Seasonal forecasting and ecosystem-based fishery management

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Fisheries are diverse
Changing weather patterns affect fisheries

- **Climate Changes**
  - ↑ Temperature
  - Δ Precipitation
  - ↑ Atmospheric Carbon Dioxide

- **Physical Chemical Impacts**
  - ↑ Ocean temperature
  - ↓ Sea ice
  - ↑ Sea level
  - Δ Freshwater
  - ↑ Ocean Acidification

- **Biological Impacts**
  - Δ Productivity
  - Δ Phenology & survivorship
  - Δ Species distribution
  - Δ Species abundance
  - Δ Community composition

- **Social Economic Impacts**
  - Δ Fishing activities
  - Δ Revenues & economies
  - Δ Industries
  - Δ Subsistence use
  - Δ Community health

Changing weather patterns affect fisheries — U.S. Department of Commerce | National Oceanic and Atmospheric Administration | NOAA Fisheries | Page 3
How can seasonal forecasts help with decisions about fishing?
Where should I fish today?

When should we be ready for fish?

Gulf of Maine ocean temperatures above normal

Joe Cormier of Westbrook, Maine, paddles out to surf, Thursday, March 29, 2012, at Higgins Beach in Scarborough, Maine, where the ocean temperature was in the 40s. The winter’s warm air temperatures are resulting in water temperatures in the Gulf of Maine that are rising well above average, according to scientists.
When should we be ready for fish?

Cooperative data collection

http://www.nefsc.noaa.gov/epd/ocean/MainPage/emolt.html
How many fish will there be next year? (and for the next two?)

<table>
<thead>
<tr>
<th>Species</th>
<th>Year</th>
<th>Commercial Quota (millions of pounds)</th>
<th>Commercial Minimum Fish Size (TL)</th>
<th>Commercial Mesh Size</th>
<th>Recreational Harvest Limit (millions of pounds)</th>
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<tr>
<td>Summer Flounder</td>
<td>2015</td>
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<td>5.5&quot;</td>
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<td>2016</td>
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<td>2017</td>
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<td>5.5&quot;</td>
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<td>2018</td>
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<td>Scup</td>
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<td>Black Sea Bass</td>
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</tbody>
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http://www.mafmc.org/newsfeed/2015-08-17/demersal-specifications
Could we improve 1-2 year fish forecasts?

Key Information Requirements

WHAT IS CHANGING?

1970’s

2000’s

Red Hake

West Atlantic SST

WHY IS IT CHANGING?

HOW WILL IT CHANGE?

HOW TO RESPOND?
We are moving beyond previously observed ranges

NEED seasonal to two year forecasts to model system responses and adjust management for the unknown
Our plans...

Thank you

http://www.nefsc.noaa.gov/ecosys/

http://www.nefsc.noaa.gov/ecosys/current-conditions/forecast.html

http://www.nefsc.noaa.gov/ecosys/climate-change/projected.html