Developing a placed-based participatory IEA framework for coastal communities in the Gulf of Alaska

Levels of Application of Ecosystem-based Management

EBM - Ecosystem Based Management
- Fisheries
- Development
- Energy
- Eco Tourism
- Oil & Gas
- Conservation
- Marine
- Sanctuaries
- Aquaculture
- Etc

EBFM - Ecosystem Based Fisheries Management
- Climate
- Habitat
- Predator

EAFM - Ecosystem Approach to Fisheries Management
- Climate
- Habitat
- Predator

SS - Single Species

Source: Dolan et al. 2015
What is an Integrated Ecosystem Assessment?

Source: NOAA Fisheries
Regional vs. place-based IEAs

www.integratedecosystemassessment.noaa.gov
Southeast Alaska case study: Sitka

Steps completed:

Focal species:
Conceptual models

- Essential part of the IEA loop
- Communication tool
- Integration of social, environmental and biological components
- Incorporation of diverse types of knowledge (e.g., science and LEK) → **Co-production of knowledge**
- Identification of knowledge gaps and research needs
Building conceptual models

- Synthesizing available scientific information

Halibut
Fresh water input
Halibut larvae
Positive

- Alongshore transport enhanced
  - Micronutrients supplied from river discharge
  - High levels of chlorophyll-a

Stabeno et al., 2004
Etherington et al., 2007
Bailey et al., 2008
Doyle et al., 2009
Arimitsu et al., 2016
• Sitka focus groups

**Ecological connections**
- Environmental variables
- Prey, predators and competitors
- Knowledge gaps

**Human dimensions**
- Resident’s capacity to derive well-being from fisheries
Final conceptual model (herring)
Human well-being indicators

COMMERCIAL
+ Income Security
+ Livelihood
+ Physical Safety
+ National Food Security

SUBSISTENCE
+ Local Food Security
+ Spirituality

+ Identity
  + Sense of Place
  + Sense of Community
  + Family Connection
  + Education & Information
  + Personal Development
  + Sense of Enjoyment & Fulfillment
  + Cultural Values & Traditions
  + Connection to the Water & Ecosystem
    ± Stewardship
  + Family Heritage
  + Food/ Nutrition
  + Physical & Mental Health
    + Self Determination
  + Social Justice & Equity
    + Local Economy
  + Governance & Management
    – Political Participation
Operationalizing conceptual models
(Qualitative network models)

Predator (sablefish)

Prey (jellyfish)

Press perturbation
(more jellyfish)

Sablefish model

Community matrix

An increase in:

Causes a response in:
Press perturbation scenario example: ↑Gelatinous zooplankton + ↑Jellyfish and Cephalopods

- 67% positive response on adults large
- 99% positive response on adults small
- 97% positive response on juveniles
- 68% negative response on Gross Revenue
- 95% negative response on Fishing effort
- 88% negative response on average price

Which linkages are most important to sign outcome of small adults?

<table>
<thead>
<tr>
<th>Linkage</th>
<th>Relative influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large adults - Eggs &amp; larvae</td>
<td>8.37</td>
</tr>
<tr>
<td>Cephalopods &amp; jellyfish - Juveniles</td>
<td>5.78</td>
</tr>
<tr>
<td>Fishing effort - Harvest by volume</td>
<td>4.94</td>
</tr>
<tr>
<td>Eggs &amp; larvae - Juveniles</td>
<td>3.69</td>
</tr>
<tr>
<td>Cephalopods &amp; jellyfish - Small adults</td>
<td>3.54</td>
</tr>
<tr>
<td>Large adults - Harvest by volume</td>
<td>3.30</td>
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<tr>
<td>Small adults - Eggs &amp; larvae</td>
<td>2.96</td>
</tr>
<tr>
<td>Euphausiids - Herring</td>
<td>2.17</td>
</tr>
</tbody>
</table>

≥70% high sign consistency
≤70% low sign consistency
In summary, our approach is a …

“Placed-based participatory IEA”

• Sitka is a unique fishing community
• Sitka stakeholders have a deep understanding of their local ecosystem
• Conceptual models captured and integrated LEK
• Incorporation of LEK into science needed to achieve sustainable, effective, and equitable management of fisheries
• More informed and empowered community in relation to their local ecosystem and resources
• Operationalizing conceptual models allow an understanding of how different components of the model respond to a particular perturbation
• Long-term goal: Incorporate socio-ecological distinctive regions of GOA into one unifying IEA framework
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