Temporal and spatial variation in springtime ichthyoplankton assemblages in Puget Sound: the search for an ecological baseline

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Temporal and spatial variation in springtime ichthyoplankton assemblages in Puget Sound: the search for an ecological baseline

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Photos by Alan Lovewell & Alicia Godersky
Benefits of larval studies

- Enables sampling of communities vs. particular habitats
- Useful estimate of adult abundance
- More feasible, less costly than sampling adults
- Interest in evaluating change over time, managing sustainable fishing in Puget Sound
- Need to establish a baseline to evaluate change
- Rely on data from commercial harvest but limited to earliest records
- Serve as strong indicators of ecosystem health

Puget Sound in 1967 (Waldron)

Photo credit: NOAA Observer Program, News Tribune Blog, All Star Charters
I. Is there spatial and temporal variation in Puget Sound ichthyoplankton assemblages between 1967 and 2011 surveys?

II. Do changes observed in Puget Sound extend to larger temporal and spatial scales?
   i. Are changes similar along the Washington coast?
Sites: Puget Sound & Washington coast

Historical:
Oblique tows
500-700µm mesh

2011:
Vertical &
horizontal tows
250 & 500µm mesh

2006-2012:
Bongo nets
335µm mesh
Common families

- Clupeidae (herring)
- Ammodytidae (sand lance)
- Merlucciidae (hake)
- Gadidae (cods)
- Scorpaenidae (rockfish)
- Pleuronectidae (flatfish)
- Cottidae (sculpin)

http://www.scandfish.com/ig/gallery
Composition changes by basin

[Diagram showing composition changes for different basins (C, S, A, H, W, R) for the years 1967 and 2011. Each bar is color-coded to represent different fish families: Other, Scorpaenidae, Pleuronectidae, Cottidae, Gadidae, Merlucciidae, Ammodytidae, and Clupeidae.]

- Other
- Scorpaenidae
- Pleuronectidae
- Cottidae
- Gadidae
- Merlucciidae
- Ammodytidae
- Clupeidae
Non-dominant family changes in 2011

**Absent**
- Blenniodei (blenny)
- Cyclopteridae (lumpsucker)
- Merluccidae (hake)
- Bathylagidae (deep-sea smelt)

**Present**
- Liparidae (snailfish)
- Gobiesocidae (clingfish)
- Cryptacanthodidae (wrymouth)
- Pholidae (gunnel)
- Bathymasteridae (ronquil)
Changes in density

1967 2011
Commercial harvest reflects depletion

Williams et al. 2010

1967 2011
Different assemblage on WA coast

<table>
<thead>
<tr>
<th>Year</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>PS</td>
</tr>
<tr>
<td>2011</td>
<td>PS</td>
</tr>
<tr>
<td>1967</td>
<td>C</td>
</tr>
<tr>
<td>2011</td>
<td>C</td>
</tr>
</tbody>
</table>

2D Stress: 0.2
2011: not anomalous of recent years

P-value >.05
Conclusions

I. Significant temporal & spatial variation, shifting communities

II. Changes observed in Puget Sound do not extend to WA coast

III. 2011 is representative of variation among recent years
Food web impacts

• Altered distribution
  – Potentially fewer larvae available as a prey item
  – Changes are not uniform, unique to each basin

• Varied composition
  – Fewer larvae may lead to less adults
  – Change in timing of prey availability

• Evidence for a shifted baseline
  – What point in time is the Puget Sound ‘healthy’?
Acknowledgments

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Watershed Program
(NWFSC)

Larval Rockfish

Thank you!

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Join us!

Meet the session’s presenters after 5pm at Rock Bottom Brewery on 5th & Union St. for continued discussion over drinks.