



Western Washington University
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Salish Sea Ecosystem Conference

2018 Salish Sea Ecosystem Conference
(Seattle, Wash.)

Apr 5th, 4:45 PM - 5:00 PM

Fine-scale taxonomic and spatiotemporal variability in the energy density of prey for juvenile Chinook salmon (*Oncorhynchus tshawytscha*)

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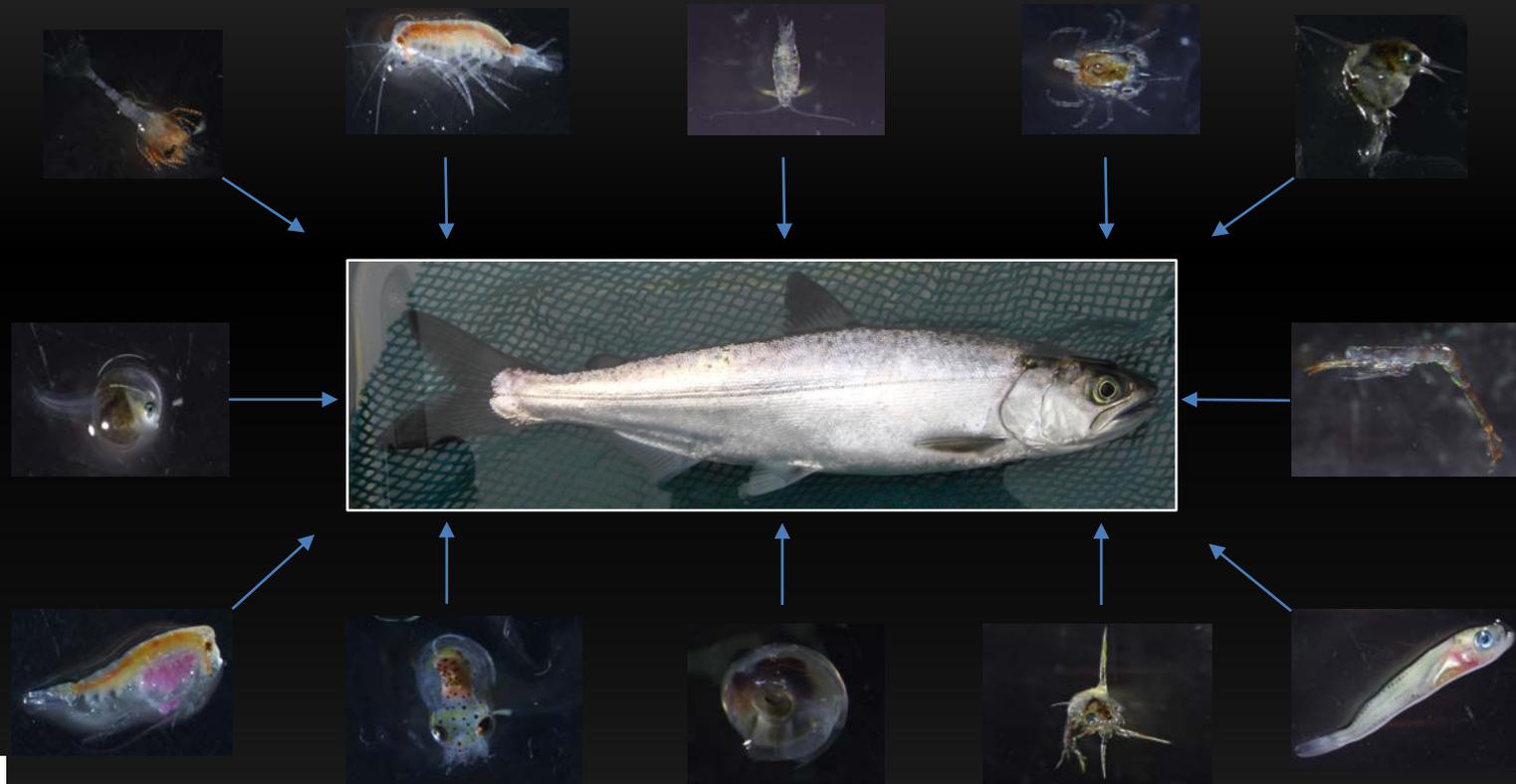
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Weil, Jacob; Duguid, Will; and Juanes, Francis, "Fine-scale taxonomic and spatiotemporal variability in the energy density of prey for juvenile Chinook salmon (*Oncorhynchus tshawytscha*)" (2018). *Salish Sea Ecosystem Conference*. 421.

<https://cedar.wvu.edu/ssec/2018ssec/allsessions/421>

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Fine-scale taxonomic and spatiotemporal variability in the energy density of prey for juvenile Chinook Salmon (*Oncorhynchus tshawytscha*)

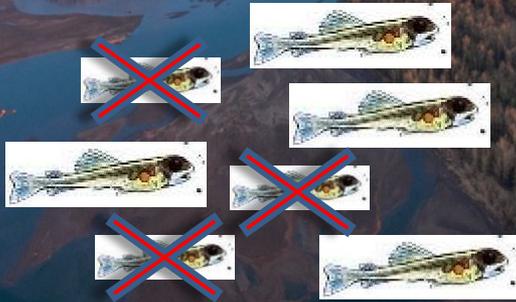


Jacob Weil – MSc Student – Juanes Lab
University of Victoria

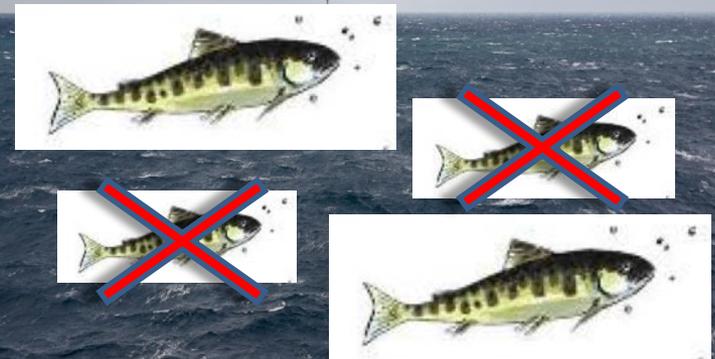
Critical Size/Period Hypothesis

- There are 2 periods of high mortality for juvenile salmon:

Ocean Entry (Spring):
Predation-based mortality



First Marine Winter:
Growth-based mortality



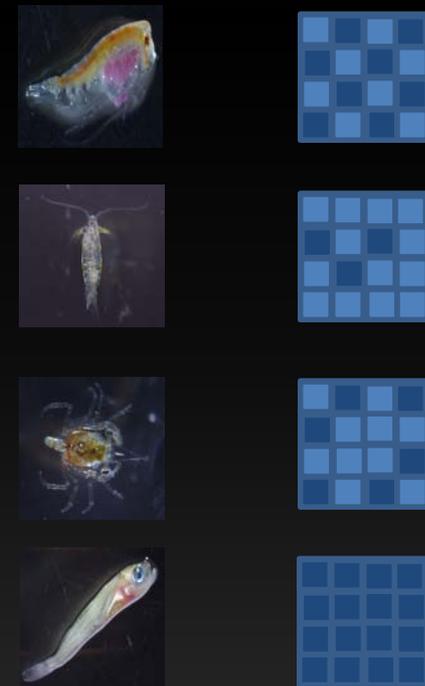
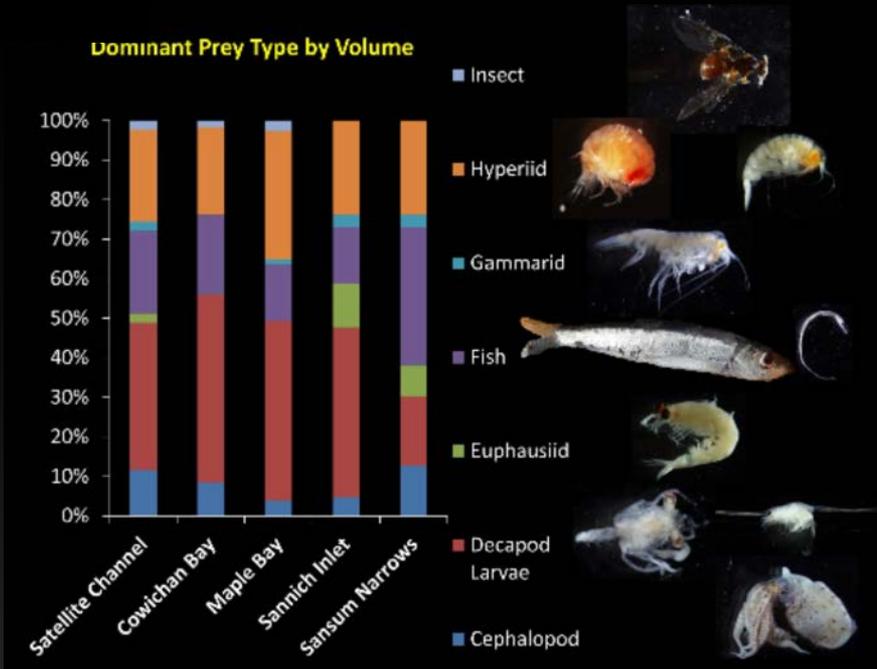
Assessing Growth

- Growth \sim prey quantity + prey quality
- Currently we assess quality by:

Prey Proportion in Diet

X

Energy Density (J/g)



Assessing Growth

- Growth \sim prey quantity + prey quality
- Currently we assess quality by:
- BUT... when we do this we assume:



Hyperia medusarum



Hyperoche medusarum



Themisto pacifica



Research Questions

- i) Does energy density vary between similar species of invertebrate prey?



Hyperia medusarum



Hyperoche medusarum



Themisto pacifica



Research Questions

- i) Does energy density vary between similar species of invertebrate prey?
- ii) Does energy density of prey vary throughout a season?



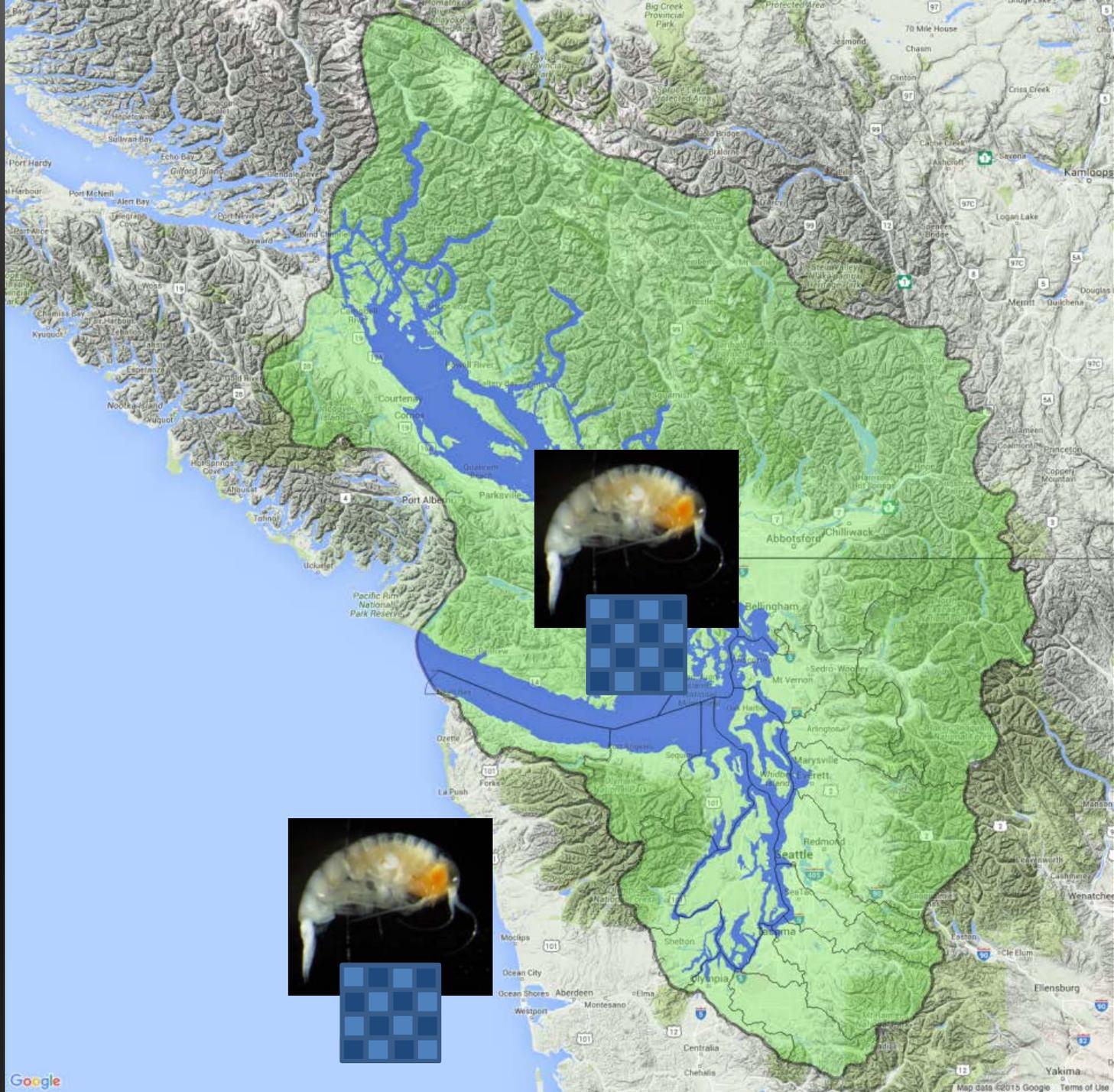
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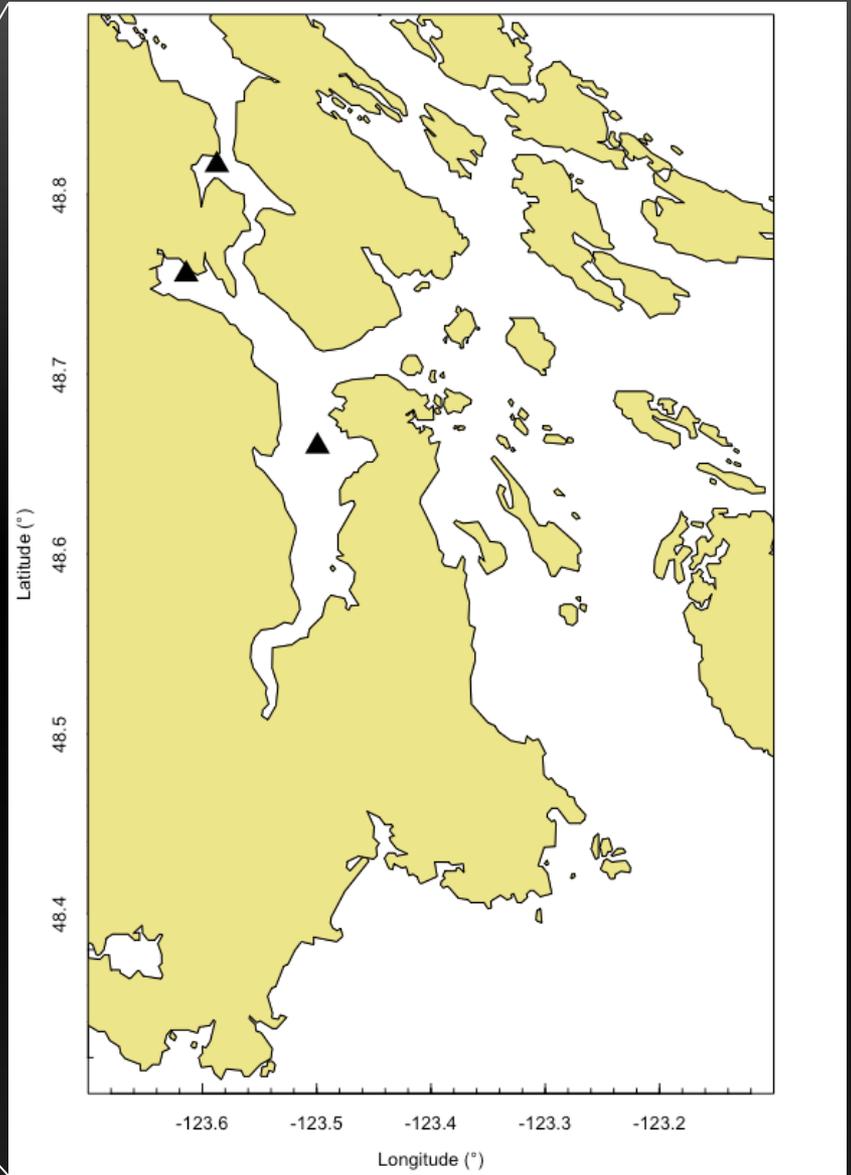


i) of

ii)

iii)





Methods



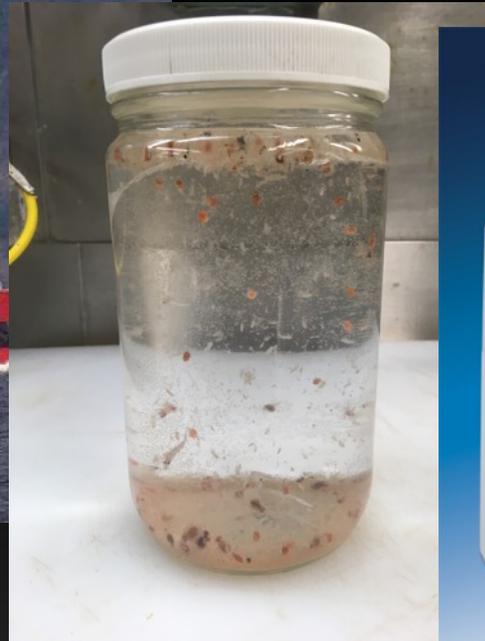
Methods

- Species Identification



Methods

- i) Does energy density vary between similar species of invertebrate prey?
- What is the best way to assess energy density?



Building A Model

- **% Ash-free dry weight is highly correlated to energy density**

Wet Weight



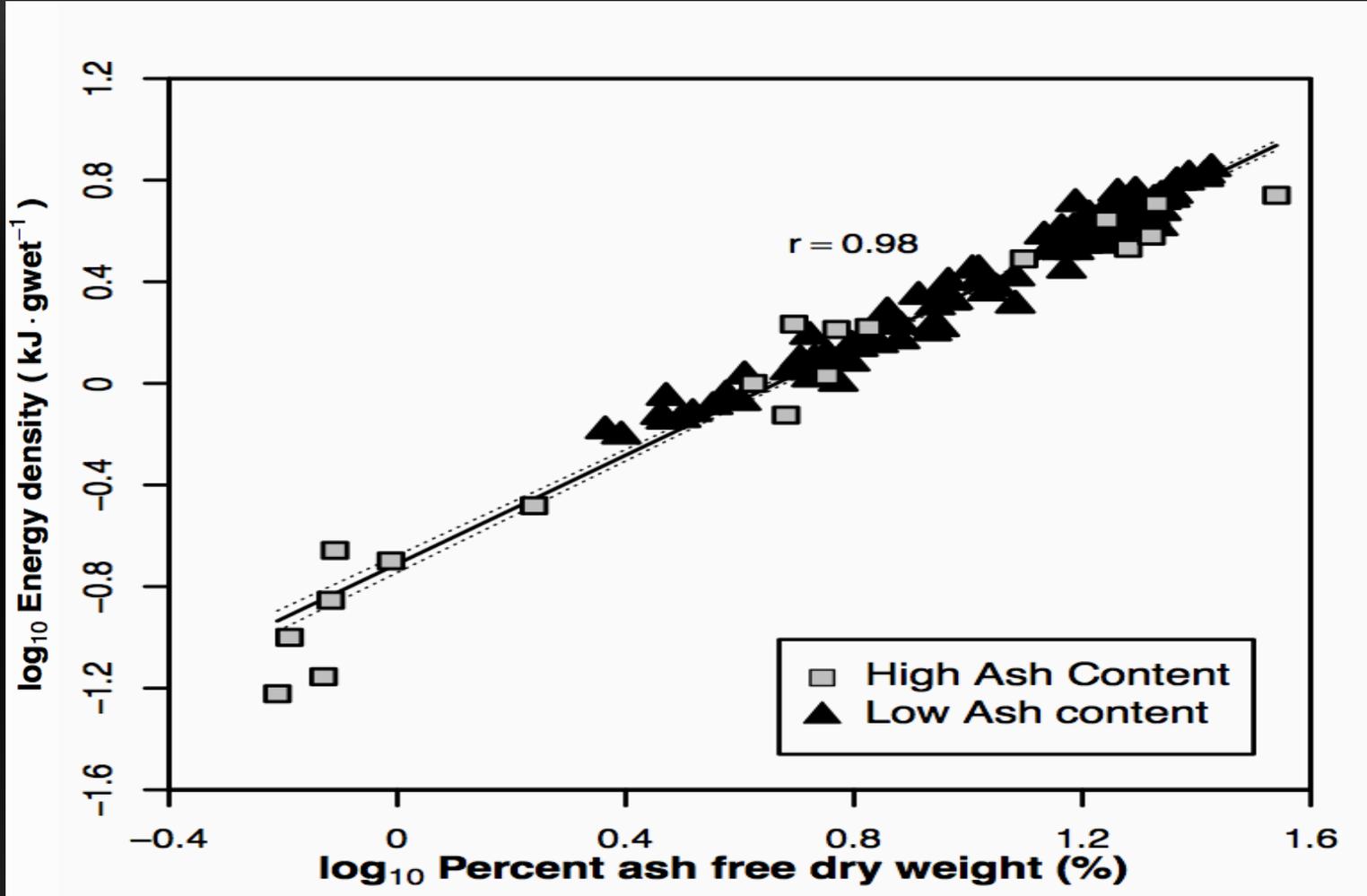
Dry Weight



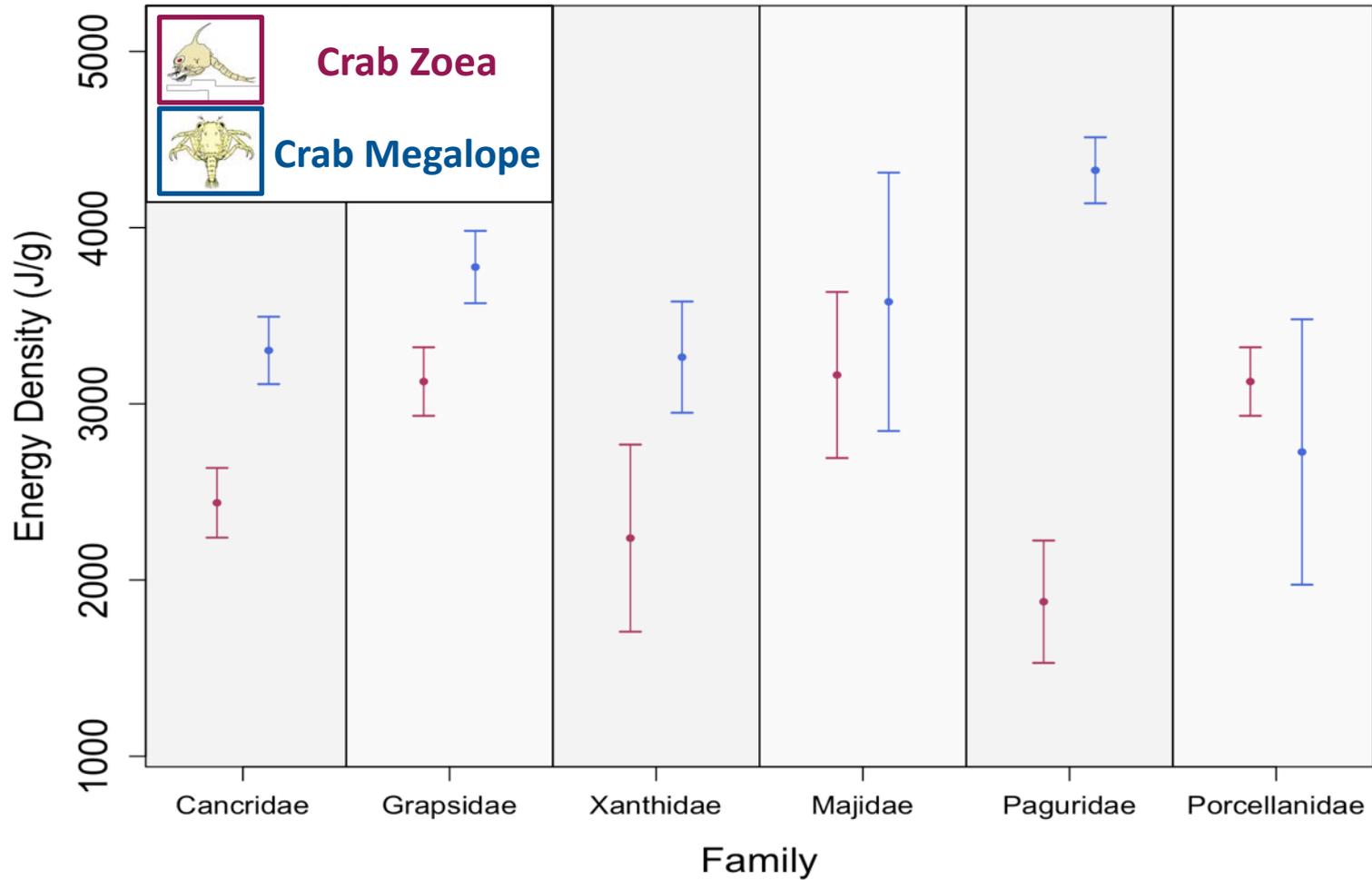
Ash Weight



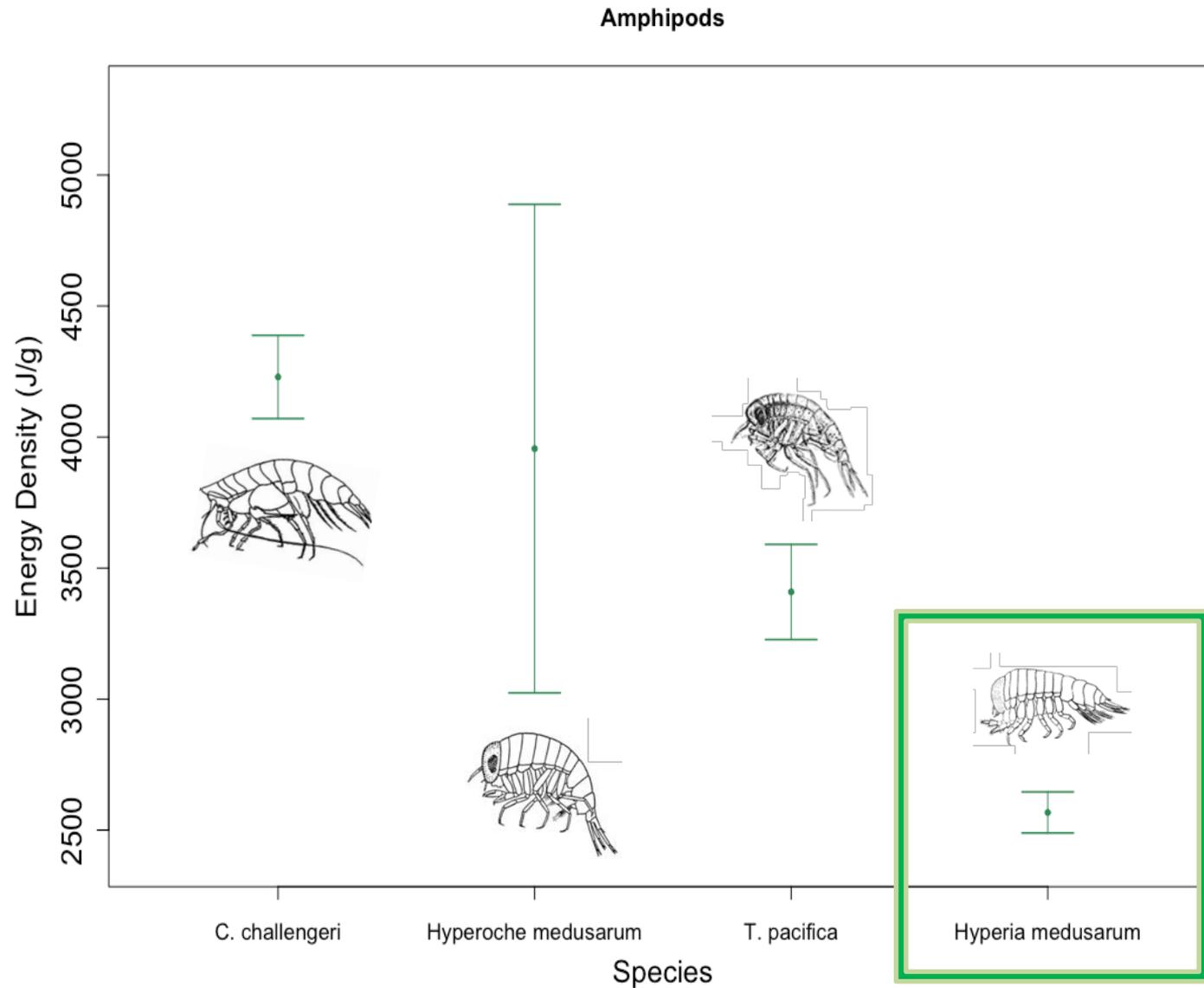
Building A Model



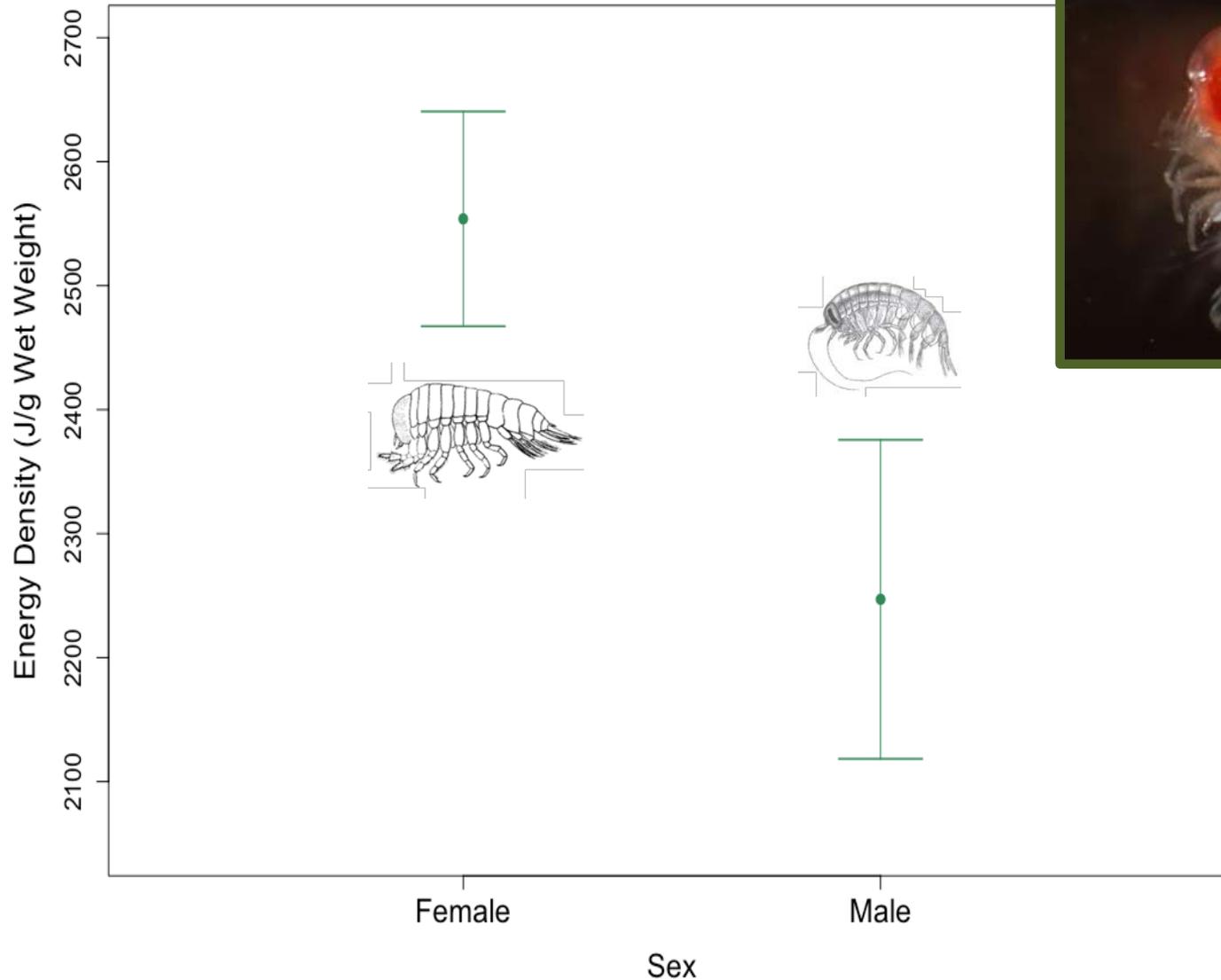
Results



Results



H. medusarum Sex Differences



Research Questions

- i) Does energy density vary between similar species of invertebrate prey?



Hyperia medusarum



Hyperoche medusarum



Themisto pacifica



Preliminary Conclusion

- i) **YES!** Energy density appears to vary between similar species of invertebrate prey



Hyperia medusarum



Hyperoche medusarum



Themisto pacifica



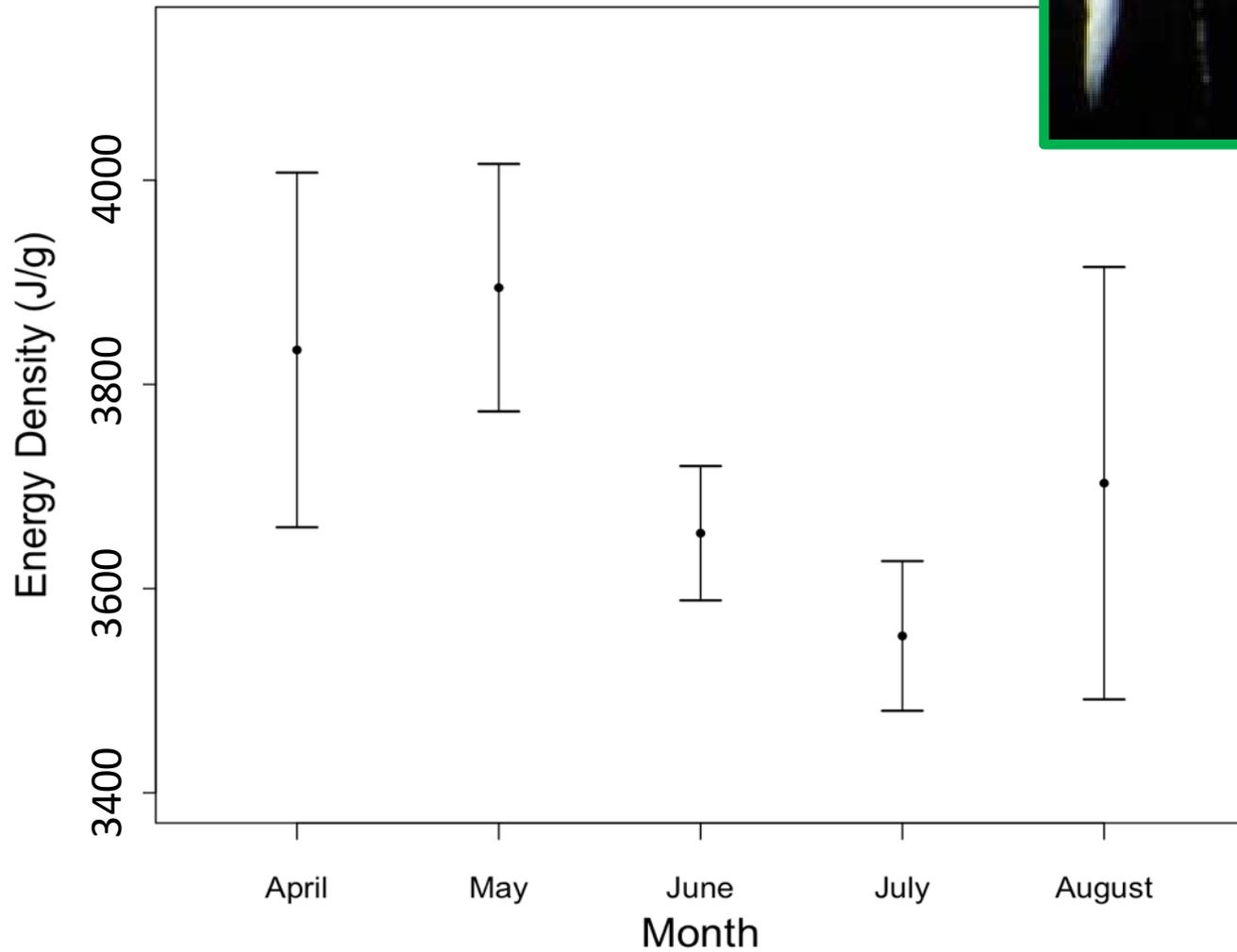
Research Questions

- i) Does energy density vary between similar species of invertebrate prey?
- ii) Does energy density of prey vary throughout a season?

Results



Temporal Changes - *T. pacifica*



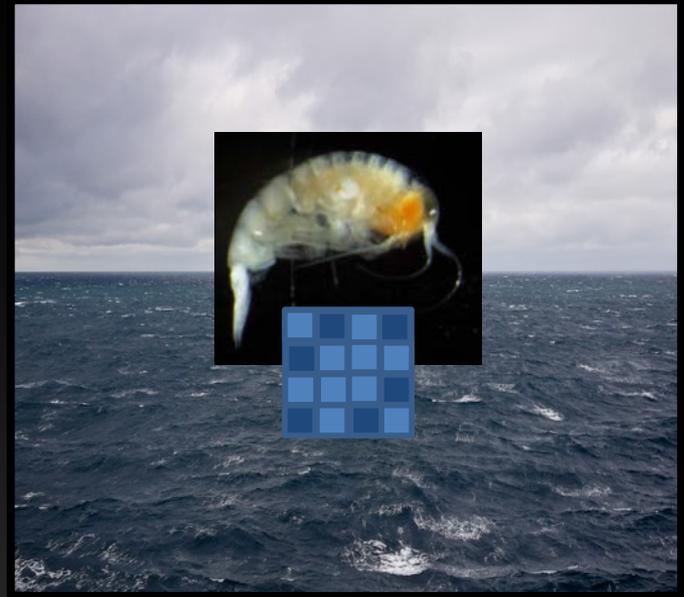
Preliminary Conclusion

- ii) Does energy density of prey vary throughout a season?

YES! Energy density appears to vary temporally



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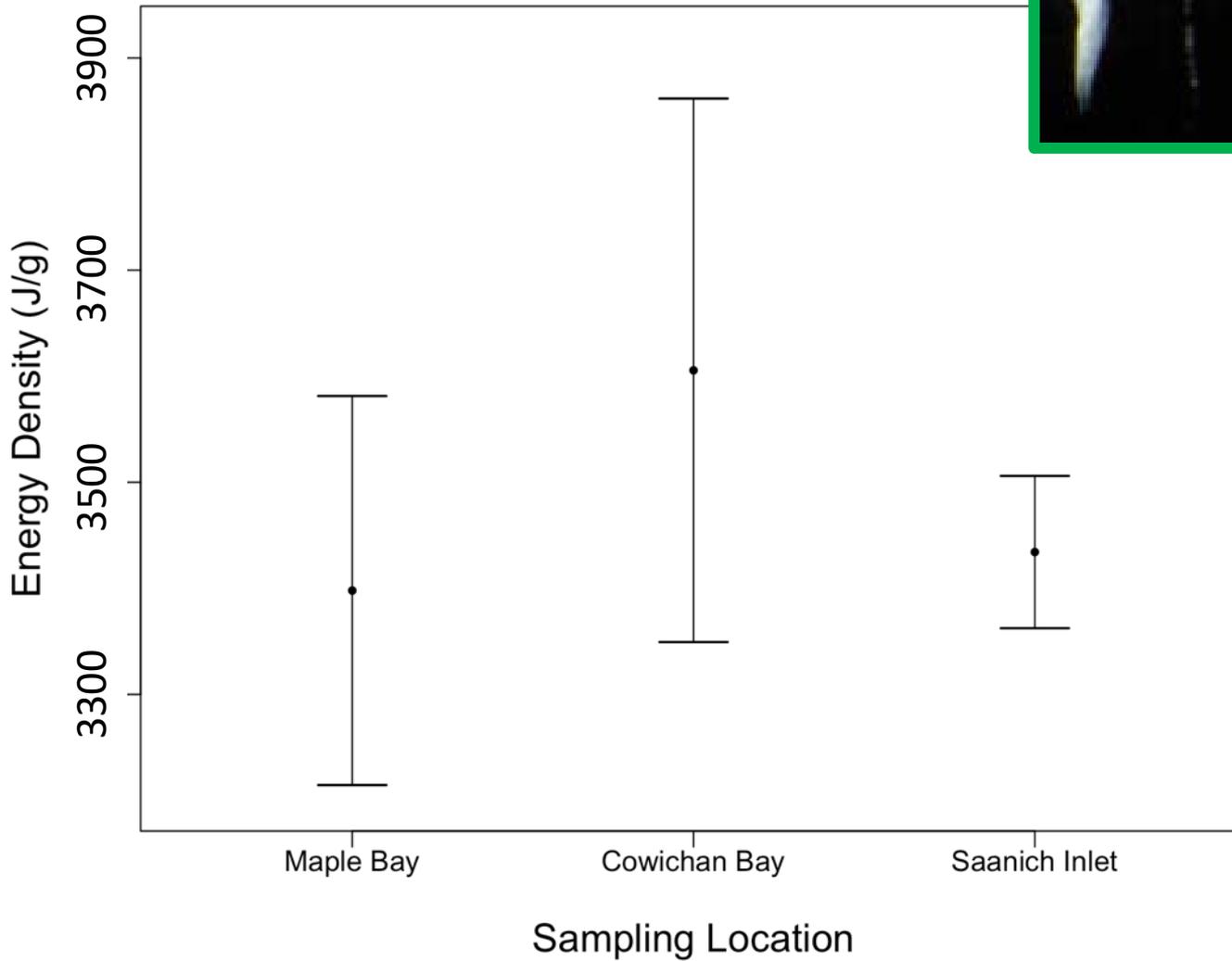
Research Questions

- i) Does energy density vary between similar species of invertebrate prey?
- ii) Does energy density of prey vary throughout a season?
- iii) Does energy density of prey vary spatially?

Results



Spatial Differences - *T. pacifica*



Research Questions

- i) Does energy density vary between similar species of invertebrate prey?
 - Preliminary results suggest yes
 - Tied to life history

- ii) Does energy density of prey vary throughout a season?
 - Preliminary results suggest yes

- iii) Does energy density of prey vary spatially?
 - Not on a fine spatial scale

How Much Does It Matter?

- Goal: To determine to what degree variability will affect growth?

$$G = \frac{dW}{W \cdot dt} = p \left[C_{\max} - (ACT \cdot SMR + SDA + F + U) \right] \cdot \frac{CAL_z}{CAL_f}$$

Trudel *et al.* In press

Thank You

Supervisor: Dr. Francis Juanes

Field Assistants: Jessica Qualley, Katie Innes, Hailey Davies

Committee Members: Dr. Rana El-Sabaawi, Dr. John Dower

Special Thanks: Will Duguid, Moira Gailbraith

