MOLT SEARCH SURVEY PROTOCOL

Conduct **one timed Molt Search** per MyCoast report submission

The emerging invasion by European green crabs (*Carcinus maenas*) threatens marine resources in Washington. Early detection of new populations gives us the best chance to reduce the spread and impact of this globally damaging invasive species. The presence of European green crab molts along inland shorelines can serve as an early indicator of the presence of a European green crab in an area. Additional data on native Dungeness crab molts adds value to search efforts by filling a significant knowledge gap on the range and growth patterns of juvenile Dungeness. **The goal of the molt survey is to collect as many crustacean molts as possible with a standardized amount of effort.**

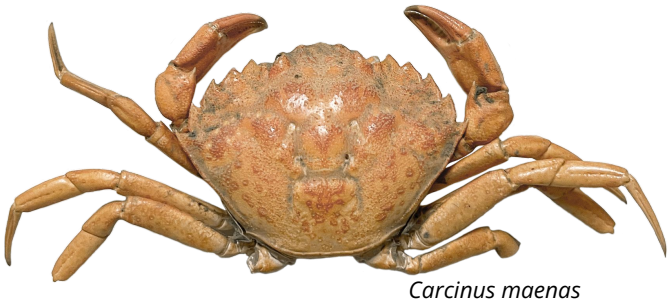
1. Prepare for your molt survey

a. **Choose a location where you have safe and legal access to the shoreline during a medium to low tide**. Don't forget to dress for the weather!

b. **Bring with you**:

- ❑ A phone or device that can take photos (with access to the MyCoast app if you'll submit from the field)
- ❑ 1 collection container per person (tub, bag, bucket, etc.)
- ❑ A measuring device (calipers are the gold standard)
- ❑ Molt Search ID Guide (or access to a digital copy)

What is a molt?



Carcinus maenas

All crustaceans, including crabs, have to shed their hard outer shell to get bigger. The ***molt*** is the old shell that's left behind (until broken down by waves, sun or stomping) and is a perfect replica of the crab. The ***carapace*** (backshell) of a crab is the easiest to identify, often separates from the rest of the body and is fairly durable. For this project, we focus on collecting **crab molts with a minimum of half a carapace**.

2. Conduct your molt survey

a. **Open the MyCoast.org app at your selected starting point and identify your location.**

b. **Note your survey start time.**

c. **From your starting location, begin your search by starting a timer with an alarm for a total of 20-person minutes** (20 minutes for one person; 10 minutes for 2 people; 6 minutes 40 seconds for 3 people; 5 minutes for 4 people. It's best to keep group sizes limited to 4 people. If you have a larger group split into teams and conduct two separate molt hunts).

d. **Walk the beach and start collecting as many molts as possible.** 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 below large beach logs.

e. Collect molts by hand **one at a time** and **don't try to identify** molts as you collect them. Note that you are looking for any crustacean molt of any size (crabs, hermit crabs, shrimps, amphipods, isopods, barnacles; from very tiny to huge).

3. Record your molt survey

a. **<u>After</u> the timer goes off, combine and sort through all of the molts**. We recommend starting by sorting "like with like" before identifying. While we are only asking you to report European green crab and Dungeness crabs, carefully identifying every molt you have collected to species can be a good way to make sure you haven't overlooked any green crab molts.

b. Regardless of what you have found, **take a photograph of your entire collection with something in it for scale** (e.g. calipers). Fragments & dead crabs can be included in this photo.

c. **Submit the photo on the MyCoast reporting form.** If you do not find any molts (not uncommon during cool-water months), select "no molts found" in the MyCoast app.

d. **If you find European green crab molts:**

   i. Record the total number of green crab molts found. Only include molts with at least 50% of the carapace intact in this number.

   ii. You will record sex and size of a subsample of green crab molts to help learn about the population. Place all green crab molts together in one container, then look away and haphazardly select up to 10 to record. If you have found fewer than 10, submit data for all of the green crab molts you have found.

   iii. For each individual European green crab molt:

      1. Add a **photo**
      2. Record the condition of each crab (**molt, alive,** or **dead)**
      3. Record the **sex** if the abdomen is present, and
      4. Measure the **carapace width**. Measure the width at the outside of the widest point of the carapace (back shell, including spines) to the **nearest millimeter**. If the carapace is broken, estimate the full size by measuring from the widest point to the centerline of the intact portion and doubling that measurement. Make a note that the carapace width is estimated for this molt in the field notes/comments section.

e. **If you find Dungeness crab molts:**

   i. Record the total number of Dungeness crab molts found. Only include molts with at least 50% of the carapace intact in this number.

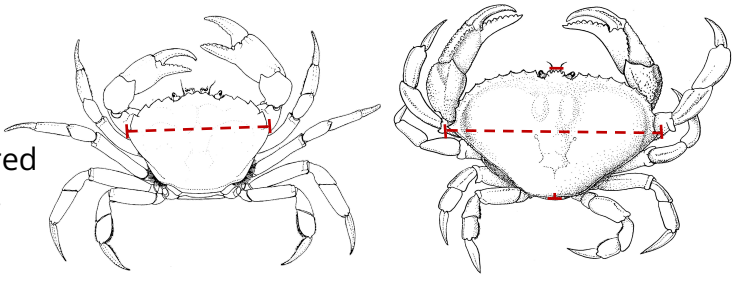
   ii. You will record sex and size of a subsample of Dungeness crab molts to help learn about the population. Place all Dungeness crab molts together in one container, then look away and haphazardly select up to 10 to record. If you have found fewer than 10, submit data for all of the Dungeness crab molts you have found.

   iii. For each individual Dungeness crab molt:

      1. Measure the **carapace width**. Measure the width at the outside of the widest point of the carapace (back shell, including spines) to the **nearest millimeter**.
      2. If the molt is larger than 30mm and the abdomen is present, determine and record whether the crab is a male or female based on the abdomen shape.

Measuring crabs

All crabs should be measured to the widest point of shell, including any spines.



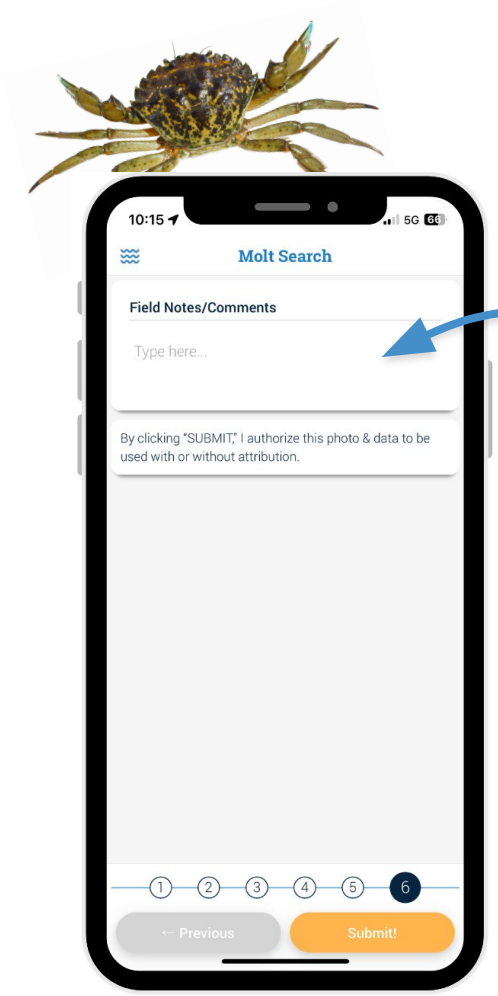
4. After your molt survey

a. **Dispose of molts**. Where legal to do so, retain any green crab molts you find in case additional information is needed for verification. You can leave all other molts on the beach, or take them home for study, decoration, alternative garden gnomes or whatever you can imagine.

   Note that if you plan to survey the same beach the next day, be aware of the possibility that you might re-find the same molts. If you would like to do a second survey, you could crush the molts collected during the first survey, choose another location, or come back to this spot a bit later.

b. **Submit survey on MyCoast.** If you had the app open while collecting, don't forget to click submit on your final observations. If you did not have internet access at your survey location and are submitting the report from home, don't forget to double check that your location and survey start time are accurate before submitting your survey. Submission via computer at MyCoast.org is also possible.

c. **If you found a European green crab molt:** We will follow up with you after you submit your report—if you can, please hold on to the molt until you hear from us. We may request additional photos or details on your report.



What to do if you find...

A live or dead green crab?

Report it through the MyCoast report form, indicating that the condition of the crab is alive or dead.

- If dead: please record the sex and carapace width as you would with a molt, and take it home with you in case additional information is needed. It'll probably be pretty stinky so store it somewhere that works for you (e.g., freezer).
- If alive: take several pictures from different angles, record the sex and measure the carapace width. **Then you MUST RELEASE it! Seems counterintuitive, but European green crabs are a prohibited species and illegal to possess live.**

A molt you can't confidently rule out as a European green crab?

Make sure the molt is in your collection photograph, and make a note in the field notes/comments section at the end of the MyCoast reporting form. Hang on to the molt in case additional information is needed to confirm an ID.

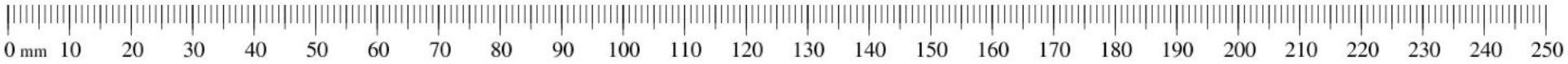
A molt or molt fragment smaller than half a carapace that appears to be a green crab?

If you've found a small piece of an otherwise identifiable carapace, or a carapace-less molt fragment that appears to be a green crab, you can include these pieces in your collection photograph and note them in the field notes/comments section.

Contact us:

wsg.washington.edu/moltsearch

email: crabteam@uw.edu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