

Optimal Foraging of Whelks in the Intertidal Zone

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Funded by the National Science Foundation and
the UCSB Coastal Fund





Luke Miller 2009



Understanding Community Dynamics

An aerial photograph of a coastal landscape. On the right, a steep, forested hillside descends towards a sandy beach. The beach is bordered by a rocky reef area with shallow pools of water. The ocean extends to the horizon under a clear sky. The overall scene is a mix of natural coastal features and human-made structures like a fence in the foreground.

**Maintain Biodiversity
as keystone predators
(Paine, 1969)**

**Understand community
dynamics to understand
how communities may
change**

Optimal Foraging

Optimal Foraging: why do they eat what they eat?

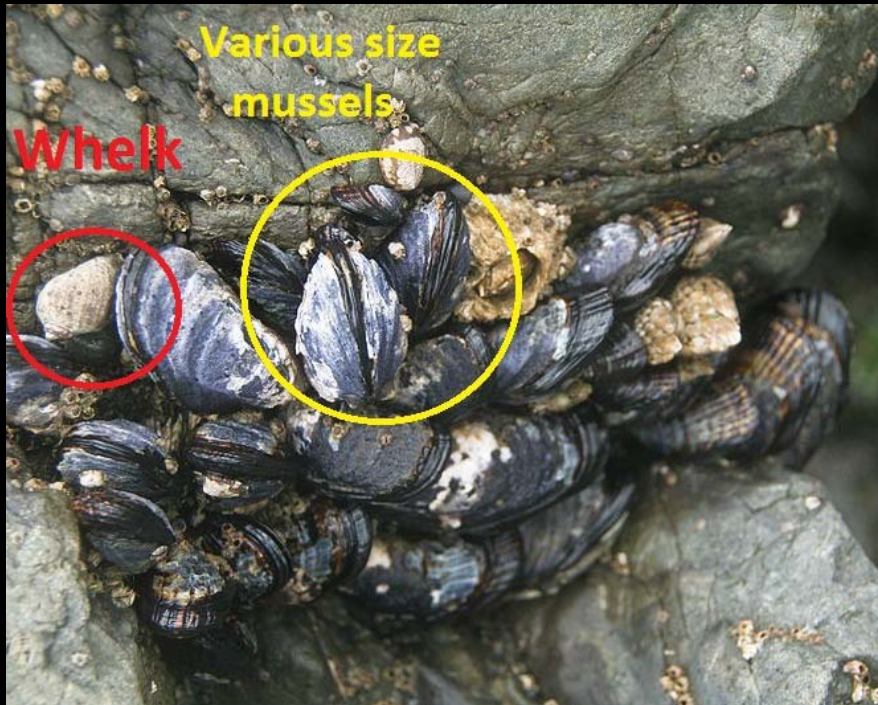
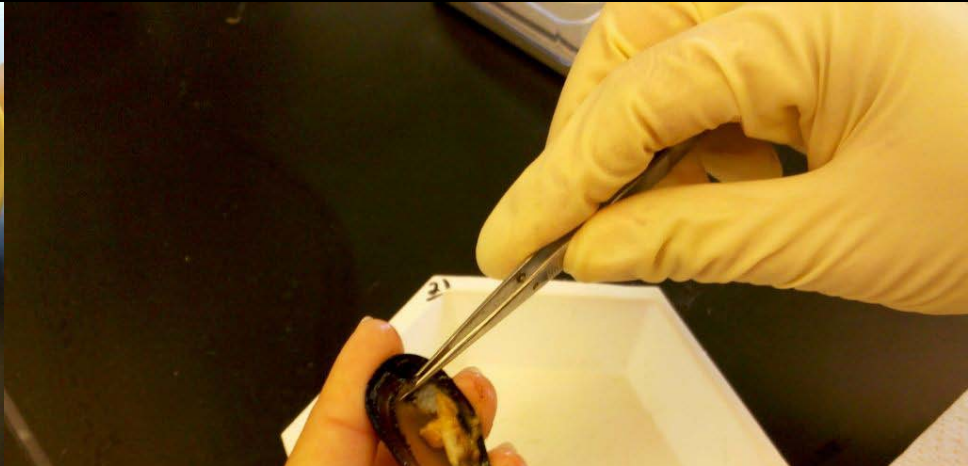
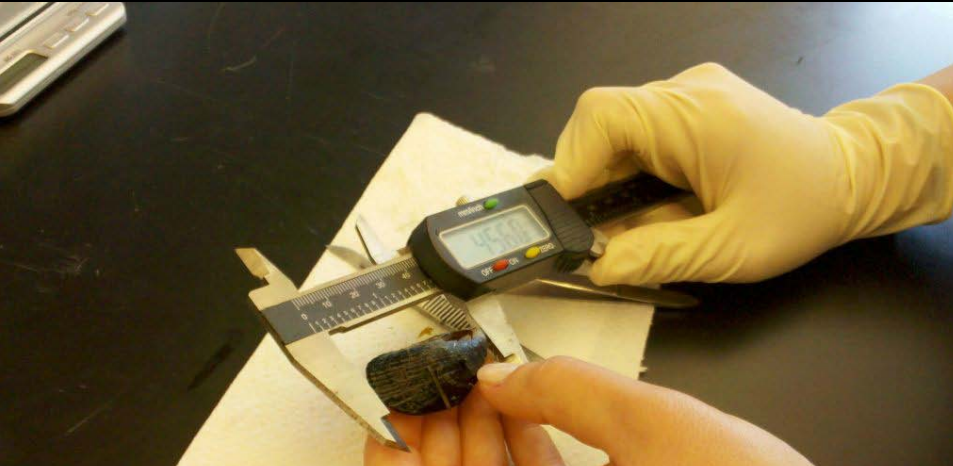


Image courtesy of www.wikipedia.org

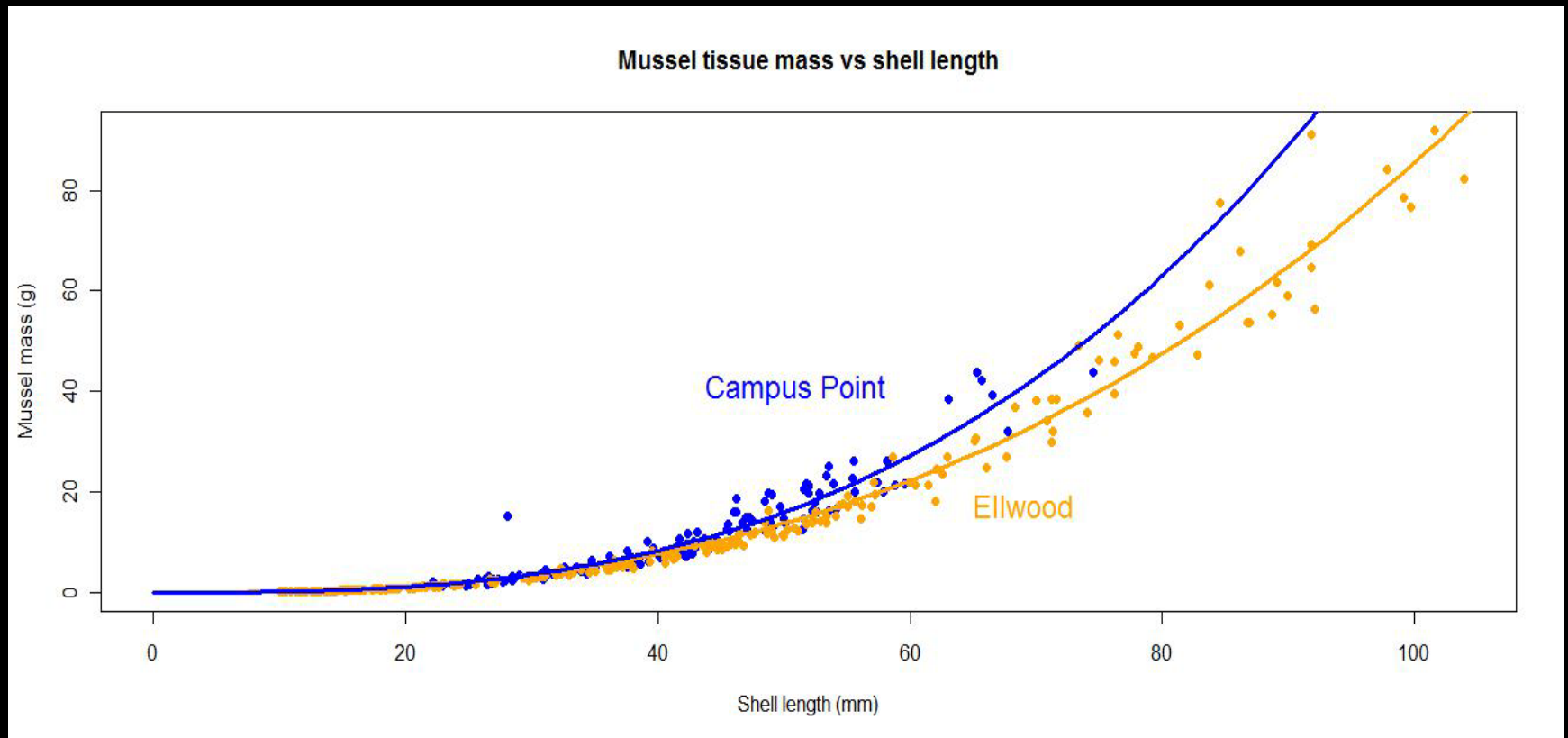
Goal Determine:

- What provides most energy
- What allows the most growth
- What they choose to eat due to other factors

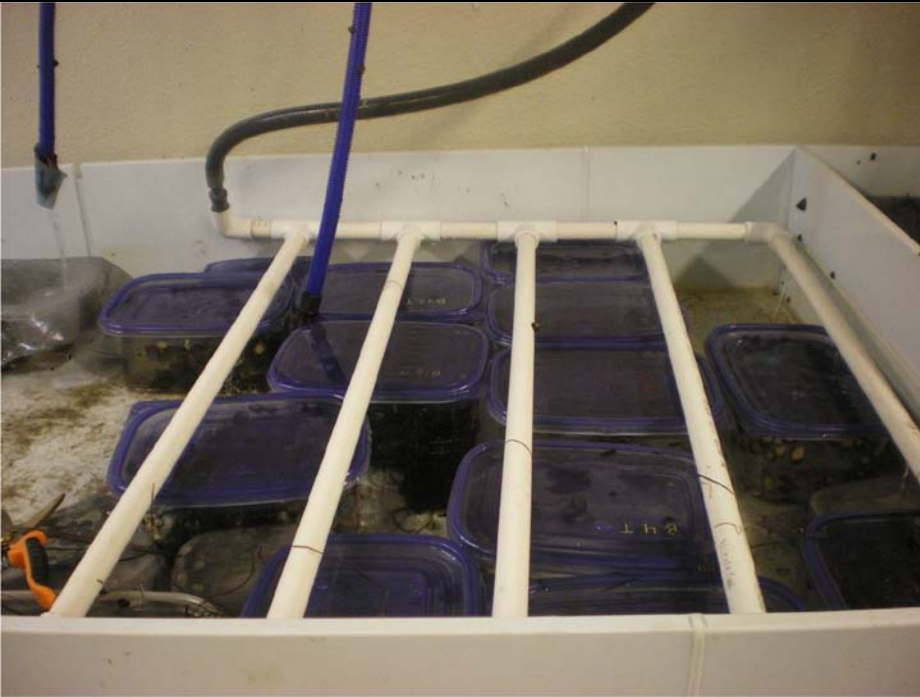
Dissecting Mussels



Larger mussels have exponentially more edible tissue

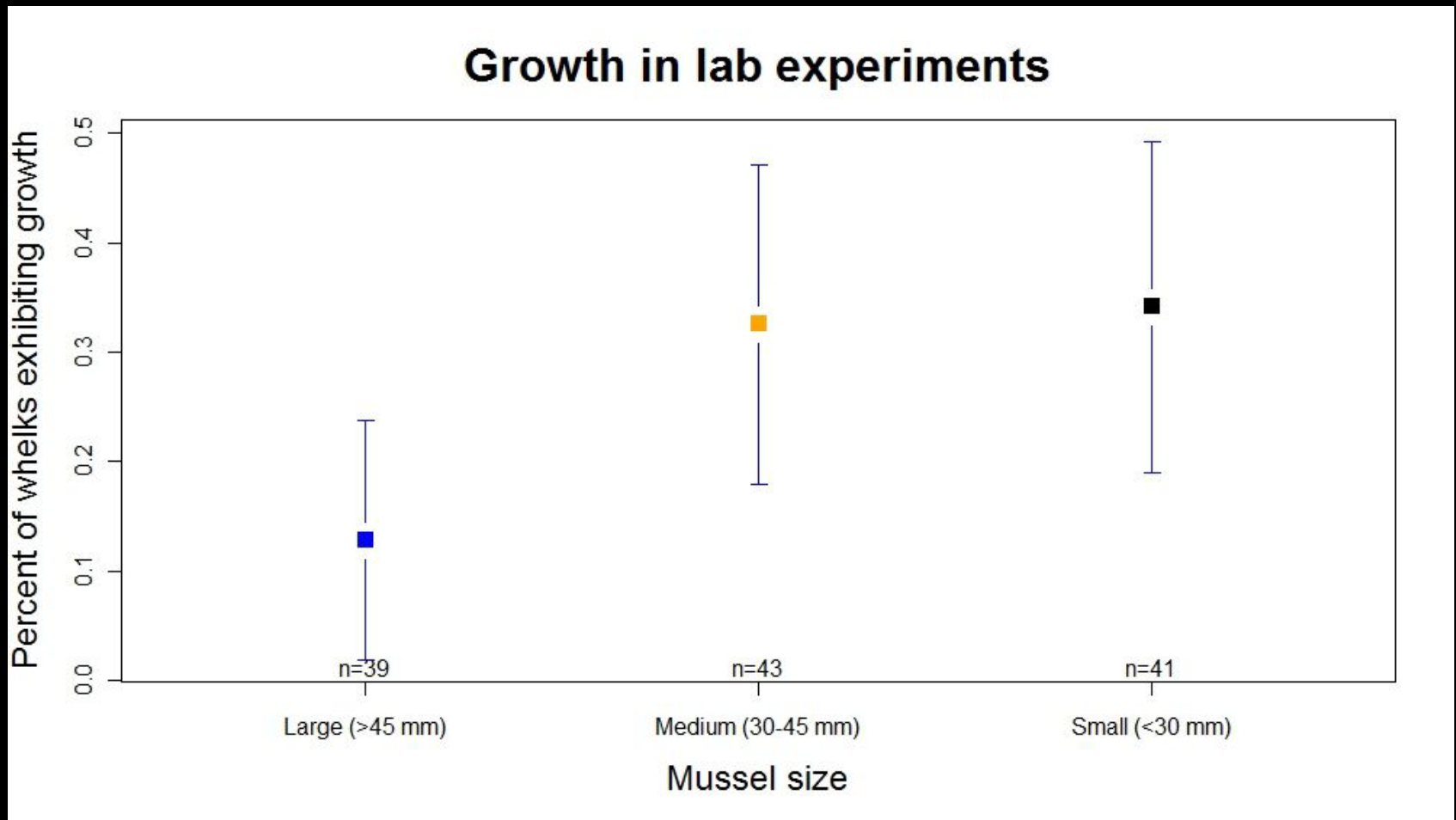


Growth Experiments

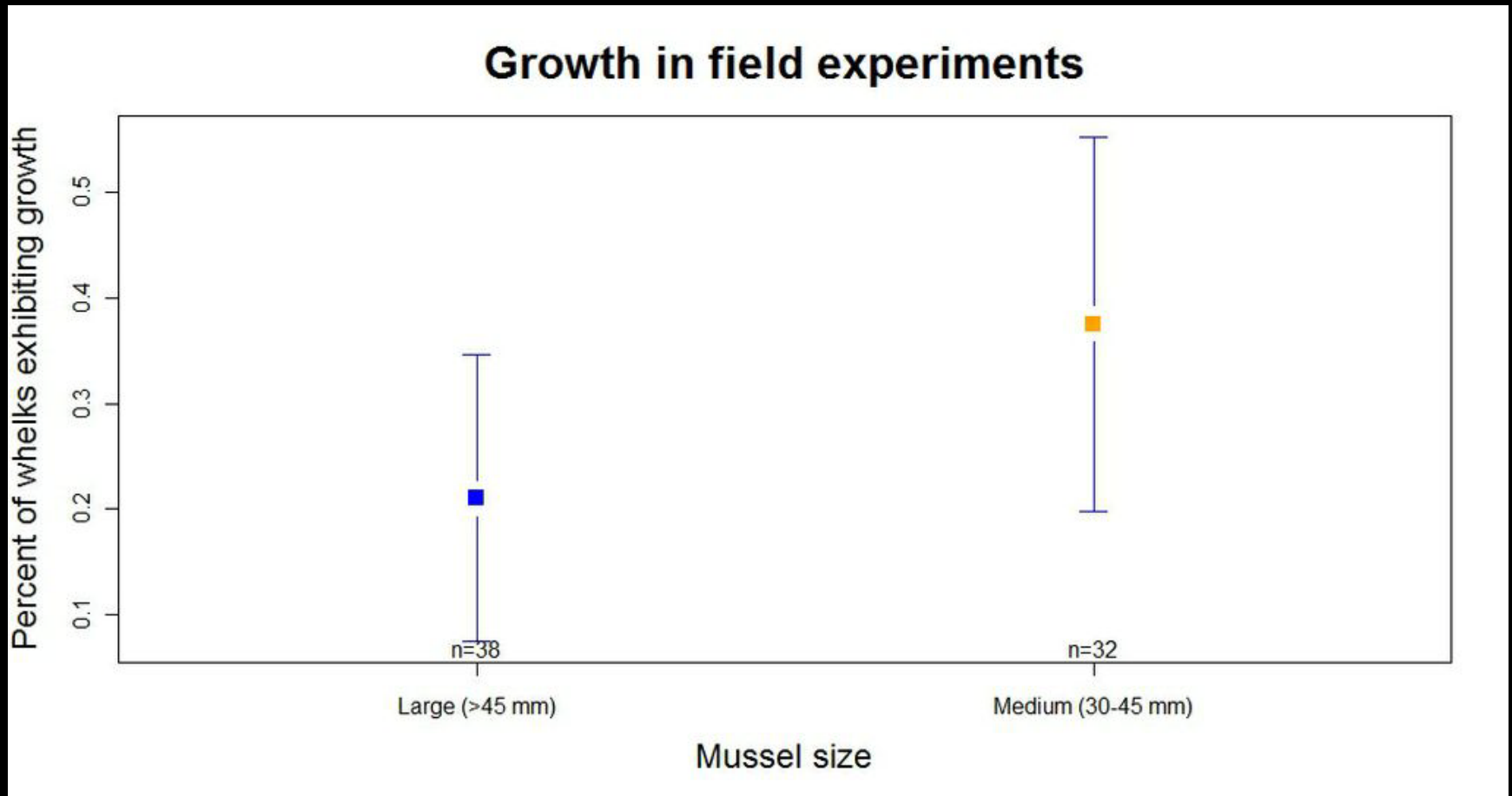


Mussel Size	Prey Sample Size	Predator Sample Size
>30 mm	25 mussels	15 whelks
30-50mm	25 mussels	15 whelks
50-70mm	25 mussels	15 whelks

Growth in the Lab

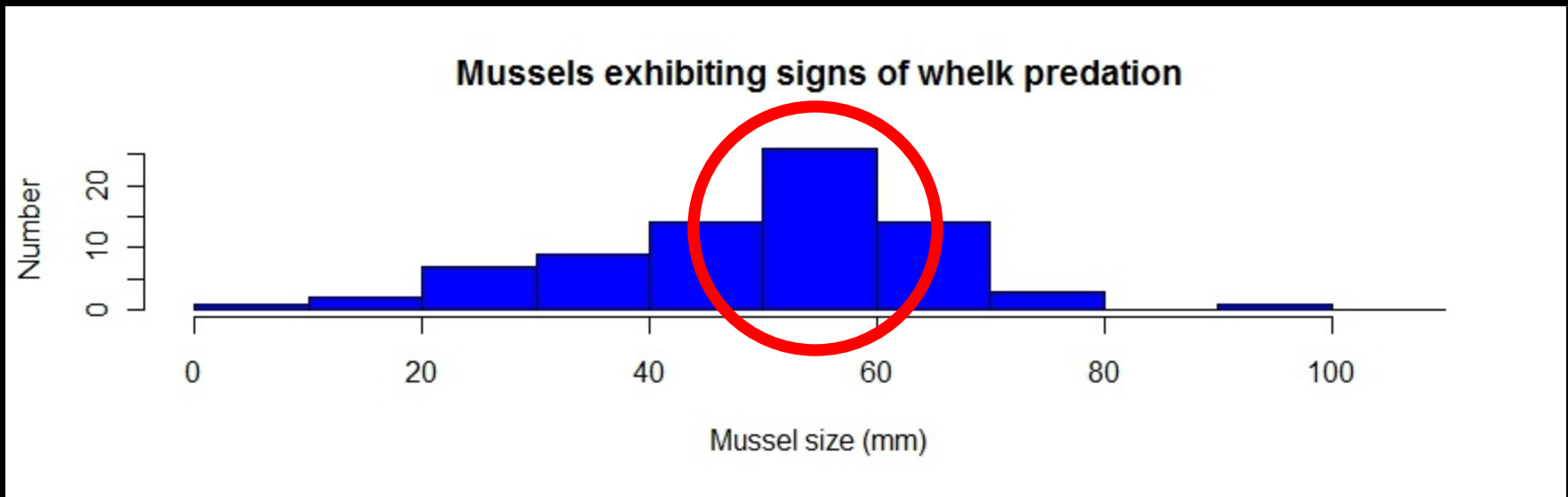


Growth in the Field



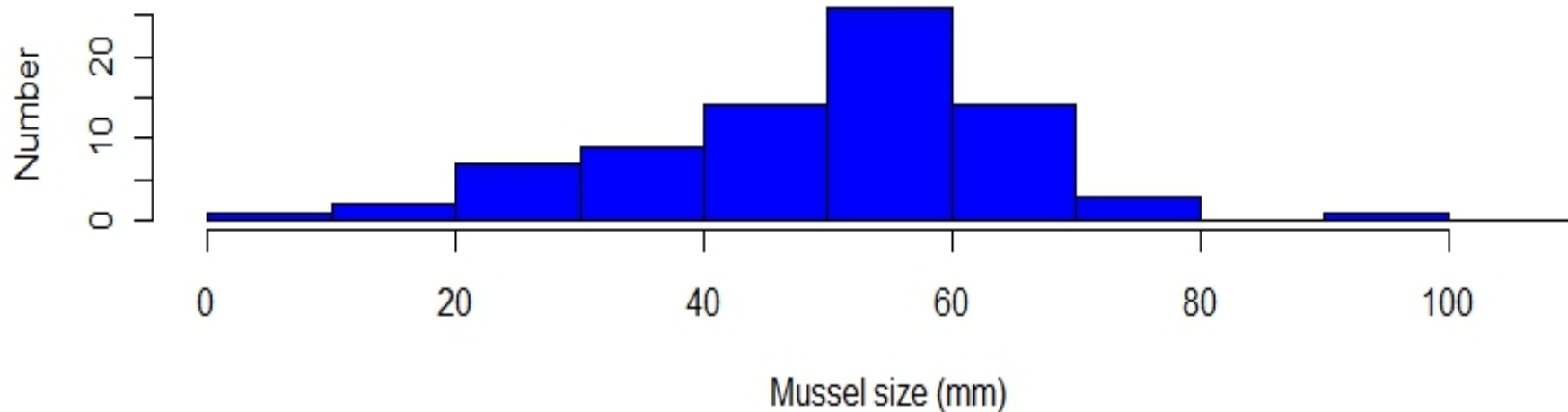
What do they eat?

-Mussel shells that evidenced predation were within a specific size range

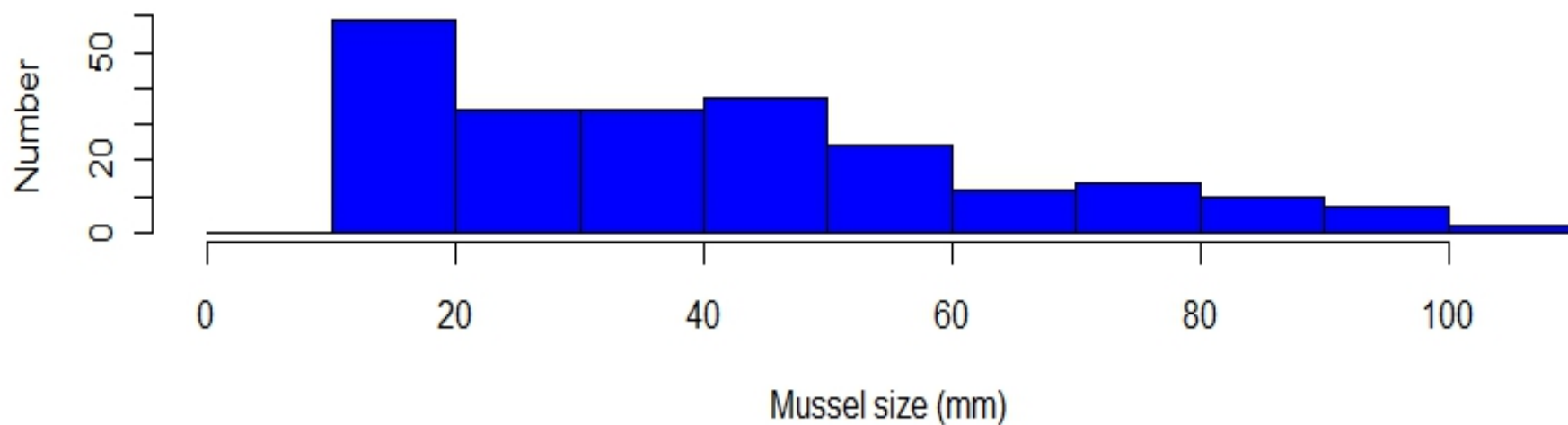


one of mussels they were consuming

Mussels exhibiting signs of whelk predation



Mussel sizes from Ellwood Beach



Conclusions

- Larger mussels are more tissue-rich per millimeter
- Smaller mussels appear to optimize growth in whelks
- Preference of prey is not random



Future Plans

- Determine relationship between energy content of mussels and size
- Determine drilling rates
- Determine impacts of other factors (predators, wave action)

Acknowledgements

Thank you to the following for your hard work
and support:

INSET Staff

Mentor: Stephen Gosnell

Faculty Advisor: Steven Gaines

Friends and Family

Size of whelks feeding on mussels

