Zooplankton: Big talk about tiny critters

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How small is small?



Anchorage

Cordova

Gulf of Alaska



Cordova, AK



Our study area



How we collect zooplankton

- 6 8 cruises per year
- M/V New Wave
- Bongo net
 - 202 micrometer mesh
 - 0-50 m vertical tow
 - Flow meter = how much water was filtered







<u>PWS Autonomous</u> <u>Moored Profiler</u> (PAMPr)

- Moored oceanographic robot
 - 0-60 m everyday
- Suite of oceanographic instruments
 - Nutrients
 - Salinity
 - Temperature
- Now with a microscope camera!









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Many hours at the microscope

- Zooplankton are subsampled
- Species identification
- Copepod life history stage and sex





2009-2016: 188 Species and Categories

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Taxonomic Frequency



Copepod Larvacean Pteropod Krill larvae Bryozoa larvae Clam larvae Barnacle larvae Seastar larvae Egg Worm larvae

Other

Seasonality



- Seasonality in abundance
- Abundance peaks between mid-spring and early-summer
- Quickly declines through summer
- Sometimes fall uptick

Seasonality



- Seasonality to community structure
- Large copepods prominent in early spring
 - During bloom of large bodied phytoplankton
- Smaller copepods prominent afterward
 - Can efficiently exploit smaller phytoplankton (Frost 1993)

"The Blob" Jan 2013 – Aug 2015

Sea Surface Temperature Anomaly (°C). Base Period 1971-2000 Week of 2 JAN 2013



"The Blob" Jan 2013 – Aug 2015

Sea Surface Temperature Anomaly (°C), Base Period 1971-2000 Week of 2 JAN 2013



Fall/Winter Zooplankton Community

- Increasing numbers of smaller, southern, warm-water associated copepods
 - Calanus pacificus
 - Mesocalanus tenuicornis
 - Paracalanus parvus
- Indicative of warm water masses possibly from WA/OR coast
- Climate change and events such as "The Blob" may create warmer habitat in PWS for species such as these







The Fats of Life

- Copepod lipid sacs small guys vs. big
- Warm water = smaller body size
- Herring & pollock eat juvenile pink salmon
 - Switch to big fatty copepods in spring at peak abundance
 - PWSAC juvenile pink salmon released at this time
 - More predators and less prey?









Future Directions

- Analyze copepod lipid sac size from PAMPr images
- Further explore the relationships between "The Blob", climate change, and zooplankton community structure in PWS
- Continue Gulf Watch Alaska's monitoring program to better understand ecosystem dynamics in PWS – baseline data





Thank you for having me!

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EVOS Trustee Council