May 2nd, 10:30 AM - 12:00 PM

Variation in juvenile Chinook salmon diet composition and foraging success between two estuaries with contrasting land-use histories

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Speaker
Aaron David, Charles Simenstad, Jeffrey R. Cordell, Jason Toft, Christopher Ellings, Ayesha Gray, and Hans B. Berge

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Wetland loss and juvenile Chinook salmon foraging performance in Salish Sea (and other) estuaries

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²Nisqually Indian Tribe, Department of Natural Resources
³Earth Design Consultants
⁴King County, Water and Land Resource Division
A critical size and period hypothesis to explain natural regulation of salmon abundance and the linkage to climate and climate change

R.J. Beamish, Conrad Mahnken

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*National Marine Fisheries Service, 7305 Beach Drive East, Port Orchard, WA 98366, USA

Size Selective Predation Among Juvenile Salmonid Fishes in a British Columbia Inlet

ROBERT R. PARKER
Fisheries Research Board of Canada
Biological Station, Nanaimo, B.C.

Over-winter lipid depletion and mortality of age-0 rainbow trout (Oncorhynchus mykiss)

Peter A. Biro, Ashley E. Morton, John R. Post, and Eric A. Parkinson

From Duffy and Beauchamp (2011)
Estuaries provide productive foraging opportunities

But human impacts to estuaries may affect juvenile salmon foraging performance
Wetland loss/modification

Reduced invertebrate populations

Shifts in invertebrate assemblages

Reduced juvenile salmon growth

Density of conspecifics

Reduced salmon foraging performance

Reduced estuarine and marine survival

From Magnusson and Hilborn (2003)
Hypotheses

- Minimal wetland loss
- Extensive wetland loss
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<th>Estuary</th>
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<th>Percent wetlands lost</th>
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<td>Alsea</td>
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<td>43</td>
<td>2003</td>
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<td>1000</td>
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<td>Nestucca</td>
<td>(Bieber 2005)</td>
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<td>505</td>
<td>2010-2012</td>
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<td>Yaquina</td>
<td>(Bieber 2005)</td>
<td>32</td>
<td>2003</td>
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Methods
Ration size = 100*(stomach contents mass / fish mass)
Energy ration = \( \sum \text{prey taxa mass}_i \times \text{energy density}_i \) / fish mass
Multivariate diet analysis

• Canonical correspondence analysis (CCA)

• Used sampling events (location x date) as the unit of observation.

• Explanatory variables:
  - Proportional wetland loss
  - Salinity
  - Day of year
  - Mean fork length
## Multivariate results

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Conclusions

• Little evidence of a direct effect of estuarine wetland loss on salmon foraging performance.

• But, wetland loss appeared to mediate the effect of density on salmon foraging performance.

• Salmon recovery efforts need to recognize that density-dependent processes may still be important at abundances that are low relative to historic levels (Achord et al. 2003; Green and Beechie 2004).
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