



CRAB TEAM

INLAND MONITORING HANDBOOK

2024 Edition

Welcome

Thank you for helping to protect Washington’s shorelines as a monitor with the Washington Sea Grant (WSG) Crab Team network! You are a part of a large collaborative effort to track and manage invasive European green crab (*Carcinus maenas*) across the state. Crab Team’s consistent monitoring data provides critical information to management efforts on the abundance, status, and population structure of invasive green crabs. In addition, Crab Team protocols are designed to monitor sites and ecological communities to detect impacts to native ecosystems. This information complements and bolsters larger control efforts conducted by Washington Department of Fish and Wildlife (WDFW), tribes, agencies, shellfish growers, and all green crab partners.

Contact us:

Green crab hotline: 360-670-0883

Call/text only if you’ve found a green crab.

wsg.washington.edu/crabteam

Email: crabteam@uw.edu



@WAGreenCrab

Monitors at inland Crab Team sites conduct two types of survey in 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. As participants in the Crab Team network, monitors:

- work with a team of 3-6 trained monitors at an assigned site,
- conduct monthly surveys from April through September,
- submit data to Crab Team *within a week* of completing surveys, and
- notify Crab Team immediately upon finding evidence of green crab presence.

Where does the Crab Team network monitor?

Crab Team monitors survey more than 65 sites across Washington shorelines, in both inland and coastal estuaries. Monitoring sites focus on locations with the highest habitat suitability for survival of green crabs at early life stages, pocket estuaries and salt marshes. This is because green crabs are likely to first be detectable in places where they do best, facilitating early detection in places where they have not yet been reported, and because, over the long term, green crabs could have the greatest impacts on these sites. Other considerations that determined which sites have been selected for the network include property access logistics, geographic distribution, whether the site is large enough to accommodate protocols, and whether monitors can safely navigate the terrain to sample. Consistent long-term monitoring of network sites, some of which date back to 2015, contributes to an ecological dataset that increases in value over time, as we learn about the status and spread of green crabs and the ecological changes associated with the invasion.



Crab Team Map:

www.tinyurl.com/wagreencrab

MONITOR GUIDELINES & RESPONSIBILITIES

Your contribution of time is incredibly important to us, and we do our best 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, emphasizing the value of sustained participation and ongoing training of monitors. Therefore, we ask that you commit to participate in Crab Team only if you can be present for at least 75% of sampling days (at least 9 out of the 12 per year), and attend trainings as requested. 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. Volunteers for the University of Washington also hold the responsibility of reporting suspected child abuse or neglect while on duty, so as part of Crab Team training, all volunteers will participate in UW's required Mandated Reporter training, in addition to Crab Team program specific training.

Crabbers Code

To maintain a safe, rewarding experience for participants and data quality across the network, Crab Team monitors & staff collaborate to outline program expectations in the “**Crabbers Code**”, which is included on the final page of this handbook. It includes many of the guidelines set forth in this section, as well as some additional concepts about Crab Team as a community experience.

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 or are uneasy about accessing it, **DON'T DO IT!** Be mindful of the tides and *always* work with a partner on site. Always wear footwear that covers your entire foot, because the mud can hide sharp shells. Narrow-ankle boots or hip/chest waders make 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 enjoyable.

WDFW classifies European green crab as a prohibited animal species under WAC 220-12-090. In Washington, a permit is required to possess this species, even as a part of a WDFW monitoring and control program. Other permits may also apply to your site based on local sampling permissions. Additionally, some Crab Team sites are within known salmon streams. Because some local population groups of salmonids are listed under the Endangered Species Act, Crab Team holds a NOAA Scientific Research Permit, which allows for the unintentional capture of listed salmonids during Crab Team monitoring efforts. If you trap in a known salmon stream during return season, fukui traps should be set perpendicular to and outside of the main flow to mitigate potential salmonid entry. WSG will provide and renew all necessary permits to cover Crab Team activities for trained monitors, but **you must carry a copy of the permits while you are trapping for them to be valid and they only cover Crab Team monitoring activities**. Permits will be renewed annually, so we will provide a copy to each site at the beginning of every sampling season.

Gear required and provided

In addition to your own boots, each group will need a digital camera (phones are generally fine) to submit images of your trap catches so that we can verify the species being trapped. We will loan everything else you will need, and appreciate your help sustaining this project by taking good care of the gear, returning it to us if you ever decide to end your participation. Please don't modify your gear without checking with us since it could affect how it functions. It is also a condition of the permit that the gear may not be used at any other location, or for any other purpose than Crab Team protocols without dispensation.

Each team will be provided:

For trapping:

- 3 - Square Fukui traps
- 3 - Galvanized steel minnow traps
- Bait (frozen mackerel) & Bait Jars (6)
- 6 - Trap stakes
- 2 - Sets of calipers
- Photo ID cards and wax pencil
- 2 - Sorting bins

For shoreline surveys:

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

General gear provided:

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

TRAPPING

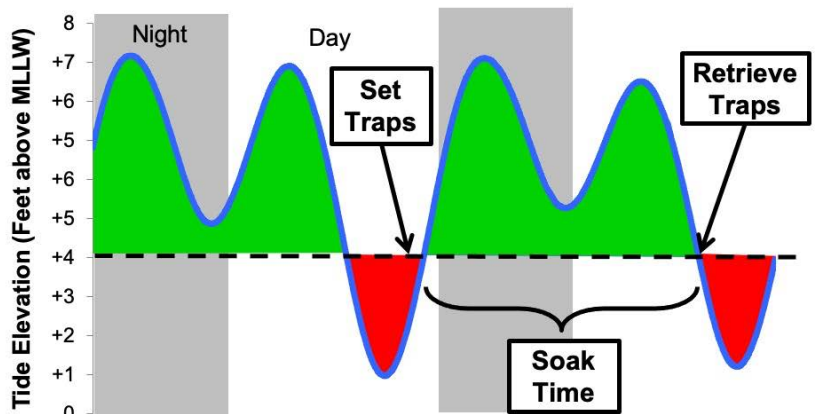
Set a total of **6 baited traps** (3 square Fukui traps, and 3 minnow traps) for **one nighttime high tide per month** from April through September.

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 because the precise timing of tides varies depending on location. You can choose dates and times that are good for your site and team, and Crab Team staff is available to help advise you.

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, when the ebbing tide first drops low enough to reach your traps. This likely means you will not be targeting the lowest tides of either day.



Example: Traps are typically set intertidally. A common trap elevation is +4ft (dotted line). At this height, traps will be submerged (fishing) any time the tide is predicted to be above +4ft (areas in green), but traps would be out of water if the tide height is below the trap elevation (red). Check tide charts to be sure traps remain under water during overnight low tides.

To find the tide forecast for your site:

- www.tidesandcurrents.noaa.gov/tide_predictions.html
- App for iOS: Tide Graph

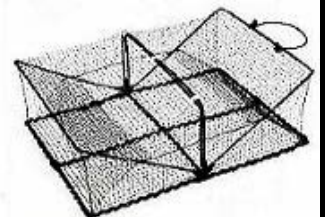
2. Preparation

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 attached.

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

An hour or so 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.

Fukui Trap



Minnow Trap

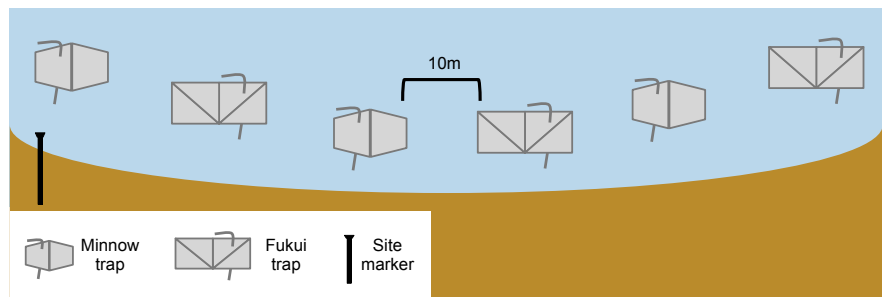


3. Setting Traps

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.** Load the bait into bait jars. The bait has been portioned out for you; you only need to empty one small bag into each of the 6 bait jars. Save the bags to dispose of used bait.
- 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 preferable that the traps are slightly further than 10m apart, rather than closer together.

- Set up the traps.** Place one bait jar inside each trap. No need to attach jars to the trap. Close the Fukui trap by lifting the collapsible sides and clipping them together 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.

Place traps in the water so that they are more than half-way submerged and can begin fishing immediately. Orient the minnow traps with the orange tag on top, so it can be easily read without moving the trap. Push the stake all the way through the trap, from top to bottom, so that the bent portion of the stake is level with the top of the trap, pinning it down. The top of the stake should be covering

the middle bars or rings of 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 track the "soak time", or the amount of time that the traps were fishing for crabs.

4. Retrieving Traps

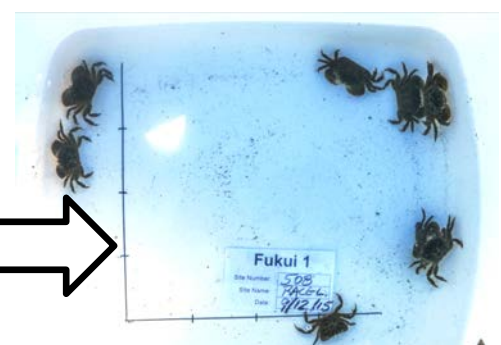
Check the traps as soon as they will be accessible the following day and **record the number and species of all organisms** in the trap.

- 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 only one*) that best describes the entire 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!) from inside the trap, 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: _____

- Photograph the entire catch of each trap** 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 these with the data sheets for verification. Take several photos to be sure you get one with reasonable resolution, clear water, 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.

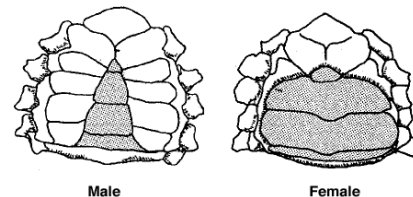
Totals: For crab species, record the total number of males and total number females on the appropriate sub-rows of the data sheet. For non-crabs and hermit crabs, record a single total (disregard sex).

- g. If you catch a green crab in your trap, text a picture to Crab Team as soon as possible to verify ID. Photograph the top and underside of the crab with your calipers in the image for scale. Record the species data as with any other species, but measure the sex and size of every single green crab, even if there are greater than 10 males or females (which is very unlikely at inland sites).

Keep the crab *alive* until you receive instructions from Crab Team. Green crabs can be kept cool in a small cooler with blue ice and damp with paper towels soaked with seawater. Do not place the crab in a refrigerator or freezer

- h. If a trap is empty, 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.

To determine crab sex, look at the abdomen



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

If you catch a green crab:



Submit photos of all traps including EMPTY ones.

★ Special cases ★

- Measure and sex every single green crab (CAMA) captured, even if greater than 10 males or females.
- Feminized male shore crabs (HEOR or HENU) are treated as male, measured and tallied with other males, and can be noted in the Comments column.
- Record the number of mortalities, and number of egg-bearing females if there are any. Include both categories in the total number of individuals (of the respective sex) for the species, as appropriate.

4. Retrieving Traps (continued)

- i. If you have an **uncommon** or **unidentifiable** animal, take several photographs from different angles with your something in the photo for size reference. Even if you are confident of species ID, these photos help confirm rare species in our data. If you are confident the organism is *not* a green crab, release it. If you cannot identify the species, use a placeholder on your datasheet, such as “Unknown species A” until the organism can be identified. Email photos and a description to WSG as soon as possible so that we can ID the organism for you before you turn in your data sheet.

It is our goal to identify every animal in the traps. Take multiple photos of unknown species from different angles with something for scale.



- j. Release all organisms in the water nearby, *EXCEPT* European green crabs. Try to find a spot where organisms will be able to reach open water and protective structure to reduce mortality.
- k. Repeat with each of the other traps one at a time.

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. If animals learn to come to the site looking for food, they may start trying to get bait from traps while traps are fishing.

Clean gear before leaving the site. Remove seaweed or other debris that has collected on or in the traps and other gear, and rinse mud off 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 gear to a new location.

Rinse all your gear well with fresh water and allow to dry completely. Because loaned trapping gear is not deployed at any other site, further decontamination is not required.

Store gear in a dry, covered space, out of direct sunlight. If any of your traps have lost their tags, request replacements from WSG 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 this sampling.

TRANSECT SURVEY

Conduct **one habitat transect survey** each month from April through September to characterize the shoreline habitat, vegetation, substrate, and wrack.

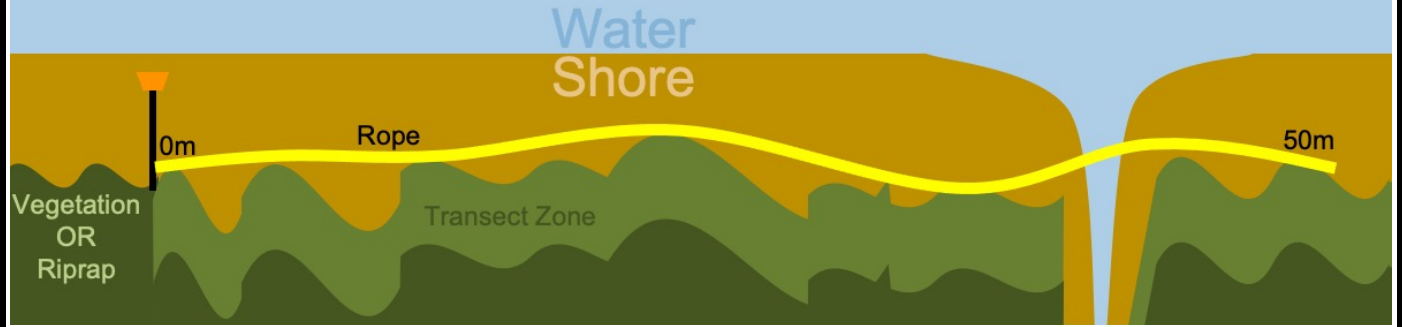
1. Delineate the transect

a. **Find the habitat boundary.** On a low tide (typically +3 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 line.** Starting adjacent to your site marker, string the 50m measuring tape/rope along the deep boundary of the vegetation or riprap zone. You don't need to be extremely precise in following all the contours- the goal of the line is only to gauge the distance at which measurements will be taken. Small, sparse patches of vegetation, discontinuous with the main area, do not need to be included. Connect gaps larger than 5m.

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.

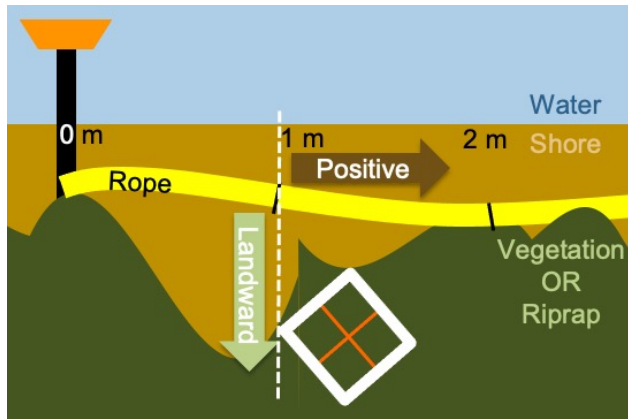


c. **Determine distances at which observations will be made.** Each month you will use a new set of distances (1-50) for your quadrat sampling locations using the table to the right. These numbers change annually. For instance, in April 2023, you will survey quadrats at the 2, 6, 9...and so on, meter marks along your rope or tape.

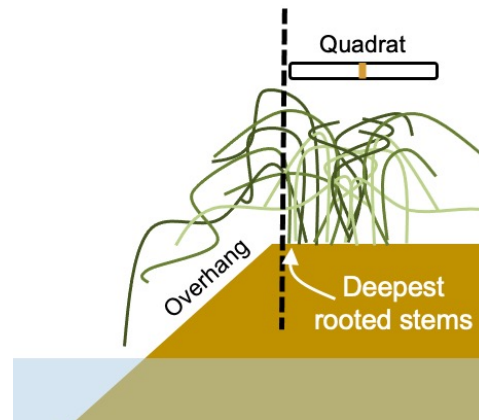
Month	2023 Randomly Sampled Distances (meters)									
Apr	5	4	7	13	14	32	34	35	42	48
May	2	3	11	18	24	34	42	43	44	47
Jun	10	13	16	31	36	37	39	43	44	50
Jul	3	5	27	32	33	35	39	45	47	48
Aug	4	11	15	18	31	36	40	42	46	49
Sep	3	4	5	14	17	22	28	29	36	50

2. Record cover at each replicate quadrat

- d. **Place the quadrat in the habitat zone at appropriate distance.** Find distance corresponding to assigned random number for that month, and place the deepest edge of the quadrat along the deepest edge of the stems (for vegetation transects) or rocks (for rip-rap transects). Do not place quadrat based on location of overhanging vegetation (with no stems or roots directly underneath), but move upslope to find where the vegetation is rooted at its deepest point on the shore. The entire quadrat should be oriented so it generally falls within the habitat zone.



The quadrat is on the *landward* side of the rope, *positive* relative to the meter mark.



Place the quadrat so that the deepest edge aligns with the deepest, rooted vegetation stems. Don't include "overhang" in quadrat

- e. **Box 1: Visually estimate percent cover of wrack.** Round to the nearest 5%. Cover 2.5% or greater is rounded up to 5%, anything less is recorded as 0%. Assess only the *top layer* of wrack material, as if it were a flat photo. Record the following categories of wrack, should total 0-100%:

- Eelgrass
- Seaweed (macroalgae)
- Trash (any object or debris of human origin, plastic, etc.)
- Terrestrial vegetation (leaves, sticks, pinecones, logs)

- f. **Box 2a: Remove wrack, and estimate percent cover of attached algae.** This category typically includes woolly filamentous green algae, but can include any attached algae such as Fucus, or ulvoid sea lettuce. This can range from 0-100%, independent of other categories. This category can grow directly on sediment, loosely attached, or on the stems of rooted vegetation or surface of rocks. However, if it is *not* attached, but clearly washed it, it should be recorded as wrack in Box 1- seaweed. Estimate to nearest 5% as above.



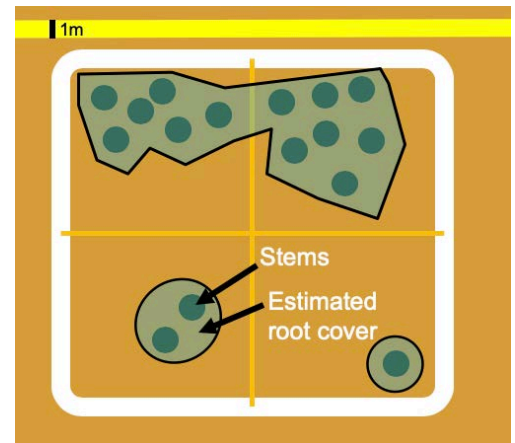
Examples of "attached algae" are filamentous greens (left) and furoid macroalgae (right). Though very different categories of organism, they fill a similar ecological role in our transects.



Attached algae can grow loosely secured directly to the substrate, but is not stabilizing the sediment like pickleweed which is considered rooted vegetation and counted in step 2b.

2. Record cover at each replicate quadrat (cont.)

- g. **Box 2b: Estimate percent cover of habitat categories to nearest 5%.** These three categories should always 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 sediment in the quadrat that is stabilized by roots underground. Rooted vegetation does not have to be “live” and sometimes it can be difficult to distinguish between dormant and dead pickleweed. So, focus primarily on the estimated root area.
 - **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, crabs of any kind, dead organisms, or empty shells.
 - **Bare substrate:** all remaining space else to total exactly 100%.
- h. **Box 3: Record the dominant sediment type** in the quadrat as one of the categories below. If it is a combination, choose the one that takes up the most space.



Visually estimate the rooted area of the vegetation by imagining “buffers” or “halos” (1 inch radius) around the plant stems in the quadrat.



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

MOLT HUNT

Conduct **one timed molt hunt** each month from April through September to characterize the entire crustacean community.

1. Collect all crustacean molts

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

- a. **Start with *all participants standing at the site marker***. To be consistent from month to month, start in the same place because walking time is included in the search effort. Target the areas you think will have the greatest density of molts. Spotty patches of beach wrack are a great place to look, as is the base of vegetation, or at the base of 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.). Use a timer with an alarm - it's easy to lose track of time molt hunting. When you start the timer, participants may then walk to any spots you've targeted, and start collecting as many molts as possible. Note that you are looking for *any* crustacean molt, not only European green crabs, so use a broad search image. Collect molts from any crustaceans, including amphipods, shrimps, hermit crabs. Many molts are small, especially shore crabs. Don't try to ID molts as you collect them. This could eat into time dedicated to collection effort.
- c. **You can search anywhere on your site but stay *on the site***. That is, if your site is an enclosed lagoon or marsh, don't search or collect on open portions of the beaches that are on the other side of the berm from your enclosed area. Check with Crab Team staff if you aren't sure about where to delineate your molt search.



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



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

- d. **Place molts into a bait jar or cup, by hand, *one at a time***. Even if you have a lot of molts at your site, avoid sweeping piles of molts into your collection container. Doing so makes it difficult to standardize search 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 a hand free for picking up the next one.

2. Count and identify all molts collected (cont.)

- a. **Count and identify each molt.** After you have finished collecting, sort through all the molts collected, and identify each to species/taxon. You can even take molts home to sort and ID in comfort.
- b. **Only count molts for which you have found at least half of the carapace.** If you find only a claw or small portion of the shell, this does not get included in your total – even if you are able to identify the species of the crab it came from. This enables us to avoid potentially double-counting individual crabs for which the molts have broken into multiple pieces.

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



- c. **Record the number of molts and any dead crabs you find.** No information about sex or size is needed (*except* for green crab, see below), but you should record dead crabs separately from molts. Dead crabs are 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. If it is not clear that the crab is a full dead specimen, record as a molt. Record these categories separately on the data sheet in the correct columns.
- d. **Dispose of molts.** Dump molts on beach and crush or throw away in trash.

3. What to do if you find...

...a green crab molt?

Contact Crab Team as soon as possible. Text a photo to 360-670-0883 with your survey information (site), and an indication of scale (e.g., your calipers, or scale bar in the bin) next to the molt.

Record the sex and size of up to 10 haphazardly selected green crab (CAMA) molts. If you find many green crab molts (unlikely), select up to 10 of either sex haphazardly to measure. In CAMA data section, record the sex (if the abdomen is present) and carapace width, measured at the outside of the widest point of the back shell (including the spines) to the nearest mm. If you don't have a full carapace, for instance if one edge is slightly broken, estimate the full size of the carapace by measuring the carapace to the centerline from the intact portion, and doubling that measurement and note that the carapace width is *estimated* for that molt.

...a molt you can't identify?

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. It's our goal to identify molts as carefully as possible, even if they are tiny. If you can't ID the molt because less than half the shell remains, you don't need to record it at all. Email several pictures 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 (e.g., Unknown species A) until the organism can be identified. 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 verified.*

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. No day of month is included in the file name.

File Name Convention

Site.Year.Month.Content.jpg*

*Note that any image file type is acceptable (.pdf, .png, .bmp, .heic).
We have used .jpg here for example only

Trap Photo: 302.22.6.Minnow.1.jpg

Trap Data: 302.22.6.Trap.1.jpg

Molt Data: 302.22.6.Molt.jpg

Transect Data: 302.22.6.Transect.jpg

- 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: <u>6/1-6/2/23</u>		Site #: <u>302</u>		Site Name: <u>Awesome Bay</u>		Trap Soak Data	
Monitor Time Sheet (First and last names)				Day 1 Start	Day 1 End	Day 2 Start	Day 2 End
1. Crab Team Captain				2 pm	4:30	9am	12:30pm
2. Crab Team cheerleader				2:30	4:30	9am	11am
3. CT First Mate				2:30	4:30		
4. CT Swabbie				2:30	4:30	9am	11am
5.							
6. Hours include travel time, data submission etc							
		Retrieve SET		Date: <u>6/1/23</u>		Time: <u>4</u> AM/PM (circle)	
		Retrieve First Trap		Date: <u>6/2/23</u>		Time: <u>9:30</u> AM/PM (circle)	
				Weather (only 1): Clear			
				Heavy Rain		Light Rain	
				Fog/Mist		Clouds	

Last trap set

First trap retrieved

Trap Type	Trap #	Species	Size (nearest mm) of first 10 male and 10 female crabs										# Total	PHOTO TAGS		SAP		
			M		F		M		F		M			F			DEAD:	GRAVID:
M	1	MEMA	M	67	75	60									3	DEAD:	III	Track females w/ eggs
			F	55										1	GRAVID:	I		
M	1	HEOR	M	35	21	28	26	29	21	22	25	26	23	43	DEAD:	XXXX III	ONLY one weather catch (tangles, trap damage, etc)	
			F	21	21	20	22	18	21	22	17	17	17	17	GRAVID:	2 X III I		
F	1	EMPTY	M												DEAD:		Pro Tip: Use X's for 10 in tallies to save space when you have a lot of one species	
			F												GRAVID:			
M	2	LEAR	M	NA										2	DEAD:		Total males and females separately	
			F	NA											GRAVID:			
M	2	HEOR	M	18	23	26	19	22	22	25	23	19	24	23	DEAD:	XX III	Include gravid or dead in species totals	
			F	20										1	GRAVID:	I		
F	2	CYAG	M	NA										1	DEAD:		Don't measure fish	
			F	NA											GRAVID:			
F	2	MEGR	M	56										1	DEAD:		Only total #	
			F											0	GRAVID:			
M	3	LEAR	M	NA										3	DEAD:	I	Record ALL mortalities	
			F	NA											GRAVID:			
M	3	PAHI	M	NA										1	DEAD:		Don't measure hermit crabs	
			F	NA											GRAVID:			
M	3	HEOR	M	17	18	22	21	22	23	20	17	17	15	23	DEAD:	XXXXXXXXXX	Use multiple rows for tallies if you need space	
			F	15	18	19	20	20	15	19	18	23	16	15	GRAVID:			
			M												DEAD:	XX III		
			F												GRAVID:			
F	3	EMPTY	M												DEAD:		Clearly record empty traps	
			F												GRAVID:			

Circle one: End of data Data on reverse

WSG Crab Team Transect Data Sheet

Ensure complete site data

Habitat type won't change

Date: 6/1/18 Site #: 402 Volunteers Captain, Swabbie +
 Site Name: Awesome Bay Participating: Cheerleader

Quadrat Survey Circle One: Riprap-Substrate Vegetation-Substrate

Set 10 quadrats at assigned distances along transect. Estimate percent cover (nearest 5%) in each.

Quadrat 1 Random Distance (m): 7

1. Estimate wrack, then remove:		2a. Filamentous green algae		<u>100</u>
Wrack (dislodged floating material)	2b. Cover:	Live epifauna	<u>0</u>	
Eelgrass (dead or live)		Live veg (rooted)	<u>75</u>	
Terrestrial veg (dead)	*Cover total = 100%		Bare	<u>25</u>
Seaweed	3. Sediment		Mud	<u>Sand</u>
Trash	(circle 1)		Bedrock Riprap Cobble	

Quadrat 2 Random Distance (m): 8

1. Estimate wrack, then remove:		2a. Filamentous green algae		<u>95</u>
Wrack (dislodged floating material)	2b. Cover:	Live epifauna	<u>5</u>	
Eelgrass (dead or live)		Live veg (rooted)	<u>95</u>	
Terrestrial veg (dead)	*Cover total = 100%		Bare	<u>0</u>
Seaweed	3. Sediment		Mud	<u>Sand</u>
Trash	(circle 1)		Bedrock Riprap Cobble	

Quadrat 3 Random Distance (m): 9

1. Estimate wrack, then remove:		2a. Filamentous green algae		<u>0</u>
Wrack (dislodged floating material)	2b. Cover:	Live epifauna	<u>0</u>	
Eelgrass (dead or live)		Live veg (rooted)	<u>100</u>	
Terrestrial veg (dead)	*Cover total = 100%		Bare	<u>0</u>
Seaweed	3. Sediment		Mud	<u>Sand</u>
Trash	(circle 1)		Bedrock Riprap Cobble	

Quadrat 4 Random Distance (m): 12

1. Estimate wrack, then remove:		2a. Filamentous green algae		<u>0</u>
Wrack (dislodged floating material)	2b. Cover:	Live epifauna	<u>0</u>	
Eelgrass (dead or live)		Live veg (rooted)	<u>50</u>	
Terrestrial veg (dead)	*Cover total = 100%		Bare	<u>50</u>
Seaweed	3. Sediment		Mud	<u>Sand</u>
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		<u>0</u>
Wrack (dislodged floating material)	2b. Cover:	Live epifauna	<u>0</u>	
Eelgrass (dead or live)		Live veg (rooted)	<u>0</u>	
Terrestrial veg (dead)	*Cover total = 100%		Bare	<u>100</u>
Seaweed	3. Sediment		Mud	<u>Sand</u>
Trash	(circle 1)		Bedrock Riprap Cobble	

Quadrat 6 Random Distance (m): 26

1. Estimate wrack, then remove:		2a. Filamentous green algae		<u>0</u>
Wrack (dislodged floating material)	2b. Cover:	Live epifauna	<u>0</u>	
Eelgrass (dead or live)		Live veg (rooted)	<u>75</u>	
Terrestrial veg (dead)	*Cover total = 100%		Bare	<u>25</u>
Seaweed	3. Sediment		Mud	<u>Sand</u>
Trash	(circle 1)		Bedrock Riprap Cobble	

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

Quadrat 7 Random Distance (m): 17

1. Estimate wrack, then remove:		2a. Filamentous green algae		<u>0</u>
Wrack (dislodged floating material)	2b. Cover:	Live epifauna	<u>0</u>	
Eelgrass (dead or live)		Live veg (rooted)	<u>0</u>	
Terrestrial veg (dead)	*Cover total = 100%		Bare	<u>95</u>
Seaweed	3. Sediment		Mud	<u>Sand</u>
Trash	(circle 1)		Bedrock Riprap Cobble	

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

Quadrat 8 Random Distance (m): 41

1. Estimate wrack, then remove:		2a. Filamentous green algae		<u>25</u>
Wrack (dislodged floating material)	2b. Cover:	Live epifauna	<u>0</u>	
Eelgrass (dead or live)		Live veg (rooted)	<u>100</u>	
Terrestrial veg (dead)	*Cover total = 100%		Bare	<u>0</u>
Seaweed	3. Sediment		Mud	<u>Sand</u>
Trash	(circle 1)		Bedrock Riprap Cobble	

Quadrat 9 Random Distance (m): 42

1. Estimate wrack, then remove:		2a. Filamentous green algae		<u>10</u>
Wrack (dislodged floating material)	2b. Cover:	Live epifauna	<u>0</u>	
Eelgrass (dead or live)		Live veg (rooted)	<u>0</u>	
Terrestrial veg (dead)	*Cover total = 100%		Bare	<u>100</u>
Seaweed	3. Sediment		Mud	<u>Sand</u>
Trash	(circle 1)		Bedrock Riprap Cobble	

Quadrat 10 Random Distance (m): 49

1. Estimate wrack, then remove:		2a. Filamentous green algae		<u>0</u>
Wrack (dislodged floating material)	2b. Cover:	Live epifauna	<u>0</u>	
Eelgrass (dead or live)		Live veg (rooted)	<u>60</u>	
Terrestrial veg (dead)	*Cover total = 100%		Bare	<u>40</u>
Seaweed	3. Sediment		Mud	<u>Sand</u>
Trash	(circle 1)		Bedrock Riprap Cobble	

Don't forget sediment type in every quadrat

WSG Crab Team Molt Hunt Data Sheet

Date: <u>6/2/23</u>	Site #: <u>302</u>	Survey Effort (Circle one): <u>4 people (5 min)</u>	
Site Name: <u>Awesome Bay</u>		<u>2 people (10 min time)</u>	5 people (4 min)
		<u>3 people (6min 40sec)</u>	6 people (3min 20sec)

Timed Molt Search

Spend a total of 20 person-minutes collecting molts. Then, record the total number of each species.

Species Code	"Scratch Space" <small>For tallies or subtotals, etc. Note: Crab Team does not check info in this box, it is for your use only.</small>	# Molts <small>>50% of carapace</small>	#Dead <small>(if present)</small>	Notes
HEOR	XXXII III	32	3	Pro Tip: Use X's for 10 to save space when you have a lot of one species
MEGR	IIII IIII IIII	13	/	
CAMA	IIII	4	/	see below!
UNKA PEAS		1	/	verified by WSG photo!
HERM	II	2	/	
AMPH		1	/	

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

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

Collect *any* crustaceans – even amphipods (AMPH) shed their shells

CAMA Data: <i>if applicable</i>										
**sex and size of first 10 haphazardly selected CAMA molts from sample	Sex: M/F/U	F	M	U	M					
	Size: (mm)	32	65	17	64					
Batillaria Data: <i>if applicable</i>										
**number of snails in 10 haphazard quadrats at area of high density	22	36	7	16	47	49	53	20	15	20

CRAB TEAM INLAND MONITORING PROTOCOL CHEAT SHEET

Before you go:

- Notify site contact if needed with at least 2 business day advance warning.
- 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 rising, 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 1 small 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.
- Take pictures and descriptions of any unknown organisms. Email to crabteam@uw.edu.
- Keep any suspected European green crabs **alive** and contact Crab Team immediately with photos.
- Dispose of bait at home (please don't reuse or dump at the site).

Transect survey:

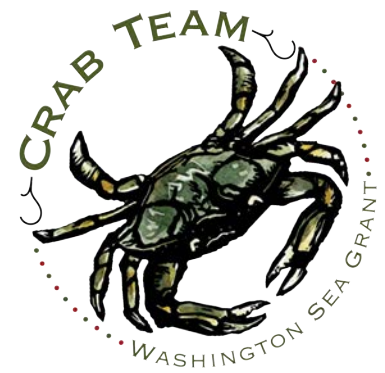
- Set the 50-meter rope along the riprap-substrate or vegetation-substrate habitat boundary.
- Place 10 quadrats at assigned distances based on the table of randomly-generated numbers for the corresponding month, and record percent cover of wrack, cover, and substrate type in each.

Molt hunt:

- Starting at site marker, collect as many crustacean shells within the site in 20 person minutes as possible
- Record the total number of each species of molt or dead crab collected after the end of the search.
- Record sex and carapace width of up to 10 haphazardly selected green crab molts. Contact Crab Team with photos.

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 completed data to crabteam@uw.edu **within one week** of sampling.



Crabbers Code

This set of community agreements was created by Crab Team monitors in a collaborative process. Here we share the most important values and principles that shape our commitments to each other as participants in the WSG Crab Team monitoring network.

1. **Show up:** I commit to attending at least 9 of the season's 12 sampling days with my assigned team. I understand that my commitment to do so contributes to the long-term success of the program and cultivates a positive experience for my teammates.
2. **Engage:** I am an engaged member of Crab Team. I maintain an active understanding of sampling protocols; communicate my availability, interests, and needs in a timely fashion; am accountable to the commitments I make; and take ownership of my team's responsibilities and contributions to the Crab Team network.
3. **Play a role:** I use my experience, skills, and perspective to improve Crab Team. I provide feedback, engage in discussion, and report concerns. I contribute to the positive reputation and value of Crab Team by ensuring my team's equipment is maintained and that our data is accurate, complete, and submitted in a timely manner.
4. **Collaborate:** I cultivate an inclusive and collaborative team by making space for and inviting my teammates' full participation, valuing their contributions, and recognizing the value in our diversity. As my team divides roles, I listen for preferences and strengths of others, share my own, and make an effort to rotate key responsibilities throughout the season.
5. **Respect:** I safeguard positive experiences for fellow Crabbers by striving to avoid harm to others, whether through discrimination, sexual harassment, physical force, verbal or mental abuse, neglect, or other harmful actions, even if they may be unintentional. I will share any observations of physical or emotional harm with my site captain and/or Crab Team staff.
6. **Be Safe:** I am vigilant to safety concerns at my site. I follow Crab Team safety guidelines and alert WSG staff and fellow monitors to potential safety hazards. I acknowledge that duties associated with Crab Team are physically demanding. I ask for help when needed, and I, likewise, offer assistance to others when I am able to do so.
7. **Steward:** I strive to be a good steward of my sampling site and respect the environmental and cultural resources there. I seek to minimize my impact and handling of animals in my care, including respecting captured European green crabs and releasing all other creatures alive and unharmed.
8. **Represent:** I serve as a *de-facto* representative of Crab Team when at my site and, as such, strive to be a positive role model by conducting myself in a respectful manner, patiently and positively addressing questions from the public, and heeding best practices shared by my site captain and Crab Team staff. I make efforts to minimize our work's impact on the site, its owners, and other user groups.

The Crabbers Code is a living document to be revisited by all Crab Team members regularly. Crab Team staff (crabteam@uw.edu) welcomes observations or concerns around respect, safety, stewardship and all other aspects of this code and Crab Team participation.