



CRAB TEAM

MONITORING HANDBOOK

2018 Edition



Welcome

Thank you for your work to help protect Washington's shorelines! As a volunteer monitor, you will conduct two types of survey to monitor pocket estuaries in Puget Sound, the Strait of Juan de Fuca and the San Juan Islands for invasion by European green crab (*Carcinus maenas*): trapping and shoreline surveys. The Crab Team staff at Washington Sea Grant (WSG) has identified sites that are thought to be at highest risk of invasion based on habitat suitability. To increase the chances that we will detect green crab at the earliest possible stages of invasion into inland Washington waters, monitors will:

- work with a team of 3-5 monitors at an assigned site,
- conduct monthly surveys from April through September of each year,
- submit data to WSG within a week of completing surveys, and
- notify WSG immediately upon finding evidence of green crab presence.

We will increase monitoring at sites where green crab have been positively identified to determine whether crabs are successfully establishing at that site, and how they are affecting other organisms in the community.

How were sites selected?

Crab Team staff have created, and maintain, a map of shoreline sites in Washington's Salish Sea categorized by habitat suitability (www.tinyurl.com/wagreencrab). On the West Coast, European green crab have been observed to prefer habitats with the following characteristics:

- Low wave action
 - shallow beach slope or extensive tide flat
 - meandering channels or sloughs, with undercut or sloughing banks
 - isolated lagoons or artificial impoundments (e.g., culverts)
- Low freshwater input
- Marsh vegetation, like pickleweed (*Salicornia*) that crabs can use for shelter

Early detection monitoring is focused on these sites because green crab are likely to first be detectable in places where they do best. In addition, these are the types of habitats most likely to be impacted by green crab if they become abundant in our region. Other considerations that determine which sites are monitored include whether we can obtain legal access, geographic distribution, whether the site is large enough to accommodate the number of traps we use, and whether volunteers can safely navigate the terrain to conduct the protocols. Crab Team continues to refine this list by ground-truthing. Observations from trap catches and molt surveys will also help us tell if green crabs are likely to be able to live at a site based on the other species found in that habitat. To precisely and consistently target the best sampling locations within a habitat, sites will be delineated with semi-permanent markers (rebar stake) to provide a visual reference point for consistent sampling.

Contact us:

wsg.washington.edu/crabteam

Email: crabteam@uw.edu



@WAGreenCrab

VOLUNTEER GUIDELINES & RESPONSIBILITIES

Your contribution of time is very important to us, and we do the best we can to make sure the data you collect will be valuable to science. In order to make this possible, sampling must be conducted consistently across all sites and over time. Therefore, we ask that you commit to participate in Crab Team only if you can be present for at least 80% of sampling days (at least 9 or 10 out of the 12 per year), and attend trainings. This is also a courtesy to your team members who rely on your participation. To be covered as a volunteer for the University of Washington, please **record the actual times you worked**, including preparation, travel, and clean up, on your data sheets each month for both survey types.

Safety & Stewardship

Please be aware that, despite their mild appearance, pocket estuaries can be hazardous areas to work in. If you think an area is potentially dangerous and are uneasy about accessing it, **DON'T DO IT!** Be mindful of the tides and *always* work with a partner on site. Proper footwear (narrow ankle boots or hip/chest waders) makes it much easier to get unstuck, and you can also use shovels or buckets for leverage in soft spots. The footing can change with the tide, so use care when traversing uneven ground, especially slippery surfaces such as wet rocks or seaweed. Don't forget weather protection; being comfortable during surveying makes the work much more fun. Please be mindful of your role as a steward of these natural areas, and minimize disturbance on the site as much as possible. Respect the property rights of local landowners, and help maintain good relationships with neighbors and other site users.

The Washington Department of Fish and Wildlife (WDFW) classifies European green crab as a prohibited animal species under WAC 220-12-090. A permit is required to possess this species, even as a part of a WDFW monitoring and control program. Crab Team obtains a permit covering all monitors we train. However, **you must be carrying a copy of the permit while you are trapping in order for it to be valid.** The permit will be renewed annually, so we will provide a copy at the beginning of each sampling season.

Gear required and provided

In addition to your own boots, each group will need a digital camera for this project. We will ask you to submit images of your trap catches so that we can verify the species being trapped. This doesn't need to be a fancy camera, your phone will most likely take adequate pictures. We will loan everything else you will need. We appreciate your help sustaining this project by taking good care of the gear, and returning it to us if you ever decide to end your participation. Please also let us know if any additional materials would be helpful, and we will see what we can do to make your job easier.

Each team will be provided:

For trapping:

- 3 - Square Fukui traps
- 3 - Galvanized steel minnow traps
- Bait (frozen mackerel) & Bait Jars (6)
- 6 - pencil rod trap stakes
- 1 - Set calipers
- Photo ID Cards and wax pencil
- 2 – Sorting Bins

For shoreline surveys:

- 1 - 0.1 m² PVC quadrat
- 1 - 50 meter rope

General gear provided:

- Gloves
- ID guide
- Clipboard
- Datasheets (on waterproof paper)
- Zip ties (trap repair, general use)
- Hand lens

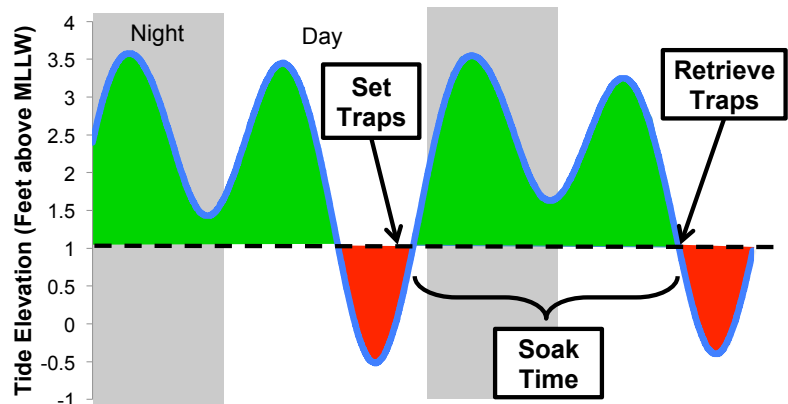
TRAPPING

Set a total of **6 baited traps** (3 square Fukui traps, and 3 minnow traps) **for one nighttime high tide per month** from April through September.

1. Timing

Traps should be deployed (“soaked”) for one overnight high tide, because that is when crabs are most actively looking for food. Depending on your site, and the tide, this could mean your traps are soaking for between 12 and 20 hours. The goal is to maximize the time that traps will be actively “fishing” but also ensure that any other organisms you catch will not be stranded out of the water when the tide drops to avoid mortality of native critters. This will take a bit of planning with tide forecasts.

This diagram shows a two-day tide forecast. Each 23 ½ hour tidal cycle has two high tides and two low tides - one higher, one lower for each. Set your traps on an afternoon or evening incoming tide, and retrieve them the next day, on the next tide low enough to reach your traps, as the tide is receding. You will trap monthly April through September, but the exact timing is flexible. Because the precise timing of tides varies depending on location, you can choose dates and times that are good for your site and team.



In this example, traps are set at +1ft (dotted line). At this height, traps will be submerged (fishing) any time the tide is predicted to be above +1ft (areas in green), but traps would be out of water if the tide height is below the trap elevation (red areas). Make sure traps are under water during overnight low tide.

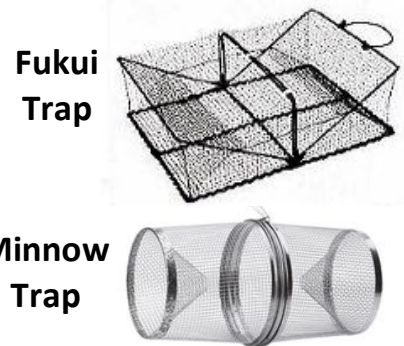
- To find the tide forecast for your site:**
- www.tidesandcurrents.noaa.gov/tide_predictions.html
 - App for iOS: Tide Graph

2. Preparation

A few days before setting traps, check that they are in good condition, clean and free of debris, and without holes in the mesh. Small holes can be repaired using zip ties. Each trap should have an orange tag with the WSG contact information.

If you need to notify a site owner of your sampling dates, contact them at least two business days before visiting the site.

A few hours before you head out, remove the bait you will use from the freezer to allow it to thaw slightly. This will allow the bait to start attracting crabs to the traps more quickly. Gather the gear on your checklist, and make sure you’re prepared for the weather.

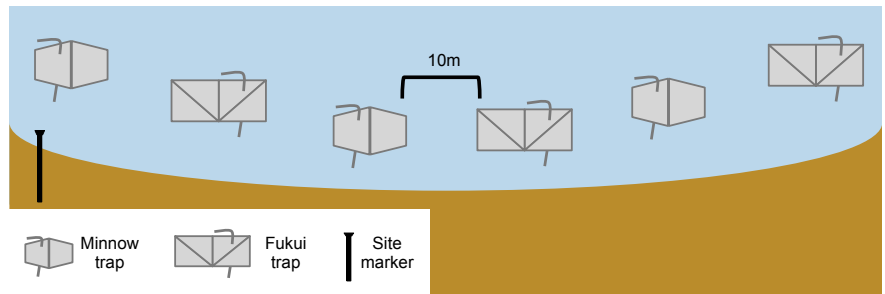


3. Setting Traps

You will set 3 square Fukui fish traps and 3 cylindrical minnow traps at each site.

- Time your trapping.** Plan to arrive at the site with enough time to set up traps on shore, and to still be able to walk out to the appropriate depth with your traps.
- Bait traps.** It's easiest to load the bait into bait jars while still on the beach. The bait has been portioned out for you; you only need to empty one sandwich bag into each of the 6 bait jars.
- Site the traps.** Generally, traps should be arrayed in a line parallel to the shore, starting adjacent to the stake marking your trapping location. Alternate the type of trap so that minnow and Fukui traps are interspersed and spaced approximately 10 meters apart (about 10 long paces).

All 6 traps should be at roughly the same tidal height. If water is retained at low tide, in a lagoon or slough, then your traps should be more than half submerged when you set them. If your site is on a sloped beach, set the traps deep enough so they won't



be exposed on the higher-low tide before you return to collect them. We want the organisms to be healthy when we release them. It is more important that the traps are placed in water than it is that they are precisely 10m apart, so it's ok if you need to adjust slightly to find pools of water in a channel, for instance. It is better for traps to be slightly more than 10m apart, rather than closer.

- Set up the traps.** Place one bait jar inside each trap, but you don't need to attach jars to the trap. Close the Fukui trap by lifting the collapsible sides and clipping them at the top. The two halves of each minnow trap clip together with the pin provided -- make sure each trap is clipped fully closed.



Traps should be more than halfway submerged, with the stake securing the trap.

which are sturdiest. If the substrate is too hard to securely stake the trap, try angling the stake slightly, or moving the stake and trap around a bit. If you consistently find this to be a challenge, check with Crab Team staff. We might need to target a different part of the site, or weight traps with rebar to ensure they don't get moved or lost.

- Record the time that your final trap was set**, so that we can calculate the "soak time", or the amount of time that the traps were fishing for crabs.

4. Retrieving Traps

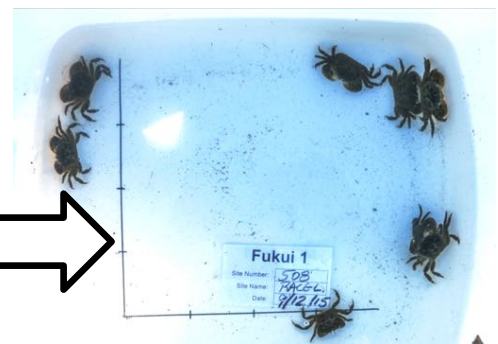
Check the traps the next time they will be out of water and **record the number and species of all organisms** in the trap. You will be sorting organisms and recording data at the same time, so it's easiest to work with a partner or two: one person can record data, and the others can handle the traps and organisms.

- Timing.** Plan to return to your traps as the tide is dropping, i.e., before the low tide. This will ensure that any organisms in the trap will remain in water, and should survive upon release.
- Record trap retrieval time as the time the first trap was removed** from the water. Even though it might take you a while to get through the traps, it's unlikely anything will climb into the traps once you are working at the site. Also, record the predominant weather condition (*select one*) that best describes the period during which the traps were soaking.
- Remove and record organisms in first trap.** Pull the stake, remove debris, and bring the trap back to shore. Carefully, to avoid losing any critters (data!), empty the contents of the trap into the tub with the scale bar on the bottom. This is tricky with Fukui traps, and requires patience not to injure the critters. Note that it is OK if very small critters fall through the mesh of the trap before you open it, as you pull it from the water, because that means they are too small to be sampled.



Empty contents of one trap at a time into the bin with the scale bar.

Photograph all organisms in each trap



Trap ID Photo Card

Minnow Trap 1

Site Number: _____

Site Name: _____

Date: _____

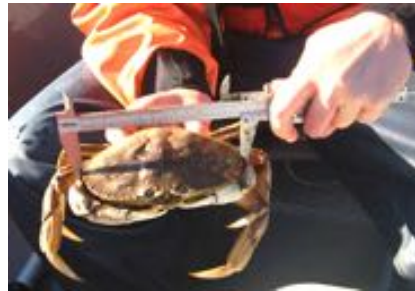
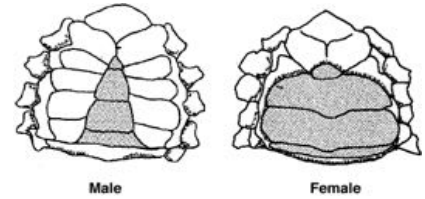
- Take one photograph of entire trap catch** including the corresponding completed trap photo ID card. Try to get as many of the organisms as possible clearly visible in the photo, although this will not be possible if there is a great number. You will submit this with your trap data for data verification. Ensure reasonable resolution and avoid glare and shadows in the photos as much as possible.
- Record trap catch on data sheet. All species: Identify and record the number. Crabs: Measure the size of up to 10 of each sex (up to 20 total) - except hermit crabs.** Fish should be counted and released first (but after photographing) because they are sensitive. Handle fish carefully, many species have defensive spines, *and* they can be easily injured. Use care when handling crabs as well, to avoid getting pinched or removing limbs, which take a while to regrow. Gloves will not protect you from large crab claws, but they can be helpful in guarding against pinches from the small shore crabs.

On the data sheet, fill out a separate row for each species found in each trap. Fill out the trap type (M: Minnow; F: Fukui) and number (1-3) that matches with the photo card. The order is not as important as matching the photo card to the data sheet. For each species, use the 4-letter code from the ID guide, and measure and tally the individuals of that species as described below. After counting an individual, move it to the second bin, the one without a scale bar, to avoid re-counting before releasing.

4. Retrieving Traps (continued)

- f. For crab species *only* (except hermit crabs), count the total number of males and females of each species, and measure size for a subsample. To avoid size bias, select individuals *haphazardly*, without looking, until you have measured 10 males and 10 females. Measure the carapace width at the widest point (including spines) to the nearest millimeter using the calipers. If there are fewer than 10 males or 10 females of a crab species, take size measurements on all individuals present. Record the size of each crab in one of the 10 boxes in the row corresponding to the correct sex for that species. When you have filled the boxes for one of the sexes, you may simply count the remaining number *of that sex* to obtain a total for each sex of that crab species.

To determine crab sex, look at the abdomen



Measure the carapace at the widest point, including spines, with calipers

Feminized male shore crabs (HEOR or HENU) are treated as male, and can be noted in the Comments column. Please also record the number of mortalities, and number of egg-bearing females if there are any. We have a very low mortality rate, but it does happen, and we report to WDFW.

For crab species, record the total number of males and total number females on the appropriate sub-rows of the data sheet. For non-crabs and hermit crabs, record only the total number (disregard sex).

- g. **If a trap is empty, clearly indicate that on the data sheet.** Write “EMPTY” in the species column and submit a photo of an empty bin with the corresponding trap ID photo card. This allows us to be sure that no traps were skipped, and leaves a placeholder for all of the data.
- g. **Release all organisms in the water nearby, EXCEPT** European green crabs (see below).
- h. **Repeat with each of the other traps one at a time.**
- i. **If you catch a green crab in your trap**, text a photograph to the Crab Team as soon as possible to verify ID. Photograph both top and underside of the crab with your calipers in the image for scale. Record the species data as with native species. Keep the crab live (cool and damp, but not in water) until you receive instructions from Crab Team.
- j. **If you are unable to identify an organism**, take several photographs from different angles with your calipers or the scale bar in the bin in the photo for size reference. If you are confident the organism is *not* a green crab, release it with the other organisms. Use a placeholder on your datasheet, such as “Unknown species A” until the organism can be identified. Email photos and a description to Crab Team as soon as possible so that we can ID the organism for you before you turn in your data sheet.

If you catch a green crab:



It is our goal to identify every organism in the traps. Take a lot of pictures and notes so we can identify the species for you!

5. Clean and store gear



**STOP INVASIVE SPECIES
IN YOUR TRACKS.**

PlayCleanGo.org

Take the used bait home to discard. This avoids fouling the sites and creating an incentive for local raccoons to investigate traps in the future. Remove any seaweed or other debris that has collected on or in the traps and rinse mud off the traps in the water of the receding tide. Cleaning as much material as possible at the site will not only make your job easier at home, but it will also reduce the possibility that you could transport organisms on the traps to a new location. When you get home, rinse all your gear well with fresh water. Gear will need additional decontamination if it will be redeployed at a different site, but your gear should not be used at any other site without consulting Crab Team staff.

Store gear in a dry, covered space, out of direct sunlight. If any of your traps have lost their tags, request replacements from the Crab Team so we can get them to you before the next sampling. Do not use your Crab Team gear at any other site, or for any purpose other than Crab Team sampling.

6. Submit Data

Please submit photographs of traps and data sheets electronically within one week of sampling.

For detailed instructions, see page 12.

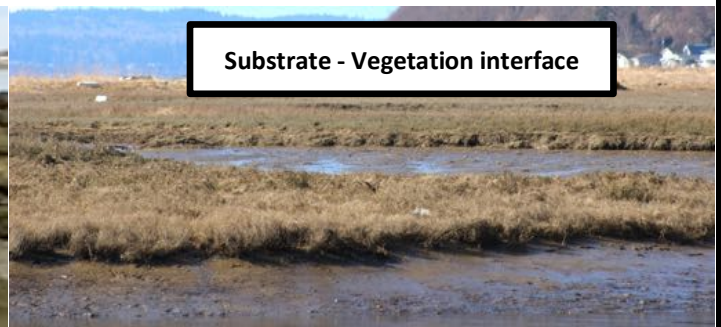
SHORELINE SURVEY

Conduct **one habitat transect and one timed molt search** each month from April through September to characterize the shoreline vegetation, substrate, and crustacean community.

A shoreline survey enables us to take a close look at the habitat and other organisms living at the site that might not be attracted to our traps. By observing these plants and animals closely, we can track whether or not they are impacted by European green crab. In addition, searching for crustacean molts gives us an additional way we might find evidence of European green crab if they are present.

1. Habitat Transect

- a. **Find the habitat boundary.** On a low tide (at least +1 ft or lower), identify the line at which the bare ground (mud/sand) of the subtidal environment interfaces with the lowest observed intertidal habitat. Sites fall into two categories: vegetation or riprap, and this survey will focus on the deepest edge of the “structured” habitat, either plants or rocks respectively.



- b. **Set the transect.** Starting adjacent to your site marker, string the 50 meter rope or measuring tape along the line formed by the deep boundary of the vegetation or riprap zone. Trace the lowest edge of plant *stems* or rocks - don't include overhang of vegetation or rocks in the transect. Follow the general contour of this lower boundary, you don't need to be extremely precise. Small, sparse patches of vegetation found deeper than the main area do not need to be included. Connect gaps larger than 5 meters.

As much as possible, avoid stepping in the transect zone while you are on site. Trampling the area could change your observations and the site over time.

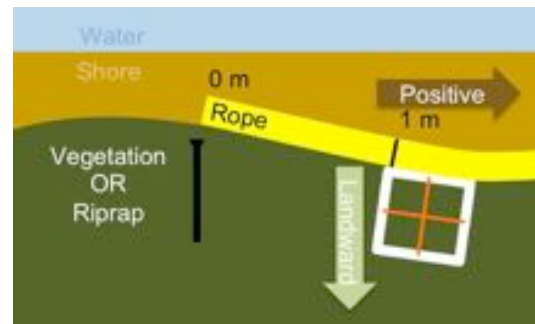


1. Habitat Transect (continued)

- c. Estimate percent cover at 10 - 0.1 m² quadrats along the entire transect. The quadrat sampling locations are chosen by randomly-generated numbers. Each month you will use a new set of distances (1-50) for your quadrat sampling locations using the table to the right. These numbers will change annually. For instance, in April 2018, you will survey quadrats at the 1, 5, 11...and so on, meter marks along your rope or tape.

Month	2018 Randomly Sampled Distances
April	1, 5, 11, 14, 15, 25, 27, 31, 43, 44
May	2, 3, 8, 10, 14, 31, 38, 43, 48, 49
June	7, 8, 9, 12, 15, 26, 35, 41, 42, 49
July	6, 18, 21, 26, 27, 33, 34, 36, 37, 42
Aug.	10, 14, 18, 20, 28, 31, 33, 43, 46, 47
Sept.	1, 7, 25, 30, 31, 37, 39, 43, 45, 50

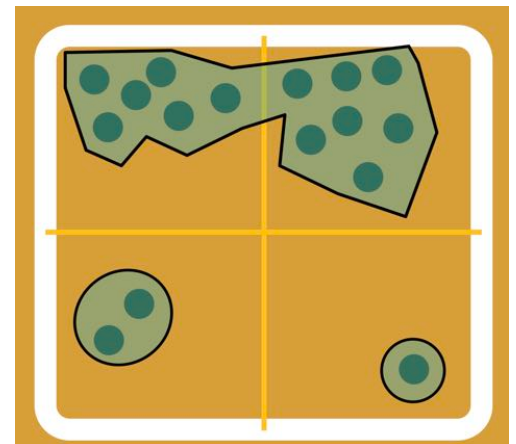
The entire quadrat should be on the landward side of the rope, positive relative to the meter mark.



- d. **Box 1: Visually estimate percent cover of wrack** (to nearest 5%). You do not need to record anything that covers less than 2.5% because that would be rounded to 5%. Assess only the *top layer* of wrack material, as if it were a 2D photo. This will total 0-100%:

- Eelgrass (dead or live)
- Seaweed (dead or live)
- Trash (of human origin, plastic, etc.)
- Terrestrial vegetation (leaves, sticks)

- e. **Box 2a: Remove wrack, and estimate percent cover of filamentous green algae.** This can range from 0-100%, independent of other categories. These wooly mats can grow on vegetation, or directly on the mud. If it is not attached, count it as wrack - seaweed. Estimate to nearest 5%.



- f. **Box 2b: Estimate percent cover of habitat categories to nearest 5%.** These should total exactly 100%, independent of the total percent cover of wrack or filamentous green algae.

- **Rooted vegetation:** e.g., pickleweed, marsh grass, estimate the area of the quadrat that is stabilized by roots underground.
- **Live epifauna:** animals living at that spot, e.g. barnacles, mussels, snails, but not crabs - anything that can't move out of the quadrat faster than you can estimate its cover. Don't include dead organisms or empty shells.
- **Bare substrate:** everything else to total 100%

Estimate the rooted area of the quadrat by imagining "buffers" or "halos" around plant stems.

- g. **Box 3: Record the dominant sediment type** in the quadrat as one of the categories to the right. If it is a combination, choose the one that takes up the most space.



- h. Repeat steps d-g for remaining 9 quadrats.

2. Timed Molt Hunt

The goal of the molt search is to collect as many molts as possible with a standardized amount of effort.

- a. **Start with *everyone* standing at the site marker.** Walking time is included in the search. Target the areas you think will have the greatest density molts. Spotty patches of beach wrack are a great place to look, as is the base of vegetation, or below large beach logs.
- b. **Collect molts for a total of 20 person-minutes** (for 2 people: 10m each; for 3 people: 6:40 each, etc.). Start a timer, and say “Go!”, at which point you may walk to the spots you’ve targeted, and start collecting as many molts as possible. Use a timer with an alarm - it’s easy to lose track of time molt hunting. Many molts are small, especially shore crabs. Collect molts from any crustaceans, including amphipods, shrimps, etc. Don’t try to ID molts as you collect them.

Most molts will be small crabs, but collect *all* crustacean molts



Burrowing Shrimp - BURR Hermit crab – HERM*

* Hermit crabs should be identified to species if live (PAGR or PAHI), but lumped together (HERM) if molts, which are hard to tell apart.

You can search anywhere on your site, but

stay on the site. That is, don’t search or collect on adjacent beaches that open to bigger water bodies.

Place molts into a bait jar or cup, by hand, one at a time. Avoid sweeping piles of molts into your cup. Doing so makes it difficult to standardize effort across sites, and can crush the molts (which makes it hard to identify them). Small molts can also be blown away by the wind, so placing them in a small cup offers some protection and keeps your hand free for picking up more.

- c. **Count and identify each molt.** After you have finished collecting, sort through all of the molts collected, and identify each to species. This can even be done at home or at a picnic table where you are comfortable. You only need to record the total number of each species, no information about sex or size is needed. You might also find dead crabs, distinguishable from molts because the flesh is still in the shell, making it heavier and much stinkier. Sometimes a dead crab turns gray rather than a pink or reddish brown of an aged molt. Note how many are dead versus molts.



Only count molts for which you have at least half of the carapace.

This will help avoid double counting individual crabs for which the molts have broken into multiple pieces. It’s also often only possible to identify the species if you have the carapace.

- d. **Dump molts on beach and crush** to avoid potentially recounting molts the following month.

3. What to do if you find...

...a green crab molt?

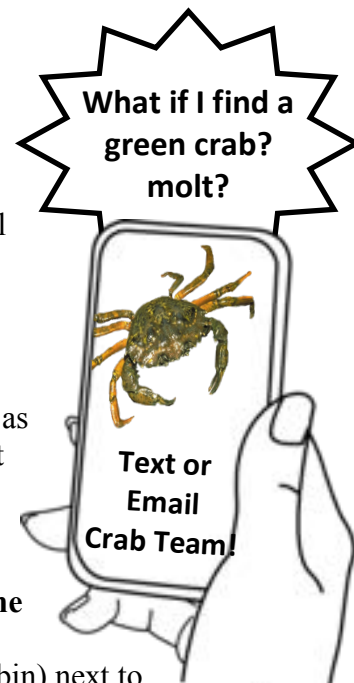
Contact Crab Team as soon as possible. Text a photo with your survey information (site), and an indication of scale (e.g., your calipers, or scale bar in the bin) next to the molt.

Place the molt in a plastic bag or other container to avoid crushing it. We will contact you to retrieve the molt.

...a molt you can't identify?

Many of the molts gathered are quite small, and sometimes distinguishing among similar species can be tricky. However, it's our goal to identify molts as carefully as possible. Remember that you only have to identify carapaces that are greater than 50% complete, so if you can't ID the molt because there isn't enough shell, you don't need to record it at all.

Because molts are the shells of the crustaceans, it's OK to take them home with you for follow up identification by Crab Team staff. Email a picture (or a few) with clear indication of scale (e.g., the calipers, or scale bar in the bin) next to the molt. You can use a temporary species placeholder on your datasheet, such as "Unknown species A", until the organism can be identified. Provide as much detail in the description to the Crab team along with the pictures. If we cannot identify the crabs from the pictures, we might ask you to send them to us. Please wait to submit data sheets until species ID has been completed.



4. Submit Data

Please submit images of transect and molt survey data sheets electronically within one week of sampling.

For detailed instructions, see page 12.



SUBMIT DATA

Submit data from monthly surveys electronically within a week of sampling, and mail the hard copies to Crab Team HQ at the end of the season.

1. Submit monthly survey data electronically

Each month, you will submit all of your data to Crab Team HQ as images or scans via email within one week of trapping.

- Verify data sheets are complete.** Check that site data and volunteer names and hours are complete. Ensure each row of data is clearly totaled in the correct column. If you have questions about species identification, please get these answered *before* you submit your data sheets, so the data submission is fully complete. We might ask you to revise your data and resubmit electronic copies.
- Scan or take a photograph of data sheets.** Your phone is often adequate for this, but quality can often be improved (and file size decreased) by using a scanner, or a scanning app on your phone (like Scanner For Me). Open all the photographs on your desktop computer (not just your phone) before sending to be sure they are sufficient resolution. Can you see the hairs on the shore crab legs?
- Rename all files according to the convention.** This likely requires transferring files to your computer, as not all phones allow you to rename image files. All file names should follow the basic format, with each element separated by a period:

Trap photo 302.15.6.Minnow.1.jpg
Site # Year Month Trap Type Trap #

**Shoreline
Transect
Data sheet** 302.15.6.Transect.jpg
Site # Year Month Data sheet type

Data sheet 302.15.6.Trapdata.1.jpg
Site # Year Month Data sheet type Sheet #
1 = Front
2 = Back

**Molt Hunt
Data sheet** 302.15.6.Molt.jpg
Site # Year Month Data sheet type

Email all images to crabteam@uw.edu. You will submit a minimum of 9 photographs each month: one for each of the 6 traps (including empty traps) and at least 3 for the data sheets. Multiple emails are fine if necessary. File sharing websites like Google Drive or Dropbox also work for us. Make sure that if you have the chance to select the file size for photographs, that you choose at least “Large”. Selecting Medium or Small will send pictures that are too low resolution to see details necessary for species identification.

2. Mail Data Sheets to WSG

At the end of the sampling season, mail hard copies to Crab Team HQ. You should have received your blank data sheets in a pre-addressed envelope at the beginning of the season. After the last month’s data sheets have been approved as finalized, mail them back in that envelope to Crab Team HQ for archiving. If you did not receive or cannot find the envelope, use the WSG Address here:

Crab Team
Washington Sea Grant
3716 Brooklyn Ave NE
Seattle, WA 98105-6716

WSG Crab Team - Trapping Data Sheet

Dates: 6/1-6/2/15	Site #: 302	Site Name: AWESOME Bay	Trap Soak D
Volunteer Time Sheet (Names & Times)			Trap Soak Date: 6/1
1. Crab Team Captain	Day 1 Start: 5:30p	Day 1 End: 7:30p	Trap Soak Time: 6:30p
2. Crab Team Chair leader	Day 2 Start: 6:00p	Day 2 End: 7:30p	Trap Soak Date: 6/2
3. Crab Team first Mate	Day 2 Start: 6:00p	Day 2 End: 7:50p	Trap Soak Time: 10:30a
4. Crab Team Swabbie	Day 2 Start: 6:00p	Day 2 End: 7:30p	Weather (circle one):
5.			Clear
6.			Heavy Rain
			Light Rain
			Fog/Mist
			Clouds

Hours include travel time, data submission etc

Last trap set

First trap retrieved

ONLY one weather

IF YOU FIND ANY GREEN CRABS, SAVE THEM & CONTACT WSG WITH PHOTOS ASAP															
Trap Type	Trap #	Species	Size (nearest mm) of first 10 male and 10 female crabs										Total	Comments/Tally	
M	1	MEMA	M 67	75	60									3	1 ♀ w/eggs
			F 55											1	
M	1	HEOR	M 35	21	28	26	29	21	22	25	26	23	15	5	2 gravid ♀
			F 41	33	13	20	21								
F	1	EMPTY	M	NA											
			F	NA											
M	2	LEAR	M	NA										2	
			F	NA											
M	2	HEOR	M 18	23	26	29	22	22	23	23	19	24	23	1	
			F 20											1	
F	2	CYAG	M	NA										1	
			F	NA											
F	2	MEGR	M	56										0	
			F												
M	3	LEAR	M	NA										3	1 mortality
			F	NA											
M	3	HEOR	M 22	26	29	27	21	20	20	19	26	25	69		
			F 33	14	27	30	21	20	19	19	18	17	18		
M	3	PAHI	M	NA										4	
			F	NA											
F	5	EMPTY	M	NA											
			F	NA											

Total males and females separately

Record females with eggs in comments

Don't measure fish

Just total #

Record ALL mortalities

Don't measure hermit crabs

Use multiple rows for tallies if you need space

Clearly record empty traps

WSG Crab Team Transect Data Sheet

Ensure complete site data

Habitat type won't change

Date: 6/1/18 Site #: 402 Volunteers: Captain, Jay, Beth + Participating: Cheerleader

Quadrat Survey Circle One: Riprap-Substrate **Vegetation-Substrate**

Set 10 quadrats at assigned distances along transect. Estimate percent cover of each in each.

Quadrat 1		Random Distance (m)	7
1. Estimate wrack, then remove:		2a. Filamentous green algae	100
Wrack (biological floating material)	2b. Cover: Live epifauna	0	
Epigrass (dead or live)	Live veg (rooted)	75	
Terrestrial veg (dead)	*Cover total = 200% Bare	25	
Seaweed	3. Sediment Mud	Sand	Gravel
Trash	(circle 1) Bedrock Riprap Cobble		

Quadrat 2		Random Distance (m)	8
1. Estimate wrack, then remove:		2a. Filamentous green algae	95
Wrack (biological floating material)	2b. Cover: Live epifauna	5	
Epigrass (dead or live)	Live veg (rooted)	95	
Terrestrial veg (dead)	*Cover total = 200% Bare	0	
Seaweed	3. Sediment Mud	Sand	Gravel
Trash	(circle 1) Bedrock Riprap Cobble		

Quadrat 3		Random Distance (m)	9
1. Estimate wrack, then remove:		2a. Filamentous green algae	0
Wrack (biological floating material)	2b. Cover: Live epifauna	0	
Epigrass (dead or live)	Live veg (rooted)	100	
Terrestrial veg (dead)	*Cover total = 200% Bare	0	
Seaweed	3. Sediment Mud	Sand	Gravel
Trash	(circle 1) Bedrock Riprap Cobble		

Quadrat 4		Random Distance (m)	12
1. Estimate wrack, then remove:		2a. Filamentous green algae	0
Wrack (biological floating material)	2b. Cover: Live epifauna	0	
Epigrass (dead or live)	Live veg (rooted)	50	
Terrestrial veg (dead)	*Cover total = 200% Bare	50	
Seaweed	3. Sediment Mud	Sand	Gravel
Trash	(circle 1) Bedrock Riprap Cobble		

Epifauna, rooted veg and bare must total exactly 100%

Quadrat 5		Random Distance (m)	15
1. Estimate wrack, then remove:		2a. Filamentous green algae	0
Wrack (biological floating material)	2b. Cover: Live epifauna	0	
Epigrass (dead or live)	Live veg (rooted)	0	
Terrestrial veg (dead)	*Cover total = 200% Bare	100	
Seaweed	3. Sediment Mud	Sand	Gravel
Trash	(circle 1) Bedrock Riprap Cobble		

Quadrat 6		Random Distance (m)	26
1. Estimate wrack, then remove:		2a. Filamentous green algae	0
Wrack (biological floating material)	2b. Cover: Live epifauna	0	
Epigrass (dead or live)	Live veg (rooted)	75	
Terrestrial veg (dead)	*Cover total = 200% Bare	25	
Seaweed	3. Sediment Mud	Sand	Gravel
Trash	(circle 1) Bedrock Riprap Cobble		

Wrack does not need to total 100% (0-100)

Filamentous green is estimated 0-100% independent of the rest of step 2.

Quadrat 7		Random Distance (m)	31
1. Estimate wrack, then remove:		2a. Filamentous green algae	0
Wrack (biological floating material)	2b. Cover: Live epifauna	0	
Epigrass (dead or live)	Live veg (rooted)	0	
Terrestrial veg (dead)	*Cover total = 200% Bare	95	
Seaweed	3. Sediment Mud	Sand	Gravel
Trash	(circle 1) Bedrock Riprap Cobble		

Quadrat 8		Random Distance (m)	37
1. Estimate wrack, then remove:		2a. Filamentous green algae	25
Wrack (biological floating material)	2b. Cover: Live epifauna	0	
Epigrass (dead or live)	Live veg (rooted)	100	
Terrestrial veg (dead)	*Cover total = 200% Bare	0	
Seaweed	3. Sediment Mud	Sand	Gravel
Trash	(circle 1) Bedrock Riprap Cobble		

Quadrat 9		Random Distance (m)	42
1. Estimate wrack, then remove:		2a. Filamentous green algae	0
Wrack (biological floating material)	2b. Cover: Live epifauna	0	
Epigrass (dead or live)	Live veg (rooted)	0	
Terrestrial veg (dead)	*Cover total = 200% Bare	100	
Seaweed	3. Sediment Mud	Sand	Gravel
Trash	(circle 1) Bedrock Riprap Cobble		

Quadrat 10		Random Distance (m)	49
1. Estimate wrack, then remove:		2a. Filamentous green algae	0
Wrack (biological floating material)	2b. Cover: Live epifauna	0	
Epigrass (dead or live)	Live veg (rooted)	60	
Terrestrial veg (dead)	*Cover total = 200% Bare	40	
Seaweed	3. Sediment Mud	Sand	Gravel
Trash	(circle 1) Bedrock Riprap Cobble		

Don't forget sediment type in every quadrat

WSG Crab Team Molt Hunt Data Sheet

Divide 20 minutes by # of volunteers participating

Date: 6/11/18	Site #: 402	Volunteers hunting: Captain + Sammie	Actual minutes per volunteer: 10
Site Name: Awesome Bay			

Timed Molt Search
 Fifteen minutes collecting molts. Then, tally the total number of each species.

Use X's for 10 to save space when you have a lot of one species

Species	# Molts	# Dead	# Total	Notes		
HEOR	XXXXX III XXXXX		104	2	106	
MEGR	III III III		13	—	13	
HENU	III		4	—	4	
UNK A	I		1	—	1	Seaphoto, no apparent marginal teeth, round shape
HERM	II		2	—	2	
AMPH	III I		6	—	6	

Hermit crabs aren't recorded by species in the molt hunt – just HERM

Use placeholders "Unknown Species" when you can't ID a molt. Keep molt and send description and photos to Crab Team *before* submitting the data sheet.

Collect any crustaceans – even amphipods (AMPH) shed shells

CRAB TEAM PROTOCOL CHEATSHEET

Before you go:

- Gather your equipment:
 - Bins
 - Traps (3 Fukui, 3 Minnow)
 - Bait (6 bags) & bait jars
 - Datasheets/clipboard
 - Measuring rope
 - Stakes (6)
 - Camera
 - Copy of permit
 - Calipers
 - Gloves
 - Quadrat
 - ID Guide
- Schedule arrival as tide is returning, before water reaches the height you will set the traps.
- Remove 6 bait bags (1 large bag) from the freezer and allow to thaw slightly.

Setting traps:

- Prepare bait on shore, adding one bag of frozen mackerel to each bait jar, one jar to each trap.
- Set traps more than half submerged, 10 meters apart, alternating type, in a line parallel to shore.
- Stake traps all the way through, securing with bent metal rod, trap tag on top.
- Record the time at which the **last trap** was deployed.

Retrieving traps:

- Record the time at which the **first trap** was removed from water.
- Pull traps out and record catch one trap at a time.
 - Photograph each trap catch in bin (with trap id photo card in image).
 - **For fish:** Record total number of each species, ignore sex/size, release back into water.
 - **For crab species** (except hermit crabs): **Record carapace width** of first 10 male and first 10 female crabs selected haphazardly; **record total by sex** (total # males, total # females)
 - **For all other species:** Record total number, ignore sex and size.
 - Release all native crabs back into water.
- Dispose of bait at home (don't reuse or dump at the site).
- Take pictures and descriptions of any unknown organisms. Email to Crab Team.
- Keep any suspected European green crabs and contact Crab Team immediately.

Shoreline Survey:

- Set the 50 meter rope along the riprap-substrate or vegetation-substrate habitat boundary.
- Set 10 quadrats at distances based on the table of randomly-generated numbers, and record percent cover of wrack, cover, and substrate type in each.
- Conduct a timed molt hunt, where volunteers work independently to collect as many molts as possible independently for a total of 20 person-minutes (e.g., 10 min each for 2 volunteers).
- Record the total number of each species of molt collected after the end of the search.
- Keep any suspected green crab molts and contact Crab Team immediately.

After returning home:

- Clean, repair, and store traps. Dispose of used bait in trash or compost.
- Decontaminate gear to avoid transporting species.
- Contact Crab Team for help IDing any unknown species.
- Submit data to crabteam@uw.edu within 1 week of sampling.