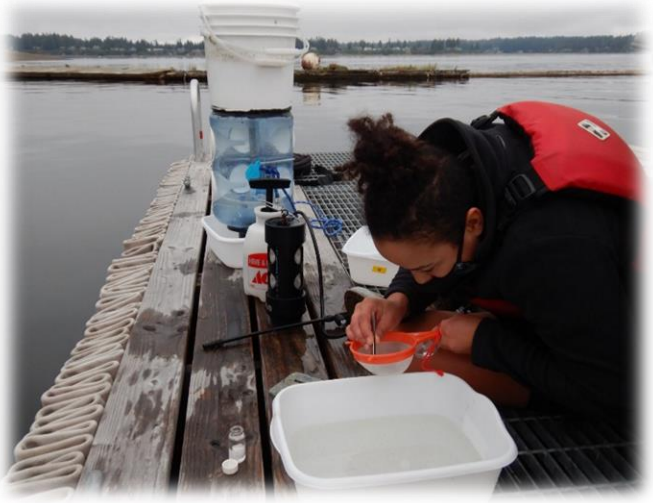
LIGHT TRAP MONITORING - SOUTH PUGET SOUND

August 26th, 2020

FIELD NOTES

Today was our final day of the 2020 season checking the light traps. A very special thank you to Rachel Hardin,



New PSI science educator Rachel Hardin checks our light trap sample for tiny crab megalopae at Boston Harbor marina this morning. Photo: Katie Houle

our newest PSI science educator and field technician, for joining me in the field today! We are very excited to have her expertise and enthusiasm of all things marine on our team! Yay!

A big thanks to everyone for joining us from home each week as we checked the trap! It's been a fun summer full of so many interesting marine animals, above and below the surface. We hope you enjoyed following along, exploring the data we collected and learning more about the marine animals we are fortunate to share this planet with! Every organism we came across this summer, no matter how big or small, has an important role to fill in the Puget Sound ecosystem. While our primary research objectives are to monitor larval Dungeness crab, we were delighted each week to see all the other critters that are attracted to our trap.

This fall we look forward to comparing our data with all the other research partners from the Pacific Northwest Crab Research Group who were able to deploy traps this season. What station saw the most Dungeness? What month had the highest number of crab megalopae?

FEATURED CREATURE!

Pacific Sand Lance *(Ammodytes hexapterus)*

Today's "Featured Creature" is the Pacific sand lance. In the photo above, several adult fish get washed off with seawater and tossed back into the bay. At the Zittel's marina light trap we have been seeing enormous schools of sand lance all summer long! This is very exciting for the ecosystem, as this species is preyed on by 100 different species in Puget Sound, including juvenile salmon and many sea birds. Sand lance can live up to 7 years growing to about 8 inches long. They are easily recognized by their long, silvery sword-shaped body, jutting lower jaw and grey-green backs. Sand lance rely on sandy nearshore habitat where they burrow at night to protect themselves from predators. During the day, adults and juveniles (photo below) forage in the water column on a variety of small crustaceans, marine worms, zooplankton and phytoplankton. From November through December each year, adult sand lance spawn along 140 miles of sandy shore in Puget Sound. Photos: Katie Houle

LIGHT TRAP MONITORING - SOUTH PUGET SOUND

What other crab species did other stations find? How does North Puget Sound species diversity compare to South Puget Sound? So many questions! Can you help us answer them? Stay tuned later this fall as we roll out a new science curriculum for 7th grade students! What questions do you have? Let's look at the data and try to find the answers! If you are a middle school science teacher in the Puget Sound area and enjoyed learning about our light trap and think your students might too, email us at katie@pacshell.org!

WATER QUALITY @ LIGHT TRAP

Depth: 2ft below surface

Temperature: 14°C or 57°F

Salinity: 29.22 ppt

Dissolved Oxygen: 7.33 mg/l

pH: 8.25

CRAB COUNTS

If you are plotting along at home with us, it's time to grab your pencil and paper! At Zittel's marina we found **EIGHT** crab megalopae in our trap and one crab instar featured here in the photo to the right. This is likely another shore crab instar with a boxy carapace. At Boston Harbor marina we found a total of **SIXTEEN** megalopae in our trap and no instars. These crab were predominantly the small graceful kelp crab.

OTHER MARINE ANIMALS

This week we caught many marine worms and sand lance at Zittel's marina that we were happy to put back in the water. At Boston Harbor marina we caught sand lance, stickleback and this adorable baby squid (photo right)!! This juvenile squid was no more than an inch long, fitting inside a plastic spoon that we used to gently scoop it to take its photograph and release it back to the water.

Photo: Katie Houle

LIGHT TRAP MONITORING - SOUTH PUGET SOUND

August 19th, 2020

FIELD NOTES

The perfect summer day for a paddle! How do you like to enjoy the water? Boston Harbor marina (below) and Zittel's marina were full of heat, temperatures around 80°F and sunshine!

Below the dock, schools of fish – perch, stickleback and sandlance -- were abundant and busy feeding on zooplankton and tiny invertebrates we find in our trap! In the photo below a marine tubeworm

(center) and sea anemones unfurl to catch the drift of plankton on their tentacles! As the tide moves in and out, all these creatures are able to snag a high speed lunch just below the surface!

FEATURED CREATURE!

Shore Crab Instar *(unidentified species)*

Today's "Featured Creature" is a shore crab instar! Even though this crab looks very similar to an adult crab, it is MUCH smaller and still considered a juvenile. Carapace width of this specimen caught in the Zittel's light trap was ~2.5mm. When the megalopa is ready to settle on the sediment bottom, it molts and transforms into a benthic instar. As the instar grows it spends most of its time crawling along the bottom, feeding and avoiding predators, which can include other adult crabs! Crabs have several "stages" of instars that represent the crab growing and molting through time toward ultimate adulthood. This process can take months to years, depending on the species. For example, Dungeness crab spend 2 years as juvenile instars, molting as many as 6 times a year! This instar is not yet identified, but is likely one of the common shore crab species we find along the muddy banks of Puget Sound. The square carapace and patterning resembles *Hemigrapsus oregonensis* or the yellow shore crab. Adults can reach up to 35mm carapace width. From that perspective, this little crab has a long way to grow! Follow this link for a fun video of the crab life cycle: https://vimeo.com/168861230
Photos: Katie Houle

LIGHT TRAP MONITORING - SOUTH PUGET SOUND

CRAB COUNTS

If you are plotting along at home with us, it's time to grab your pencil and paper! At Zittel's marina we found **TEN** crab megalopae in our trap and six crab instars. At Boston Harbor marina we found a total of **TWENTY-SIX** megalopae in our trap and one lonely instar. These crab were predominantly the small graceful kelp crab. The last several weeks we have been catching this species in the hundereds! What will we find next week??

WATER QUALITY @ LIGHT TRAP

Depth: 2ft below surface

Temperature: 15°C or 59°F

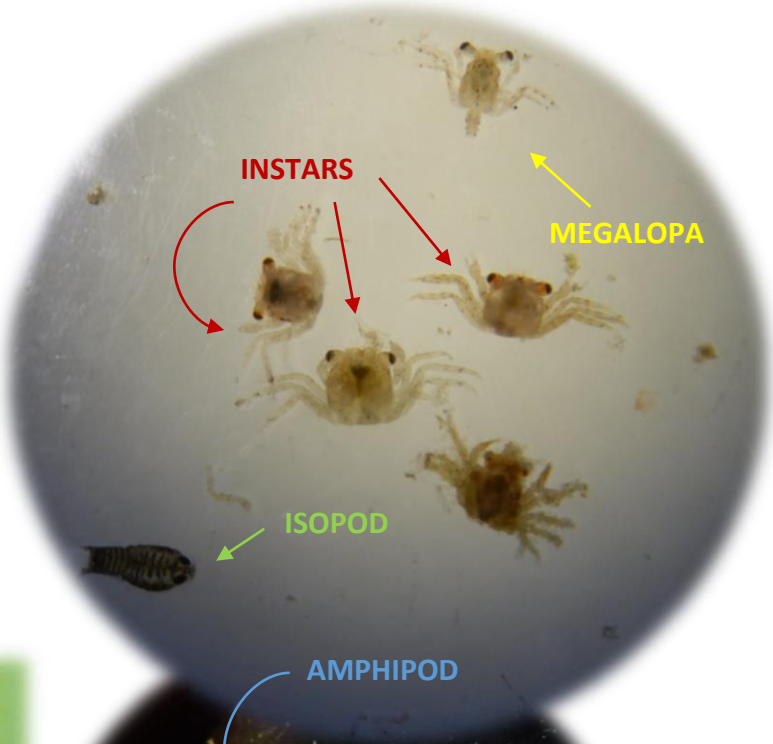
Salinity: 29.17 ppt

Dissolved Oxygen: 7.17 mg/l

pH: 8.3

OTHER MARINE ANIMALS

It was exciting to see several different kinds of crab instars alongside the megalopae in our light trap this week! It is very difficult to identify crab instars to species, even for those who regularly study crabs. An expert is necessary to key out the tiny features on these small juvenile crabs. More importantly, this photo illustrates how different the body plan of the megalopae stage is from the instars. Megalopae have legs, but are able to swim at this stage in the water column. Eventually, they settle out onto the bottom and use their legs to crawl along. Once settled on the bottom, a metamorphosis occurs. These once alien looking creatures molt and turn into the more crab-like benthic instars you see here on the right!



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LIGHT TRAP MONITORING - SOUTH PUGET SOUND

August 5th, 2020

FIELD NOTES

Thank you to PSI biologist, Aimee Christy for checking the light trap today! It was another warm, beautiful day on the Sound. Perfect to be out on the water, swimming or combing the beach!

Our sample from two nights of fishing included ten more sandlance, a gunnel and baby octopus! Also, small crustaceans including three species of crab megalopae, amphipods, copepods, cumaceans and ostracods!

FEATURED CREATURE!

Penpoint Gunnel *(Apodichthys flavidus)*

Today's "Featured Creature" is the penpoint gunnel *(Apodichthys flavidus)*! Gunnels are fairly common visitors to our light trap, including today. Adults can grow up to 18 inches long and resemble a slippery eel! They have three different color phases: emerald green, golden brown and bright red (photo below), in part influenced by their diet of small crustaceans. Regardless of color, penpoint gunnels always have a dark bar running through each eye as you can see in the photo above. Penpoint gunnels camouflage in their intertidal habitats among matching algae. It is common to find these fish under rocks and shells in the intertidal at low tide. Photos: (above) Margaret Homerding), (below) Katie Houle

LIGHT TRAP MONITORING - SOUTH PUGET SOUND

CRAB COUNTS

If you are plotting along at home with us, it's time to grab your pencil and paper! At Zittel's marina we found **ELEVEN** crab megalopae in our trap. Today we found three difference species, including graceful rock crab, graceful kelp crab and black claw shorecrab.

OTHER MARINE ANIMALS

Every week we find hundereds of macro and microscopic invertebrates featured in the photos below (clockwise): amphipods, kelp isopod and ostracods. These animals are often no more than a millimeter in length, are extremely abundant and look like tiny speckles in the bottom of our bin. These small crustaceans, while often overlooked, serve many critical ecological functions within the Puget Sound ecosystem. The base of the food web, these tiny critters are consumed by a myriad of fish, birds, crabs, and mammals. These organisms typicaly feed on algae, breaking down plant matter and detritus, which keeps energy moving through the system. We owe a lot of gratitude for these spineless creatures that call Puget Sound home.

See you all next week when we report in from the light traps!

WATER QUALITY @ LIGHT TRAP

Depth: 2ft below surface

Temperature: 14.4°C or 58°F

Salinity: 29.02 ppt

Dissolved Oxygen: 10.14 mg/l

pH: 8.34

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LIGHT TRAP MONITORING - SOUTH PUGET SOUND

July 29th, 2020

FIELD NOTES

Our report from the field this week includes lots of sunscreen, water and a BIG hat – SUN & HEAT! I hope you were able to find some shade and enjoy your

favorite swimming hole. We are excited to share some cool finds from our light trap monitoring, including this brilliant purple sea star, called an ochre star or it's scientific name, *Pisaster ochraceous*.

Another amazing creature we got to see while checking our trap this week was the giant Lion's Mane Jellyfish!

Often seen washed up on shore as a giant purple blob, live jellyfish propel themselves quite gracefully through the water as captured here in our video: https://youtu.be/rzHYb1RN194 ! The Lion's Mane Jellfish can grow up to 6.6ft (2m) across with tentacles extending up to 30ft (9m) in length!

FEATURED CREATURE!

Three-Spined Stickleback

(*Gasterosteus aculeatus*)

Today's "Featured Creature" is the three-spined stickleback (*Gasterosteus aculeatus)*, commonly found in calm Puget Sound waters among eelgrass blades, feeding on tiny crustaceans and insects. This small (~3-8cm long) silvery, torpedo shaped fish is a weekly visitor in our light traps! It is named for the three sharp spines on its back designed to deter predators, namely larger fish and marine birds. Stickleback are often seen with brown-green backs and white or silver bellies, however, breeding males will change color in the spring. Dressed to impress, males parade the waters with vivid colors of blue-green, orange and red breast attempting to attract a mate (see photo below)! When encountering a female, brightly colored males will perform a zig-zag dance to win over a mate. These interesting habits are a topic of much research and a sight to see! Look out for schools of these small fish around pier pilings at your local marina.
Photos: (above) Katie Houle, (below) Dwight Kuhn

LIGHT TRAP MONITORING - SOUTH PUGET SOUND

CRAB COUNTS

If you are plotting along at home with us, it's time to grab your pencil and paper! At Zittel's marina we found **EIGHT** megalopae in our trap including one graceful rock crab and seven graceful kelp crab. At Boston Harbor marina we observered **SIX** graceful kelp crab megalopae. This make a grand total: **8 + 6 = 14 crabs!**

OTHER MARINE ANIMALS

This week I thought it would be fun to share a photo of our light trap at night! Right, is a picture of our trap at Boston Harbor marina being investigated by a school of three-spined stickleback! A view from our microscope revealed several colorful critters (bottom left to right): crab zoea, a marine isopod (*Cirolanidae isopod*), a graceful kelp crab megalopae (*Pugettia gracilis*) and a Nereid marine worm! Tune in next week to see what we find at Zittel's and Boston Harbor marina. In the meantime, enjoy your own outdoor adventures. What's growing in the water near you?? www.pacshell.org/light-trap.asp

WATER QUALITY @ LIGHT TRAP

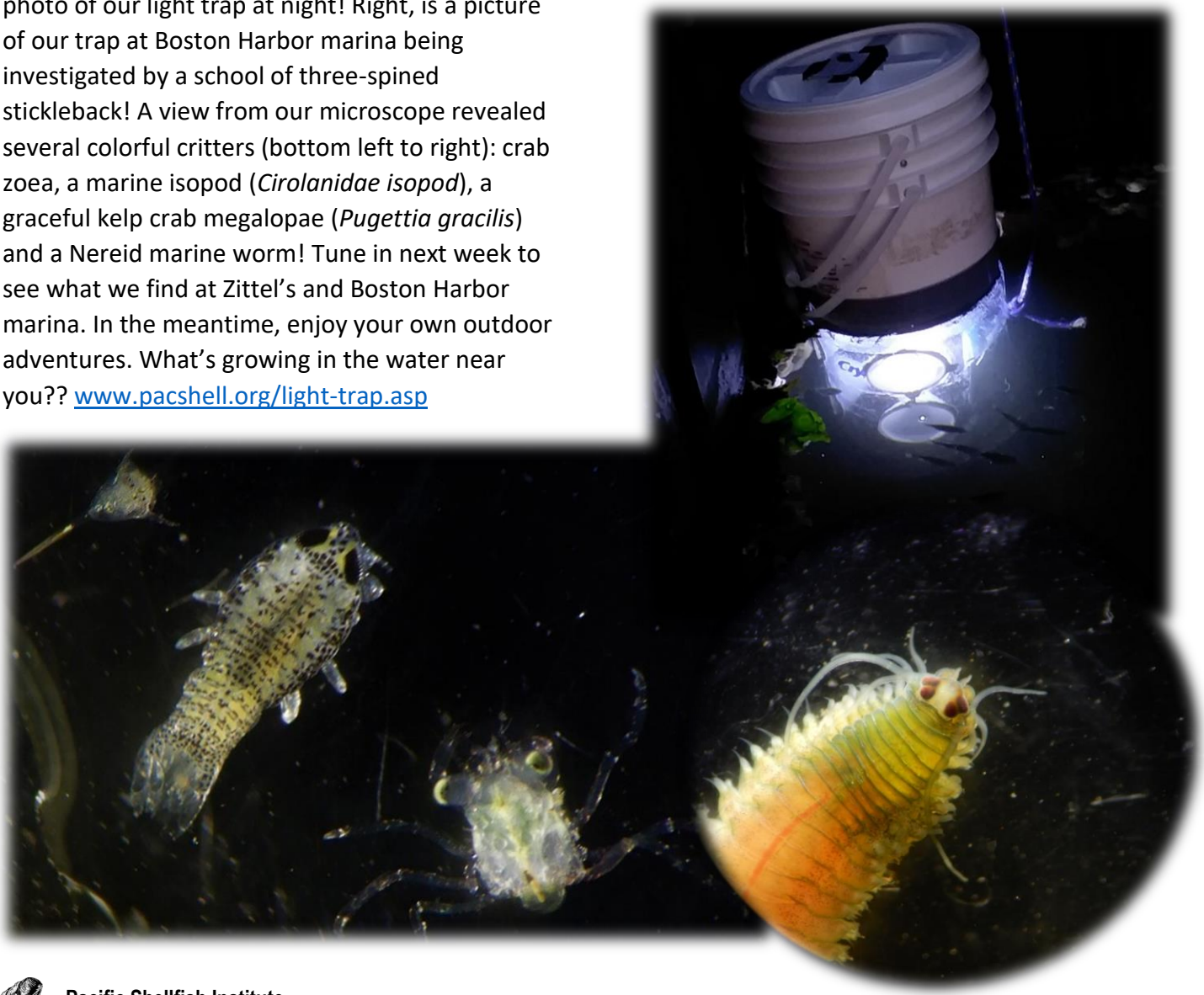
Depth: 2ft below surface

Temperature: 14.2°C or 57°F

Salinity: 29.0 ppt

Dissolved Oxygen: 8.81 mg/l

pH: 8.26



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LIGHT TRAP MONITORING - SOUTH PUGET SOUND

July 22nd, 2020

FIELD NOTES

It was a cool 67°F this morning at the docks, a welcome reprive from the hot weather we've been having! Some fun seal sightings at Zittel's marina. Each week I get the update from staff and residents – more seals than fish

and another baby seal is born! Always entertaining to watch the seal pups and parents lounging in the sun and slipping in and out of the water.

As I approached the trap I saw hundreds of small fish schooling around the dock. It seems that many managed to find their way into our trap. These small silvery fish are Pacific sand lance, a small forage fish common in Puget Sound waters. I was glad to arrive when I did to safely release them back into the bay.

FEATURED CREATURE!

Red-Eye Jellyfish (*Polyorchis penicillatus*)

Today's "Featured Creature" is the lovely Red-Eye Jellyfish (*Polyorchis penicillatus*). This jelly is a **hydromedusa** with a very round **bell** surrounded by red "eye-spots" also called **ocelli**. A unique characteristic of the hydromedusa is a shelf-like structure inside the base of the round bell called the **velum.** The velum helps this jelly gain more thrust when it contracts its bell, propelling itself through the water. The numerous short tentacles on this animal have special stinging cells called **nematocysts** that help stun prey and ward off predators (below). Common in nearshore bays among eelgrass, these jellies prefer feeding on small crustaceans, worms and tiny plankton. Only a few centimeters long, you won't need a microscope to spot these common jellies the next time you're at the dock! Photos: Katie Houle

LIGHT TRAP MONITORING - SOUTH PUGET SOUND

CRAB COUNTS

Today was a quiet day for crabs, but an exciting one for forage fish! If you are doing a Plot-Along-At-Home graph, you can add **THREE** crab megalopae from Zittel's marina and **FIVE** crab megalopae from Boston Harbor marina.

OTHER MARINE ANIMALS

After releasing all the sandlance from the light trap at Zittel's marina, we found thirty-five baby pipefish! Nearly microscopic, I would have missed them if it wasn't for the tiny blue eyes. Their bodies were almost entirely transparent and must have just recently been released from dad's brood pouch. In addition to these young pipefish, we caught juvenile three-spined stickleback (top right), shiner perch and more sandlance (bottom right). In addition to fish, we caught a few electric -- in speed and color – amphipods (bottom left) at Boston Harbor marina. It was a treat to see marine mammals (seal pups!) at Zittel's today and some Double-crested cormorants dipping and diving for their lunch! Stay tuned for next weeks critters!

WATER QUALITY @ LIGHT TRAP

Depth: 2ft below surface

Temperature: 13.7°C or 57°F

Salinity: 28.91 ppt

Dissolved Oxygen: 8.36 mg/l

pH: 8.36

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LIGHT TRAP MONITORING - SOUTH PUGET SOUND

July 15th, 2020

FIELD NOTES

Today PSI biologists checked two trap locations, the primary trap at Zittel's marina and a new trap at Boston Harbor marina. The new trap is a preliminary trial to see if any baby crabs are in the area. This trap was constructed by PSI staff and deployed on Monday to fish for two nights. Tuesday evening I was rewarded with a stunning sunset at Boston Harbor marina when I

stopped by to see if the light had turned on successfully. We are very fortunate to live in such a magical place! Thank you to staff at Boston Harbor marina for supporting the Puget Sound-wide effort to study juvenile Dungeness crab and for hosting our light trap! This new endeavor is supported by the Keta Legacy Foundation https://ketalegacy.org/ - Thank you!

We look forward to sharing any crab related news with you from this new location during our weekly updates!

WATER QUALITY @ LIGHT TRAP

Depth: 2ft below surface

Temperature: 13°C or 55.4°F

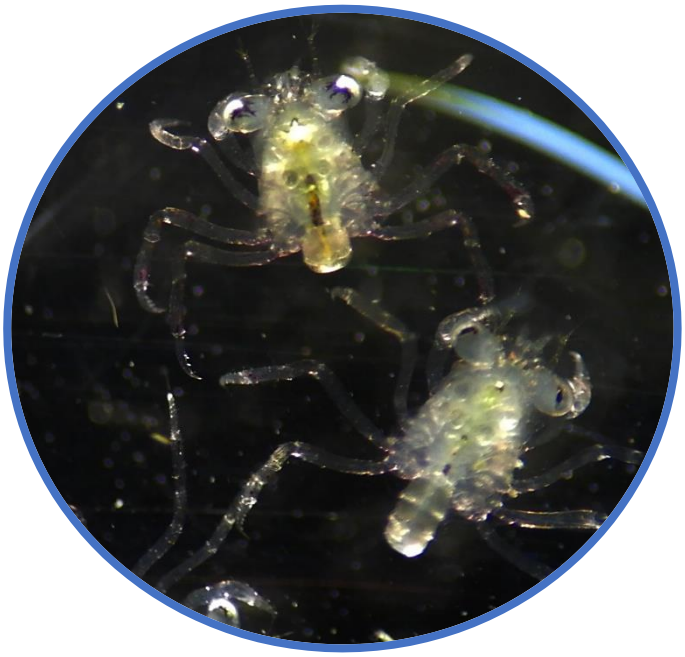
Salinity: 28.88 ppt

Dissolved Oxygen: 9.53 mg/l

pH: 8.51

FEATURED CREATURE!

Graceful Kelp Crab Megalopae
(*Pugettia gracilis)*



Today our "Featured Creature" is the graceful kelp crab megalopa or megalopae (plural). We found a total of **seven** in our light trap at Zittel's marina. There are several different species of kelp crab that call the rocky, muddy shores of Puget Sound home. When they are in the megalopal stage such as this, the carapace is close to 2mm long and 1mm wide. This makes them just visible to the human eye without a microscope. As adults, these crabs can be found in the low intertidal rocky shores, among eelgrass beds, kelp beds and hanging around pilings. Adult crabs have spines on their legs that help them hang on to kelp blades without being swept away by the current. We see many adult graceful kelp crabs at Zittel's marina clinging onto the blades of kelp that hang from the dock! This season we are seeing many megalopae, not a surprise as females can have up to 13,000 eggs per brood! Photo: Katie Houle

LIGHT TRAP MONITORING - SOUTH PUGET SOUND

CRAB COUNTS

Today we counted fifteen graceful rock crab megalopae (photo right) and seven shore crab megalopae for a total crab count of **twenty-two** crab megalopae in our sample! If you are plotting along at home, now is the time to add the # of baby crabs to your graph! All of the crab megalopae were caught at the Zittel's marina light trap. We caught no stages of crab at the new Boston Harbor location. Stay tuned next week to get crab reports from both locations!

OTHER MARINE ANIMALS

At the Boston Harbor light trap we found one adult bay pipefish and three itty bitty juveniles! Bay pipefish, *Sygnathus leptorhynchus*, are fairly common visitors to our light trap and very fun to observe up close! The color and shape of their bodies blend right in with their preferred habitat among eelgrass blades -- long, thin and green. Adults can grow up to 15 inches long (photo below), while these young pipefish were barely visible, no more than a couple centimeters long and threadlike (photo right). Sometimes we see adult males nearly bursting with their brood pouch full of eggs! Similar to seahorses, the males protect and incubate the eggs until it's time to hatch. We were happy to release them back to the bay to keep swimming and growing!


Photo: Katie Houle


Photo: Shannon Boldt

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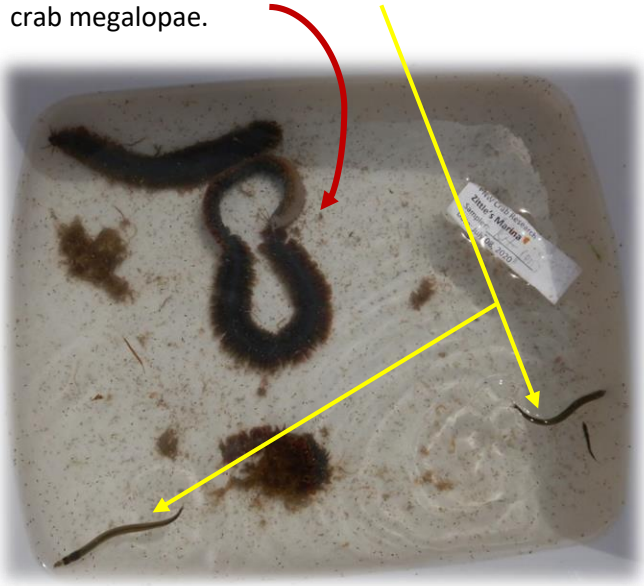
LIGHT TRAP MONITORING - SOUTH PUGET SOUND

July 8th, 2020

FIELD NOTES

Another beautiful day at Zittel's Marina for some research! Sunny and 62°F was fine by me. An interesting catch of large pile worms, forage fish and graceful rock crab megalopae.

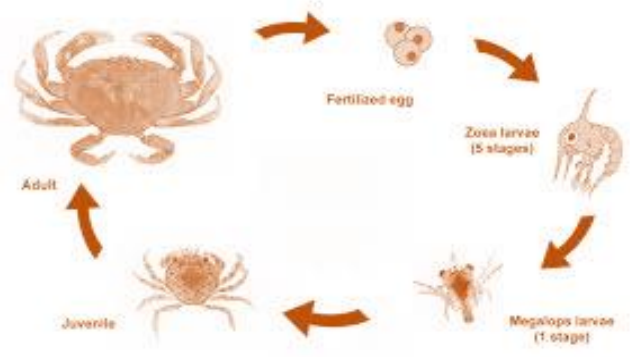


While collecting the sample, I took time to admire the outstanding array of sea anemones and tube worms hanging from the dock, waving their tentacles!

FEATURED CREATURE!

Crab Zoea (early life stage)

Today in the light trap, we caught several **crab zoea**, like the one in the photo above, our "Featured Creature" this week! After hatching from an egg, the zoea stage is the first stage in the life cycle of a crab. Zoea have limited mobility and float along with the currents as they continue to grow. Depending on the species of crab, zoea can range in size and shape. Crabs in the genus *Cancer*, including Dungeness crabs, go through five zoeal stages. Each stage is marked by a period of **molting**, or sluffing off of the hard exterior shell or exoskeleton to make way for new growth. *Photo*: Katie Houle. Life cycle of Dungeness crab below (adapted from Pauley *et al*. 1989).



LIGHT TRAP MONITORING - SOUTH PUGET SOUND

WATER QUALITY @ LIGHT TRAP

Depth: 2ft below surface

Temperature: 12.6°C or 54.7°F

Salinity: 28.91 ppt

Dissolved Oxygen: 8.3 mg/l

pH: 8.01

CRAB COUNTS

We found a total of **EIGHT baby crabs**, or megalopae in our light trap today of the graceful rock crab. If you are interested in plotting how many crabs you found, now is the time to start your own graph at home! Download the free template on our webpage or create your own.

OTHER MARINE ANIMALS

In addition to crab zoea and megalopae, we found some other interesting marine animals including two species of forage fish, pacific sand lance (below, Photo: USGS)

Photo: Katie Houle

and a three-spined stickleback. These two small species of fish are critical links in the Puget Sound food web. Juveniles feed on small crustaceans, marine worms, insects and zooplankton. In turn, they are preyed on by more than 100 species including juvenile salmon. Schools of these fish swimming near the surface attract many different kinds of seabirds, an important part of adult and baby bird's diet. Yum!

Source: WDNR https://www.dnr.wa.gov/Publications/em_fs13_021.pdf

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LIGHT TRAP MONITORING - SOUTH PUGET SOUND

July 1st, 2020

FIELD NOTES

Today at Zittel's Marina the weather was a mix of part sun and clouds. Rain on the horizon, coming my way! Only a slight breeze when I arrived at noon, beautiful:

Every time I arrive at the dock I check what's going on with the water using this handy tool called a YSI meter.

WATER QUALITY @ LIGHT TRAP

Depth: 2ft below surface

Temperature: 12.2°C or 54°F

Salinity: 28.84 ppt

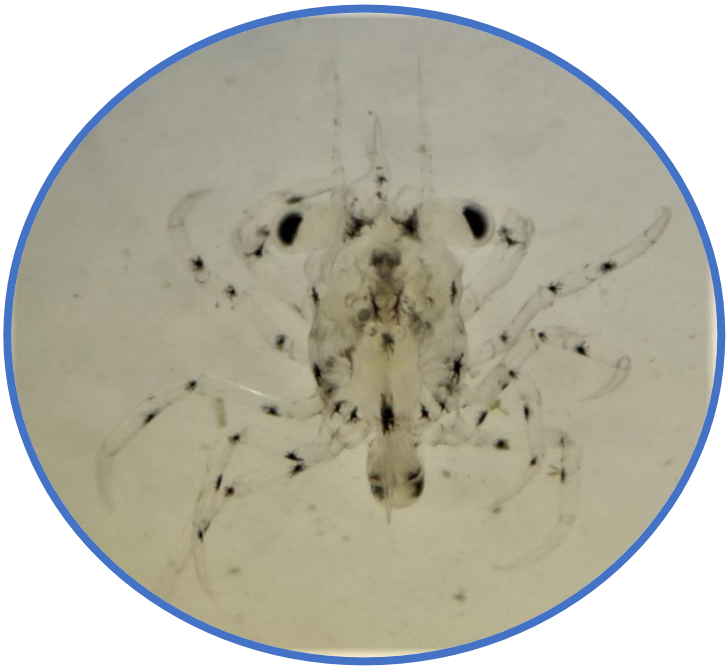
Dissolved Oxygen: 8.53 mg/l

pH: 8.14

FEATURED CREATURE!

The Graceful Rock Crab

Carcinus gracilis (megalopal stage)

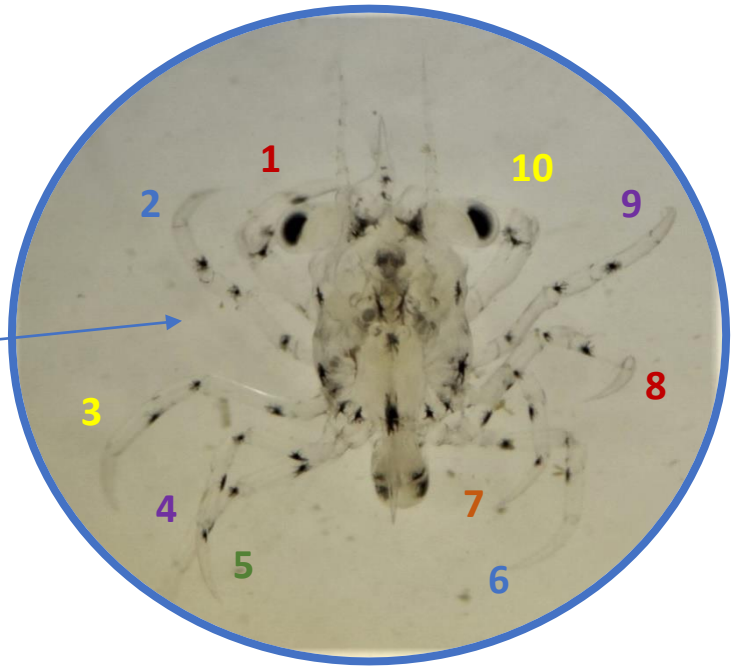


Today in the light trap, we caught this cute crabby, *Carcinus gracilis* or the Graceful Rock Crab. It is seen here in one of its juvenile life stages, called a megalopa. This crab is commonly found in Puget Sound. You may be more familiar with the adult stage featured in the photo below. Photos: Katie Houle (above), David Ayers, USGS (below)

LIGHT TRAP MONITORING - SOUTH PUGET SOUND

CRAB COUNTS

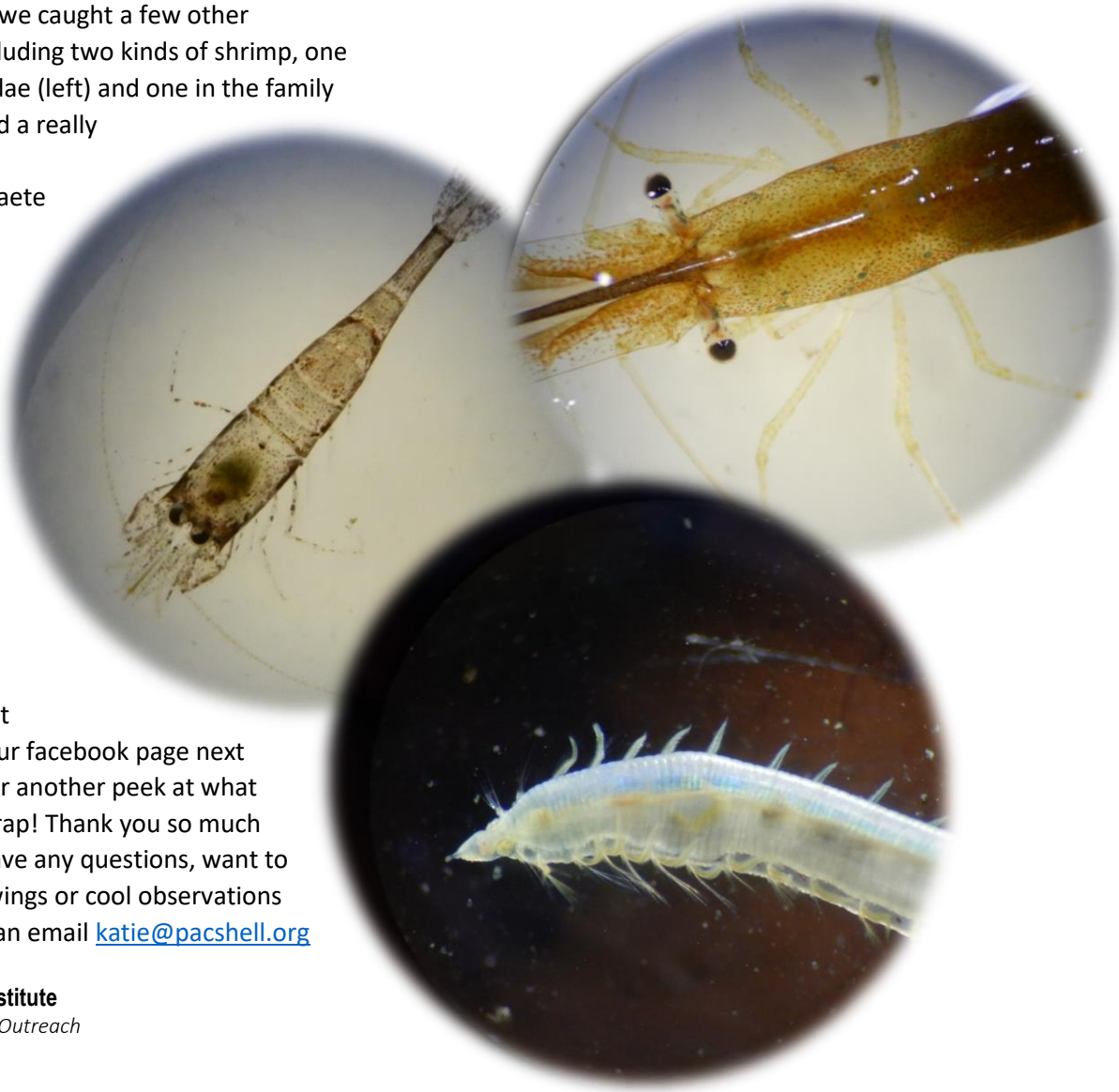
We found a total of **FOUR baby crabs**, or megalopae in our light trap today of the graceful rock crab, also our "Featured Creature" this week! If you are interested in plotting how many crabs you found, now is the time to start your own graph at home! Download the free template on our webpage or create your own. Can you count how many legs the graceful rock crab has?



I count a total of 10! This makes the graceful crab, a DECAPOD, meaning 10 feet in Latin, *deca* = 10 and *pod* = foot! In fact, all crabs are considered decapods. Other animals in the group of decapods include: shrimp, crayfish, and lobsters.

OTHER MARINE ANIMALS

Today in our light trap we caught a few other interesting animals including two kinds of shrimp, one in the family Crangonidae (left) and one in the family Hippolytidae (right) and a really cool marine worm also referred to as a polychaete (*poly*= many, *chaete*=bristles) – can you see the hair-like structures on its sides? These help the worm move through its environment. This one belongs to the group Ophelid.
Photos: Katie Houle



NEXT WEEK

Stop by our webpage at www.pacshell.org or our facebook page next **Wednesday, July 8th** for another peek at what we found in our light trap! Thank you so much for joining us! If you have any questions, want to share your graph, drawings or cool observations of your own, send me an email katie@pacshell.org

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