Zooplankton in Puget Sound

Iris Kemp, Long Live the Kings
Julie Keister, University of Washington
Zooplankton in Puget Sound

What do we know about Puget Sound zooplankton?

What zooplankton data sets exist (and don’t) in PS?
What do we know about zooplankton in Puget Sound?

- Species composition
- Important salmon prey taxa (diet studies)
- Life history patterns of several species
- Depth distributions
- Seasonal cycles
- Spatial patterns
- Interannual variability
Extant zooplankton datasets in Puget Sound:

- UW (Frost) cruises:
  - 216µm mesh, 1m ring, vertical lifts from near bottom
  - Fully analyzed

- UW (Keister) PRISM cruises:
  - Winter and summer 2008-2011
  - ≤200µm mesh, 60cm ring, vertical tows
  - Various depths depending on winch availability “wire time”
  - Mostly not analyzed

- NOAA (Greene) ‘nearshore’ sampling, monthly, 2012
  - ~Upper 15 m, two net types
  - Fully analyzed

- NOAA (Greene) Skagit time series
  - 2008, 2009 (partial), 2010
  - Analyzed for total copepods only (?)
Extant zooplankton datasets in Puget Sound:

- **UW (Keister)** Developing monthly (or better) time series:
  - JEMS time series *(w/ WA DOE in Strait of Juan de Fuca)* – partially analyzed
  - Lower Hood Canal, 2010-2011 *(w/ HCSEG)* – partially analyzed
  - P28 Main Basin, 2011-ongoing *(w/ OIP)*
  - Commencement Bay, ongoing since Spring 2012 *(w/ Foss Waterways)*
  - Possession Sound, starting now *(w/ Everett Community College)*
  - Northern Hood Canal starting now *(Port Gamble S’Klallum Tribe)*
  - Miscellaneous others in 1960’s and 70’s

- **WDFW (Penttila)** herring spawn surveys:
  - Herring spawn site surface zooplankton tows
  - Canadian border to Olympia, in the Straits to Dungeness Bay (some years Willapa and Grays Harbor)
  - 0.5mm plankton net towed horizontally behind zodiac
  - Mostly qualitative, presence/absence
JEMS
Joint Effort to Monitor the Strait

Sponsored by Washington Department of Ecology
Monthly monitoring from FHL since 1999
Zooplankton sampling added in 2003

- CTD casts (T,S,D,DO)
- Bottle chlorophyll, nutrients, oxygen
- Zooplankton net tows
  - 1-m diameter
  - 150μm mesh
  - Surface (0-40 m) and deep (80-120 m) tows
Terribly lacking:

- Time series spanning >2 years
- Consistent methodology
  - Seasonal cycles
  - Interannual variability
- Dynamics of critical prey taxa (crab larvae, euphausiids, amphipods)
- Spatial patterns and “hot-spots” of abundance
Considerations:

Variability among basins
How much data do we need to understand PS patterns?

Quantitative vs. Qualitative?
(i.e., abundance vs. relative species composition)

Time to ‘enlightenment’
5 years? 10 years?
Variability among regions of Puget Sound:

Seasonal cycles of chlorophyll across the basins:

Abundances vary:

Species present differs:

Vertical
Quantitative vs. Qualitative? (i.e., abundance vs. relative species composition)

...Or: “Why to use a flow meter”

<table>
<thead>
<tr>
<th>Year</th>
<th>Abundance m⁻³</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000</td>
<td></td>
</tr>
<tr>
<td>10000</td>
<td></td>
</tr>
<tr>
<td>15000</td>
<td></td>
</tr>
<tr>
<td>20000</td>
<td></td>
</tr>
<tr>
<td>25000</td>
<td></td>
</tr>
</tbody>
</table>

- Calculated from target depth
- Quantitative from flow meter
Surface salinity from MOSSEA
Thank you!

Iris Kemp
ikemp@lltk.org

Julie Keister
Jkeister@u.washington.edu