Noisy Neighbors: how human noise affects forage fish and community ecosystems

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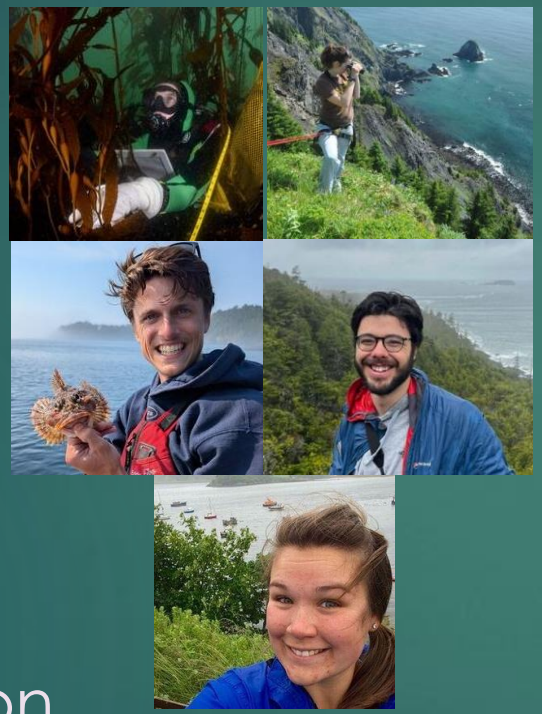

I acknowledge and respect the Lək̓ʷəŋən (Songhees and Esquimalt) Peoples on whose territory Uvic stands, the Tulalip, Samish, S'Klallam, Lummi, Semiahmoo, Hul'qumi'num Treaty Group, Cayuse, Umatilla, Walla Walla, Lək̓ʷəŋən, and W̱SÁNEĆ Peoples on whose land these experiments took place on and whose historical relationships with the land continue to this day.

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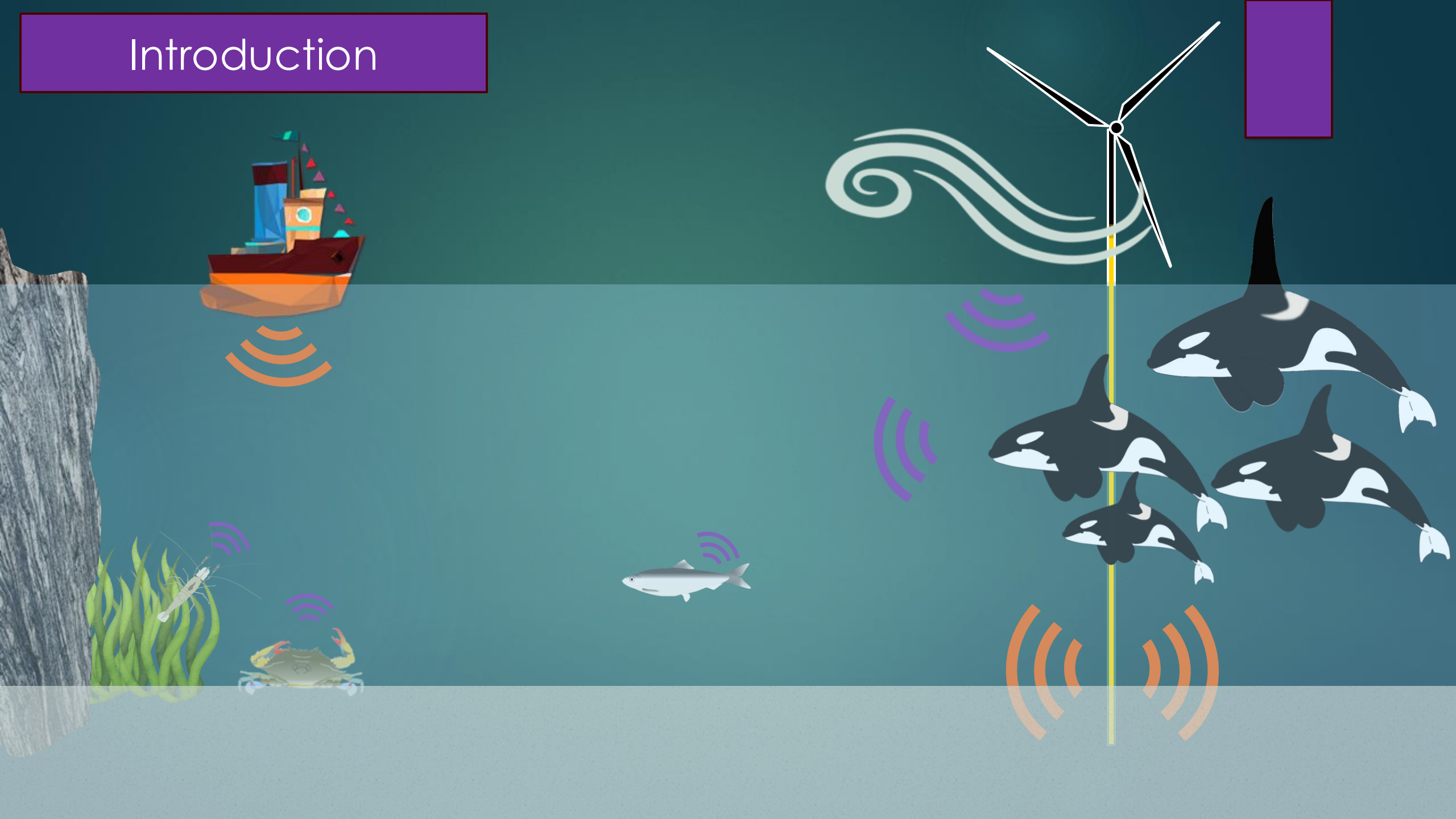
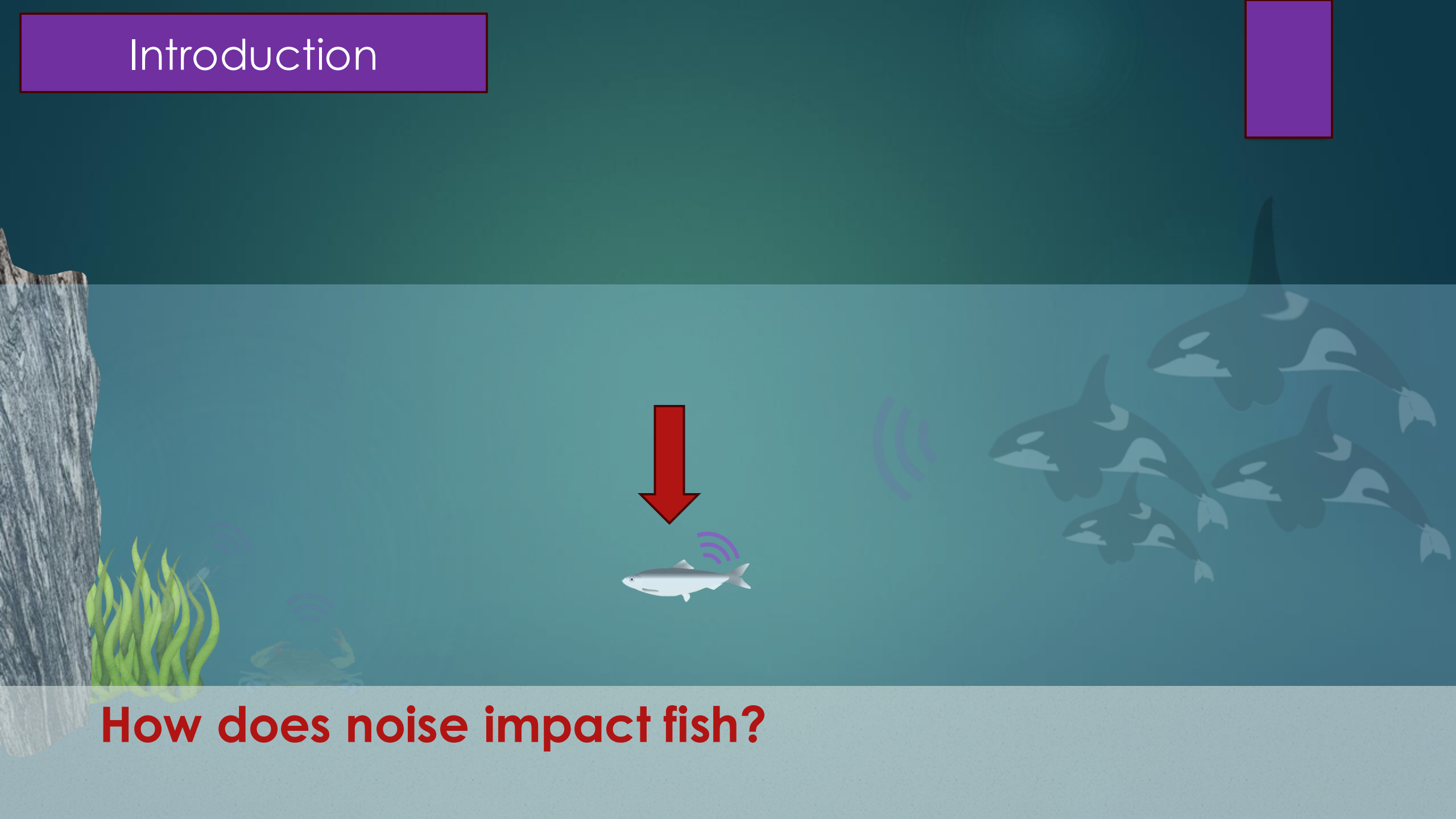
Introduction

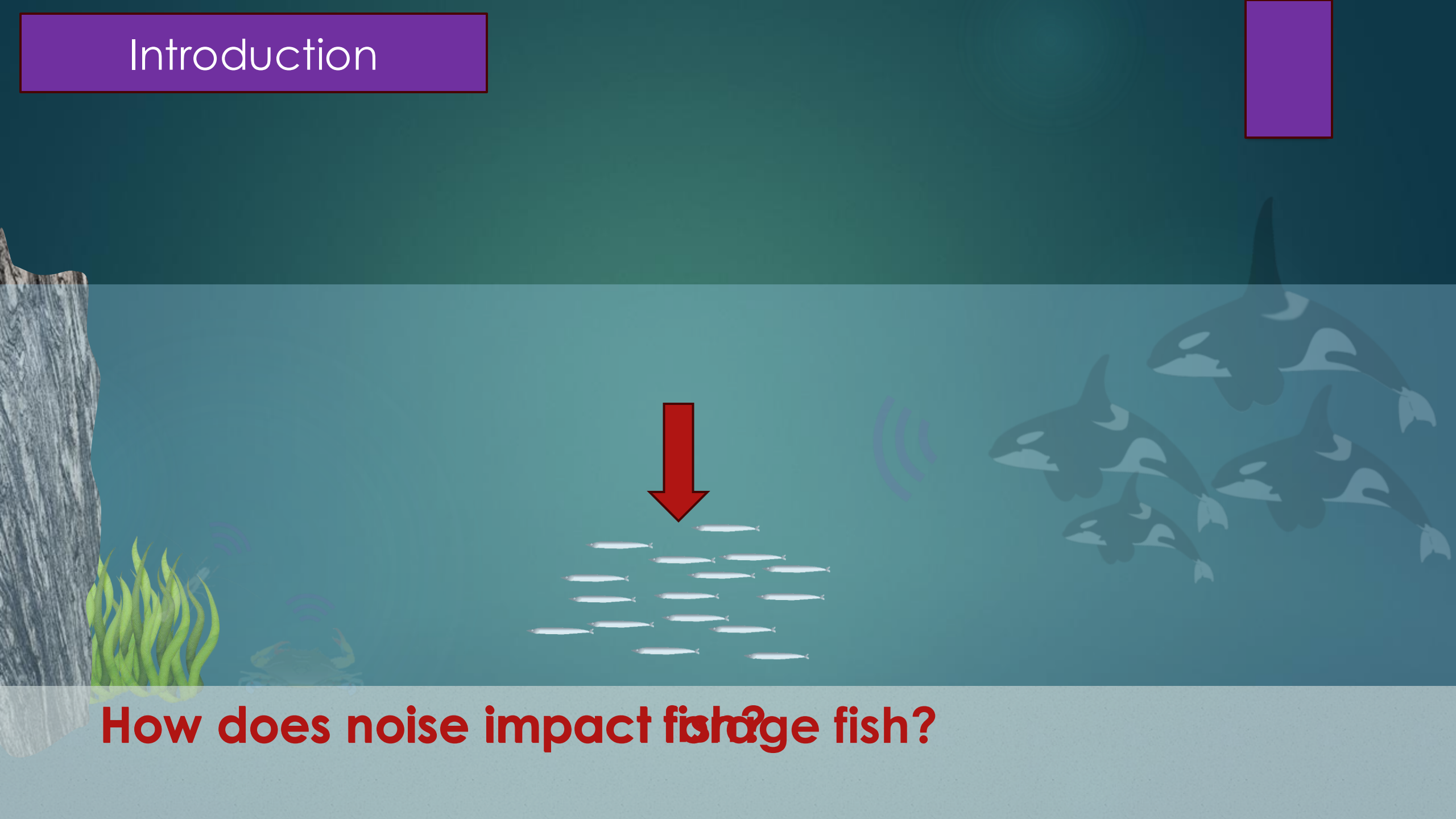


Introduction



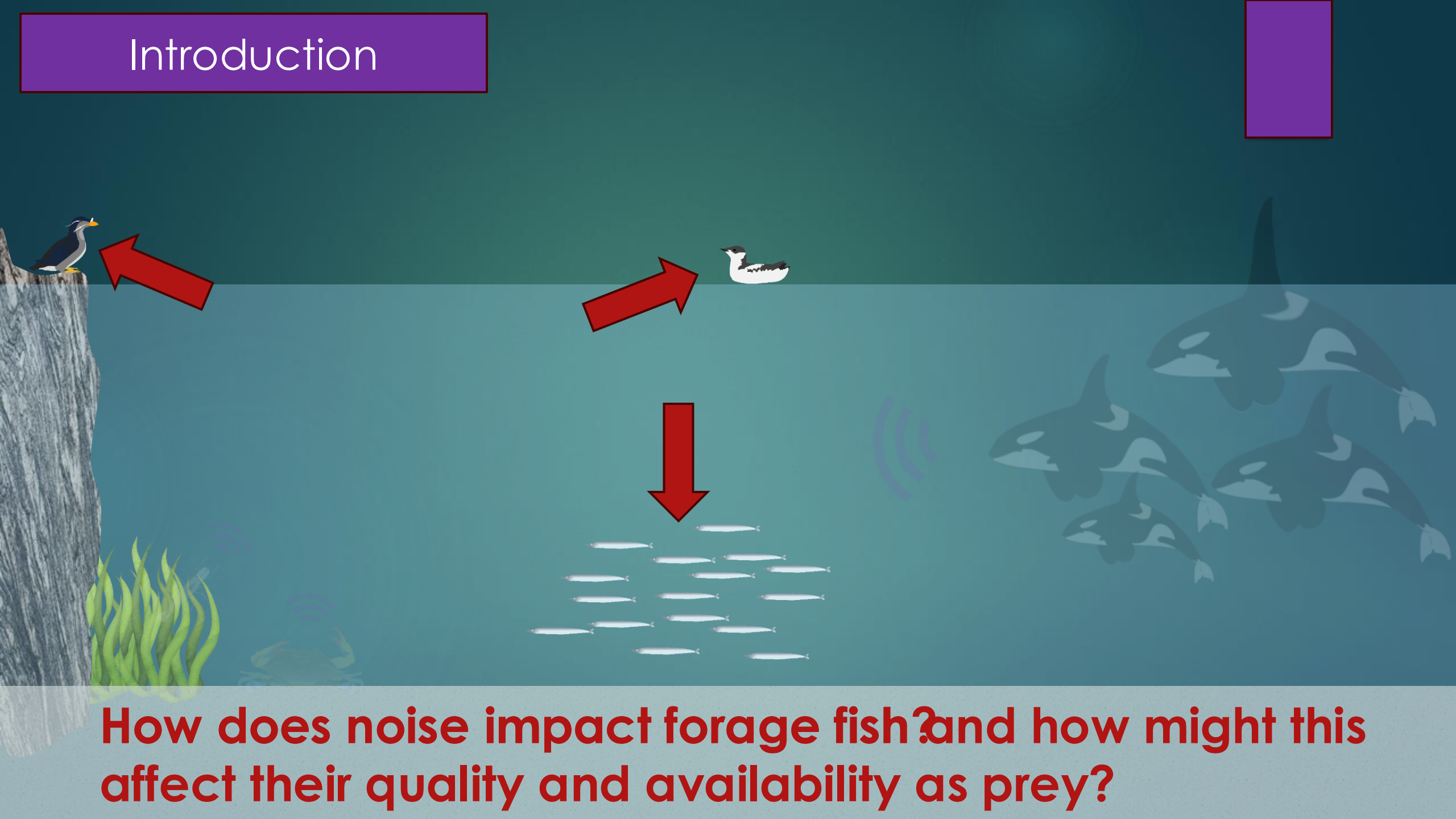
How does noise impact fish?

Introduction



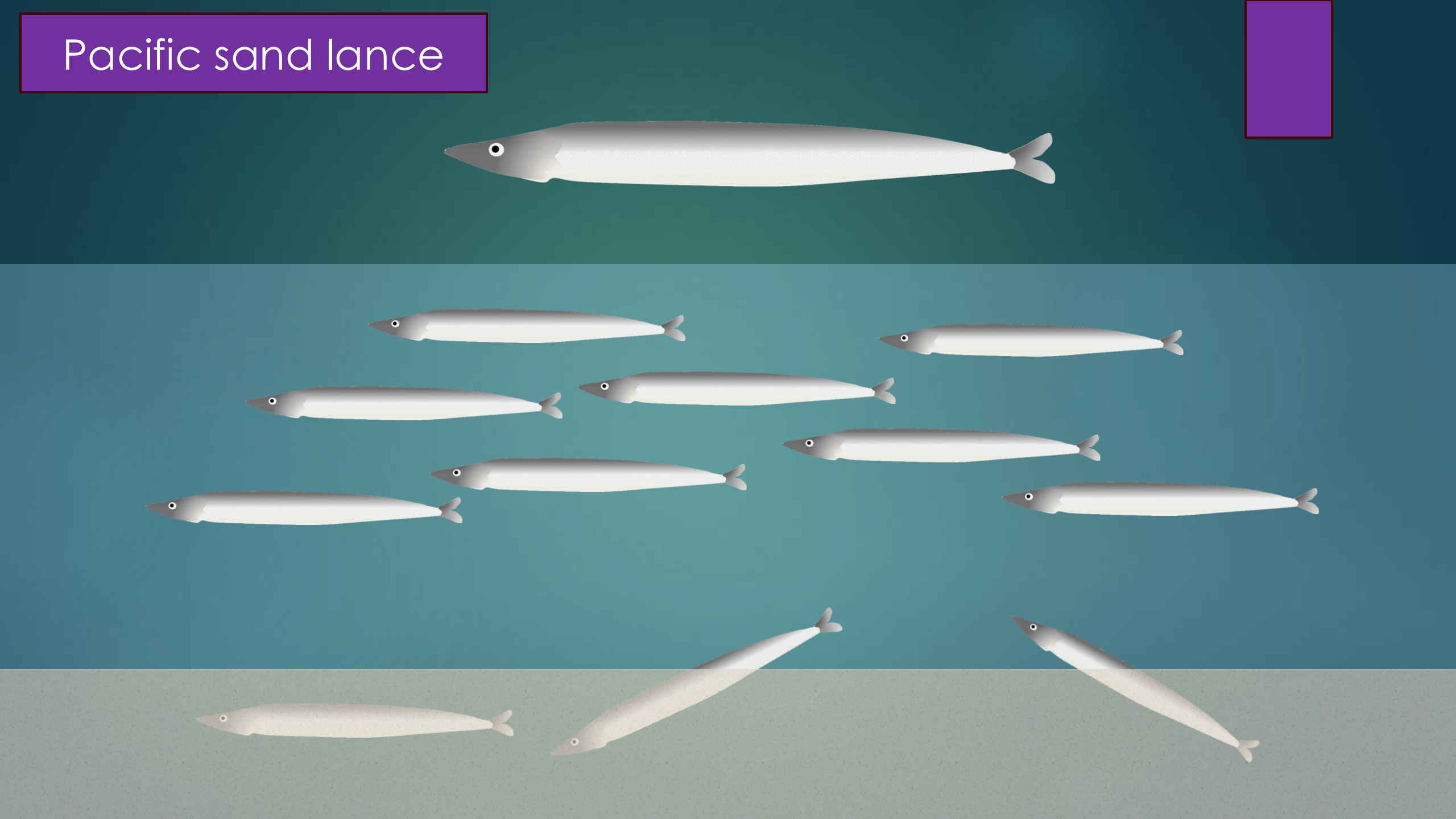
How does noise impact forage fish?

Introduction



How does noise impact forage fish? and how might this affect their quality and availability as prey?

Pacific sand lance



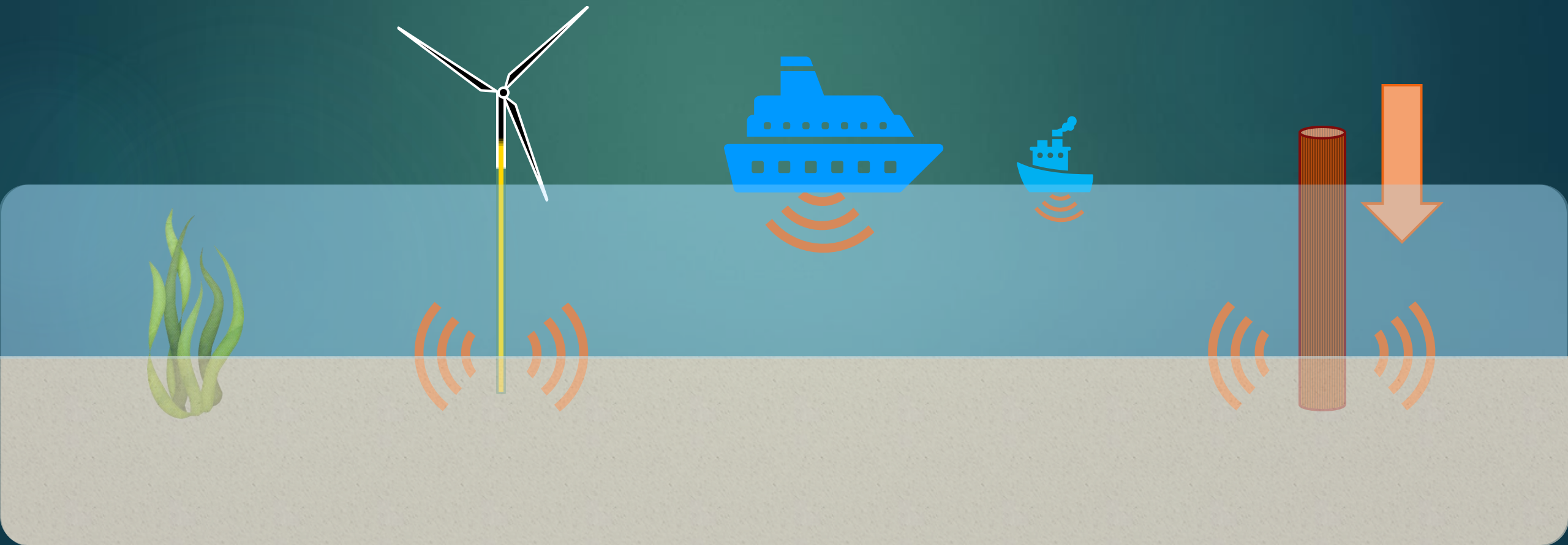
Sound environment

Control
(Silence)

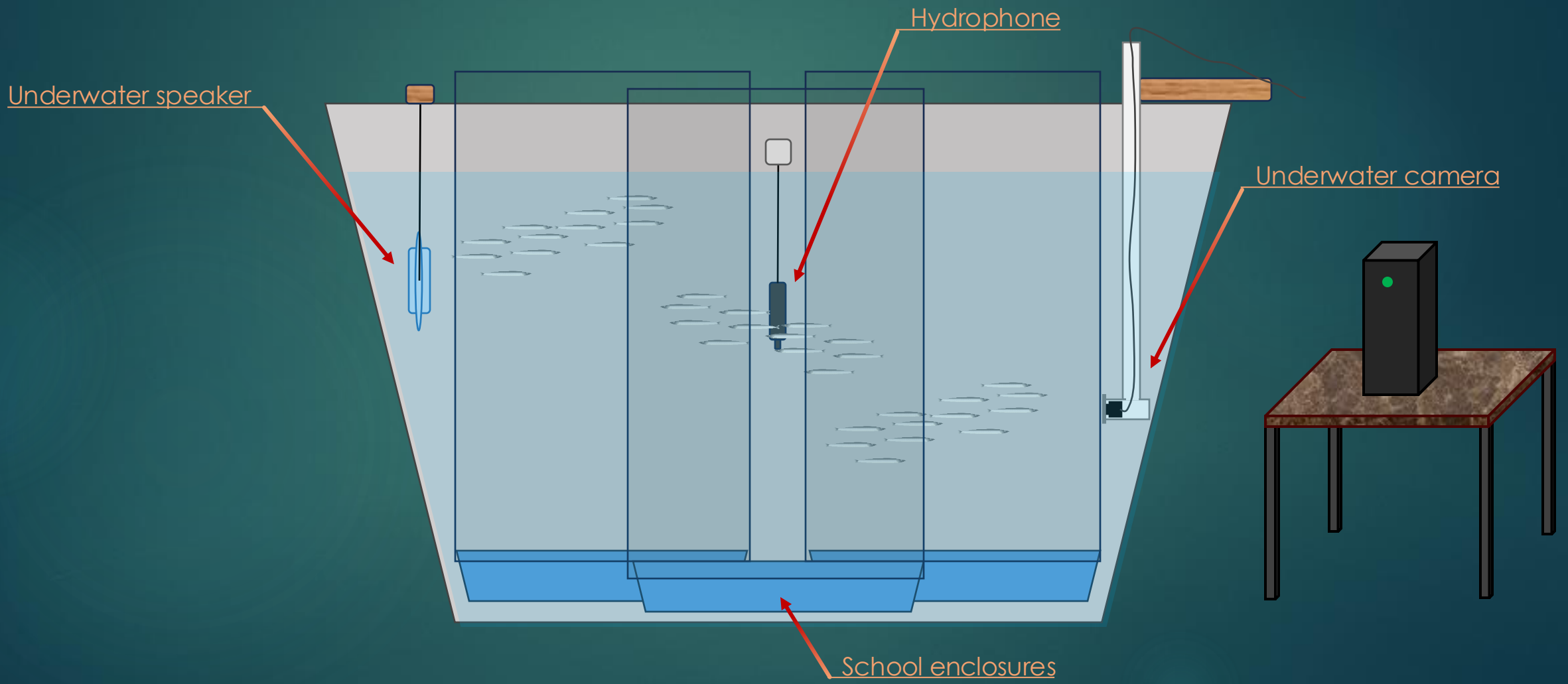
Consistent
(Windfarm)

Variable
(Boat traffic)

Intermittent
(Pile driving)

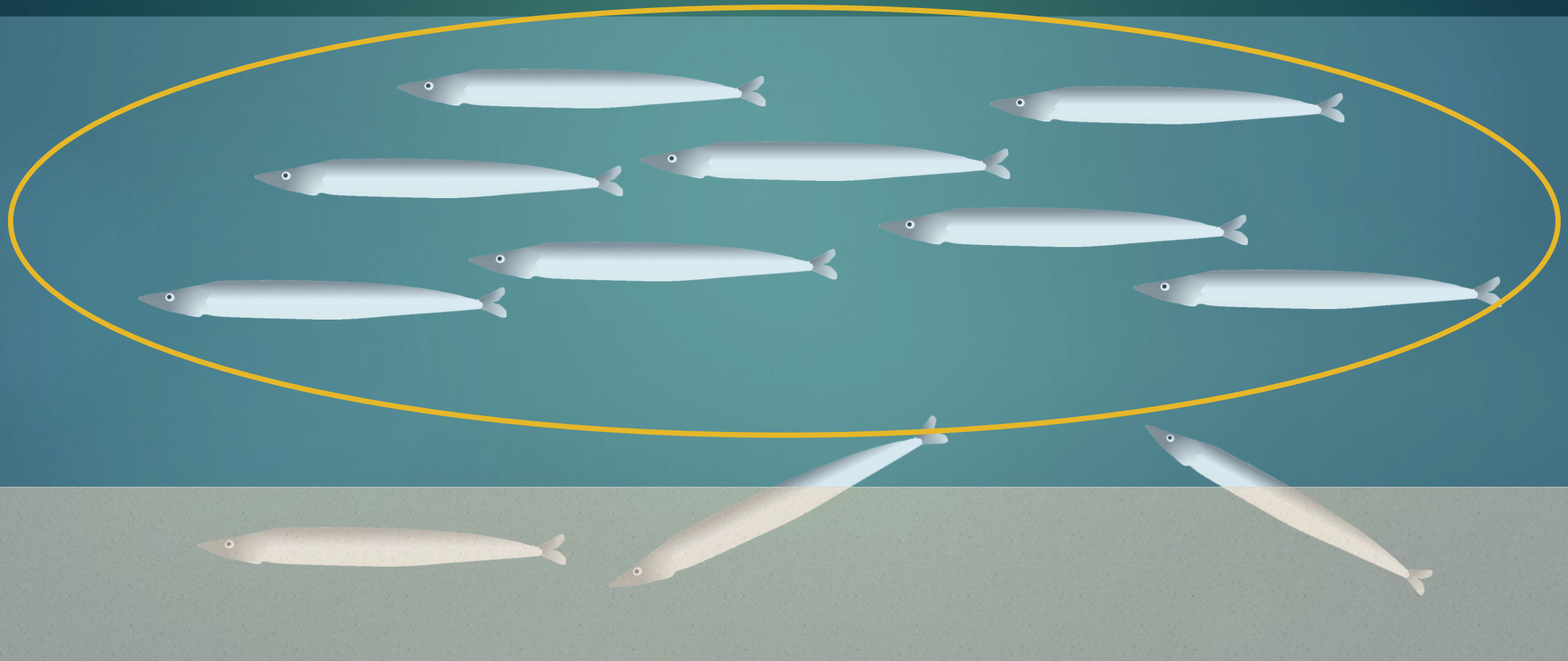


Housing


Underwater speaker
Hydrophone
Underwater camera
School enclosures

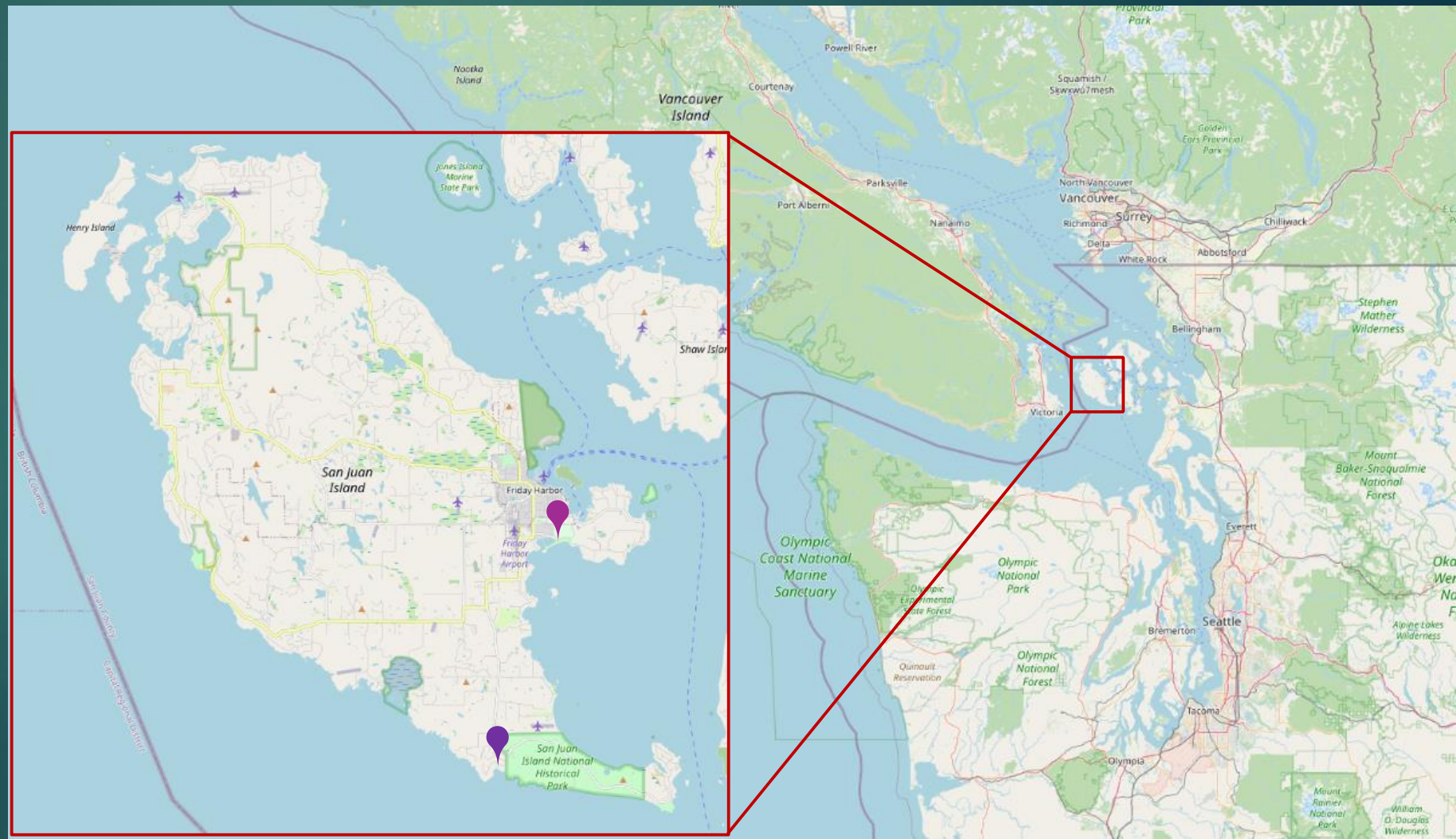
Pacific sand lance

Quality



Lab experiment

- April & May 2023
- San Juan Island, WA, USA
- 10 days

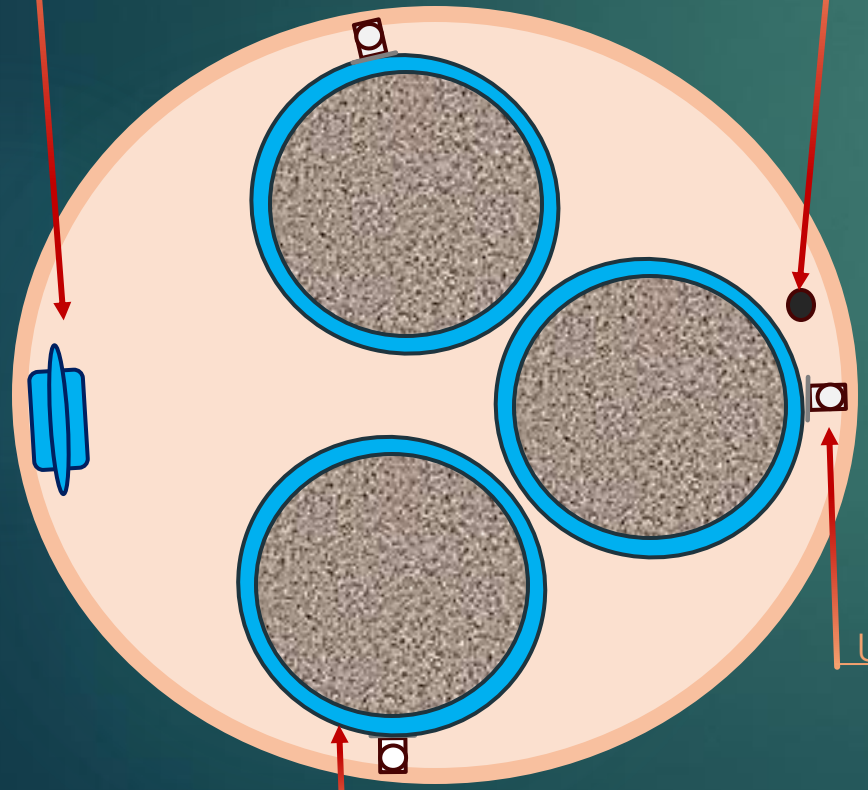


Housing

Underwater speaker

Hydrophone

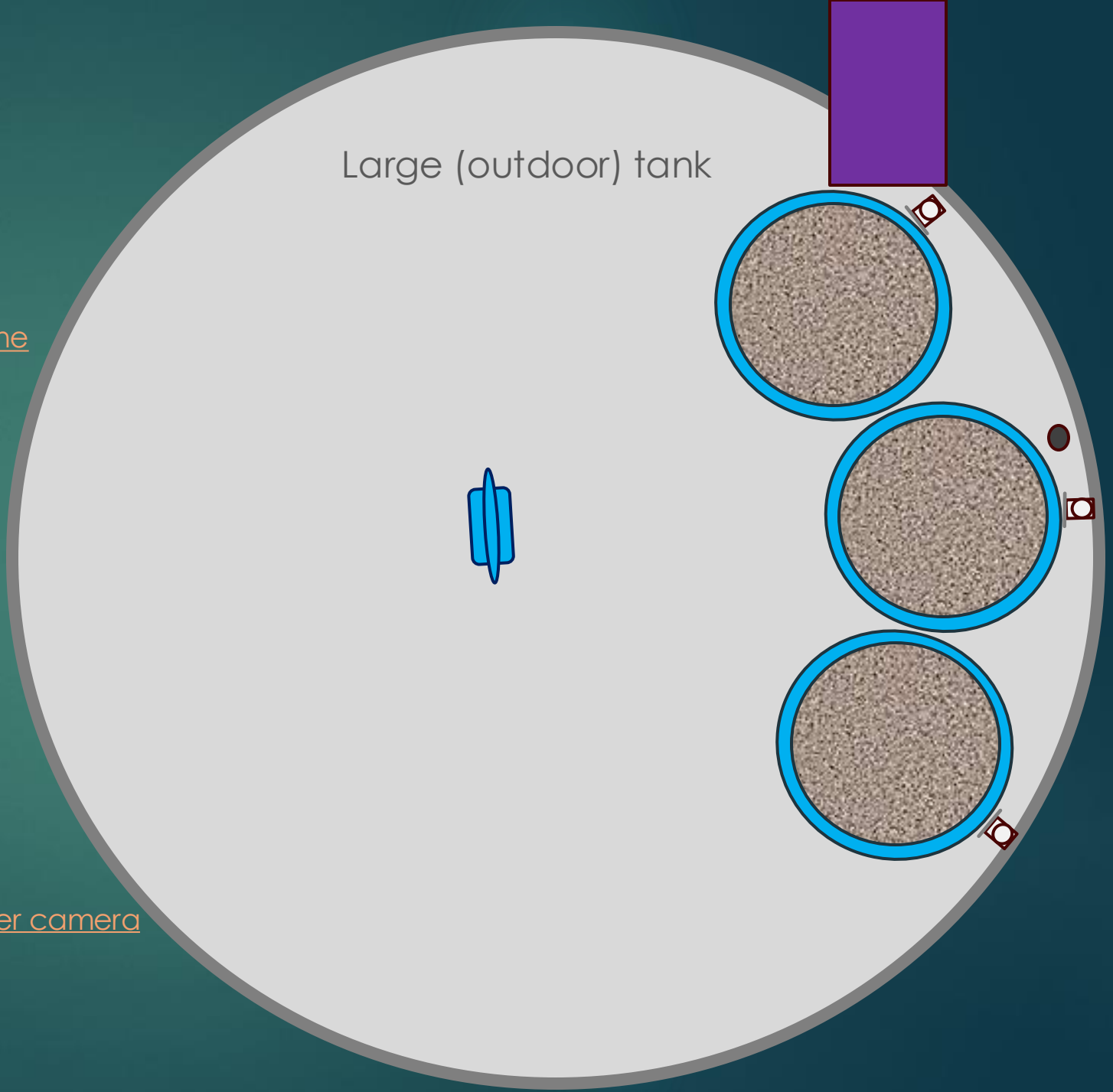
Small (indoor) tank



Underwater camera

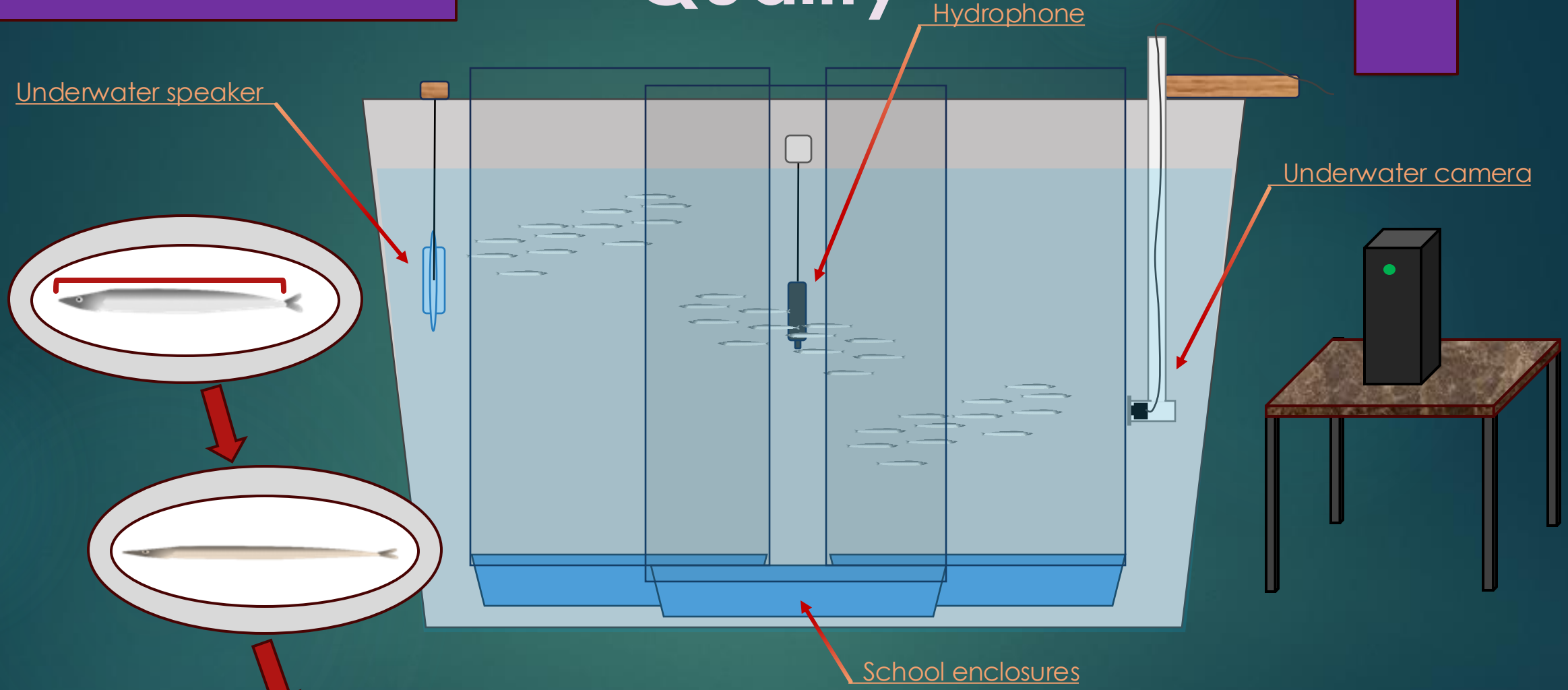
School enclosures

Large (outdoor) tank



Data collection

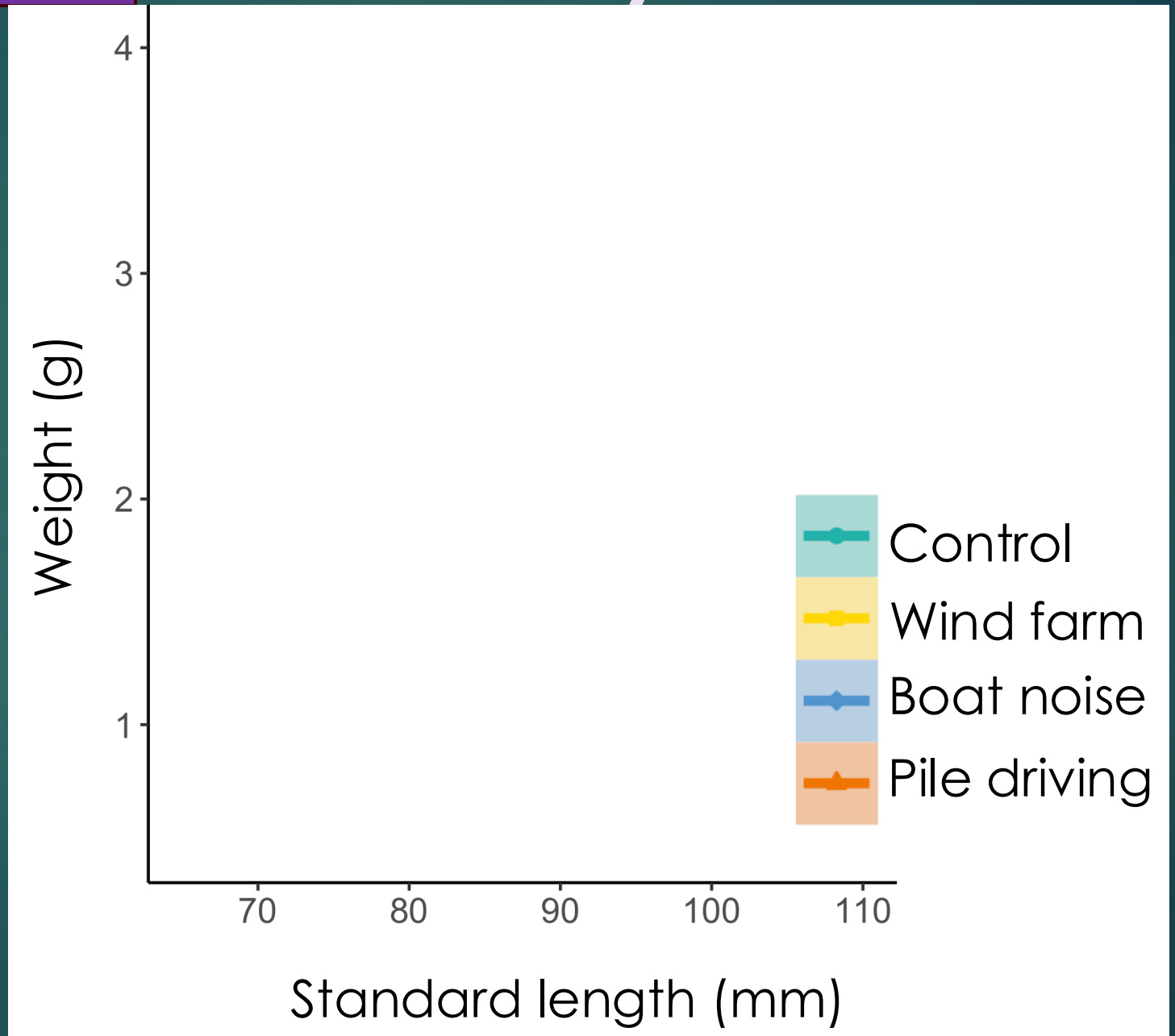
Quality



$$Energy\ Density = 10^{(1.07 * Log_{10}(AFDW) - 0.71)}$$

Results

Quality



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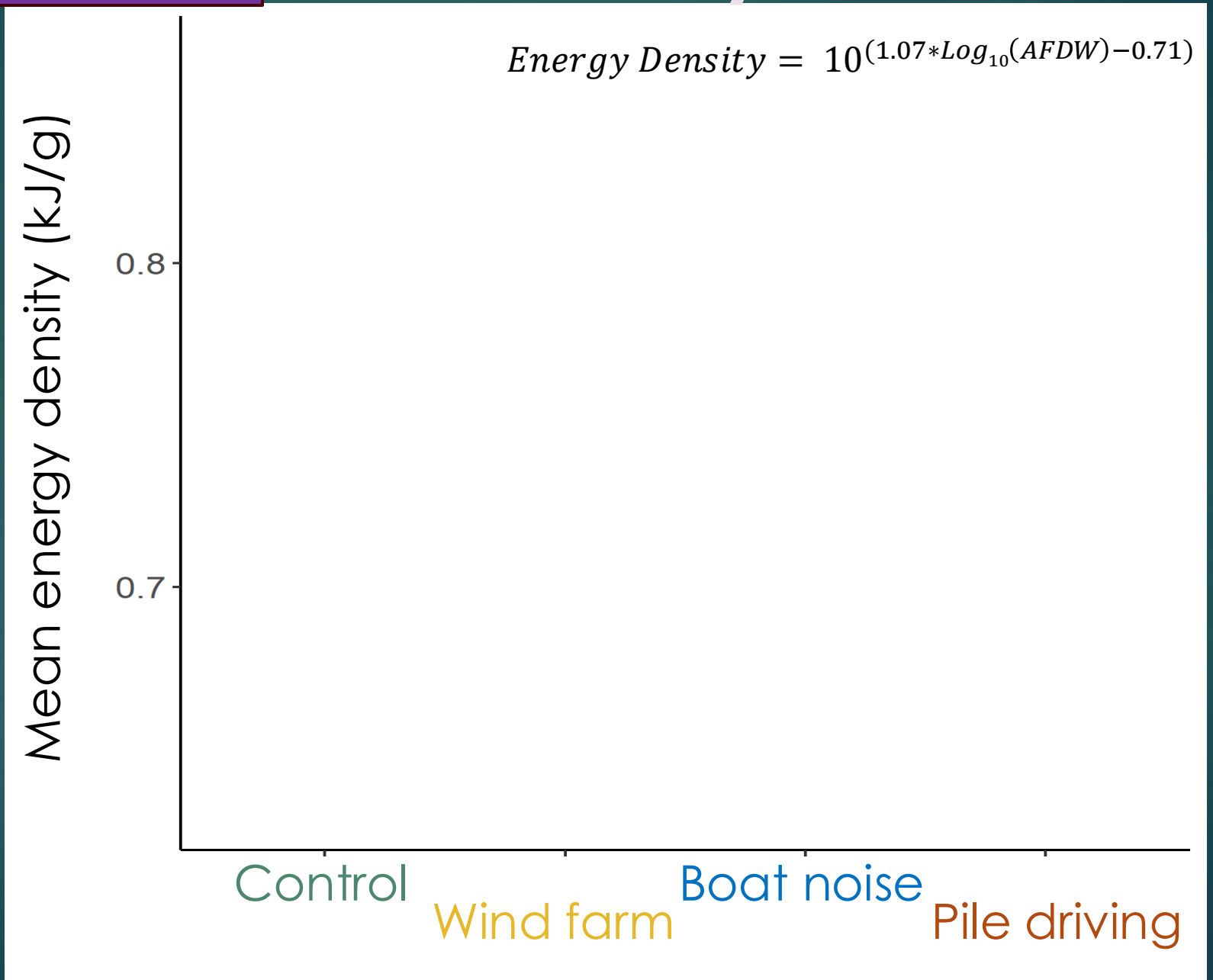
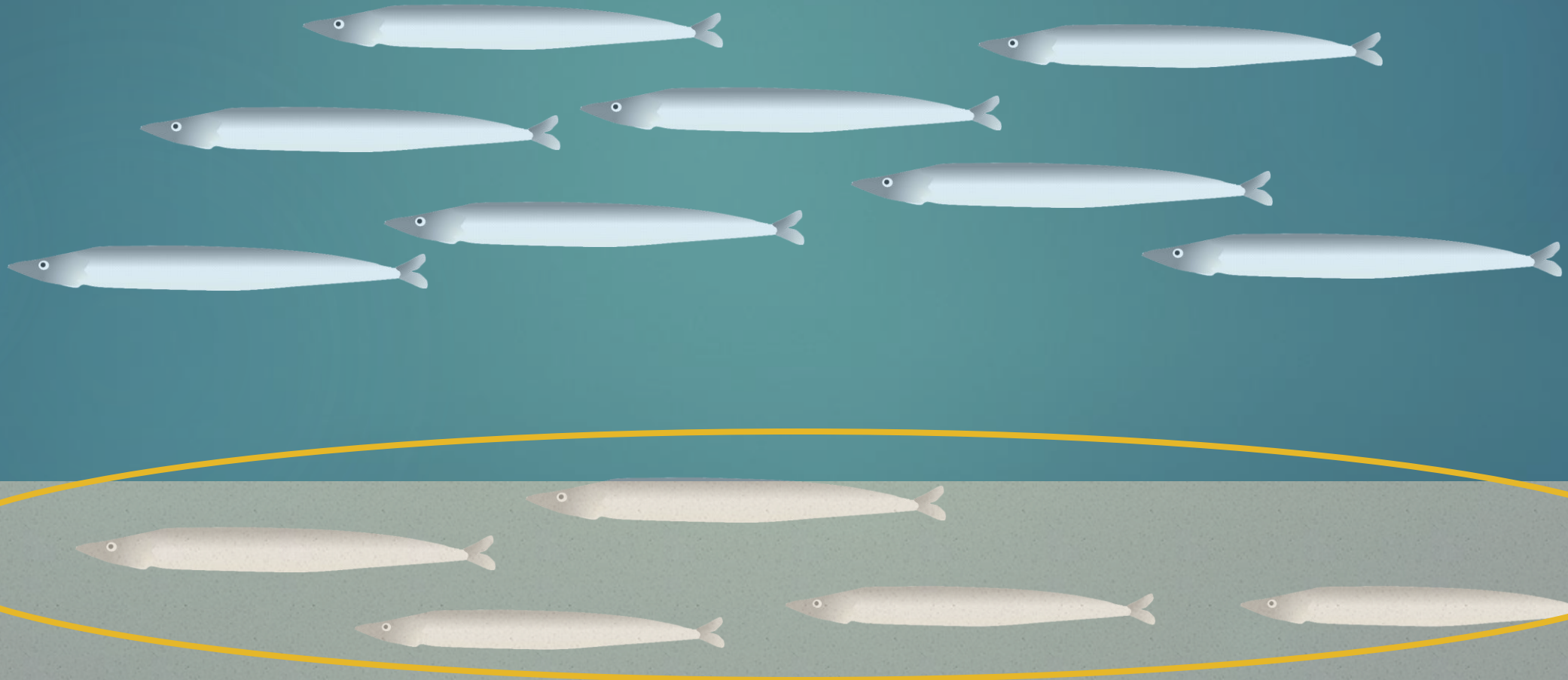


Conclusions

- ***Pacific sand lance in noisy environments are poorer <u>quality</u> (spring & summer)***
  - *All types of noise result in reduction of energy density and lower weight/length relationships*
  - *PSL living in any noisy area may be poorer quality for their predators*

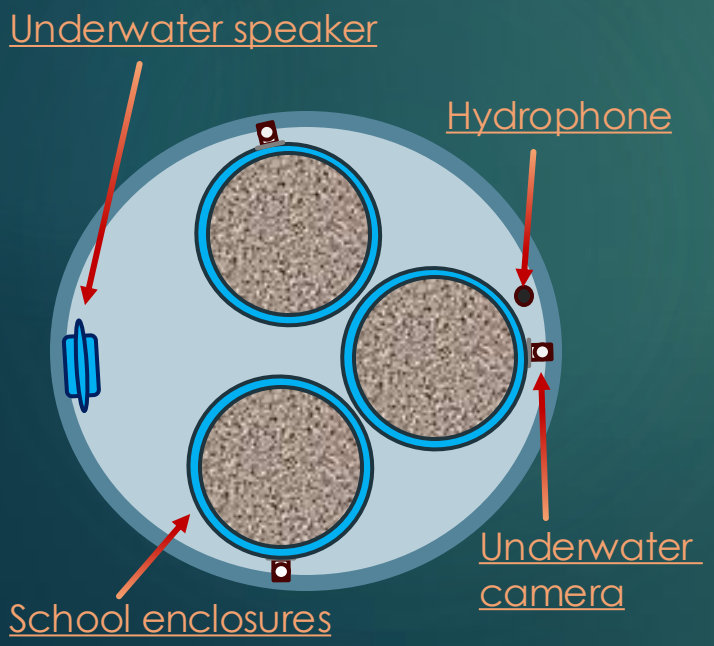
Pacific sand lance

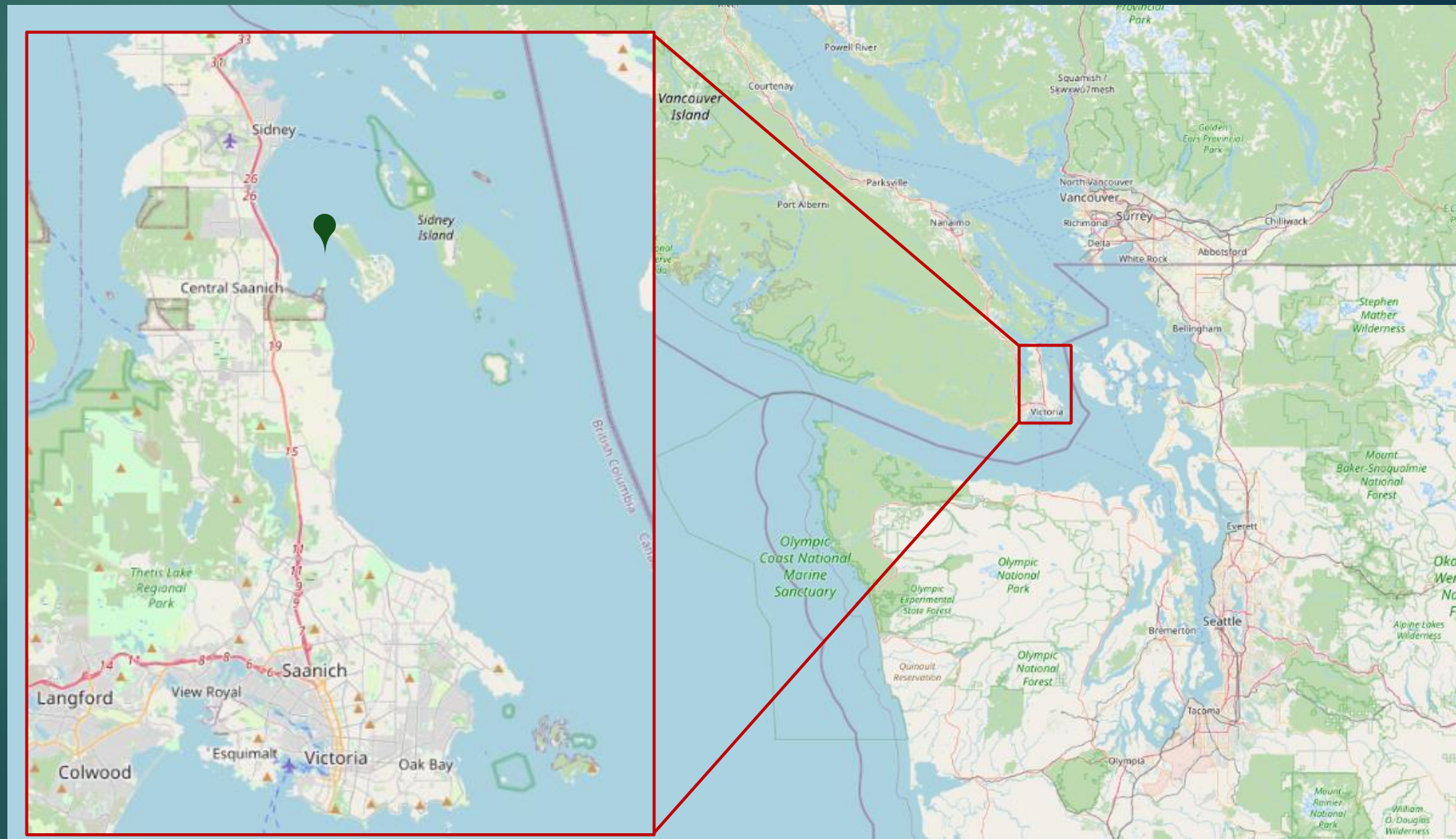
Quality



Methods

- November 2023 – March 2024
- University of Victoria, BC Canada
- Aquatics facility
- 10 weeks





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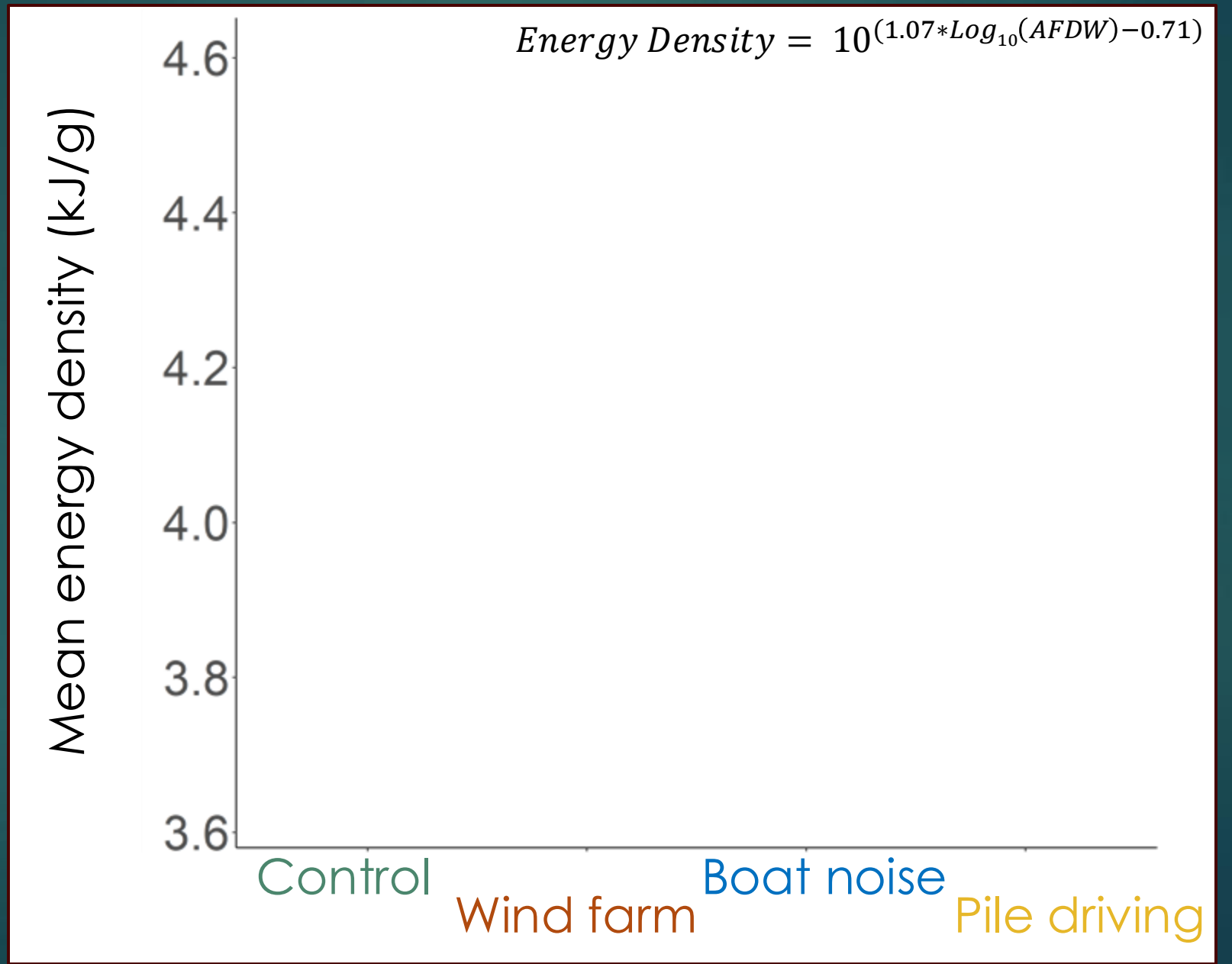

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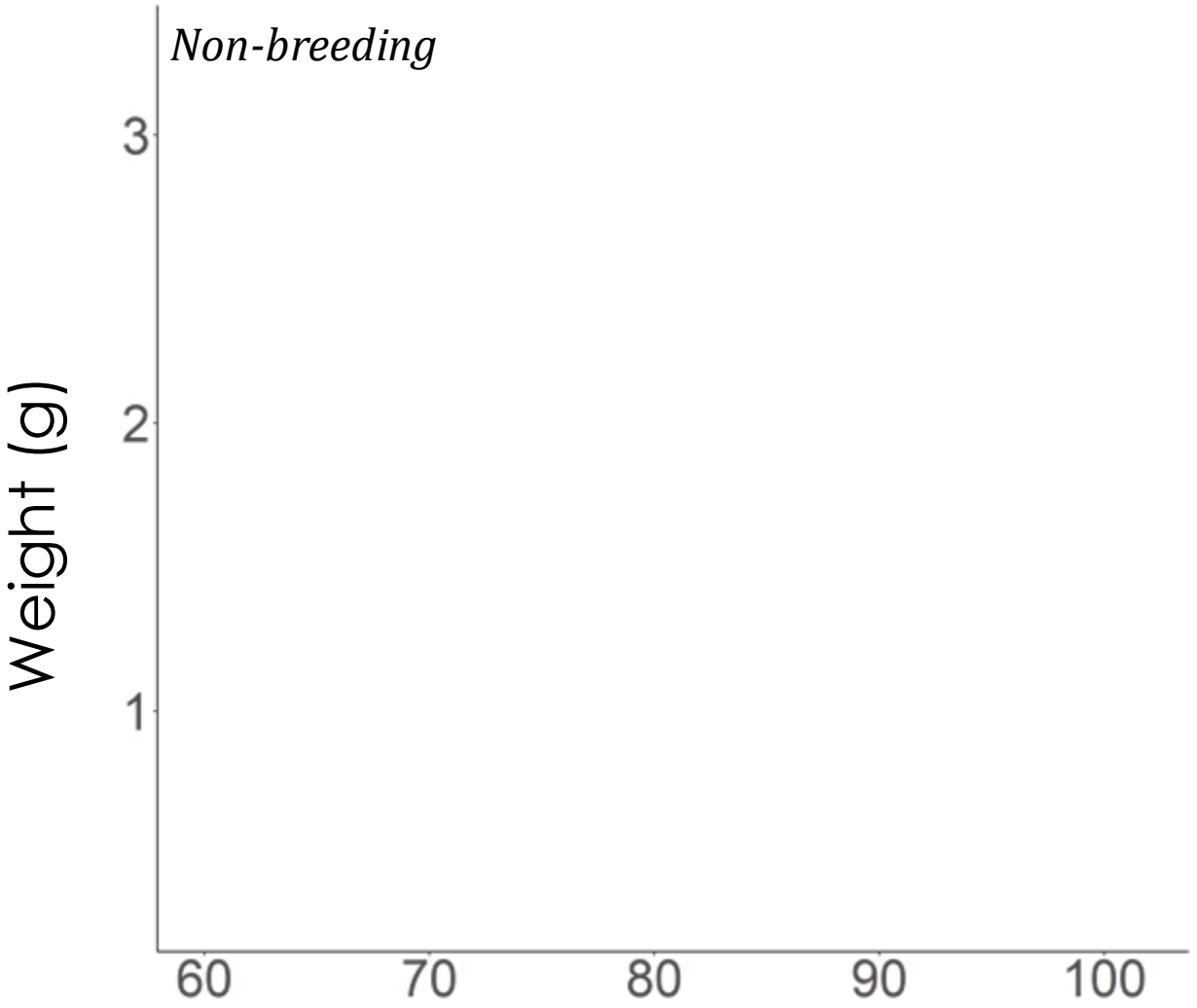

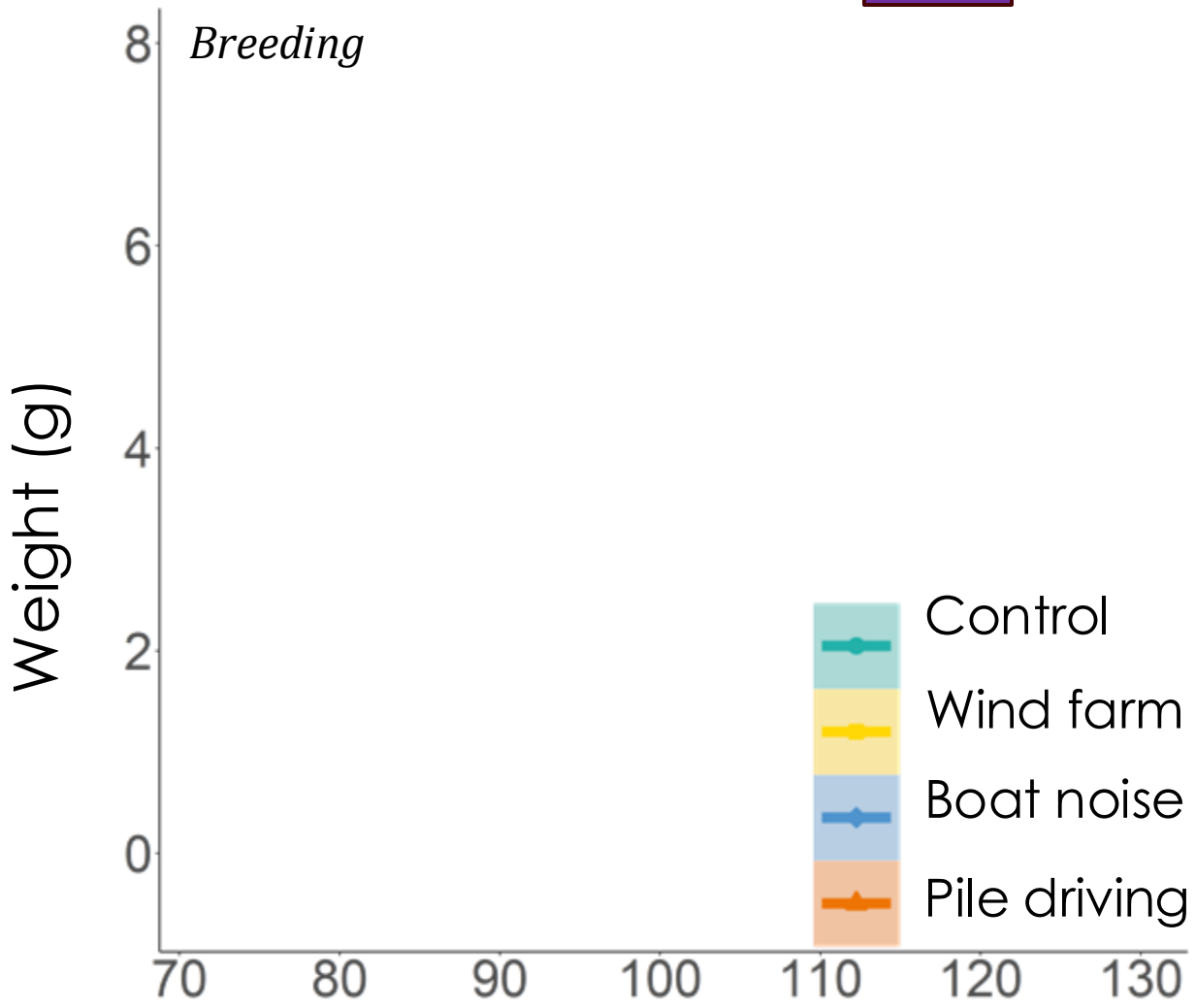

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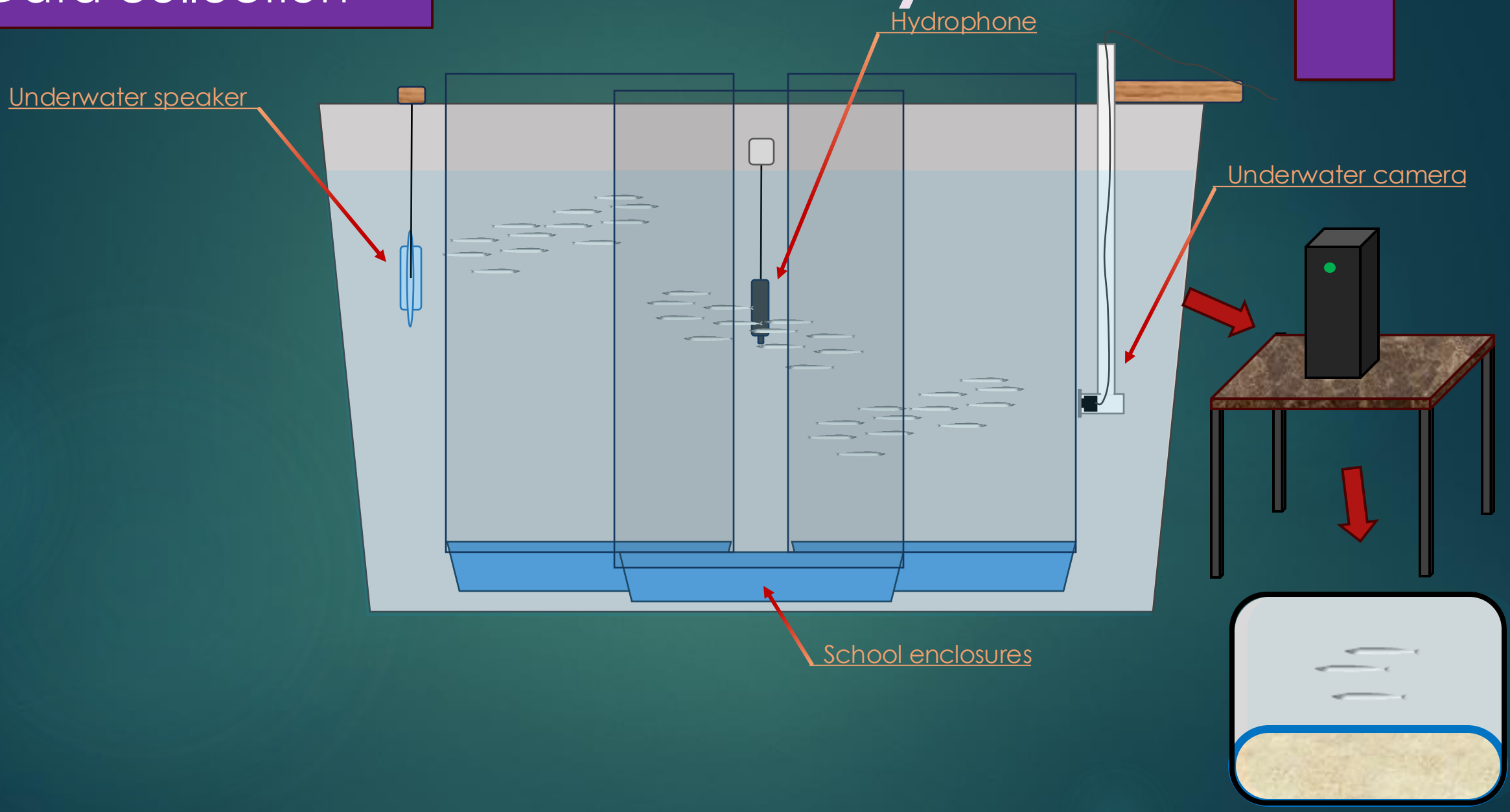
- ***Dormancy may partially buffer fish against noise effects (winter)***

Data collection

Availability



Results – M. White

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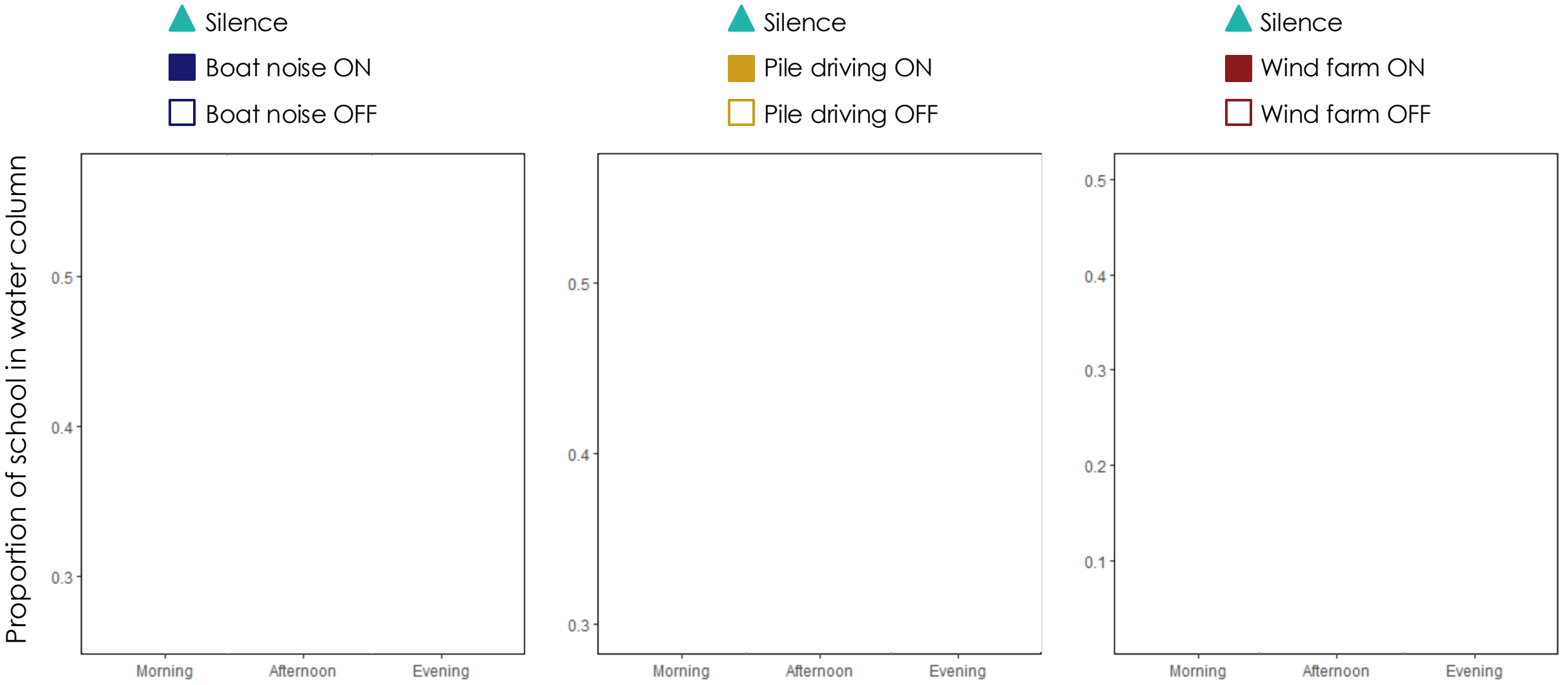

Results – M. White

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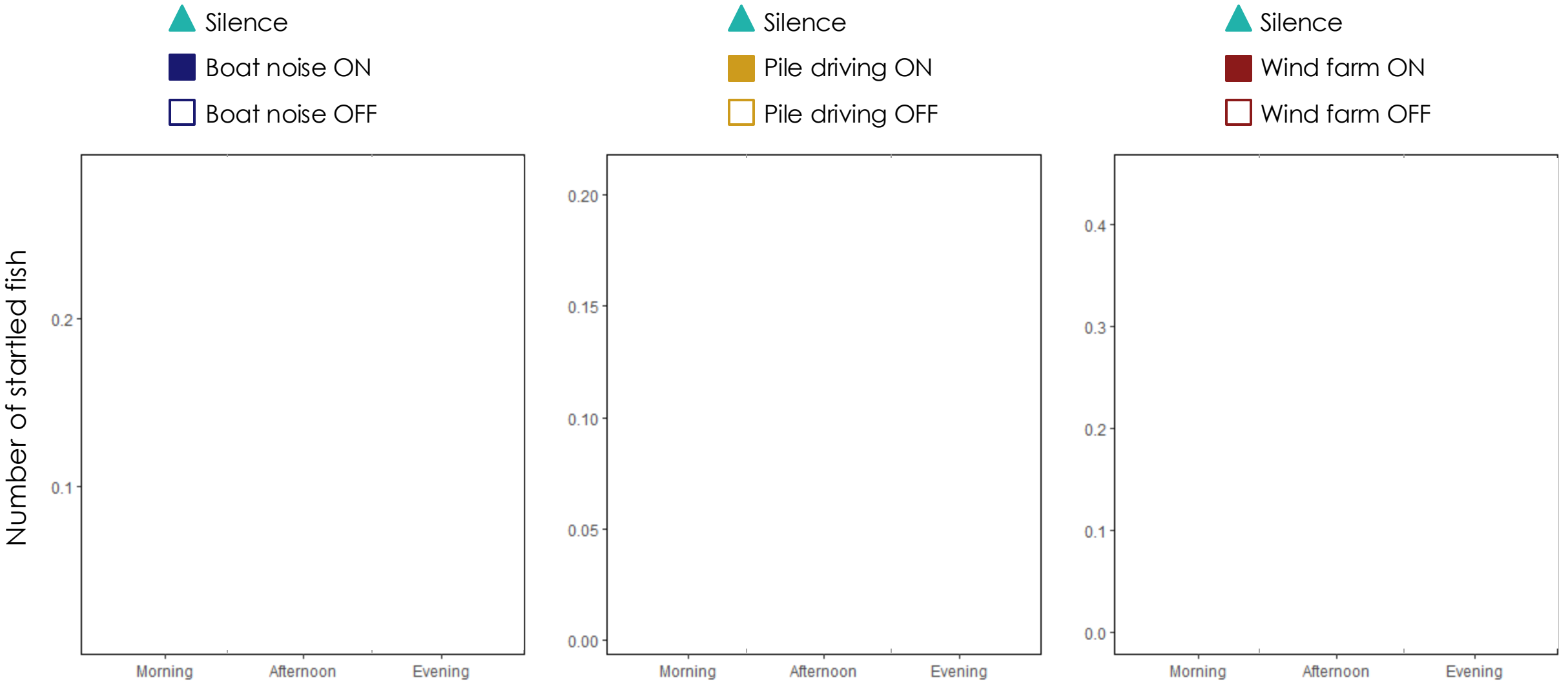

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- ***Dormancy may partially buffer fish against noise effects (winter)***

- ***Pacific sand lance <u>availability</u> in noisy environments changes based on noise type***
  - *All type of noise impact*
    - *Boat noise & Pile driving -> increased availability*
    - *Wind farm -> decreased availability*