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Emma Taccardi

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Can stable isotopes indicate the geographical origins of sea lice?

Emma Taccardi^{1,2}

Carrie Byron³, Ian Bricknell^{1,2}

¹School of Marine Sciences & ²Aquaculture Research Institute, University of Maine; ³University of New England



Stable Isotope Analysis (SIA)

- Animal movement, food web dynamics, population differences
- Aquatic vs. terrestrial, marine vs. freshwater, inshore vs. offshore habitats
- Quantify origins of sea louse populations?



Objectives

- What is the most efficient protocol for sea lice SIA?
- Can wild and farmed populations of lice be identified in the wild?
 - Analyze $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values of lice from Atlantic salmon

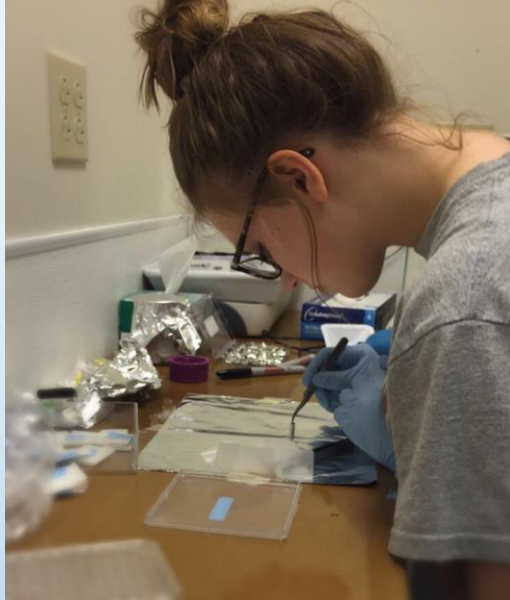


Methods

- Lice collected from:
 - Farmed salmon in Cobscook Bay, ME
 - Wild salmon at Milford Dam, ME
- Processing: storage media; acidification



Methods



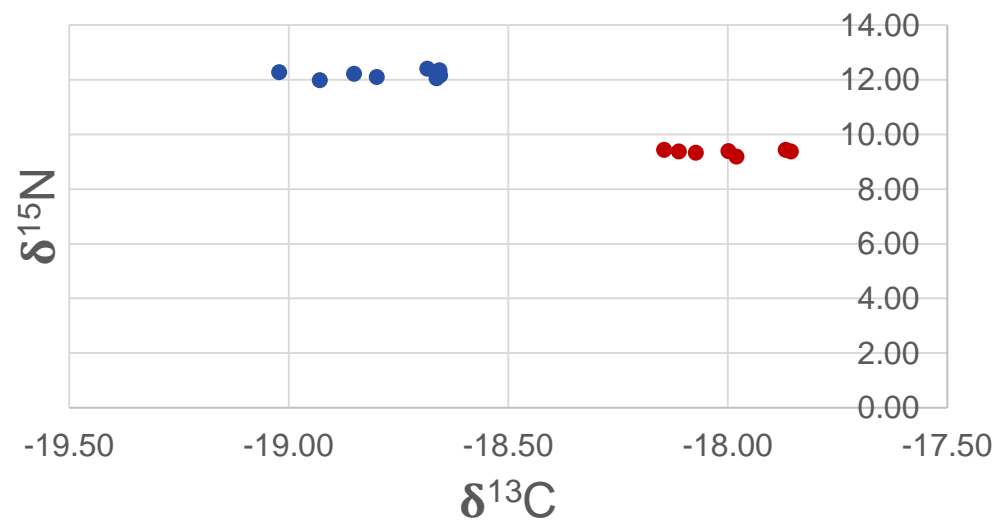
- Capsules analyzed at University of California, Davis Stable Isotope Facility
- Analyzed $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ with RStudio

Results

- All lice found on farmed salmon were *L. salmonis*
- All lice found on wild salmon were *Argulus foliaceus*

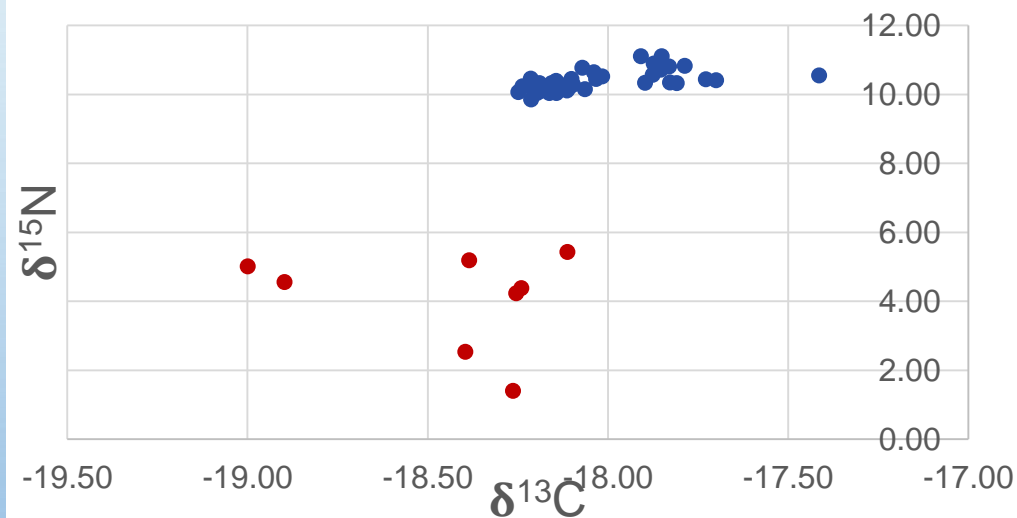


Tray 1 $\delta^{13}\text{C}$ vs. $\delta^{15}\text{N}$



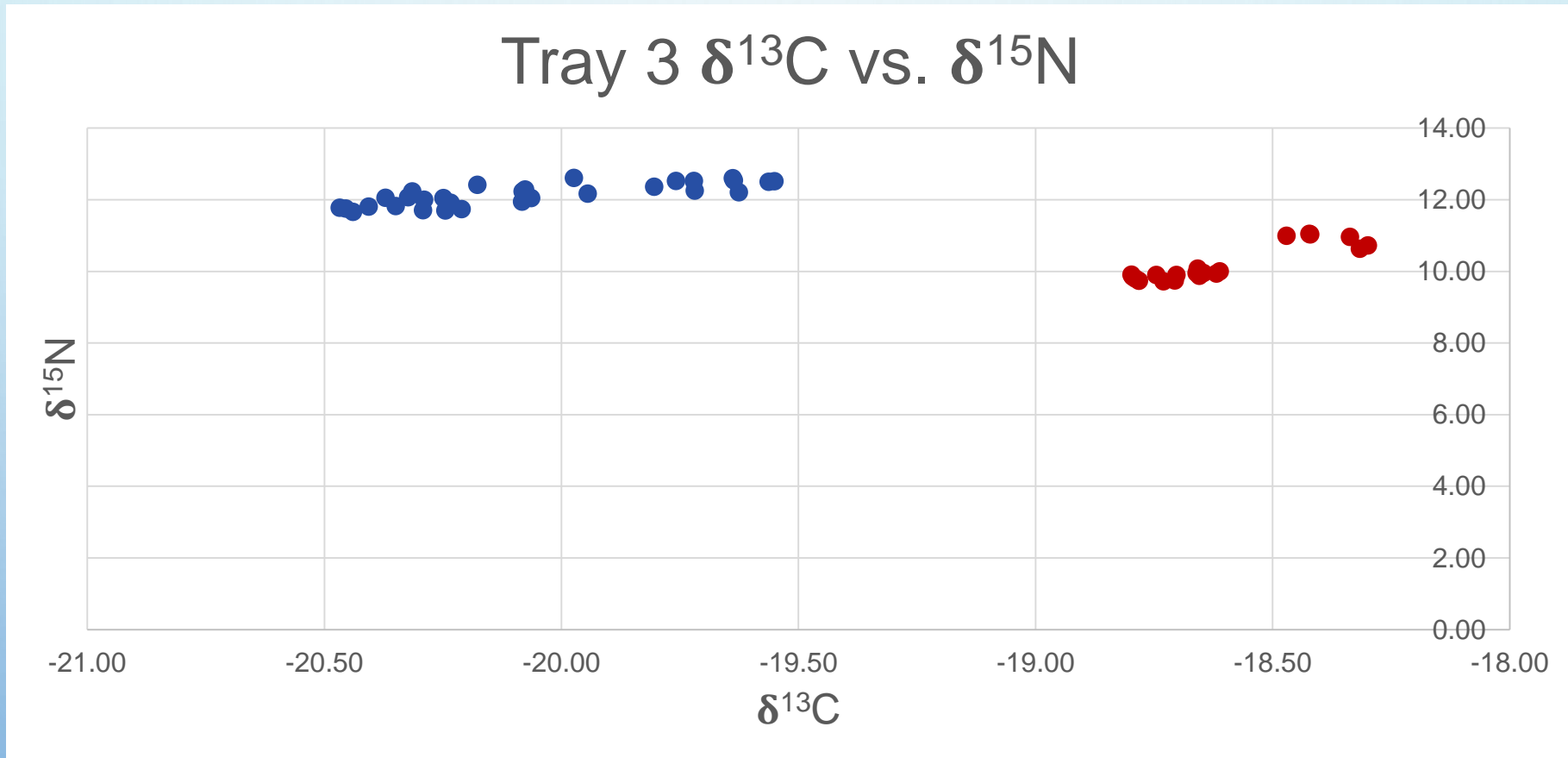
Seawater vs. **DI Water**

Tray 2 $\delta^{13}\text{C}$ vs. $\delta^{15}\text{N}$



Acidified vs. Not Acidified

Results



Wild vs. Farmed Salmon

What does this mean?

- Processing significantly affects isotope signatures
- Lice signatures from farmed vs. wild salmon were unique
- Appears promising that isotopes will differ between other food sources for lice

Next steps...

- Compare sea lice and host isotopes
 - Fin, liver, skin, and white muscle
- UK samples
- Build detailed dataset and run multifactor ANOVA



Thank you!

- Questions or comments?
emma.taccardi@maine.edu



Schram, T.A. 1993. Supplementary descriptions of the developmental stages of *Lepeophtheirus salmonis* (Krøyer, 1837) (Copepoda: Caligidae). Pathogens of wild and farmed fish: sea lice. New York: Ellis Horwood. 30-47.