

Crab Times



New Website!

www.wsg.washington.edu/crabteam

Upcoming Events

We are adding many new events right now, for full details, visit our events calendar on our website.

Mini Seminar: Introduction to Invasive European Green Crab

January 17, 2 - 3pm (Bayview)
Padilla Bay NERR

February 6, 11am - 12:15pm
Sound Waters 2016 (Langley)
Hosted by Sound Water Stewards
Registration Required

February 10, 5 - 6pm (Pt Townsend)
Port Townsend Marine Science Center

February 11, 7 - 8pm (Poulsbo)
Poulsbo Marine Science Center

Volunteer Training Workshops

Registration required
See website for details

March 4, 9am - 3pm (Whidbey Is)
Trinity Lutheran Church, Freeland

March 14, 9:30am - 4:30pm
(San Juan Island)
Friday Harbor Labs, Friday Harbor

March 18, 9am - 3pm (Pt Townsend)
Port Townsend Marine Science Center



Winter 2016

Happy New Year from the WSG Crab Team!

With the turn of the year, we are reflecting on the successes and lessons learned from our pilot season of pocket estuary monitoring, and now that the traps are washed and stored for the winter, and the data sheets are in, we are grateful to have this opportunity to update you on our success last year and to look forward to what is coming up for 2016!

During the summer of 2015, we held three training workshops, recruiting 30 volunteers and launching monitoring at seven sites: two in South Sound, four in Island County, and one near Port Townsend. Our awesome volunteers spent a combined total of 217 hours looking for green crabs, and recording everything that was present in traps and molt surveys. You can read about our search for European green crab and what we saw in the traps in this newsletter. You'll also have a chance to meet Crab Team volunteers and take a virtual trip to monitoring sites in our Site Spotlight.

Over the fall and winter, the Crab Team has been working to evaluate the success of our pilot year, and adjust our protocol and trainings based on feedback from this year's pioneer volunteers. With the help of UW Capstone Student, Natalie White, we have solicited and are reviewing extensive feedback from our volunteer monitors on ways we can improve. We are also identifying new potential sampling sites to add to our list for next year with the goal of expanding to monitor 30 sites across Puget Sound, the San Juan Islands, and the Strait of Juan de Fuca.

This winter, we are offering mini-seminars throughout Puget Sound, on the history and threat of the European green crab invasion worldwide. We hope that you can join us at one near you. Check the events calendar on our website for new dates and locations as we add them. For all of the latest, check out the Crab Team Calendar on our website. You can also get updates by following us on Twitter (@WAGreenCrab) or Facebook (WSG Green Crab). We can't wait to get back in the mud in April 2016!

Until then, happy crabbing!

Crab Team

The Crab Team is a project of Washington Sea Grant that aims to learn about Washington's inland shorelines, and monitor them for invasion by the European green crab. The Crab Team partners with volunteers and institutions to survey the habitats that could be affected by European green crab, with the goal of detecting the invasive at the earliest possible stage of establishment, increasing our chances of controlling populations and reducing its impacts.

This project has been funded wholly or in part by the United States Environmental Protection Agency under Assistance Agreement PC 00J29801 to Washington Department of Fish & Wildlife. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

Where Are the Green Crabs?

The good news is: Not at any of the sites we are monitoring

No invasive European green crabs were found at any of the 7 sites we monitored this summer, which is truly a great relief! That doesn't necessarily mean that they aren't yet present in Washington's inland shoreline habitats – we might just not have looked in the right spot. To cast a wider net, we will be expanding the list of monitoring sites next year, aiming for a total of 25 sites monitored all across Puget Sound.

We are targeting sites that we think will be good habitat for this species (see sidebar), but in order to be good monitoring sites, we *also* have to obtain permission from landowners to work at them, and they have to be safe to navigate. Next year we hope to add more sites that are closer to the potential source population in Sooke Inlet, BC, where we hear the population of green crabs is thriving! If you are interested in what sites are currently being monitored, and what sites look like good green crab habitat, visit the green crab map: www.tinyurl.com/wagreencrab.

If not green crabs, then what *did* we find at our sites during 2015? Each month, Crab Team volunteers set baited traps and record everything that was found in the trap, regardless of whether or not it's a green crab. This is very valuable information about what is living in habitats that could be affected by green crabs, even more so because these habitats aren't typically well studied. So not only are Crab Team volunteers helping protect Washington's valuable natural resources, they are increasing what we know about the communities of organisms that live in salt marshes and pocket estuaries.

Even though we only sampled a handful of sites in 2015, we are able to start seeing some trends. For instance, by far,

For a summary of monitoring results: <http://tinyurl.com/2015Monitoring>



the most common animal in the traps was the hairy shore crab (*Hemigrapsus oregonensis*, see Creature Feature, next page). In parts of California where the green crab is also invasive, populations of the hairy shore crab have dropped, possibly due to competition with or predation by the invasive crab.

What is good green crab habitat?

Based on sites where green crabs have invaded in other parts of the west coast, including Willapa Bay, WA, we've identified a set of habitat features that make a site favorable for green crab establishment:



Photo: E. Grason

Salt marsh channels In quiet side channels like these, the sloughing, undercut banks offer great hiding spots for green crab when the tide is out. They can keep cool and wet in holes in the banks, waiting for the tide to return.



Photo: J. Adams

Marsh vegetation Dense growth of saltmarsh plant, such as grasses and pickleweed, also protects green crabs from larger predators when the tide is in – that's when the large crabs come in to forage in the rich pocket estuaries



Photo: E. Grason

Quiet, isolated, lagoons So-called "pocket estuaries", such as lagoons cut off from the main shoreline, offer green crabs protection from the larger crabs (such as Dungeness or red rock crabs) that would eat green crabs if given the chance. Pocket estuaries are also often full of good things to eat, which for green crabs

Site Spotlight

Site 311: Penn Cove Whidbey Island

You might be familiar with Penn Cove, in the middle of Whidbey Island, as the source of some mighty tasty mussels. Not far from the Penn Cove Shellfish Company mussel rafts is a lovely pocket estuary we affectionately call site 311. A pair of coupled lagoons sit at the head of Penn Cove, which, along with the adjacent tidelands are managed by the Washington Department of Fish and Wildlife. These lagoons don't get much attention by themselves, perhaps noted by clam diggers heading out to the recreational shellfish bed on a good low tide, but they are a great pocket estuary and potential green crab habitat. The top lagoon is shallow but doesn't drain all the way on even the lowest tides, and is ringed by pickleweed and marsh grasses.

Imagine this lagoon from the perspective of a green crab: when the tide comes in, along with it, come the Dungeness crabs that migrate to deeper waters of Penn Cove at low tides. They sure look hungry, so you had better retreat to the marsh plants. The dense stems create a forest that is too difficult to navigate for the big Dungeness, so you're safe from getting eaten. When the tide drops, and the big boys leave, you're left with an abundance of small crabs (*Hemigrapsus oregonensis* primarily) and fishes (*Leptocottus armatus*, staghorn sculpin), and worms to eat.



Photo: E. Grason

Members of the Penn Cove Monitoring Team: Charlie Seablom, Dave Grason, and Debra Paros (Photo: E. Grason)



Penn Cove from space, showing the coupled lagoons, and the location of sampling (Imagery: Google)

Anyone who has walked the beaches of Penn Cove has seen the astounding abundance of mussels growing on the cobble beaches that come from the mussel operation. When the mussels on the rafts spawn, larvae flood Penn Cove. These shellfish offer a potentially abundant food source for green crabs (as well as everything else living in Penn Cove). Penn Cove is a great place to be if you're a mussel-loving human, but we also think it could be a place green crabs want to be as well. In other parts of their range, the invasive green crab has been problematic for mussels. Don't worry, the mussels on the rafts should be well protected, however, because they are suspended off the bottom, making them difficult for green crabs to reach.

The team of volunteer monitors at Penn Cove, captained by Debra Paros, crewed by Dave Grason, Susan Mador, and Charlie Seablom, has a wealth of shoreline monitoring experience, several are Sound Water Steward (formerly Island County Beachwatchers). They have shown a particular knack for thinking critically about the protocol, and proposing techniques to increase sampling efficiency.

In just the first two months of sampling, they have counted a total of 1,300 *Hemigrapsus oregonensis* (993 live, 307 as molts), 12 *Leptocottus armatus*, and 1 graceful crab (*Metacarcinus (Cancer) gracilis*) at their site. This group is also very fashion-forward, demonstrating that you don't have to sacrifice couture just because you're working with your knees in the mud.



Photo: D. Paros

Susan Mador, also of the Penn Cove Monitoring Team, demonstrates proper bait jar technique. (Photo: D. Paros)

Creature Feature

Hemigrapsus oregonensis: The other “green crab”

After just two months of sampling, volunteers are already very familiar with this species, which, despite an abundance of common names, is known on data sheets simply as HEOR (for *Hemigrapsus oregonensis*). This is the little crab you are most likely to see skittering away if you turn over a rock on the beach and, no, they aren't baby crabs, they are full grown at about 2 inches. They are omnivorous and use the small fleshy tufts on the inside of the claws to help them feed on algae. One thing you will quickly notice is the diversity of colors in this species. They can range from nearly pure white, to orange and red, to green and brown, and even, rarely, purple (sparking confusion with the “purple” shore crab, *H. nudus*). Read more about color variation in HEOR in the San Juan Islands at <http://tinyurl.com/HEORcolors>.

The rainbow of supposedly “green” shore crabs begs the question, why are there so many colors of HEOR? Is it a need to express their crabby individuality? A recent paper by Greg Jensen and colleagues out of the University of Washington looked into one aspect of this question, crabs with white patches. The researchers surveyed HEOR from across Puget Sound and found that crabs with white patches were more frequently found at whiter beaches, such as those with a lot of barnacles, suggesting camouflage might play a role in keeping white patches in the gene pool. They also found that some, but not all, HEOR can get darker when they molt, but that there are fewer larger, older males with white patches than females. The authors hypothesized that the sex difference might be caused by the fact that male crabs tend to be bolder; male crabs might put themselves at greater risk of getting eaten than females, especially those with white patches if they don't blend in well. Read the full research paper: <http://tinyurl.com/jensenHEOR>.



Photo: E. Grason

There is a surprising number of colorful HEOR once you start looking. This female, from Penn Cove, was sporting a red patch shaped like a star.

The notion of male boldness is one that we can see even in our own traps. This past year, we captured 7 male HEOR for every female. That could just mean that there are more males in the population than females. However, the group of volunteers at Iverson Spit casually observed that the ratio of males to females in the

molts they counted was closer to 50:50. Counting molted shells should be a less biased sample of the population than counting the crabs that choose to come into a trap, so this



Photo: J. Adams

Species Name: *Hemigrapsus oregonensis*

Common names: Hairy shore crab, yellow or green shore crab*, Oregon shore crab

Size: up to 2 inches across the carapace

Distinguishing features: Square-shaped carapace with 3 marginal teeth (spines to the outside of the eye), hairy legs (distinguishes it from the similar *Hemigrapsus nudus*)

suggests that, indeed, the males are more likely than females to seek out the stinky mackerel bait and risk predation and competition from other males.

We humans are often most fascinated by the rarest creatures, perhaps believing that the common ones have little to teach us. We see them so often they become, well, boring. But the very success of common species itself is a fascinating topic,

and begs a key question: what are the factors that enable a native species to become extraordinarily abundant? It's clear that we still have much to learn about *Hemigrapsus oregonensis*, and there will be lots of opportunity as we measure and sort these “other” green crabs.



Photo: Kala Krabbers

Volunteers monitoring at Kala Point captured a lot of HEOR. This single trap held more than 400 individual crabs!

*a confusing name, particularly since the European green crab is known as the “shore crab” in its native range in Europe!