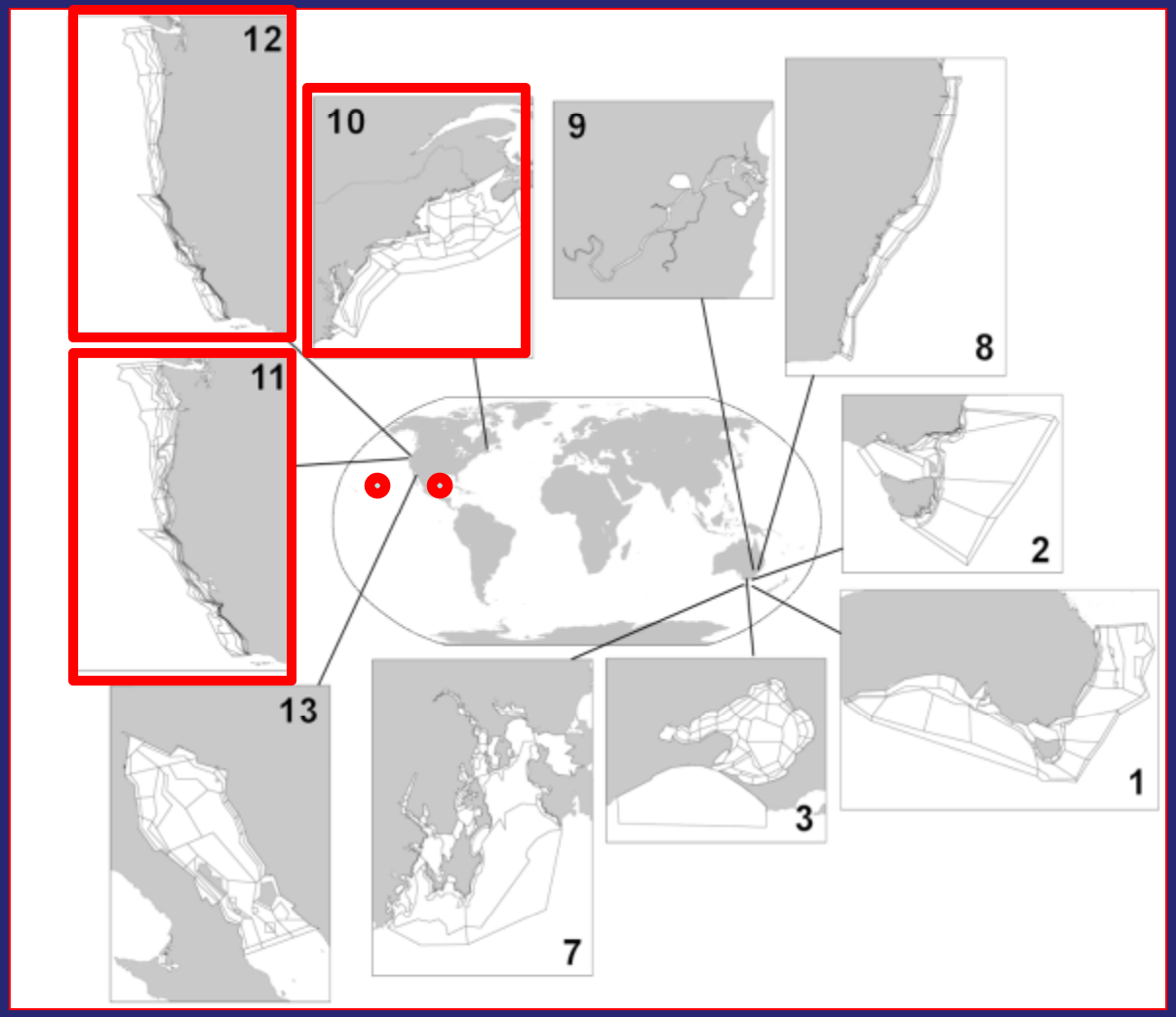
# Translating IEAs to management: Pacific Hake in an Ecosystem Context




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

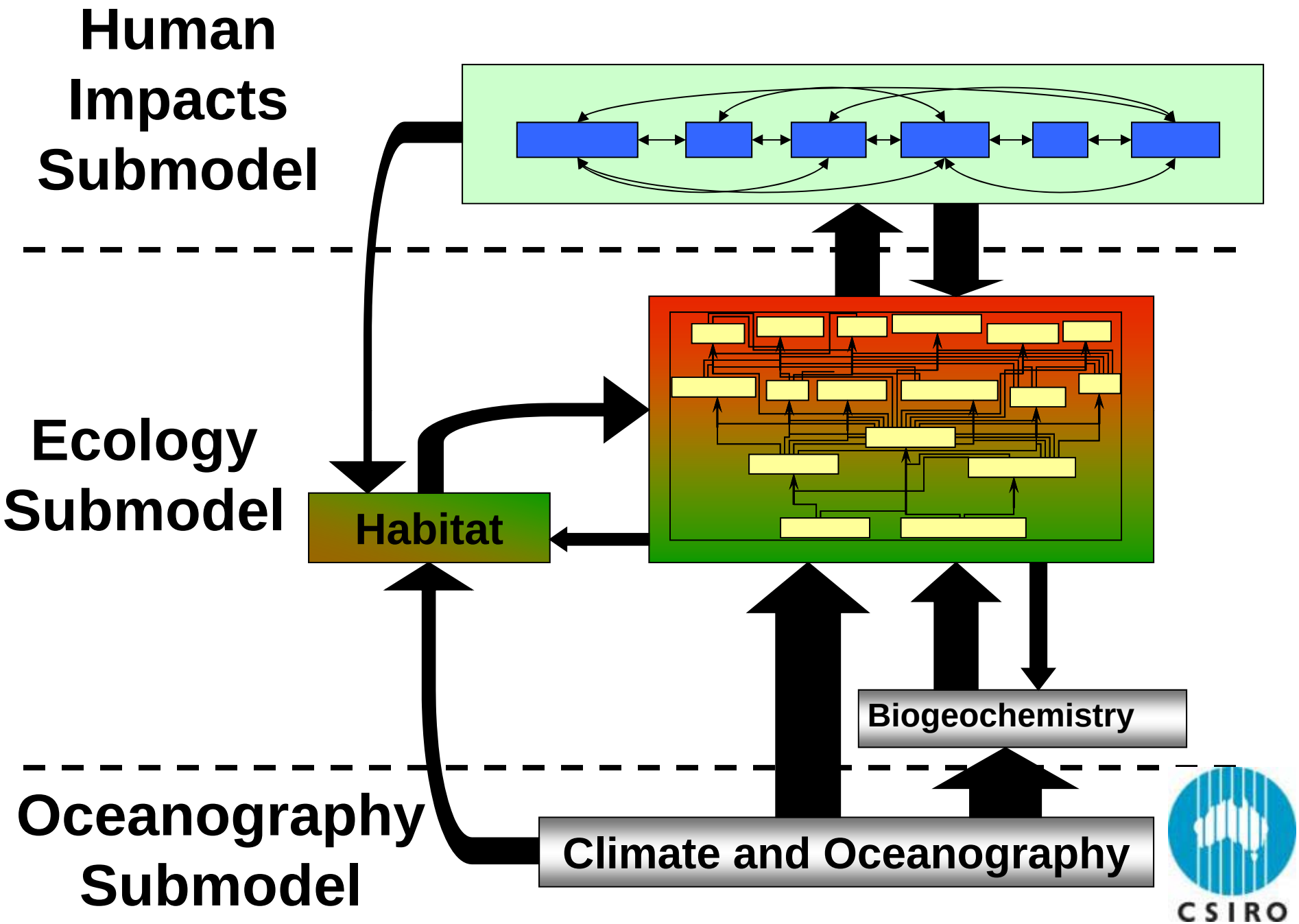
Models: Atlantis, Ecoviz, and Qualitative Modeling

# End-to-end “whole of ecosystem” models




IEA Applications of Atlantis ecosystem model

Fulton et al. 2011. *Fish and Fisheries* 12(2) 171–188.




Fulton et al. 2011. *Fish and Fisheries* 12(2) 171–188.

# Gulf of Mexico Atlantis Polygon Geometry

**89 functional groups**

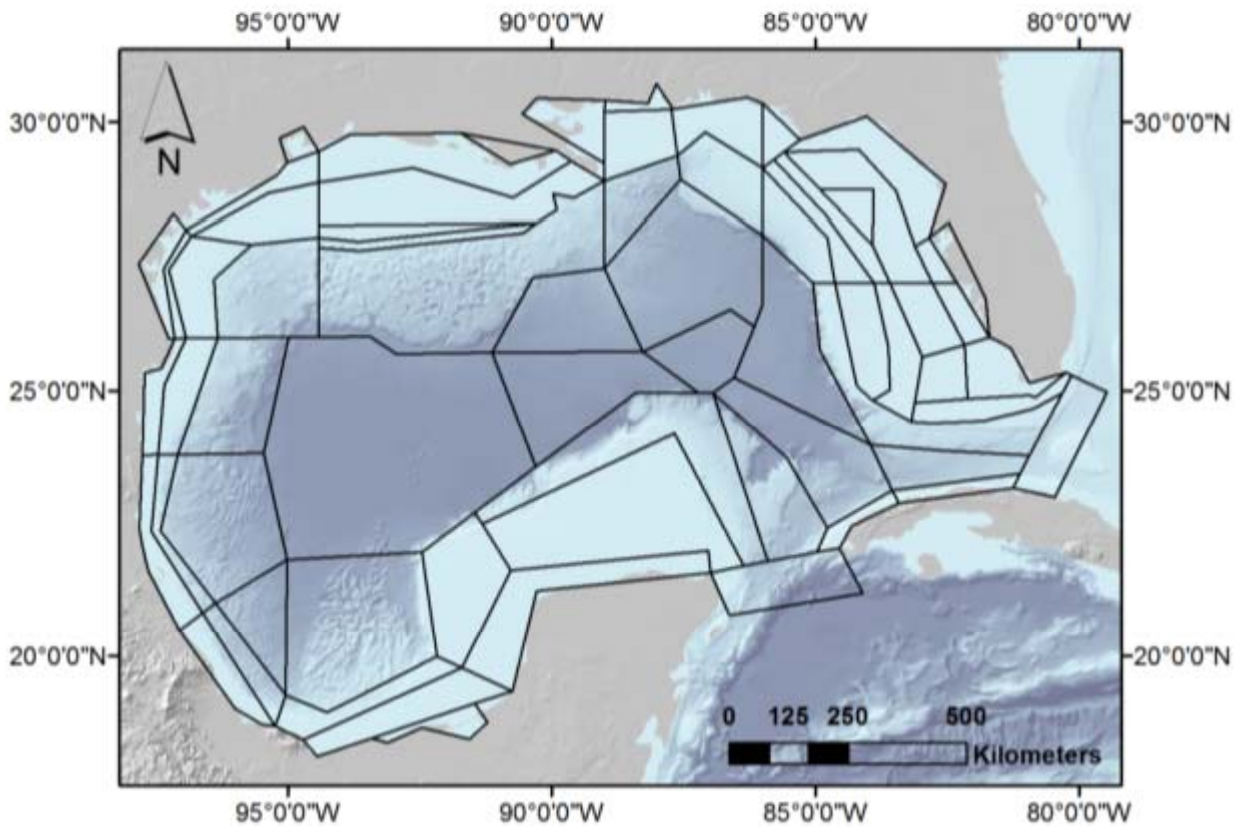
- 48 fish
- 22 invertebrates
- 4 mammals
- 3 turtles, 2 birds
- 7 primary producers
- bacteria & detritus

Commercial importance

Conservation interest

Ecological importance

2710 species total



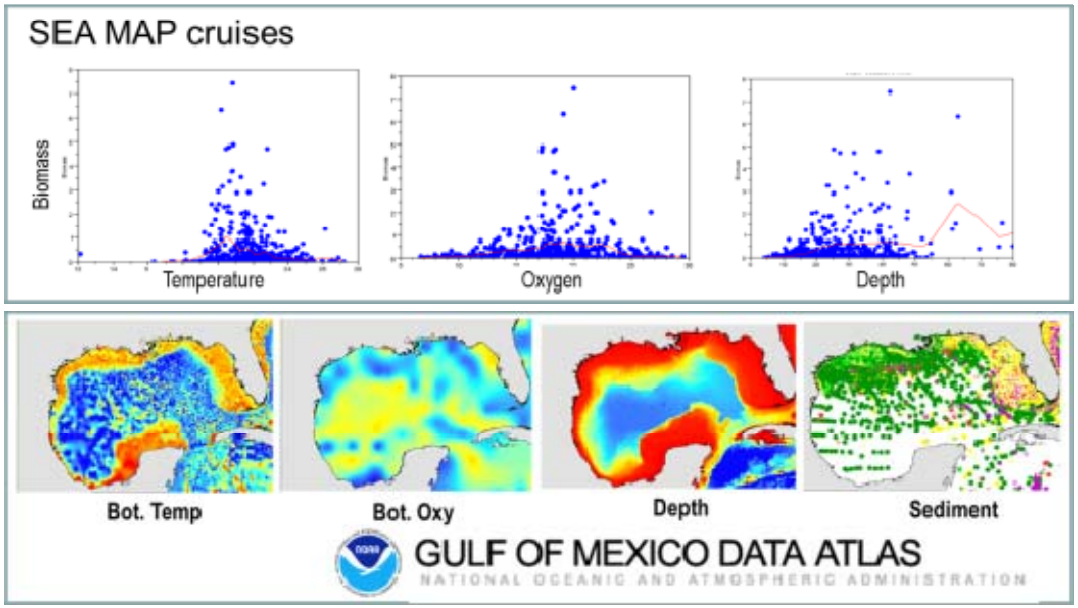

66 polygons with 7 depth layers

# Data sources

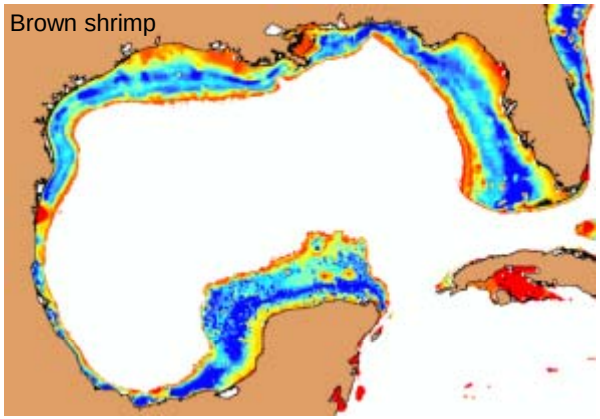
## Biomass

- 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*




*Preliminary result*




## 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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- To join the web portion of the meeting:
- https://esipfed.webex.com/mw0306ld/mywebex/default.do?siteurl=esipfed&service=1
- 
- 1. Click join next to the meeting name. (Note: If the meeting has not yet started, join will not be visible, and it will say 'Display Info'. Wait a minute and refresh screen)
- 2. Enter your name and email address
- 3. Enter the access code as the password: 23138379
- 
- After you start the web portion, you can use VoIP and call from your computer or you can use the phone and call-in:
- 1-877-668-4493
- Attendee Access code: 231 383 79#
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