ALASKA EUROPEAN GREEN CRAB COMMUNITY-BASED EARLY DETECTION MONITORING MANUAL

Acknowledgements

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Adopted by AKISP Marine Committee 2025

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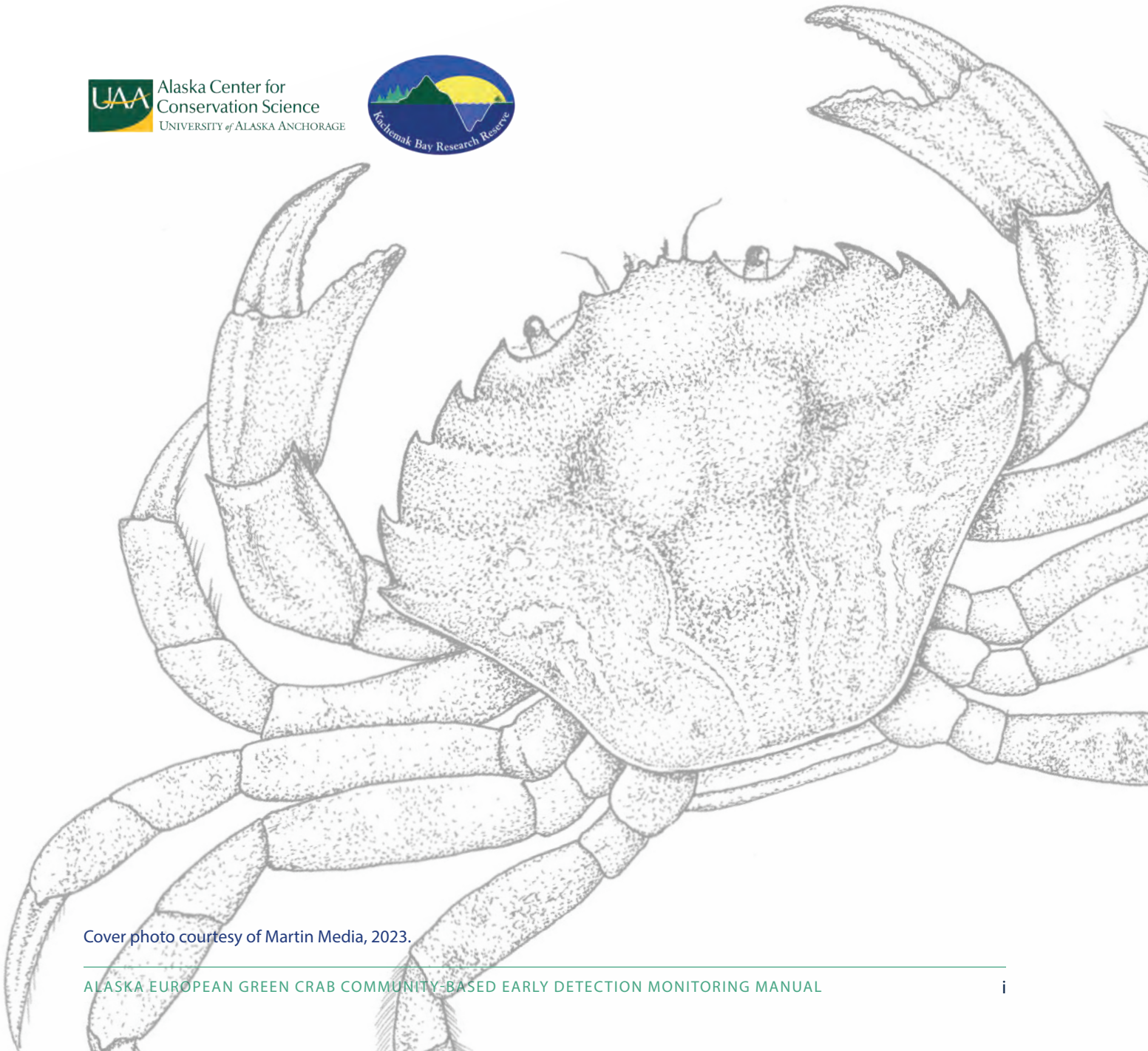

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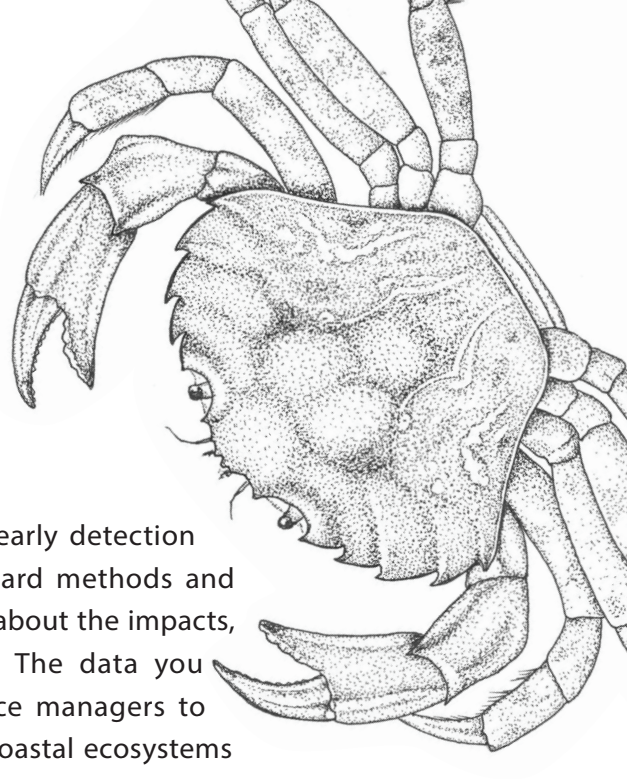


General Information

Thank you for joining the effort to increase awareness and early detection of invasive European green crab (EGC) in Alaska. You are joining a statewide partnership of volunteers, Tribes, agencies, and researchers to detect and track the spread of EGC in coastal Alaska.

This manual provides detailed instructions on standardized early detection methods for invasive European green crabs. By using standard methods and data collection, your efforts will produce valuable information about the impacts, invasion status, location, and relative abundance of EGC. The data you contribute can be shared with decision makers and resource managers to elevate awareness and address the threat of EGC to Alaska's coastal ecosystems and economies.

Field sampling protocols covered in this manual include molt surveys, early detection crab trapping, and standards for data collection Suitable locations for crab trapping can be determined during annual monitor training, site visits with Program Coordinators, and in consultation with Alaska Department of Fish and Game (ADF&G) Invasive Species Program Coordinator, Tammy Davis

Early detection is a key component of assessment, response, and management of invasive species Upon the detection of invasive EGC during early detection trapping or a molt walk, local partners will coordinate to conduct an assessment or rapid response to evaluate the level of invasion, following the Early Detection and Rapid Response Plan for Invasive European Green Crab (Carcinus maenas) in Alaska, 2023-2028

Based on the assessment, appropriate actions will be taken, such as intense removal and suppression efforts, returning to monitoring, or designing long-term management strategies and goals Community Monitor early detection may continue at the same sites, supporting these efforts as Sentinel Sites to understand the local EGC population dynamics and impacts

Alaska EGC Early Detection Monitors:

- Are an integral part of a statewide partnership to keep Alaska wild and free from invasive species.
- Receive training on early detection of EGC to monitor specific sites.
- Conduct monthly monitoring from April through September (or longer).
- Submit data monthly to a Program Coordinator or ADF&G Invasive Species Program Coordinator.
- Notify ADF&G immediately upon finding evidence of EGC presence.

Recording molt walk data after a molt walk on the Homer Spit. Photo courtesy of A. Lutto, USFWS, Homer, AK, 2023.

ALASKA'S EGC EARLY DETECTORS CODE

The Alaska Invasive Species Partnership EGC Subcommittee has outlined standard methods and practices to foster a safe and rewarding experience for all EGC Early Detection Monitors, ensuring the collection and sharing of quality data across Alaska's vast geography and diverse programs. EGC early detection in Alaska encourages each participant to review volunteer agreements periodically, understand what is expected of volunteers, remain vigilant to safety concerns, and demonstrate respect for themselves, others, and the environment. Responding to the threat of EGC in Alaska requires all of us to work together collaboratively and inclusively, bringing our personal strengths and skills to the shared goal of minimizing the impacts of this aggressive marine invasive species.

SAFETY AND STEWARDSHIP

Coastlines can be hazardous. Before beginning, be sure to let someone know where you are going and when you plan to return. If you think an area is potentially hazardous and feel uneasy about accessing it, DON'T DO IT! Be mindful of the tides, weather, mudflats, and other natural phenomena around your site. Always work with a partner and wear appropriate gear for the area and weather, such as rubber boots, rain gear, and gloves. Respect private property boundaries and culturally sacred sites, and only access these areas if you have permission.

COLLECTION PERMITS

Invasive European green crabs are classified as banned invasive species under Alaska regulation 5 AAC 41.075. Possession and transport of these species are prohibited without the appropriate permit, such as an Aquatic Resource Permit (ARP). An ARP from Alaska Department of Fish and Game is required for any activity involving the collection of fish, amphibian, shellfish, or marine aquatic plants not covered by current sport, personal use, aquatic farm, and commercial regulations. The ARP must be renewed annually by submitting an application to dfg.fmpd.permitcoordinator@alaska.gov. The permit covers trapping activities for the early detection of invasive EGC and allows the permittee(s) to retain and remove EGC caught during trapping efforts.

The value of reporting unusual or suspect invasive species is recognized in the Alaska banned invasive species regulations. A person may collect, contain, and transport a suspected organism for the purpose of reporting it to the Alaska Department of Fish and Game. The first suspected EGC detected at any site should be kept in a sealed container, frozen, and confirmed within 24 hours. The ADF&G Invasive Species Program Coordinator, Juneau, 1-877-INVASIV (1-877-468-2748), dfg.dsf.invasivespecies@alaska.gov should also be contacted within 24 hours if you find any species suspected to be European green crabs (including larvae) or other non-native species during your sampling. When reporting an invasive species, be sure to collect the following information: a photo of the organism, a photo of the environment where it was observed, and the location with GPS coordinates or by describing it on a map with landmarks.

Be aware that EGC are agile and aggressive and will try to escape. Ensure crabs are in a tightly sealed container before transporting them for identification confirmation and/or disposal. Proper disposal of EGC will be determined by ADF&G regulation and may be site-specific. Disposal methods will be communicated through Program Coordinators, and it is important to follow disposal practices for your specific location to ensure no EGC escape. CAUTION: EGC can reanimate after being in a freezer for 36-48 hours.

Releasing native crabs after processing the catch from a trap in Kachemak Bay. Photo courtesy of A. Lutto, USFWS, Homer, AK, 2023.

Molts collected during a molt walk on the Homer Spit. Photo courtesy of J. Maurer, KBNERR, Homer, AK, 2023.

Molt Walk Protocol

All crabs must molt to grow, and the molted exoskeletons (carapaces) are often deposited by the high tide onto the upper beach with seaweed and other beach wrack and debris. In addition to live trapping, searching for molts provides a method for volunteers to detect European green crabs in nearby waters. In multiple cases, molt collection has been the method of detecting the arrival of EGC at new locations along the northeast Pacific Coast, including Alaska. ADF&G has a blanket permit for molt walk surveys, which can be found here or provided by your Program Coordinator. This permit should be printed and present during molt walk activities, along with the datasheet (available under Resources on p. 15) for recording observations. It is a requirement for molt walk permit users to submit data to ADF&G at the end of the year, either directly or through Program Coordinators.

Molt walk surveys may be conducted on any beach or shoreline. You can conduct multiple 20-person-minute molt walks in different areas of the same beach on the same day. Ideal locations include "catcher beaches" that accumulate ocean debris. Estuary shorelines and areas near eelgrass beds and freshwater inputs are likely habitats for early EGC invasion.

Protocol: Volunteers collect crab molts for a minimum of 20 total person-minutes (e.g., 20 minutes for one person, 10 minutes for two people, 6 minutes and 45 seconds for three people). Molt walk duration can be greater than 20 person minutes.

Follow these steps to ensure accurate data collection.

- Target areas with high molt concentrations: Focus your beach walk survey to areas of the beach where the most molts are found. Pick up molts one at a time to avoid damage.
- Collect molts for a minimum of 20 person-minutes: Once the time is up, gather at a location where you can comfortably identify, count, and record the species of each of the molts. Record the time in total person minutes spent collecting molts.
- Identify and record: Only count molts that include at least half of the back shell (carapace) and have identifiable species characteristics. Do not count loose crab legs .
- Consecutive molt walks can be conducted on the same day at the same location when time allows.

Whole carapaces counted during a molt walk.

Legs only, not counted during a molt walk.

- Document findings: Record the total number of molts for each species on the back of the datasheet. Note the location of the molt walk, beach habitat description (e.g., wrack, driftwood, upper beach vegetation), and specific place where most molts were found.
- Review and smash: Ensure all required information is recorded legibly. After identifying and counting, smash the molts to avoid recounting in future surveys. Photograph any unidentifiable carapaces.
- Report suspected EGC molts: Photograph and report suspected EGC molts to the Alaska Invasive Species Hotline (1-877-INVASIV) or using the provided QR code. Retain these molts for identification confirmation.

Early Detection Crab Trapping Protocol

As a reminder, trapping activities for the early detection of EGC require an Aquatic Resource Permit. Some monitors will apply for a permit directly, while others will receive a permit from their local Program Coordinator. Permits must be printed and in-hand during trapping activities. Ensure all traps are labeled with the current year's permit number, contact name, and phone number. If there are changes in personnel engaged in trapping, work with the ADF&G permit coordinator to amend your permit so that all active members are listed. All permit holders must submit collection reports at the end of the year. Refer to the stipulations on the permit for details on what information to include.

The first site of EGC detection in Alaska, Tamgas Harbor, Annette Island, AK. Photo courtesy of Linda Shaw, NOAA.

SITE SELECTION

When selecting a site for early detection of invasive European green crab, follow these general guidelines.

- Choose the right area: Choose a relatively small area with high suitability for EGC survival. A bay or estuary may have several monitoring sites to cover suitable habitats. Each site should be large enough to accommodate six traps spaced about 30 feet apart
- Tap resources for assistance: If you have an Early Detection Monitoring Coordinator, work with them to combine your local area knowledge with information on EGC habitat preferences during the initial invasion stage. If you don't have an Early Detection Coordinator,

assistance can be obtained through paired site visits with local Early Detection Monitors and regional Program Coordinators, seasonal trainings, direct communication with the ADF&G Invasive Species Coordinator, or by participating in AKISP Marine Committee and EGC subcommittee meetings. Don't tackle site selection alone—leverage the resources and knowledge of AK Marine Invasive Species Committee members.

- Safety first: Ensure the site is safe for monitors and accessible during the sampling season (April to September or October). The sampling season may vary depending on your region in Alaska and winter weather conditions.
- Know the basics: EGC are most often found in protected bays, inlets, and estuaries. They may also be found in standing water at low tide and near eelgrass beds or freshwater inputs in these protected areas. At the initial stages of invasion, EGC are often found in the upper portion of the tidal zone, and near structures like driftwood, boulders, or cut banks.
- Reposition periodically: Adjust trap locations within your site from time to time. For example, in an estuary, consider moving traps systematically from one tidal channel confluence to another throughout the season.

MONITORING SITE STEWARDSHIP

All monitoring sites should be safe, ecologically relevant to European green crab invasion, and suitable for deploying and retrieving trapping equipment. As stewards of Alaska's marine resources, Community Monitors must minimize their impact on monitoring sites. To do so, use existing trails, avoiding disturbing fragile habitats, dispose used bait in a trash can and thoroughly clean boots and equipment to avoid transporting unseen animals or seeds.

Whenever possible, use traps at only one site per season. If traps are used at multiple sites, clean and dry them upland for at least three days between deployments.

European green crab at the earliest stages of invasion will be patchy in distribution and trapping is an inherently limited method of monitoring. To increase detection probability, a minimum of 12-18 traps should be set within a 2-3 month timeframe during peak crab activity (May to September). This can be achieved by setting six traps over three consecutive days (18 traps set), six traps once each month (18 traps set), or a combination of these methods.

Measuring a helmet crab during trap retrieval in Homer. Photo courtesy of A. Lutto, USFWS, Homer, AK, 2023.

EQUIPMENT

Before leaving to deploy or retrieve traps, make sure your kit includes the following:

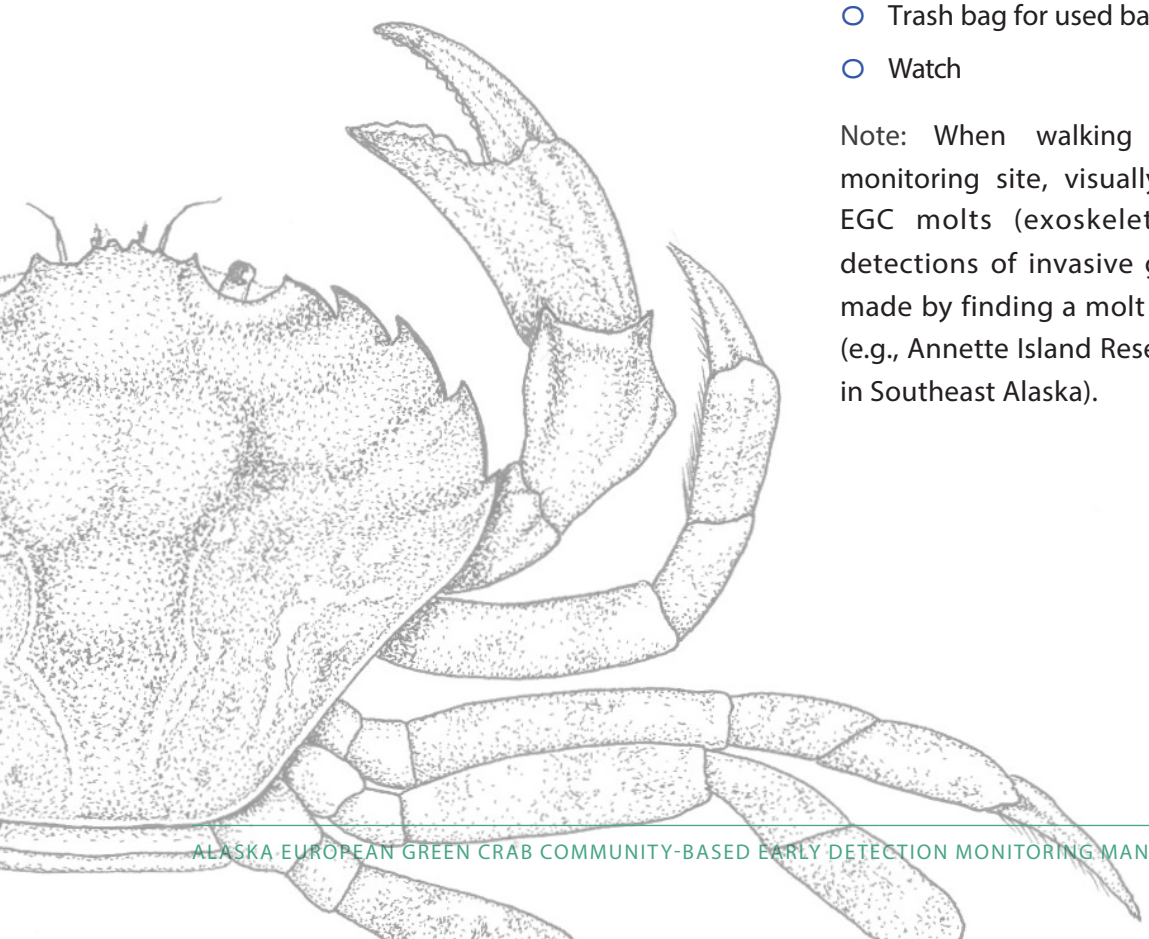
Deployment equipment:

- ADF&G Permit
- Bait (thawed)
- Bait jars with lids (6)
- Bucket
- Clipboard
- Data sheet
- Extra line
- Extra stake
- Field knife
- Folding traps (5)
- Gloves (optional)
- Hammer
- Minnow trap (1)
- Pencils
- Stakes (if not attached to traps)

Retrieval equipment:

- ADF&G Permit
- Calipers (2)
- Camera
- Clipboard
- Collection container for suspected EGC
- Data sheet
- Field knife
- Gloves (optional)
- ID guides (fish, crabs, crabdomen, other)
- Pencils
- Photo labels
- Ruler
- Salinity meter (refractometer)
- Sorting tubs (2)
- Thermometer
- Trash bag for used bait
- Watch

Note: When walking to and from your monitoring site, visually scan the beach for EGC molts (exoskeletons). Several initial detections of invasive green crab have been made by finding a molt rather than a live crab (e.g., Annette Island Reserve and Bostwick Inlet in Southeast Alaska).



DEPLOYING TRAPS

- Arrival and set-up: Arrive at your site 30-60 minutes before your desired deployment time to set traps at the appropriate depth Each set should include six traps: five folding traps (Fukui) and one minnow trap Additional traps can be set if time and space allow Check the weather forecast to avoid deploying traps in worsening conditions, as along-shore currents created by wave action can dislodge stakes, resulting in trap loss Use existing trails to access the site when available.

- Baiting traps: Bait each trap with 2-3 pieces of thawed cut herring or an equivalent bait in a container Specify the type of bait used on the datasheet Place the bait container inside the trap before closing it; there is no need to secure the container to the trap Thawed bait ensures the traps are fishing consistently throughout deployment, unlike frozen bait that will thaw at varying rates Bait should always be placed in a container to attract and retain crabs in the trap

- Trap placement: Set traps at low tide on a day with a -0 1 tide or lower and leave them for 24 hours Arrange the traps in a line parallel to shore, spaced 30 feet (10 full paces) apart Whenever possible, deploy traps near large rocks, logs, or areas where crabs may find cover. If placing traps in estuarine habitat, attempt to place traps in channels. Always place traps so that they are submerged more than halfway but not too deep for retrieval the next day A good way to accomplish this is to set the traps when the lowest low tide of the day is falling Traps should remain submerged throughout the 24-hour period to minimize exposure of fish or other captured organisms to air and reduce the chance of non-marine species (e g , river otters, birds) entering the trap

Cutting herring for crab trap bait. Photo courtesy of J. Arguetta, KBNERR, Homer, AK, 2023.

Traps set parallel to the shoreline in water slightly greater than halfway up the trap. Photo courtesy of KBNERR, AK.

- Distance: Space traps 30 feet (10 meters) apart to prevent interference with each other's fishing range. Adjust trap placement based on habitat variations and habitat structure instead of spacing them uniformly. Ensure traps are set as low as possible without being covered by the next low tide.
- Securing traps: Traps should be anchored to the substrate with stakes, stakes and line, or line wrapped around large rocks. Anchor traps securely by pushing the stakes into the ground Alternatively, use rebar, or PVC pipe to secure traps to the ground. Ensure traps are closed.

For folding traps, lift the collapsible sides and clip the top together. For minnow traps, secure the halves with cotton line or the pin-and-clip system.

- Time Period: Deploy traps for a 24-hour soak period that covers a full tidal and day/night cycle. Check and empty traps after this period.
- Frequency: Aim for a minimum of three sampling events from April through September. If possible, increase frequency to once a month per site to improve the chances of early detection of invasive European green crab. If trapping on consecutive days, record catch data and refresh bait after 24 hours.
- Other details: Check that all trap labels are still attached. Be aware of weather conditions to avoid trap loss or damage from storm-driven waves. Record the time of the last trap set on the datasheet to track "soak time" and calculate effort.

TRAP RETRIEVAL PROTOCOL

Return to your site as soon as the traps are exposed the day following deployment. Dispose of bait upland to prevent transporting unseen predators and to avoid attracting foraging birds and mammals.

- Arrival time: Arrive at your site before low tide to ensure that organisms in the trap remain in water, minimizing mortalities.
- Recording time: Record the trap retrieval time as the moment you start processing the first trap. Although it may take time to process all the traps, it's unlikely that more organisms will enter once you are near the traps.
- Habitat and weather: Record habitat descriptions and the predominant weather condition (circle one on the datasheet) during trap retrieval.
- Environmental measurements: Measure and record temperature and salinity, if possible, before checking the traps. Enter these results at the top of the datasheet. You may need to secure the thermometer to the bucket and allow it to stabilize for a few minutes before recording the temperature.
- Removing organisms: Remove organisms from the trap by first taking out the stakes or untying the securing line. It's acceptable to move the trap to dry land for processing. If large fish (greater than 12 inches) are present, remove them before moving the trap, taking care not to lose smaller organisms. Photograph and measure large fish, including any salmonid species, before releasing them back into the site. Empty the remaining organisms into a tub. Handle animals quickly and gently. Wear gloves to avoid being pinched or bitten. If organisms are tangled, gently nudge them with a pencil or tap the trap to dislodge them.
- Photographing organisms: Photograph all organisms from each trap. Group photographs are sufficient for most organisms. For large fish, take an individual photo and when appropriate estimate size before releasing them. For any unknown fish take multiple individual photos, capturing a side profile, dorsal fins, spines or soft projections on the head or gill cover if present. Photograph both sides of any unknown flat fish. Place the remaining catch in a collection tub with a scale bar and photograph with a label, including the site name, trap number, and date. Share photos of unknown organisms with the Program Coordinator within three weeks for identification.

The entire catch from one trap. Photo courtesy of KBNERR, Homer, AK, 2024.

- Recording catch data.
  - Preferred measurement method: Assign one person as the data recorder, writing legibly in pencil. Process fish first and release them at the site to minimize their time out of water. Measure the total length of the first 10 individuals of each fish species and record it on the datasheet. For more than 10 individuals, count the total and note that on the datasheet. You do not need to determine fish sex. If unsure about any fish, take pictures and share them with your Program Coordinator within three weeks for identification. For large fish, make a note if you provided a size estimate. Identify and count (when appropriate) hermit crabs and non-crab invertebrates. For all other native crabs, randomly select and measure up to 10 males and 10 females of each species. Count and record the total number of trapped males and females. Release all native crabs alive at the site, placing them where they will not be harmed. Invasive European green crabs should be sexed, measured, and retained for genetic analysis and confirmation.

    Trap Photo Label Example

    Folding Trap 1

    Site Name: The Moon

    Date: 1/23/45

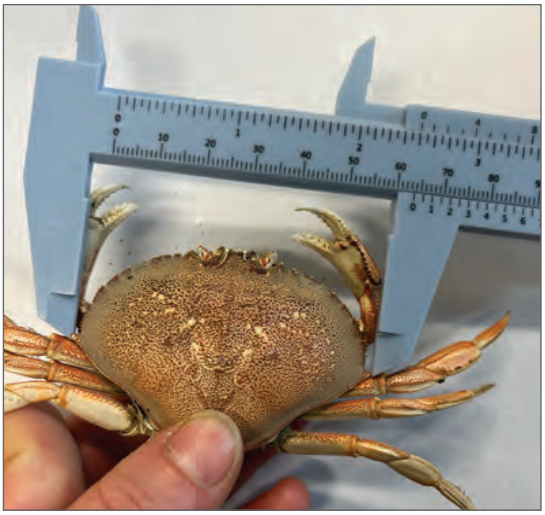
  - Alternate method: Identify and count (when appropriate): If processing capacity is limited, you can reduce processing time by eliminating the measuring of native crabs and fish. Instead, count each fish species and the total number of males and females for each crab species. The trapping effort remains the same at 15-18 traps at the same site within 2-3 months. Sex and measure any suspected or confirmed EGC.

- Datasheet
  - Site and environmental information: Fill out site information before pulling traps. Document the site name and description. Complete a site sketch of the trap layout. If trap lay out is changed during the season, complete a new site sketch. Record all Early Detection Monitors' names for each trapping event.

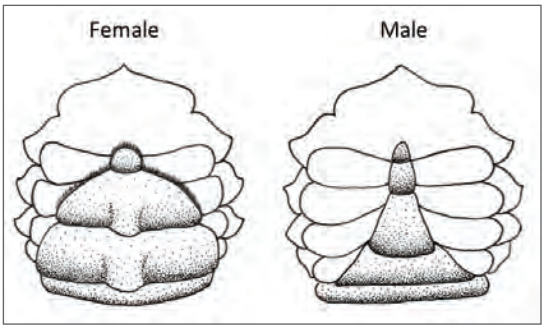
- Catch Information: Write "Empty" next to the trap number if the trap is empty
- Crab Data: If crabs have parasites or eggs, note this on the data sheet

  - Crab ID: Use provided ID guides to identify all crabs. Photograph any crab that is not easily identified or is suspected to be invasive.
  - Crab Size: Measure the carapace (back) width at the widest point using calipers or a ruler. Measure the first 10 female and first 10 male crabs from each species. If more than 10 male or female crabs are caught, count the additional ones and record the total number.
  - Crab Sex: Determine the sex by examining the width and shape of the tail, which lays flat against the underside of the abdomen. Males have a narrow, triangular abdomen, while females have a broader abdomen.
  - Unidentified Crabs: For unidentified or suspected invasive crabs, take several photos, including at least one with a scale bar and photo label. Share these photos for verification and to complete your datasheet within three weeks.

- Review data: Once the trapping event has ended, review the datasheet to ensure all information is recorded accurately. If multiple datasheets were used, number the page.



Measuring a crab carapace at its widest point, as shown above. Photo courtesy of KBNERR, Homer, AK.



Female and male crab abdomen shapes used to determine sex. Illustration by K. Schuster, KBNERR.

- Report data: Take pictures of completed data sheets using a phone camera. Coordinate on preferred reporting methods with your Program Coordinator. Data sheet photos and catch photos may be submitted by email at the end of each month, using the file naming convention: SiteName. Year. Month. Content. Mail hard copies of data sheets via postal service at the end of the season or as planned with your Program Coordinator.

File Naming Convention

TheMoon. 22. 7. Trap.2.jpg

TheMoon. 22. 7. Fishunknown.T2.jpg

- Trap care and maintenance: Clean all debris, plants, and animals off traps between surveys. Rinse with fresh water, dry, fold flat, and store in a safe, dry place. Report any damage to your Program Coordinator to repair or replace the traps before your next event. At the end of the season, arrange with your Program Coordinator to return or store traps for the winter.

Female helmet crab with eggs from Kachemak Bay. Photo courtesy of J. Maurer KBNERR Homer, AK, 2024.

Reporting Suspected Invasive Species

If you suspect you have found or caught an invasive EGC -- or any other unidentifiable crab -- REPORT IT IMMEDIATELY! After recording the data, place the specimen in a sealed container marked "Preserved Specimen" and store it in your freezer. Write out a label with the date of capture, specific trap location, names of the surveyors, and a contact phone number and place it in the container. Contact your Program Coordinator right away to confirm the crab's identity and notify the Invasive Species Hotline at 1-877-INVASIV (1-877-468-2748). Prompt confirmation of identification is crucial.

Confirmed new EGC detections must be reported immediately to ADF&G. If an invasive EGC is identified, Program Coordinators will collaborate with local and state partners, as well as local Community Monitors, to assess the level of invasion and determine the appropriate next steps.

Quick Start Guide to EGC Early Detection Trapping

Before trapping day

1. Determine the days and tides for trapping. Traps must be set at a tidal height of -0.1 or lower, and the lowest low tide of the 24-hour cycle so they remain covered when you are not at the site.
2. Thaw bait before setting traps to ensure they are fishing from the start.
3. Check your gear list before heading to your site.

Deploying traps

4. Place 2-3 pieces of bait in each bait jar as you set the traps.
5. Set the traps about 30 feet (10 meters) apart.
6. Record the site and time on your datasheet.

Retrieving traps

7. Return to the site when the traps are exposed again, about 24 hours later.
8. Collect temperature and salinity measurements.
9. Photograph and measure or estimate the total length of large fish in the trap, then release them.
10. Place smaller fish and crabs in a tub together and photograph them with a photo label.
11. Identify, measure, and release fish first.
12. Identify, determine the sex, and measure native crabs, then release them.
13. Place any suspected EGC specimens in a sealed container marked “Preserved Specimen” and follow the reporting protocol described above.
14. Collect used bait and dispose of it upland.
15. Conduct a molt walk at your site (OPTIONAL).
16. Do visual scan for EGC molts when traveling to and from your site.
17. Double-check the datasheet for completeness.

Wrap up and clean up

18. Clean trapping gear and store it dry until the next event.
19. Send any identification questions to Program Coordinators so you can complete the datasheet.
20. Photograph and rename completed datasheets and catch photos, then email them to your Program Coordinator at the end of each month, or as pre-determined.

Resources

Downloads

Some Crabs of Kachemak Bay Guide

Nearshore Fish of Kachemak Bay

Common Sculpins of Cook Inlet Guide WA

Sea Grant Crab Team Identification Guide

Alaska DF&G Molt Walk Permit Alaska Molt

Walk Data sheet

Websites

Alaska Department of Fish & Game Invasive European green crab

Alaska Invasive Species Partnership

Alaska Invasive Species Online Reporter

UW Sea Grant Crab Team

List of Coordinators & other contacts

Ben Wishnek – U S Fish and Wildlife Service

Danielle Verna – Prince William Sound Regional Citizens' Advisory Council

Genelle Winter – Metlaktla Indian Community

Jasmine Maurer – Kachemak Bay National Estuarine Research Reserve

Kari Lanipher – Southeast Alaska Tribal Ocean Research

Linda Shaw – NOAA Alaska Regional Office Habitat Conservation Division

Sunny Rice – Alaska Sea Grant Petersburg

Tammy Davis – Alaska Department of Fish and Game

AKISP ALASKA INVASIVE SPECIES PARTNERSHIP

Sea Grant ALASKA

Ketchikan INDIAN COMMUNITY Cultural Resources

Alaska Center for Conservation Science UNIVERSITY of ALASKA ANCHORAGE

National Estuarine Research Reserve System Science Collaborative