Lower Columbia Estuary Program – Ecosystem Monitoring Program
2021 Annual Science Work Group Meeting

Juvenile salmon prey availability and diets, presented by: Kerry Accola
Wetland Ecosystem Team – School of Aquatic and Fishery Sciences, University of Washington
Process Salmon Prey Availability and Salmon Diets

Potential prey – Neuston and Benthic

- **Sample Methods**
  - Neuston – open water (OW) and emergent vegetation (EV), deployed from boat, top 20 cm of water, 2x/month at each
  - Benthic – cores sampled; 2” PVC pipe depth of 10 cm

- **Lab Methods**
  - Number of individuals counted in each group (order or family)
  - Blot each group dry and weigh to nearest 0.0001g
  - 2020 samples from **Feb – March**; 2020 data entry finished recently; preliminary neuston plots

Salmon Diets

- **Sample Methods**: bag seines, up to 3x/month, euthanized, frozen, whole stomachs preserved
- **Lab Methods**: Count each prey taxon; blot dry and weigh to nearest 0.0001g
- All 2020 diets were sampled in **February – March**
- All 2020 fish lengths were **30 – 59 mm**
Neuston % Gravimetric Composition: Feb - March

Emergent Vegetation

Emergent Vegetation

Open water

- Turbellaria
- Trichoptera
- Scorpaeniformes
- Ostracoda
- Oligochaeta
- Isopoda
- Hemiptera
- Ephemeroptera
- Collembola
- Coleoptera
- Araneae
- Cyclopoida
- Copepoda
- Cladocera
- Diptera
- Amphipoda
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\[ IRI = FO \times (\% \text{ Numeric Comp} + \% \text{ Gravimetric Comp}) \]

- Dipterans -> chironomids
- Amphipods -> *Americorophium* spp.
- Cladocerans -> *Daphnia* spp.
IRI = FO \times (% \text{ Numeric Comp} + % \text{ Gravimetric Comp})
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\( IR = \frac{\text{sum of prey weight}}{\text{field weight}} \)

\( ER = \frac{\text{sum of prey energy density}}{\text{field weight}} \)

Measure fish foraging performance
Measure fish foraging performance

\[ IR = \frac{\text{sum of prey weight}}{\text{field weight}} \]

\[ ER = \frac{\text{sum of prey energy density}}{\text{field weight}} \]
\[ J_m (\text{maintenance metabolism}) = j_m \cdot e^{dt} \cdot W \]

Represents metabolic upkeep; general assessment of habitat quality; affected by temp and body mass

\( j_m \) = mass specific maintenance costs at 0º C
\( d \) = temperature coefficient for biomass assimilation
\( T \) = water temperature in ºC; \( W \) = fish body mass

High energy, low metabolic costs = positive growing conditions (lower right)
2020 -> above average metabolic costs
### Pairwise comparisons - ANOSIM

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<tr>
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### Cumulative Contr.

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**PerMANOVA**

- **Site**: R-value 0.35, p-value 0.001
- **Year**: R-value 0.08, p-value 0.001
- **Size class**: R-value 0.06, p-value 0.002
- **Site*Year**: R-value 0.06, p-value 0.002
- **Year*Size class**: R-value 0.03, p-value 0.06
- **Site*Size class**: R-value 0.06, p-value 0.21
Summary
- Relatively few taxa are driving diet composition differences among sites
- Sites are more dissimilar than years or fish class size
- Benthic and neuston analyses coming

Next steps
- Reed canary grass manuscript – nearly ready to submit
- Future manuscript ideas?