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Native Crabs of the Salish Sea

Over the past decade, there has been a severe decline in the harvest of Dungeness crab (*Metacarcinus magister*) in south Puget Sound. The Pacific Northwest Crab Research Group (PCRG) collects population counts of crab populations targeting Dungeness crab larvae. As PCRG has become more established over the years, they are expanding their abundance counts to all crab species that can be identified. Within the traps we are seeing an abundance of many different crab species. All crabs follow the same larval stages, called zoeae and megalopae, which appear similar among species. This creates a problem because abundance counts are often done by volunteers who don't have prior knowledge of larval morphology.



Figure 1. Photo of a Juvenile instar collected at the Point Defiance larval light trap.

Crab Life History

The different life stages of a crab are zoea, megalopa, instar, and adults. Zoea is the first form of crab larva after they leave their eggs. They have very distinct characteristics such as a dorsal and rostral spine. After zoea, comes the megalopal stage. This is where their claws first start to form. After megalopae is the final stage called instar. This is also where they start to look like an actual crab and is considered to be the beginning of the juvenile stage.

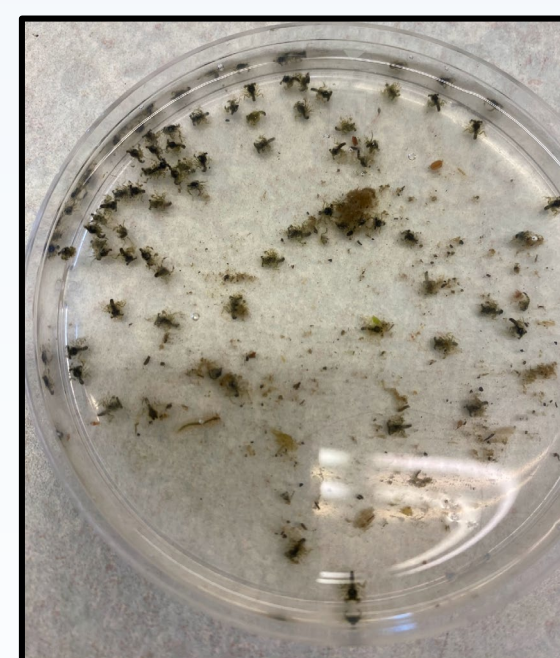


Figure 2. 81 Blackclaw megalopae collected in one night.

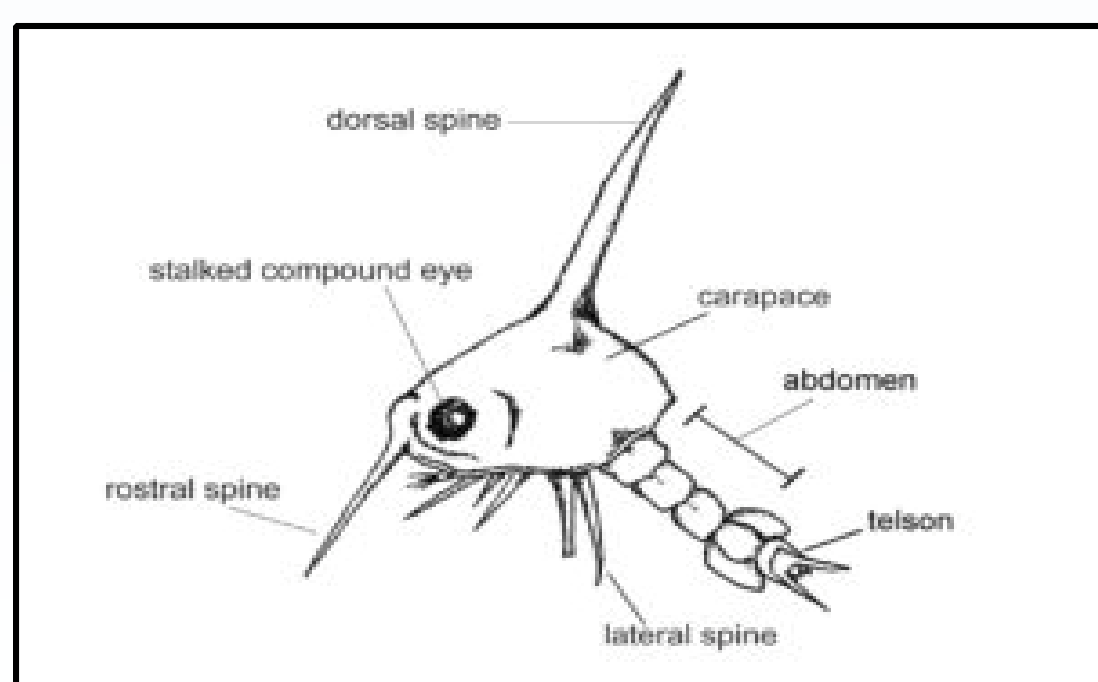


Figure 3. Figure of crab zoeal anatomy. This figure is used by volunteers to help know the anatomy of zoea and identify any notable differences among zoeae. Source: Vic High Marina.



Figure 4. Photo of zoea under microscope highlighting the side view anatomy.

Methods

- Deploy light trap in the ocean (Figure 5). The light comes on at night attracting crab larvae through positive phototaxis.
- Check samples four times per week from April to September.
- Collect samples of crab larvae that appear to be the most abundant.
- Look under a microscope and note down characteristics (color of abdomen, color of spines, color of claws, number of spines, length of spines, carapace length, etc).
- Samples preserved in 70% ethanol will be sent to Seattle University for DNA barcoding.
- If two sample share similar notable characteristics they are grouped in one vial in 70% ethanol
- Once DNA results come back, determine if specimens that had identical characteristics are genetically matched

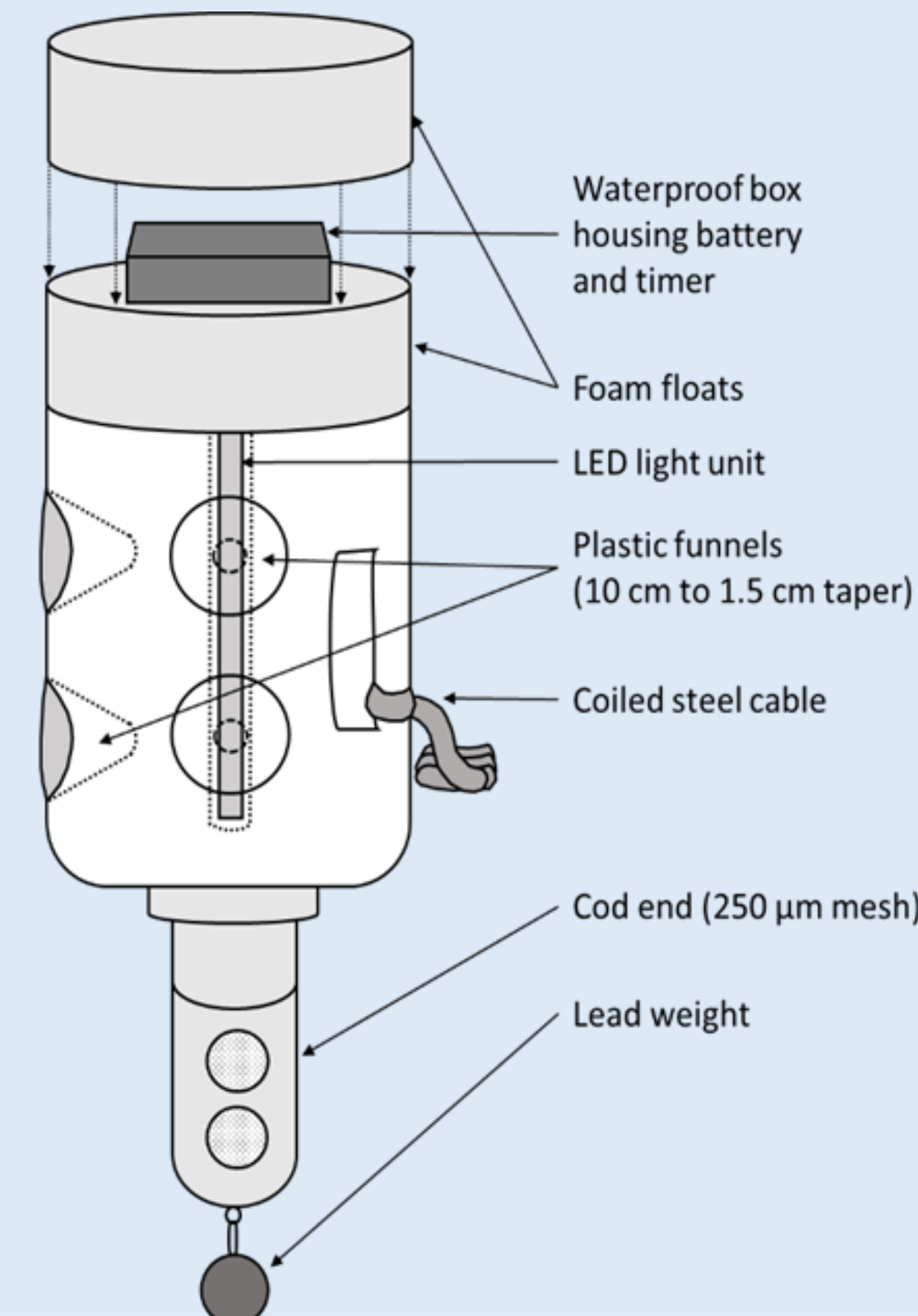


Figure 5. Notable aspects light traps used at every PCRG Trap body is composed of large water bottle. Source: Swinomish Indian Tribal Community

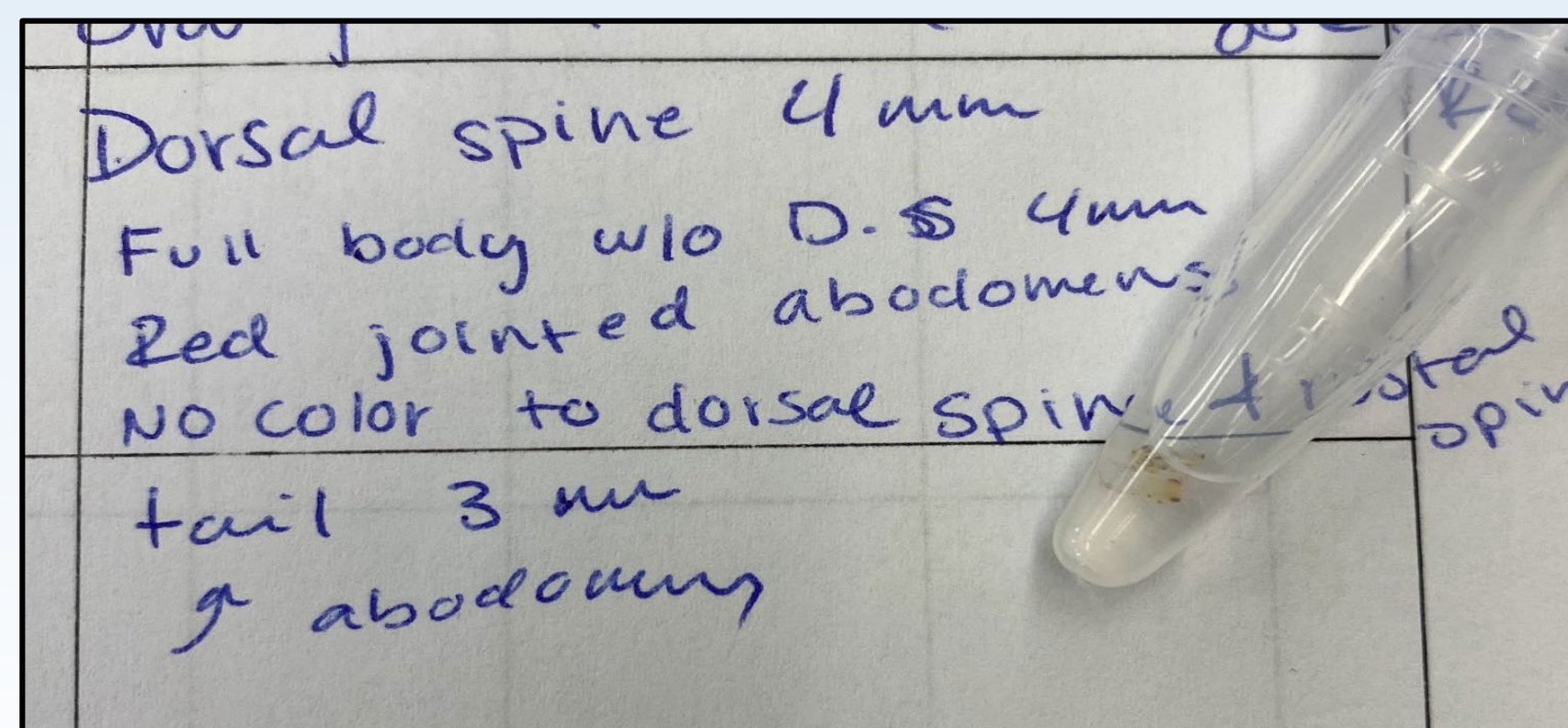


Figure 6. Photo of notes taken about sample M-11 with samples in 70% ethanol to the right.



Figure 7. Photo of *Cancer productus* (Red Rock) showing red claws in the megalopa stage

Overarching Goals

- Better understand crab larval life history
- Classify the unknown larvae into morphospecies and into the barcode of life
- Create a field guide for crab zoeae and megalopae down to the species that is easy to read and easy for people to understand without a technical background.
- Improve the accuracy of population counts of different crab species increasing reliability and value of future PCRG data.



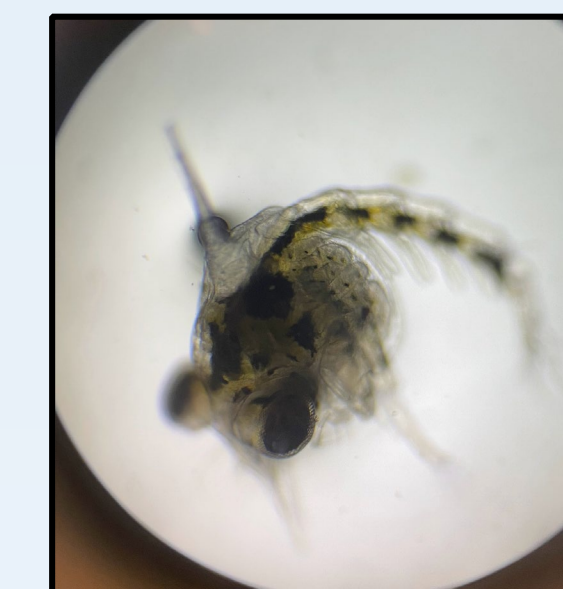
Figure 8. A spoonful of zoeae that were collected from MaST Center this season.

Observations

Different species appear to come at different times, suggesting that the spawning and development of different crabs follow different seasonal cues. In the beginning of the season we see high abundances of a variety of species and throughout the season both diversity and abundance number taper off

Results

I collected 31 samples from MaST and 5 samples from Point Defiance. Sent 5 different samples to Seattle U earlier in the season and got results back on 4 of them. Rest of samples we brought to Seattle U on August 14 and are waiting for results. Here are some of the samples collected from the trap, photographed, sequenced and identified that will be used in the field guide



Telmessus cheiragonus (Helmet crab)

- All black zoea with naked eye
- Abdomen is black with yellow joints
- Dorsal spine is black

Figure 9. Picture of helmet crab zoea under a microscope.

Oregonia gracilis (Graceful Decorator)

- Two red rostral spine
- Dorsal spine is clear
- Transparent with red joint in abdomen



Figure 10. Picture of graceful decorator zoea under microscope.

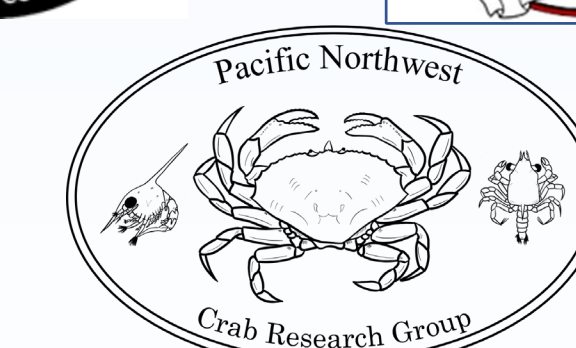


Glebocarcinus oregonensis (Pygmy Rock)

- Dorsal spine 4mm (very long)
- Red joint abdomen
- No color on dorsal and rostral spine
- Estimates to see over 10,000 on May 10th

Figure 11. Picture of Pygmy rock zoea under microscope.

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References

[PCRG] Pacific Northwest Research Group. 2020. Pacific Northwest Dungeness Crab Research Guide. 2020 -2025. Port Townsend (WA): Puget Sound Restoration Fund.