State of Washington
DEPARTMENT OF FISH AND WILDLIFE
Mailing Address: PO Box 43200, Olympia, WA 98504-3200 · 360 902-2200 · TDD 360 902-2207
Main Office Location: Natural Resources Building, 1111 Washington Street, Olympia, WA

February 28, 2025

The Honorable June Robinson
Chair, Senate Ways and Means
303 John A. Cherberg Building
Post Office Box 40438
Olympia, WA 98504

The Honorable Timm Ormsby
Chair, House Appropriations
315 John L. O'Brien Building
Post Office Box 40600
Olympia, WA 98504

The Honorable Mike Chapman
Chair, Senate Agriculture and
Natural Resources
402 Legislative Building
Post Office Box 40424
Olympia, WA 98504

The Honorable Kristine Reeves
Chair, House Agriculture and
Natural Resources
132F Legislative Building
Post Office Box 40600
Olympia, WA 98504

RE: European Green Crab Quarterly Progress Report – Winter 2024 (October 1 to December 31, 2024)

Dear Chairs Robinson, Ormsby, Chapman, and Reeves,

In 2021, the Washington Department of Fish and Wildlife (WDFW), tribal co-managers, and partners identified an exponential increase of invasive European green crabs (EGC), *Carcinus maenas*, in the Lummi Nation's Sea Pond within the Salish Sea, and in outer coastal areas including Makah Bay, Grays Harbor, and Willapa Bay.

On December 14, 2021, the WDFW Director submitted an emergency measures request under Revised Code of Washington (RCW) 77.135.090 for EGC response to Governor Jay Inslee. On Jan. 19, 2022, Governor Inslee issued an emergency proclamation (#22-02) to address the exponential increase in EGC populations across Washington's marine shorelines. The proclamation directed WDFW to eradicate, reduce, or contain EGC in Washington, and to increase coordination with partner agencies and Native American tribes.

The Washington State Legislature approved $8,568,000 in emergency funding during the 2022 Supplemental Budget to facilitate increased EGC management efforts. In response to the legislative budget proviso directive, this report is the tenth in a series of ongoing quarterly progress reports. The progress report outlines the successes and challenges of ongoing EGC emergency response efforts in Washington state from October 1 to December 31, 2024.

Since January 1, 2022, approximately 1,696,190 EGC were removed from Washington state marine waters, with 1,604,161 removed from the Coast Branch, and 92,029 removed from the Salish Sea Branch. During this reporting period, the collective effort of all organizations resulted in 372,631 EGC removed from Washington state waters, with 370,664 removed from the Coastal Branch and 1,967 removed from the Salish Sea Branch.

European green crab removal numbers for Washington increased substantially in 2024 compared to previous years, though changes in removal numbers and catch per unit effort was highly variable across Management and Coordination Areas. The EGC emergency remains a complex and nuanced situation with no universal solution to this highly variable problem.

The European Green Crab Multi-Agency Coordination Group and Research Task Force continues to coordinate with EGC managers and researchers across the Pacific coast of North America to achieve state management objectives and advance research priorities to support green crab management efforts in Washington state and throughout the region. Additional progress was also made on public education and community engagement to support green crab awareness, with WDFW representatives engaging individuals at public events and producing new outreach materials. While challenges remain, the continued efforts of all parties and the clear organizational structure set previously will allow for continued success through calendar year 2025, guided by the 2025-2031 Management Plan for Washington. The plan was completed and submitted to the governor's office and the legislature on September 25, 2024, and can be found at https://wdfw.wa.gov/publications/02537 .

Per RCW 77.135.090, the WDFW Director continues to evaluate the effects of the European Green Crab emergency measures and finds that the emergency continues to persist and advises that emergency measures continue.

If you have any questions about this report or the WDFW efforts to address this emergency, please contact Melena Thompson, WDFW's Legislative Director, at (360) 480-1472.

Sincerely,

Justin D. Bush
WDFW European Green Crab Incident Commander

CC:
Kelly Susewind, Director, WDFW
Kelly Cunningham, WDFW Fish Program Director
Raquel Crosier, WDFW European Green Crab Deputy Incident Commander
Owen Rowe, Senior Natural Resources Policy Advisor to Governor Bob Ferguson

European Green Crab Quarterly Progress Report – Winter 2024 (October 1 to December 31, 2024)

Washington Department of Fish and Wildlife

European Green Crab Quarterly Progress Report – Winter 2024 (October 1 to December 31, 2024)

Author

Brian Christopher Turner

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Cover photo by WDFW.

Acknowledging the Indigenous People of the Pacific Northwest

Since time immemorial, Indigenous People have lived in the Pacific Northwest and hunted, fished, and gathered natural resources, traditional foods, and medicinal plants to support their diverse cultures. They were the original occupants and stewards of this land that all Washingtonians enjoy today.

The very survival of the Pacific Northwest Tribes is a testament of resiliency of what they have endured and continue to endure throughout generations on this landscape. Through many historical encounters of massacre, renunciation of religious freedom, systemic racism, cultural assimilation of native children through institutional residential schools, and the fight for their inherent rights and liberties, they have prevailed. Throughout this painful history brought by colonization, abrogated treaties, infringement of civil rights, and the salmon protests of the 1960s, the Northwest Tribes and the Washington Department of Fish and Wildlife (WDFW) have founded a commitment of respect, unity, and alliance informed by the realities of the past.

Today, tribal governments and WDFW work collaboratively to conserve and manage aquatic and terrestrial resources statewide and practice sound science to guide management decisions. The Tribes and WDFW work together to ensure the sustainability of fish, wildlife, ecosystems, and culture for the next seven generations and beyond.

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Executive Summary

In response to the ESSB 5693 (2022 c 297) legislative budget proviso directive, this report has been authored as the tenth in a series of ongoing quarterly progress reports. This report will serve to outline the successes and challenges of ongoing European green crab (hereafter green crab) emergency response efforts in Washington state from October 1 to December 31, 2024. In addition, this report will examine green crab data for the totality of 2024 in the context of previous years (2022-2023).

The previous quarterly progress reports are available at: https://wdfw.wa.gov/publications and on WDFW's European green crab webpage.

In 2021, the Washington Department of Fish and Wildlife (WDFW), co-managers, tribes, and partners identified an exponential increase of invasive European green crab, C*arcinus maenas*, in the Lummi Nation's Sea Pond within the Salish Sea, and in outer coastal areas including Grays Harbor, Makah Bay, and Willapa Bay. On Dec. 14, 2021, WDFW Director Susewind submitted an emergency measures request under RCW 77.135.090 for green crab response to Governor Jay Inslee. On Jan. 19, 2022, Governor Jay Inslee issued an emergency proclamation (#22-02) to address the exponential increase in green crab populations across Washington's marine shorelines. The proclamation directed WDFW to eradicate, reduce, or contain green crab populations in Washington. The Washington State Legislature approved $8,568,000 in emergency funding during the 2022 Supplemental Budget to facilitate increased green crab management efforts. In response to the legislative budget proviso directive, this report is the tenth in a series of ongoing quarterly progress reports. This Winter 2024 report will outline the successes and challenges of ongoing green crab emergency response efforts in Washington state from October 1 to December 31, 2024.

An Incident Command System (ICS) was established to deal with the complexities of the green crab management effort. Support for and coordination with co-managers, tribes, and partners is essential, as the scale of the green crab emergency is such that no one entity could ever hope to implement successful statewide management strategies alone. Washington Sea Grant (WSG), the Lummi Nation, the Makah Tribe, the Shoalwater Bay Tribe, shellfish growers and various other entities have continued their ongoing efforts managing green crab populations, closely coordinating with WDFW. The ICS also resulted in the creation and distribution of various updates including reports to the governor every 10 days and Situation Reports (SitReps) based on monthly operational periods to provide information on and ensure transparency regarding management actions taken, grant funding allocations, green crab catch numbers, trapping efforts, media outreach, and other relevant information. These Situation Reports were synthesized for the public, media, and other external audiences in bi-monthly Green Crab Public Updates published and distributed through WDFW's Green Crab Management Updates email list as well as Department webpages, communications, and social media channels.

Representatives from many entities participating in green crab management have joined the ICS Multi-Agency Coordination (MAC) Group. The MAC Group provides a forum for these representatives to share information, establish a common operating picture, develop long-term priorities for the green crab

emergency, and commit and allocate funding and other resources to enhance emergency measures responses.

During Winter 2024, the collective effort of all organizations resulted in approximately 372,631 green crab removed from Washington state marine waters, with 370,664 from the Coastal Branch and 1,967 from the Salish Sea Branch. Since January 1, 2022, approximately 1,696,190 green crab have been removed from Washington state marine waters, with 1,604,161 removed from the Coast Branch, and 92,029 removed from the Salish Sea Branch. In addition to active control trapping, Winter 2024 trap deployment for early detection monitoring occurred in areas where green crab had not previously been detected. Green crab has not been detected in the Salish Sea Branch south of the northern Hood Canal. Data on green crab abundance, body size, sex ratios, and reproductive status were collected for future analysis, along with DNA and RNA samples to assess connectivity between green crab populations.

Green crab removal numbers for Washington increased substantially in 2024 compared to previous years overall, though changes in removal numbers and catch per unit effort (CPUE) was highly variable across Management and Coordination Areas. One likely contribution to the increase in CPUE is the El Niño Southern Oscillation (ENSO) event during the winter of 2023 which supported recruitment of green crab in many management areas. At the same time, there were more trapping partners covering more sites, removing higher volumes of green crab. The green crab emergency remains a complex and nuanced situation with no universal solution to this highly variable problem.

WDFW, WSG, co-managers, tribes, and partners achieved significant progress in green crab management efforts. The European Green Crab Research Task Force continues to coordinate with green crab researchers across the Pacific coast of North America to advance research priorities to support green crab management efforts in Washington state and throughout the region. Additional progress was also made on public education and community engagement to support green crab awareness, with WDFW representatives engaging individuals at public events and producing new outreach materials. While challenges remain (e.g., preparing for the 2025 field season), the continued efforts of all parties and the clear organizational structure set previously will allow for continued success through 2025.

Background

European green crab

The European green crab, *Carcinus maenas,* is a globally damaging invasive species that poses a threat to the ecological, economic, and cultural resources of Washington state. Native to Western Europe and Northwestern Africa, this hardy and voracious predator has since expanded its range throughout the globe (Carlton and Cohen 2003). Green crabs exploit a variety of different habitat types within intertidal and subtidal zones. Along the Pacific coast of North America, green crab inhabit protected shorelines in unstructured sandy and muddy bottoms, estuaries, saltmarshes and seagrass beds, as well as utilizing woody debris and rocky substrates (Kern et al. 2002). Green crab have wide tolerances for salinity (1.4-

54 ppt) and temperature (0-35 °C) and can even survive air exposure for several days (Leignel et al. 2014).

In areas where green crab have been able to establish large populations for extended periods of time, they have the potential to negatively impact other species, particularly smaller crabs and bivalves (Jamieson et al. 1998, McDonald et al. 2001). It is estimated that damages to commercial shellfisheries from green crab predation average $22.6 million per year on the East coast of the United States (Lovell et al. 2007). Similar loses from green crab predation are possible for Salish Sea shellfish fisheries (Mach and Chan 2013) and Pacific Coast fisheries are also at risk. Predation on oysters by green crab could negatively impact oyster fisheries, as adult green crab can prey upon young oysters (Dare et al. 1983, Poirier et al. 2017) and have been observed cracking and consuming adult oysters in laboratory settings (Forster). Lab work has shown that juvenile green crab outcompeted similar-sized Dungeness crabs for food and shelter and juvenile Dungeness may serve as prey for larger green crab, resulting in potential impacts to wild Dungeness populations (McDonald et al. 2001). Predation by green crab has led to declines in native bivalve and crab populations in invaded habitats (Grosholz et al. 2000). In addition, burrowing by green crab can have significant negative impacts on eelgrass, estuary, and marsh habitats (Malyshev and Quijón 2011, Matheson et al. 2016, Howard et al. 2019).

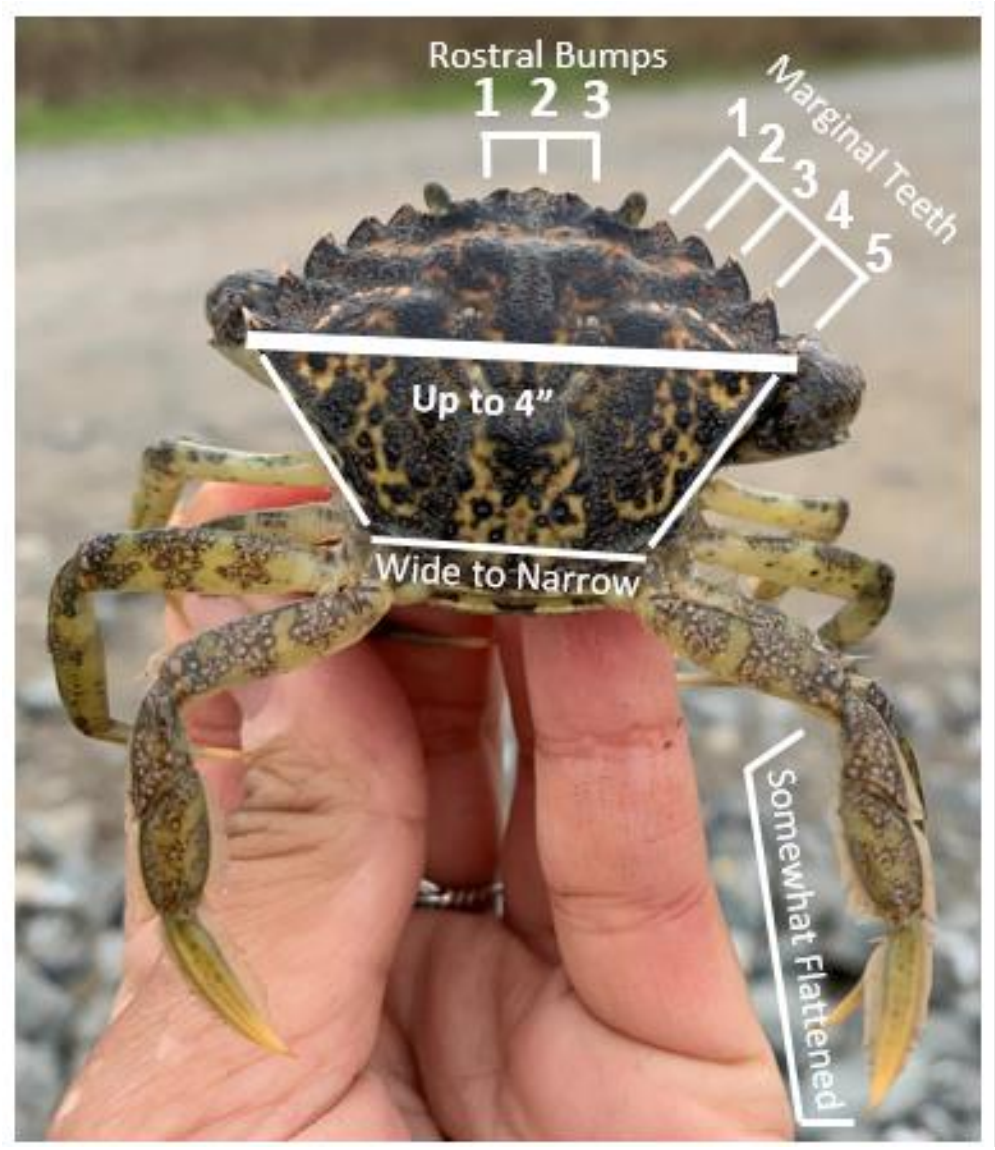
Given their history as a prolific invasive species, green crab is classified as a Prohibited Level 1 Invasive Species in Washington (WAC 220-640-030; Appendix A), meaning they may not be possessed, introduced on or into a water body or property, or trafficked (transported, bought, or sold), without department authorization, a permit, or as otherwise provided by rule (RCW 77.135.040; Appendix A). WDFW is currently not asking the public to kill suspected green crab, which may sound counterintuitive but is intended to protect native crabs from cases of mistaken identity (native crab species continue to be commonly misreported as green crab by the public; Flannery, personal communication). Green crab is most accurately identified by the 5 large spines, also called marginal teeth, on either side of their forward carapace, a unique pattern for crabs on the Pacific coast of North America (Figure 1). Despite their name, coloration of green crabs varies from bright green to dark orange, thus color is not a reliable feature to use when distinguishing green crab from native crab species.

History of the European green crab in Washington state

The first detection of European green crab in the waters of Washington was in 1998 in Willapa Bay and Grays Harbor (Carlton and Cohen 2003; Table 1; Figure 2). Initial emergency management responses took place but ended after a few years due to a lack of evidence of self-recruitment and fewer green crab captured. In 2015, the Washington Department of Fish and Wildlife (WDFW) learned that a population of green crab was discovered in 2012 in Sooke Basin, British Columbia, Canada (Gillespie et al. 2015). In response over concerns of new green crab introductions within the Washington portion of the Salish Sea, WDFW designated Washington Sea Grant (WSG) to lead an early detection monthly monitoring community science network, also known as the Crab Team. This also marked the beginning of increased communication and collaboration with the Department of Fisheries and Oceans Canada (DFO) to explore transboundary green crab management in the Salish Sea. The first detections of green crab in the Washington region of the Salish Sea occurred in 2016 at Westcott Bay on San Juan Island by

the WSG Crab Team and in Padilla Bay by staff at the Padilla Bay National Estuary Research Reserve (Grason et al. 2018). There were additional detections of green crab in 2017 in Makah Bay by the Makah Tribe and in Dungeness Spit within the Dungeness National Wildlife Refuge, which is managed by the US Fish and Wildlife Service. Since 2018, there have been increasing numbers of green crab detections in the Salish Sea and Pacific coastal regions of Washington. In response to continued green crab presence in the Salish Sea, the Salish Sea Transboundary Action Plan for Invasive European Green Crab was created and signed by representatives of WDFW, WSG, the Puget Sound Partnership, and the DFO in 2019 (Drinkwin et al. 2018).

Figure 1 Image of a European green crab, Carcinus maenas, with distinguishing features highlighted.



The main distinguishing feature of green crab are the five spines, or marginal teeth, on each side of the carapace behind the eyes. Additional identifying features are the three lobes, or rostral bumps, between the eyes, and somewhat flattened rear legs.

Table 1 Yearly European green crab captures in Washington from 1998-2024.

Year	Salish Sea	Pacific Coast	Total
1998	0	364	364
1999	0	507	507
2000	0	235	235
2001	0	142	142
2002	0	167	167
2003	0	24	24
2004	0	4	4
2005	0	115	115
2006 - 2014	0	68	68
2015	0	8	8
2016	5	19	24
2017	101	64	165
2018	77	1,115	1,192
2019	177	1,766	1,943
2020	2,858	3,971	6,829
2021	86,340	16,825	103,165
2022	81,009	204,405	285,414
2023	6,452	354,962	361,414
2024	4,568	1,044,794	1,044,794

Data is divided by green crab captured in the Washington State portion of the Salish Sea and green crab captured along the Pacific coast. Please note that these data only represent crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across years and location.

Emergency proclamation and supplemental funding

In 2021, WDFW, co-managers, tribes, and partners identified an exponential increase of invasive green crab in the Lummi Nation's Sea Pond within the Salish Sea, and in coastal areas including Makah Bay, Grays Harbor, and Willapa Bay. It was concluded that this continuing increase in green crab distribution and abundance posed an imminent threat to Washington's economic, environmental, and cultural resources. While $2.3 million was appropriated by the State Legislature for green crab management in the 2021-23 biennium, it was determined to be insufficient to control these exploding populations.

On Dec. 14, 2021, Director Susewind submitted an emergency measures request under RCW 77.135.090 (Appendix A) for a green crab response to Governor Jay Inslee. While emergency funding was not immediately available, on Jan. 19, 2022, Gov. Inslee issued an emergency proclamation (#22-02) to address the exponential increase in the green crab population within the Lummi Nation's Sea Pond and Pacific coastal areas. The proclamation directs WDFW to implement emergency measures as necessary to affect the eradication of or to prevent the permanent establishment and expansion of green crab in Washington. In addition, the Governor urged the Legislature to provide additional emergency funding as requested by the WDFW as soon as possible.

Working with the Governor's office, the Office of Financial Management, co-managers, and tribes including the Lummi Nation, Makah Tribe, and others, along with Washington Sea Grant (WSG), WDFW requested $8,568,000 from the State Legislature during the 2022 supplemental session to control increasing green crab populations. The Legislature fully-funded this request in the 2022 Supplemental Budget, which was signed by Governor Inslee on March 31, 2022.

In April 2023, the State Legislature and governor designated $6,082,000 to be appropriated annually for green crab management in the 2023-25 Operating Budget. This amounts to a total of approximately $13 million for the 2023-25 Biennial Budget. Previously, the Legislature had provided $2.3 million per biennium ongoing for green crab control in 2021, but this amount was deemed insufficient to match the scale of this growing threat.

Governor Proclamation 22-02 Directives

The following text, taken from "Emergency Proclamation by the Governor 22-02 Green Crab Infestation", outlines the primary directives to WDFW and other state agencies by Governor Jay Inslee regarding green crab management:

> "NOW THEREFORE, I, Jay Inslee, Governor of the state of Washington, by virtue of the authority vested in me under RCW 43.06.010(14), as a result of the above-noted situation, and in accordance with RCW 77.135.090, do hereby order the Department of Fish and Wildlife to begin implementation of emergency measures as necessary to effect the eradication of or to prevent the permanent establishment and expansion of European green crab.

FURTHERMORE, I direct the Department of Ecology, and I ask the Department of Natural Resources and the State Parks and Recreation Commission to identify European green crab management as a high priority on their respective state-owned aquatic lands and to facilitate implementing the emergency measures described herein."

Legislative Proviso

The following text, taken from "ESSB 5693 - Making 2021-2023 fiscal biennium supplemental operating appropriations", Section 308 (Page 552, Line 16) - outlines the primary directives to WDFW by the Washington State Legislature regarding green crab management:

"Implement eradication and control measures on European green crabs through coordination and grants with partner organizations. Provide quarterly progress reports on the success and challenges of the measures to the appropriate committees of the legislature."

Figure 2 Timeline of European green crab invasion In Washington State.

Successes of European green crab management measures

The following is an overview of the major successes related to European green crab management actions for Winter 2024, which covers October 1 to December 31, 2024. Data from 2022-2024 will also be discussed and included for context. A complete list of green crab management actions of Winer 2024 can be found in Appendix A of this report.

Incident Command System implementation

The Washington State Emergency Management Division assigned mission #22-1085 on April 18, 2022, for the green crab emergency response. After meeting with other state and federal agencies, the Washington Department of Fish and Wildlife (WDFW) Director Kelly Susewind formally implemented an Incident Command System (ICS) on May 5, 2022, in delegating authority to WDFW's Aquatic Invasive Species (AIS) Policy Coordinator, Justin Bush, to serve as Incident Commander (Figure 3). This approach provides a clear command structure, as well as standardizing communications and management action implementation across the state. In addition, ICS provides support to federal and tribal participants across the state while they retain their autonomy in green crab management decisions and actions.

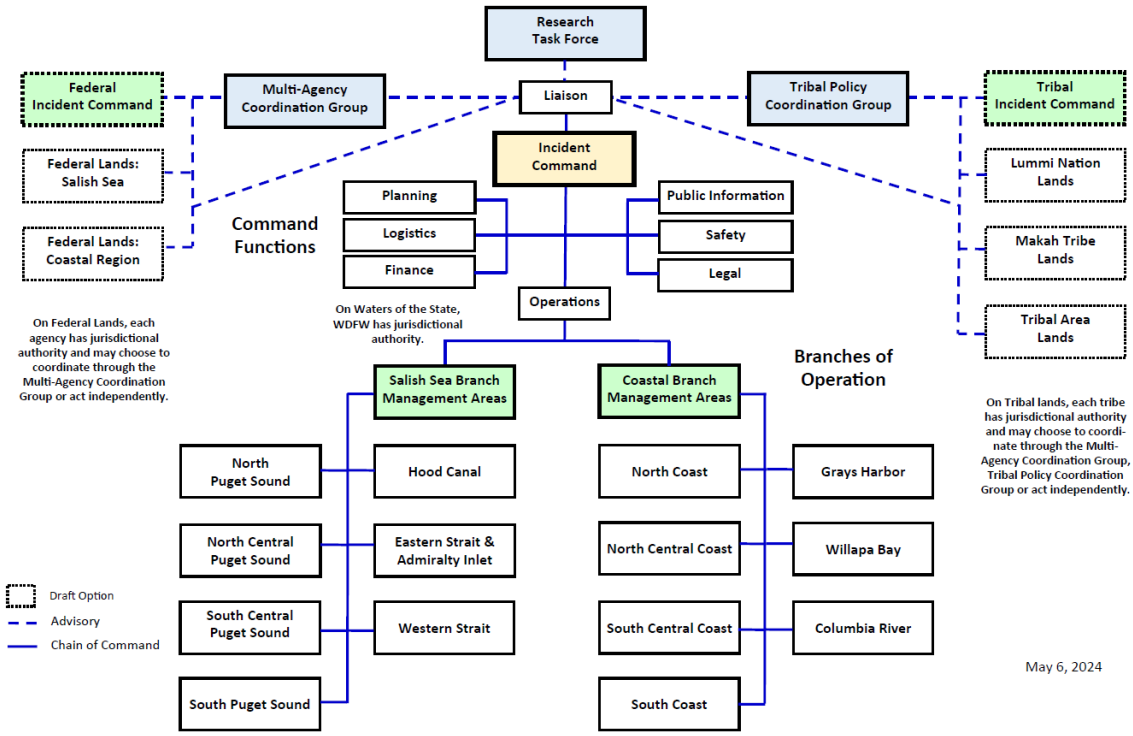
During Winter 2024, successes of the green crab ICS have included:

- Raquel Crosier, WDFW AIS Division Management Coordinator, was appointed Deputy Incident Commander. Raquel joined the AIS Division on October 1, 2024, and was appointed Deputy Incident Commander on December 17, 2024.
- Ensuring that ongoing management actions are guided by the five Incident Objectives developed in at the beginning of the:
    A. Facilitate WDFW implementing Governor's Emergency Proclamation for statewide emergency measures with respect for tribal sovereignty and federal jurisdictions.
    B. Health and safety of all participants.
    C. Reduce or contain green crab populations below levels that result in environmental, economic, and cultural resource harm.
    D. Collaborative and transparent emergency management.
    E. Post-emergency transition to long-term green crab management by local co-managers, tribes, and partners with WDFW oversight.
- Meetings with co-managers and tribal entities to discuss ICS structure and solicit recommendations on how co-managers and tribes would like to engage on policy and technical levels.
- Regular reports to the governor every 10 days per RCW 77.135.090 on the effects of emergency measures and advising the governor if all or some emergency measures should be discontinued.
- Creation of ICS Situation Reports (SitReps) based on a monthly operational period summarizing the status of Washington state green crab emergency measures including actions taken, funding

allocations, green crab catch numbers, trapping efforts, and other relevant information for dissemination among green crab emergency measure co-managers, tribes, and partners.

- Creation of bi-monthly (e.g., January/February) green crab Public Updates that included information about Washington state Green Crab Emergency measures, highlighting the efforts of co-managers, tribes, and partners, and sharing stories from the field for dissemination to the public and media.
- Continued WDFW internal policy coordination meetings.

Figure 3 Incident Command System structure for the European green crab emergency response



An important aspect of the green crab ICS structure is the Multi-Agency Coordination (MAC) Group. The MAC Group consists of representatives from various co-managers, tribes, and partners, including state and federal agencies, and shellfish growers (Table 2). The MAC Group provides a forum for these representatives to share information, establish a common operating picture, and recommend common long-term priorities for the green crab emergency. In addition, the group is tasked with making recommendations to WDFW for emergency funding and may commit and allocate additional or in-kind funding and other resources to enhance emergency measures response. Since its formation on June 8, 2022, the MAC Group has convened forty-nine times (four times in Winter 2024). During Winter 2024, green crab MAC Group successes have included:

- Completion of RCO Green Crab Emergency Measures Fund contracts, which includes:
    - $91,316 U.S. National Oceanographic and Atmospheric Administration
    - $402,220 State of Washington Department of Natural Resources
    - $99,312 Pacific County Vegetation Management

    - $75,154 State of Washington Department of Ecology
    - $30,000 Grays Harbor Conservation District
    - $90,000 Pacific Conservation District
    - $70,517 Washington State University (WSU)/Washington Sea Grant (WSG)
    - $100,000 Lummi Indian Business Council
    - $32,897 US Fish & Wildlife Service (FWS) Dungeness National Wildlife Refuge (NWR)
    - $110,240 US FWS Willapa National Wildlife Refuge
        - See previous green crab Legislative Reports for more details.
- Reviewing updates from previously approved RCO European Green Crab Emergency Measures Fund requests, which includes:
    - $110,240 USFWS Willapa National Wildlife Refuge (NWR)
        - Progress Report Due – 1/9/2025
    - $729,965 Pacific Conservation District
        - Note: Cost increase amendment of an additional $31,515.00 is pending RCO Contracting.
        - Progress Report Due – 1/9/2025
    - Grays Harbor Conservation District
        - Progress Report Due – 1/9/2025
    - $59,828 University of Washington Ruesink Lab
        - Progress Report Due – 1/9/2025
    - $133,142 National Oceanographic and Atmospheric Administration (NOAA) Fisheries
        - Status: RCO Contracting.
    - See previous European Green Crab Legislative Reports for more details.
- Currently, $21,955.84 remains unobligated for use between July 1, 2024, and June 30, 2025.
    - No additional proposals have been received.

Table 2 List of European green crab Multi-Agency Coordination Group member organizations.

Multi-Agency Coordination group member organizations	
Department of Fisheries and Oceans Canada	U.S. National Oceanographic and Atmospheric Administration
Pacific Coast Shellfish Growers Association	Washington Emergency Management Division
Lummi Nation Business Council	Washington Sea Grant
Makah Tribe	Washington State Department of Agriculture
Puget Sound Partnership	Washington State Department of Fish and Wildlife
Quinault Indian Nation	Washington State Department of Natural Resources
Shoalwater Bay Indian Tribe	Washington State Parks and Recreation Commission
U.S. Bureau of Indian Affairs	Washington State Recreation and Conservation Office
U.S. Environmental Protection Agency	Washington State University Extension
U.S. Fish and Wildlife Service	Willapa-Grays Harbor Oyster Growers' Association
U.S. Geological Survey	Washington State Department of Ecology

Representatives of these organizations share information, establish a common operating picture, and develop common long-term priorities for the green crab emergency.

Coordination with co-managers, tribes, and partners

Perhaps the greatest success of green crab management in Washington are the efforts, both independent and collaborative, of the many co-managers, tribes, and partners within the state (Table 3). The scope of the green crab emergency is such that no one organization can hope to curtail it alone. For years, co-managers, tribes, and partners such as WSG, shellfish growers, and local, state, and federal agencies have worked with WDFW to implement short- and long-term management actions to support statewide efforts in green crab management. The contributions of all entities involved in green crab control cannot be overvalued. While this report does not go into specifics of the contributions of each group, MAC Group member organizations were invited to submit addendums to outline their specific actions and successes in their own words. Addendums submitted to WDFW before publication are included in this document in Appendix B.

Since green crab extend beyond jurisdictional boundaries, management responses require action, collaboration, and coordination between various groups. It is important to note that green crab management is very complex with multiple jurisdictions, varying management priorities, different management types, complex operations, and different resource capacities. Additionally, each organization can have differing goals for sensitive habitats, species protections and aquaculture operation protections. SitReps were disseminated monthly based on ICS operational periods to support meeting the collaboration and transparent emergency management objective. These SitReps included information on management actions taken, grant funding allocations, green crab catch numbers,

trapping efforts, media outreach and other relevant information. The first SitRep was disseminated on June 16, 2022, and forty-one have been completed as of the end of Winter 2024.

In Willapa Bay and Grays Harbor, local co-managers, tribes, and partners have a history of collaboration and coordination on regional projects. As green crab management activities increased, these strong relationships led to the development of European Green Crab Regional Coordination Groups (RCG). RCGs consist of local co-managers, tribes, and partners actively participating in management actions to prevent, detect, respond to, control, and research green crabs within a defined area (i.e., management area). RCGs are valuable because they allow for regular dialogue between active local co-managers, tribes, and partners, showcasing a strong sense of cooperation, collaboration, coordination, and communication. Based on the success of the Willapa Bay and Grays Harbor RCGs, WDFW has facilitated the creation of four additional RCGs: North Puget Sound, Western & Eastern Straight & Admiralty Inlet, North & North Central Coast, and Hood Canal. These new RCG are led by WDFW Regional Biologists and meet quarterly.

Washington Sea Grant's Crab Team (Crab Team) hosted the fourth annual Trappers Summit at the Clearwater Casino in Suquamish on December 5, 2024. Nearly fifty trappers representing seventeen partner groups attended the full-day event. Groups shared trapping observations from 2024 and aggregated local data into statewide maps and trends. The community of trappers also participated in discussions on how to streamline data and communication and articulate local and regional trapping goals. The Trappers Summit continues to be a unique and valued opportunity for co-learning and continuing education among practitioners, advancing the collective understanding of green crabs and enabling trappers and planners to leverage each other's experience. Crab Team produced companion materials, including the annual monitoring network infographic, the Crab Team Coastal Monitoring Site Summary 2024 and the annual summary blog post Part 1 (Inland) and Part 2 (Coastal Estuaries).

Table 3 List of co-managers, tribes, and partner organizations working with WDFW on control and management efforts of the European green crab in Washington.

Co-managers, Tribes, and Partners	
Baywater Shellfish Company	Quinault Indian Nation
Chuckanut Shellfish	Quileute Tribe
Drayton Harbor Oysters	Samish Indian Nation
Grays Harbor Conservation District	Shoalwater Bay Indian Tribe
Hama Hama Oyster Company	Skokomish Tribe
Hoh Tribe	Squaxin Island Tribe
Jamestown S'Klallam Tribe	Stillaguamish Tribe
Lower Elwha Klallam Tribe	Suquamish Tribe
Lummi Nation	Swinomish Indian Tribal Community
Makah Tribe	Taylor Shellfish
Marine Life Center	Tulalip Tribes
Muckleshoot Indian Tribe	United States Fish and Wildlife Service
Nisqually Tribe	United States Geological Survey Western Fisheries Research Center
Nooksack Tribe	United States Navy
Northwest Straits Commission (Washington State Department of Ecology)	Upper Skagit Tribe
Pacific Conservation District	Washington Sea Grant
Pacific County Invasive Species Management	Washington State Department of Natural Resources
Pacific Seafoods	Washington State Parks and Recreation Commission
Padilla Bay National Estuarine Research Reserve (Washington State Department of Ecology)	Washington State Recreation and Conservation Office
Penn Cove Shellfish	Washington State University Extension
Port Gamble S'Klallam Tribe	Washington State Department of Fish and Wildlife
Puget Sound Partnership	Willapa-Grays Harbor Oyster Growers' Association
Puyallup Tribe	

Participants implement short- and long-term management actions to support statewide efforts in green crab control, including independent and WDFW collaborative trapping, outreach and education, field support, and monitoring. These actions are an essential component of the green crab management in Washington.

Budget allocation

The $1,142,067 in funds provided for this report period allowed for the continuation of our management efforts.

- Staff (Salaries + Benefits): $112,575
    - Funds spent on staff. At the end of Winter 2024, the current active green crab staff to the European Green Crab Project includes a Biologist 3, three Regional Biologist 2s, a Research Scientist 1, and 1 Scientific Technician 2 (permanent).

- Contractual Services: $877,910
    - Amount spent on pass through contracts for co-managers, tribes, and partners.
- Goods & Services: $2,781
    - Funds spent on general field supplies and gear such as bait and traps.
- Travel: $4,101
    - Funds spent on motor pool vehicles, per diem and lodging. Aside from trapping efforts, travel funds allowed staff to present at and attend conferences and perform outreach for various stakeholder groups.
- Agency Indirect: $144,700
    - Funds spent on agency-wide, general administration costs.

European green crab monitoring and removal

Winter 2024

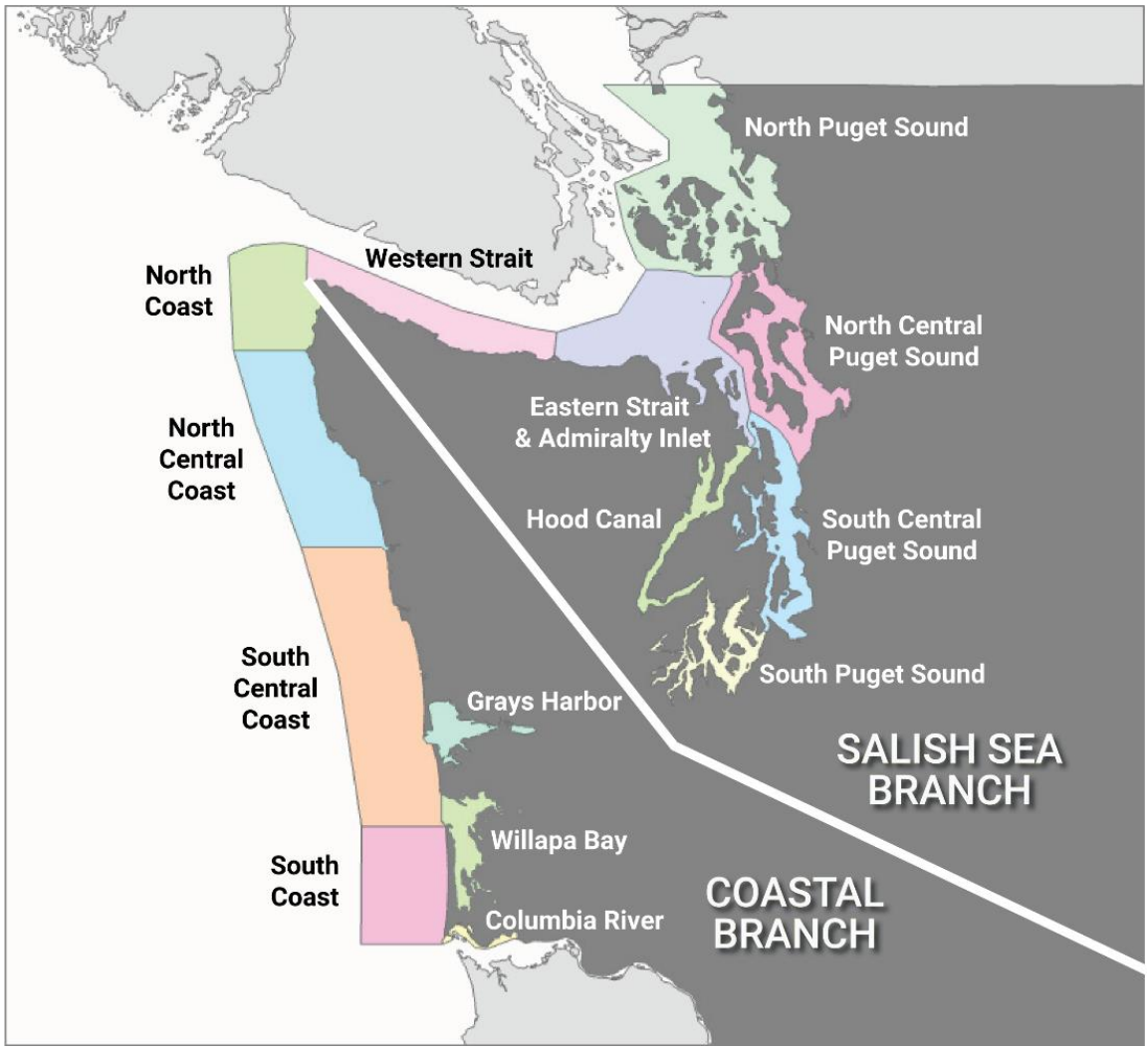
The state is divided into Coastal and Salish Sea Branches to facilitate effective European green crab ICS communications and management (Figure 4). These branches are then further divided into fourteen Management Areas based on WDFW recreational fishing marine areas, with Management Areas further divided into Coordination Areas, Sites, and Sub-Sites.

Trapping efforts across the state were undertaken by WDFW, WSG, co-managers, tribes, and partners. The catch numbers presented for Winter 2024 represent the collective effort of all organizations, and those efforts must be recognized. Trapping activities remained high in most Management Areas in October 2024 but declined overall in November and December with the end of the typical green crab field season (April - October). Some co-managers, tribes, and partners, particularly those in areas with higher green crab abundance, maintained boat-based trapping efforts in November and December 2024 due to the surprisingly high catch levels from trapping in deeper water during the limited cold weather trapping in 2023.

In total, 372,631 green crab were removed in Winter 2024 from Washington state waters, with 370,664 removed from the Coastal Branch and 1,967 removed from the Salish Sea Branch (Table 4). In the Salish Sea Branch, green crab were captured and removed from the following Management Areas: North Puget Sound (1,911), Eastern Strait & Admiralty Inlet (28), Hood Canal (16), and Western Strait (12). In the Coastal Branch, green crab were captured and removed from the following Management Areas: Willapa Bay (308,630), Grays Harbor (60,967), North Coast (1,021), and South Central Coast (46). Although trapping occurred, no green crabs were caught in North Central Puget Sound and South Central Puget Sound. No trapping occurred in the South Puget Sound, North Central Coast, South Coast Management Area, and Columbia River Management Areas in Winter 2024. To date, green crab have not been detected in the Salish Sea Branch south of northern Hood Canal Management Area, though early-detection monitoring continues across the southerly management areas. Data on green crab abundance, body size, sex ratios, and reproductive status were collected for future analysis, along with DNA and RNA samples to assess connectivity between green crab populations. Removed green crab were euthanized following humane best practices.

WDFW is partnered with Tidal Grow Agriscience (TGA), an organic fertilizer manufacturer based in Raymond, WA. TGA generously accepts fish waste (i.e., green crab and used bait) from WDFW and participating co-managers, tribes, and partners for processing into a liquid fertilizer (Pacific Gro) free of charge. This partnership allows organic material that would otherwise be dumped in landfills to be put to productive use as outlined in HB 1799 (2022). Green crab collected by the Shoalwater Bay Tribe, are utilized directly as fertilizer in their tribal community garden (Pfleeger-Ritzman, personal communication)

Figure 4 Map of Washington state European green crab management locations.



The state has been split into two Management Branches (Coastal and Salish Sea) and fourteen Management Areas (North Puget Sound, North Central Puget Sound, South Central Puget Sound, South Puget Sound, Hood Canal, Eastern Strait & Admiralty Inlet, Western Strait, North Coast, North Central Coast, South Central Coast, South Coast, Grays Harbor, Willapa Bay, Columbia River).

Table 4 European green crab removal totals for Winter 2024.

Management Branch	Management Area	Winter 2024 Green Crab Removed	All Green Crab Removed (2022-2024)
Salish Sea	North Puget Sound	1,911	91,110
Salish Sea	Western Strait	12	60
Salish Sea	Eastern Strait & Admiralty Inlet	28	666
Salish Sea	Hood Canal	16	188
Salish Sea	North Central Puget Sound	0	5
Salish Sea	South Central Puget Sound	0	0
Salish Sea	South Puget Sound	*	0
Salish Sea	**All**	**1,967**	**92,029**
Coastal	North Coast	1,021	42,701
Coastal	North Central Coast	*	47
Coastal	South Central Coast	46	126
Coastal	South Coast	*	0
Coastal	Grays Harbor	60,967	247,697
Coastal	Willapa Bay	308,630	1,313,549
Coastal	Columbia River	*	41
Coastal	**All**	**370,664**	**1,604,161**
All	***All***	***372,631***	***1,696,190***

Green crab removed during Winter 2024 (October 1 – December 31, 2024) and All (the duration of the green crab emergency) based on SitRep reported catch and trapping effort. These numbers are presented for each Management Branch (Coastal and Salish Sea) and Management Area. These totals include not only removal efforts by Washington Department of Fish and Wildlife, but co-managers, tribes, and partners such as the Washington Sea Grant Crab Team, the Lummi Nation, the Makah Tribe, the Shoalwater Bay Tribe, and participating shellfish growers. * = No trapping occurred in these Management Areas. Please note that these data only represent crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across time and location.

Catch Per Unit Effort

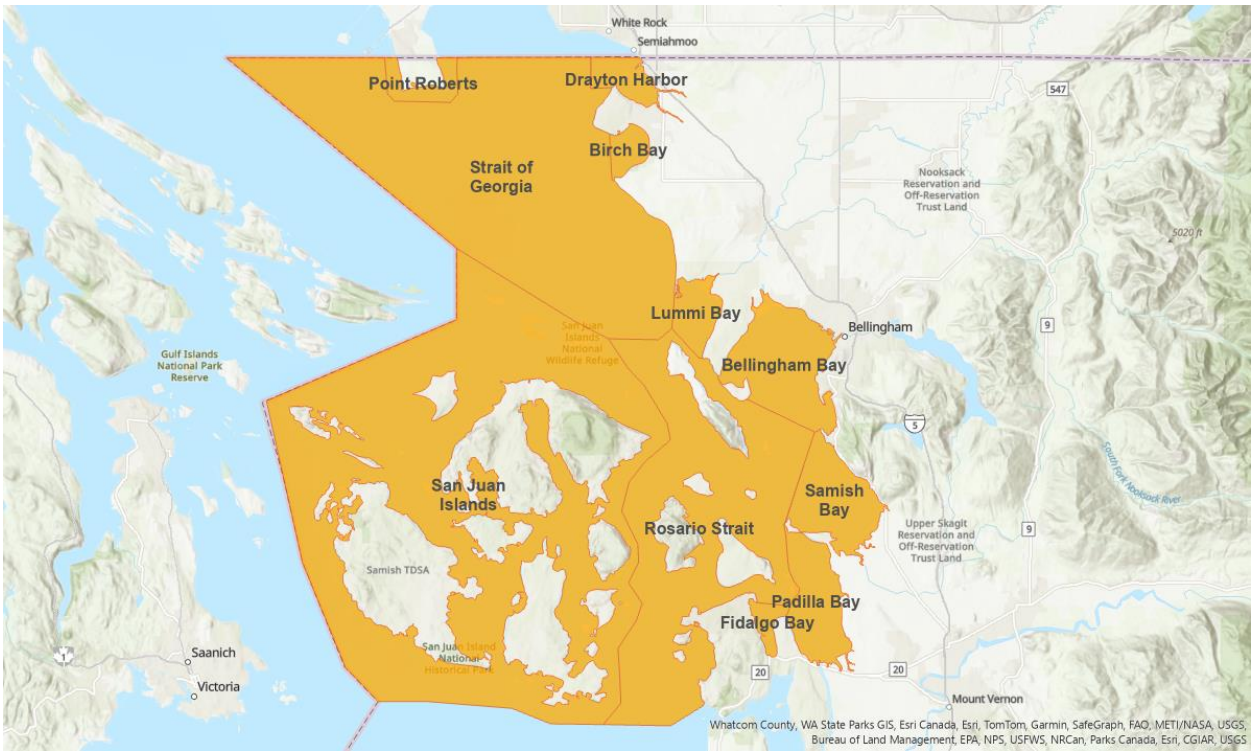
Catch per unit effort (CPUE) is a metric commonly used to assess abundance when the boundaries of a population are unknown. CPUE measures the amount of an organism collected per unit of effort. For green crab management in Washington, CPUE is calculated as the number of crabs per 100 trap checks. In contrast to absolute counts (e.g., the number of crabs removed from a location), CPUE accounts for the effort expended and provides a more representational measure of abundance.

Ideally, CPUE is measured using a consistent level of effort (e.g., 10 weekly trap checks) at a consistent location. This consistency allows for a more controlled and accurate assessment of changes in catch numbers over time. However, green crab management activities in Washington are highly variable across time and space, complicating the evaluation of CPUE. For example, in response to increasing green crab catch numbers in 2024, many co-managers, tribes, and partners expanded their trapping efforts (more traps, more trapping days, more extensive geographic coverage) which complicates interpretations of changes in CPUE. In Willapa Bay, trappers will often move to new trapping locations if green crab removal numbers decline to remove as many green crabs as possible.

While imperfect, CPUE remains the most straightforward examination of green crab catch numbers over time within a given Coordination Area while considering effort. Changes in CPUE reported in the following sections should not be disregarded, but consideration should be given to the complexity of interpreting these values with shifting management actions.

North Puget Sound

Figure 5 Map of North Puget Sound Management Area.



North Puget Sound is split into 11 Coordination Areas (Point Roberts, Drayton Harbor, Strait of Georgia, Birch Bay, Lummi Bay, Bellingham Bay, San Juan Islands, Rosario Strait, Samish Bay, Padilla Bay, and Fidalgo Bay).

While green crab removal numbers continued to decline for North Puget Sound, there was a substantial increase in green crab removal numbers in specific Coordination Areas in 2024 (Table 5). Most green crab removed since 2022 have been from the Lummi Sea Pond (LSP) within the Lummi Bay Coordination Area (CA), which also includes Lummi Bay, regions of Bellingham Bay, and Portage Bay. Intensive trapping efforts by Lummi Natural Resources (LNR) and collaborators have greatly reduced green crab abundance within LSP. However, continued trapping is necessary to maintain and further reduce green crab numbers. Green crab catch numbers increased in 2024 in Drayton Harbor, Birch Bay, Samish Bay, and Padilla Bay Coordination Areas. An increase in green crab captures compared to previous years was expected due to the El Niño Southern Oscillation (ENSO) event. Recruitment of green crabs in coastal locations such as Willapa Bay has historically peaked in years with ENSO events (1998, 2003, 2007, 2010, 2016), and a similar increase was expected for 2024.

An examination of monthly CPUE provides some insight into changes in green crab removal numbers in North Puget Sound (Figure 6). Drayton Harbor, Lummi Bay, Samish Bay, and Padilla Bay all showed a sharp increase in CPUE in late 2024 (August – November 2024). The timing of this increase aligns with green crabs potentially recruited during the ENSO event reaching a larger size and becoming more susceptible to trapping methods later in the season. This is further supported by reports of high

numbers of young of year crabs (green crabs of any life stage that belong to the current-year recruitment cohort of green crab) in late 2024.

Recent adjustments in trapping strategies may also be influencing CPUE. For example, in 2024 LNR increased trapping efforts on tidelands outside LSP, where green crabs were more abundant and brought on new staff. While these are reasonable and necessary adjustments in the context of green crab management, they could influence CPUE.

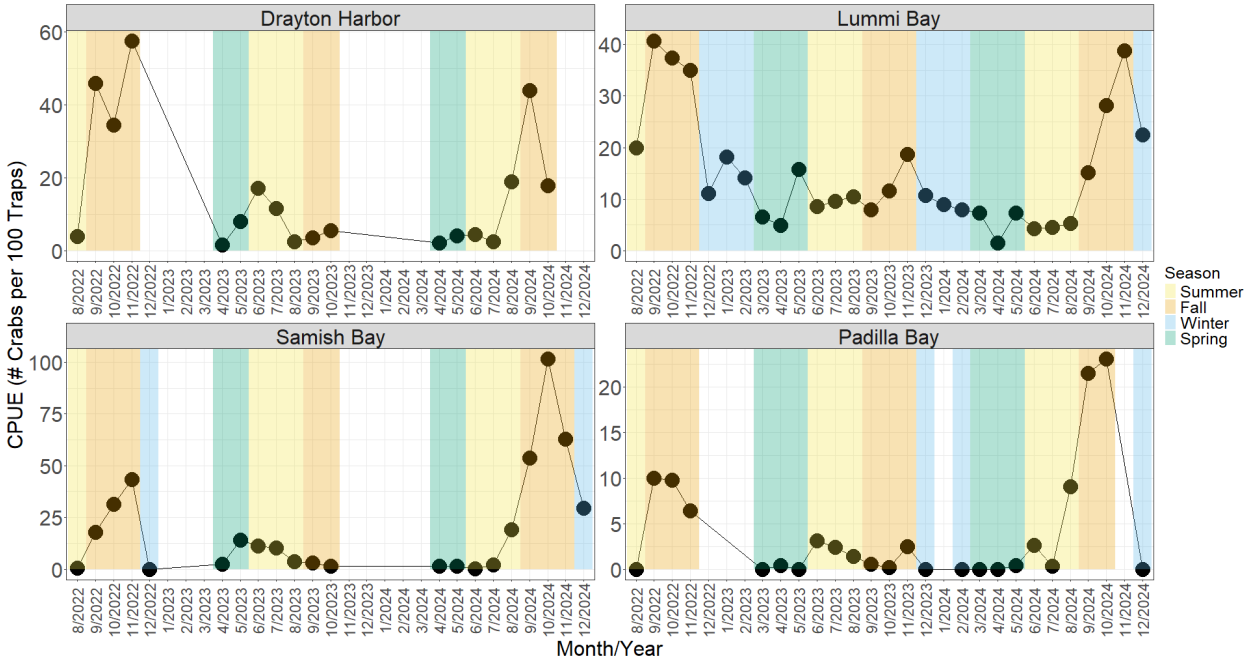
It is unclear at this time what the impact of these late season increases in green crab abundance and CPUE may be. Even if these increases result from the short term ENSO recruitment event, higher densities or numbers of green crabs create greater potential for geographical spread, the establishment of new populations, or the growth of existing populations. Although winter conditions in 2025 are expected to be less favorable for green crab recruitment, continued control trapping efforts by co-managers, tribes, and partners in the region should continue to reduce green crab populations and the potential spread via local larval production.

Table 5 North Puget Sound Management Area green crab removal totals.

Coordination Area	2022 Green Crabs Removed	2023 Green Crabs Removed	2024 Green Crabs Removed	All Green Crabs Removed
Point Roberts	*	*	*	*
Drayton Harbor	320	159	536	1,015
Strait of Georgia	*	0	*	0
Birch Bay	0	34	59	93
Lummi Bay	80,384	5,575	2,618	88,577
Bellingham Bay	3	31	19	53
San Juan Islands	0	0	0	0
Rosario Strait	0	0	0	0
Samish Bay	135	217	706	1,058
Padilla Bay	58	34	221	313
Fidalgo Bay	0	1	0	1
All	**80,900**	**6,051**	**4,159**	**91,110**

Green crab removed during 2022, 2023, 2024, and All (the duration of the green crab emergency) based on SitRep reported catch and trapping effort. These numbers are presented for each Coordination Area within North Puget Sound. These totals include removal efforts by all participating co-managers, tribes, and partners. * = No trapping occurred in these Coordination Areas. Please note that these data only represent crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across time and location.

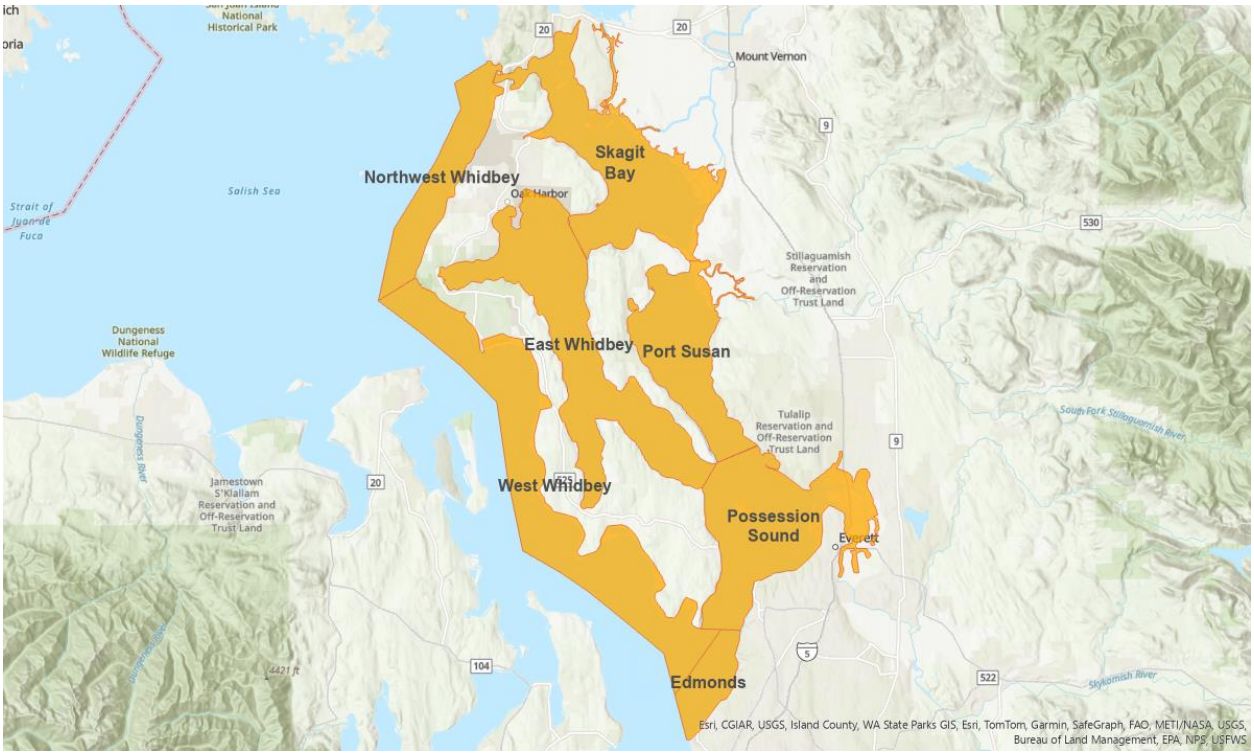
Figure 6 Monthly Catch Per Unit Effort (CPUE) for Coordination Areas in North Puget Sound.



CPUE is calculated as the number of crabs per 100 trap checks based on SitRep's reported catch and trapping effort. Drayton Harbor, Lummi Bay, Samish Bay, and Padilla Bay Coordination Areas were included because they had the most robust datasets for North Puget Sound. Trap check data was not reported in SitReps before August 2022, so CPUE is not calculated for the beginning of the green crab emergency. The color of each column denotes the season when trapping occurred: Yellow for Summer (June – August), orange for Fall (September – November), blue for Winter (December – February), and green for Spring (March – May). White columns indicate no data (trapping did not occur or no trap check data was available).

North Central Puget Sound

Figure 7 Map of North Central Puget Sound.



North Central Puget Sound is split into seven Coordination Areas (Skagit Bay, Northwest Whidbey, East Whidbey, Port Susan, West Whidbey, Possession Sound, and Edmonds).

This year marked the first detection of live green crabs in North Central Puget Sound since the start of the green crab emergency in 2022 (Table 6). One green crab was removed from Cultus Bay at the very southern tip of Whidbey Island. This detection represents North Central Puget Sound's southernmost detection of green crabs (though not the southernmost detection in the Salish Sea Management Branch). The crab was large enough to have been present for several years. Four crabs were removed from Lagoon Point at Washington Sea Grant Crab Team's (hereafter Crab Team) long-term monitoring site (all within the West Whidbey Coordination Area). Previously, two live green crabs were removed from Lagoon Point in 2017, and another was removed in 2018 at Crab Team's long-term monitoring site. A dead green crab was found at Hancock Lake in the West Whidbey Coordination Area during the Crab Team's 2024 monitoring efforts.

The recent detections of green crabs within North Central Puget Sound, particularly in new areas, are concerning. Thus far, numbers remain low within the Management Area. Expanded monitoring efforts near these detections are warranted for 2025. If more green crabs are found at these sites, or if green crabs are detected at new locations, co-managers, tribes, and partners should reevaluate current management strategies and objectives for North Central Puget Sound.

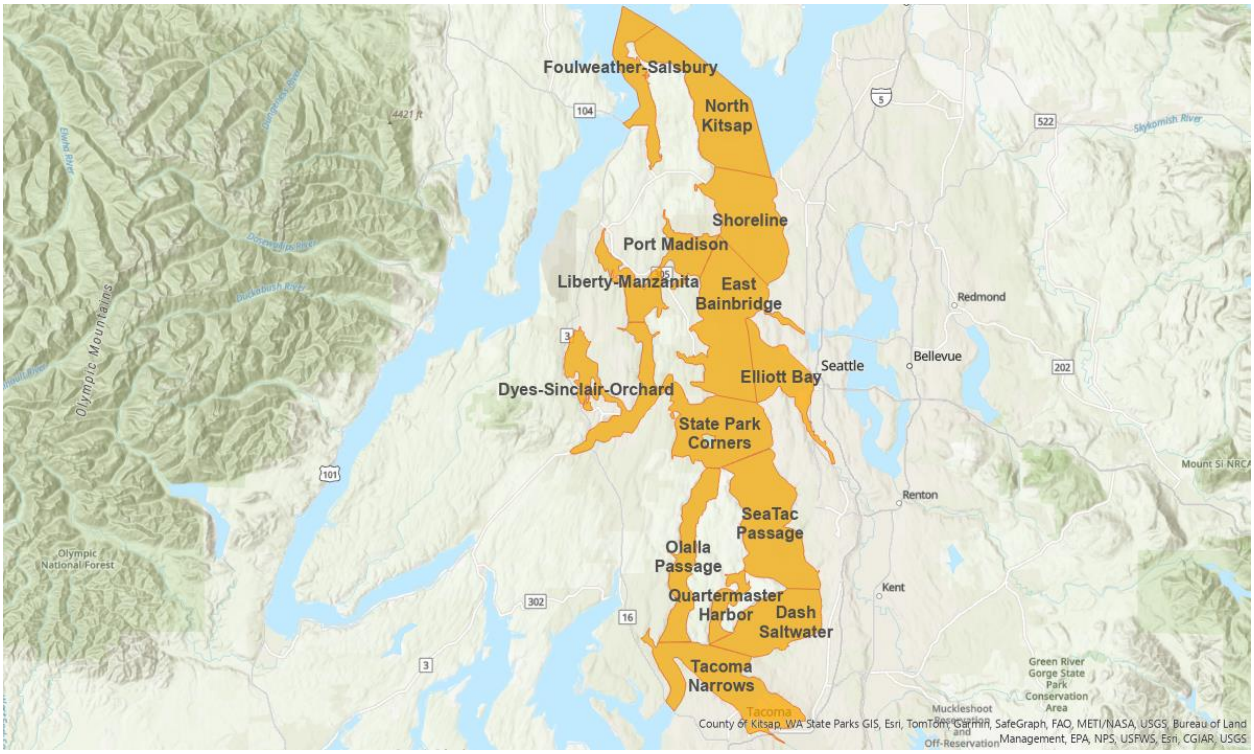
Table 6 North Central Puget Sound Management Area green crab removal totals.

Coordination Area	2022 Green Crabs Removed	2023 Green Crabs Removed	2024 Green Crabs Removed	All Green Crabs Removed
Skagit Bay	0	0	0	0
Northwestern Whidbey	*	*	*	*
East Whidbey	0	0	0	0
Port Susan	0	0	0	0
West Whidbey	0	0	5	5
Possession Sound	*	0	0	0
Edmonds	*	0	*	0
All	**0**	**0**	**5**	**5**

Green crab removed during 2022, 2023, 2024, and All (the duration of the green crab emergency) based on SitRep reported catch and trapping effort. These numbers are presented for each Coordination Area within North Central Puget Sound. These totals include removal efforts by all participating co-managers, tribes, and partners. * = No trapping occurred in these Coordination Areas. Please note that these data only represent crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across time and location.

South Central Puget Sound

Figure 8 Map of South Central Puget Sound Management Area.



South Central Puget Sound is split into 14 Coordination Areas (Foulweather-Salsbury, North Kitsap, Shoreline, Port Madison, Liberty-Manzanita, East Bainbridge, Elliot Bay, Dyes-Sinclair-Orchard, State Park Corners, Olalla Passage, SeaTac Passage, Quartermaster Harbor, Dash Saltwater, and Tacoma Narrows).

No evidence of green crabs (live crabs, dead crabs, or molts) was found in South Central Puget Sound (Table 7). The continued lack of evidence of green crabs within South Central Puget Sound is generally positive. However, monitoring efforts have yet to occur in several Coordination Areas. Continued diligence and expanded monitoring are necessary to ensure the early detection of green crabs should they be introduced into South Central Puget Sound.

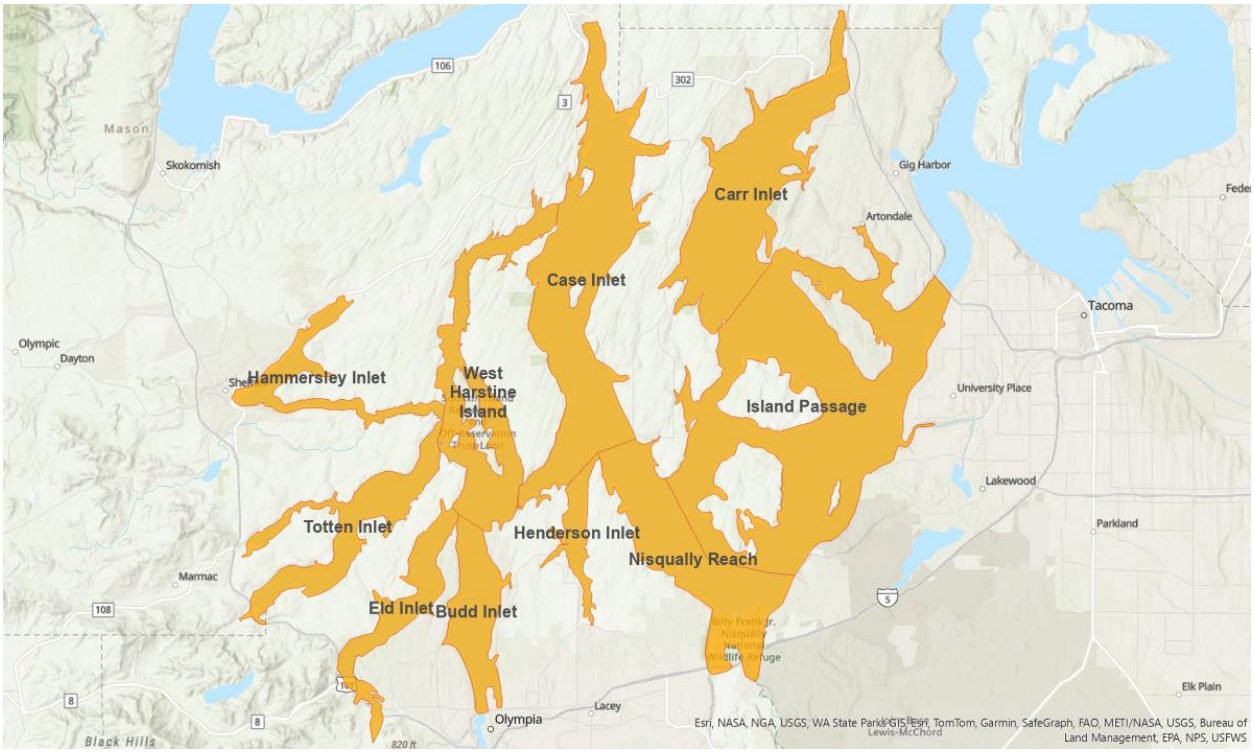
Table 7 South Central Puget Sound Management Area green crab removal totals.

Coordination Area	2022 Green Crabs Removed	2023 Green Crabs Removed	2024 Green Crabs Removed	All Green Crabs Removed
Foulweather-Salsbury	0	0	0	0
North Kitsap	*	*	*	*
Shoreline	0	0	0	0
Port Madison	0	0	0	0
Liberty-Manzanita	0	0	0	0
East Bainbridge	0	0	0	0
Elliot Bay	*	*	*	*
Dyes-Sinclair-Orchard	0	0	0	0
State Park Corners	0	0	0	0
Olalla Passage	*	*	*	*
SeaTac Passage	0	0	0	0
Quartermaster Harbor	0	0	0	0
Dash Saltwater	*	*	*	0
Tacoma Narrows	*	*	*	*
All	**0**	**0**	**0**	**0**

Green crab removed during 2022, 2023, 2024, and All (the duration of the green crab emergency) based on SitRep reported catch and trapping effort. These numbers are presented for each Coordination Area within South Central Puget Sound. These totals include removal efforts by all participating co-managers, tribes, and partners. * = No trapping occurred in these Coordination Areas. Please note that these data only represent crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across time and location.

South Puget Sound

Figure 9 Map of South Puget Sound Management Area.



South Puget Sound is split into nine Coordination Areas (Hammersley Inlet, West Harstine Island, Case Inlet, Carr Inlet, Island Passage, Totten Inlet, Eld Inlet, Budd Inlet, Henderson Inlet, Nisqually Reach).

No evidence of green crabs (live crabs, dead crabs, or molts) has been found in South Puget Sound (Table 8). The continued lack of evidence of green crabs within South Puget Sound is generally positive. However, monitoring efforts are limited to the Hammersley Inlet, West Harstine Island, Island Passage, and Nisqually Reach Coordination Areas. Continued diligence and expanded monitoring are necessary to ensure the early detection of green crabs should they be introduced into South Puget Sound.

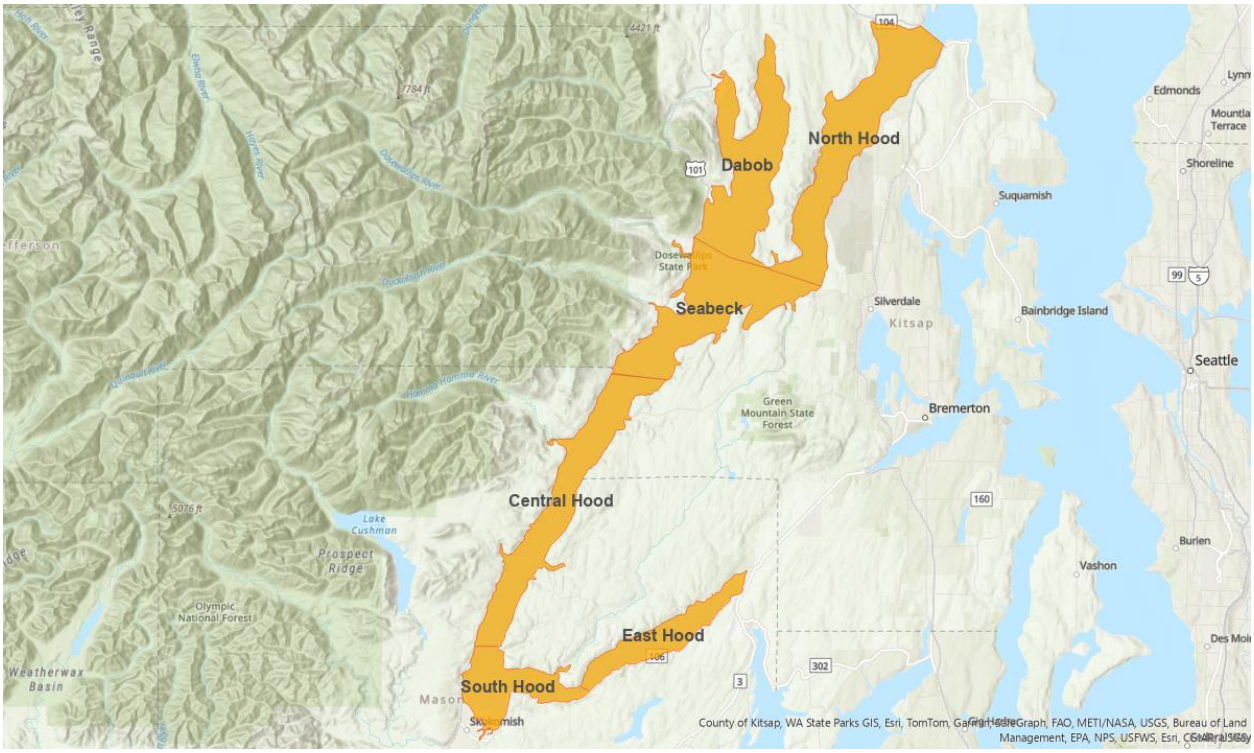
Table 8 South Puget Sound Management Area green crab removal totals.

Coordination Area	2022 Green Crabs Removed	2023 Green Crabs Removed	2024 Green Crabs Removed	All Green Crabs Removed
Hammersley Inlet	*	*	0	0
West Harstine Island	*	*	0	0
Case Inlet	*	*	*	*
Carr Inlet	*	*	*	*
Island Passage	0	0	0	0
Totten Inlet	*	*	*	*
Eld Inlet	*	*	*	*
Budd Inlet	*	*	*	*
Hendersen Inlet	*	*	*	*
Nisqually Reach	0	0	0	0
All	**0**	**0**	**0**	**0**

Green crab removed during 2022, 2023, 2024, and All (the duration of the green crab emergency) based on SitRep reported catch and trapping effort. These numbers are presented for each Coordination Area within South Puget Sound. These totals include removal efforts by all participating co-managers, tribes, and partners. * = No trapping occurred in these Coordination Areas. Please note that these data only represent crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across time and location.

Hood Canal

Figure 10 Map of Hood Canal Management Area.



Hood Canal is split into six Coordination Areas (North Hood, Dabob, Seabeck, Central Hood, South Hood, and East Hood). Blue circles represent Washington Sea Grant Crab Team long-term monitoring locations (3 locations).

There was no dramatic change in green crab removal numbers in Hood Canal for 2024 (Table 9). Green crabs were detected in Dabob and Seabeck Coordination Areas, and there was no evidence of geographic spread within Hood Canal. CPUE in the Seabeck Coordination Area was like that seen in 2023. While there was a dramatic increase in the Dabob Coordination Area CPUE in October 2024, this increase was caused by the removal of eleven crabs (Figure 11). While this single event represented an abnormally high number of crabs removed from Dabob, it does not indicate a large recruitment event like in North Puget Sound.

The continued persistence in Hood Canal is concerning. Continued diligence and expanded monitoring, particularly in southern Hood Canal, are necessary to ensure the early detection of green crabs should populations expand beyond their current locations.

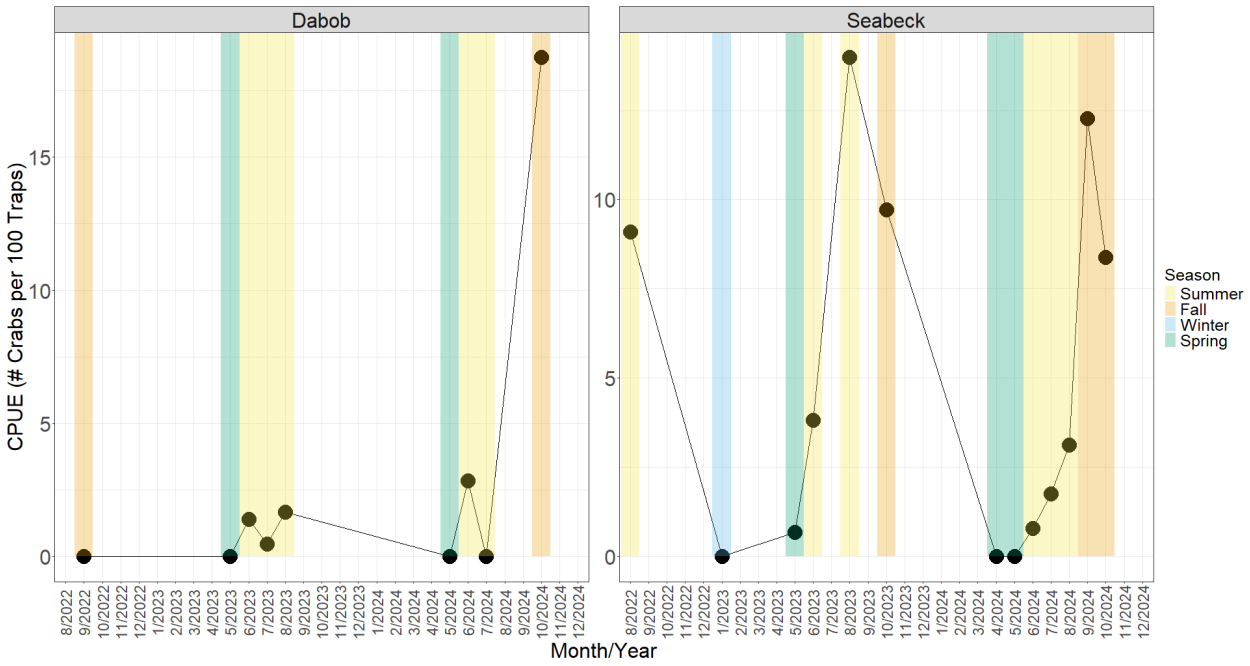
Table 9 Hood Canal Management Area green crab removal totals.

Coordination Area	2022 Green Crabs Removed	2023 Green Crabs Removed	2024 Green Crabs Removed	All Green Crabs Removed
North Hood	*	1	0	1

Dabob	0	11	22	33
Seabeck	16	101	37	154
Central Hood	*	0	0	0
South Hood	0	0	0	0
East Hood	*	0	*	0
All	**16**	**113**	**59**	**188**

Green crab removed during 2022, 2023, 2024, and All (the duration of the green crab emergency) based on SitRep reported catch and trapping effort. These numbers are presented for each Coordination Area within Hood Canal. These totals include removal efforts by all participating co-managers, tribes, and partners. * = No trapping occurred in these Coordination Areas. Please note that these data only represent crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across time and location.

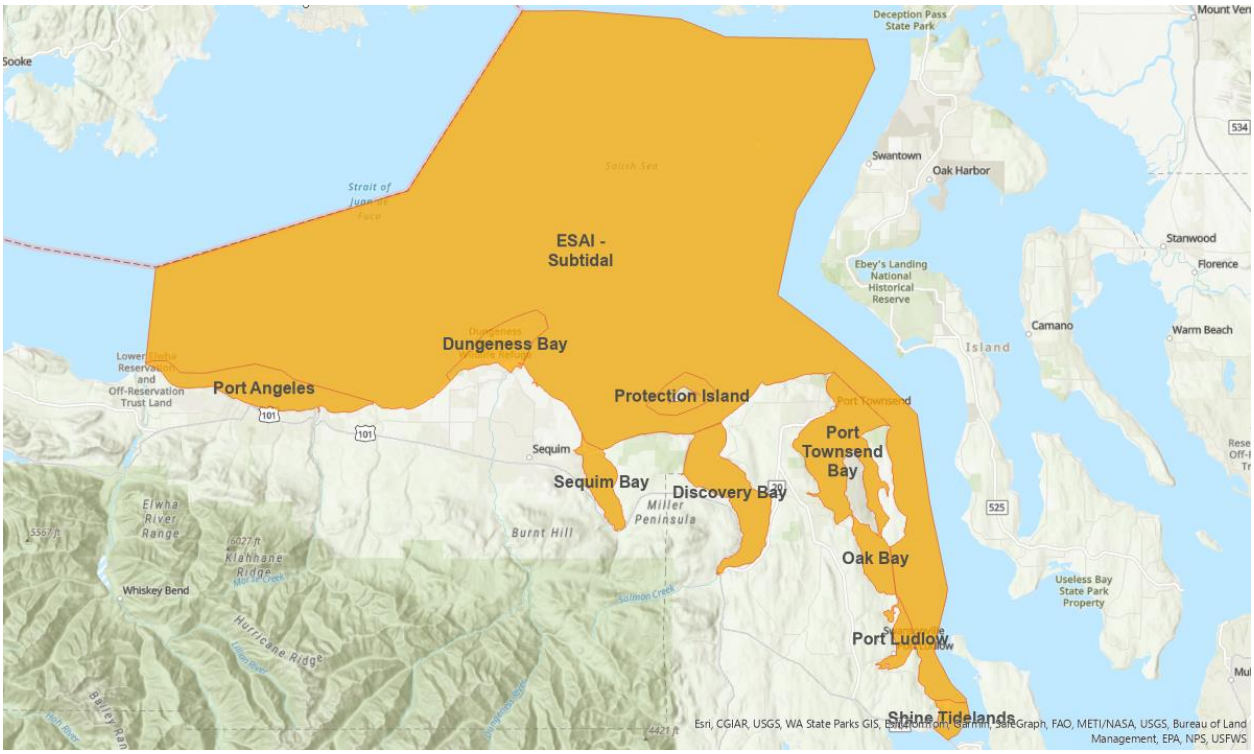
Figure 11 Monthly Catch Per Unit Effort (CPUE) for Coordination Areas in Hood Canal.



CPUE is calculated as the number of crabs per 100 trap checks based on SitRep's reported catch and trapping effort. Dabob and Seabeck Coordination Areas were included because they had the most robust datasets for Hood Canal. Trap check data was not reported in SitReps before August 2022, so CPUE is not calculated for the beginning of the green crab emergency. The color of each column denotes the season when trapping occurred: Yellow for Summer (June – August), orange for Fall (September – November), blue for Winter (December – February), and green for Spring (March – May). White columns indicate no data (trapping did not occur or no trap check data was available).

Eastern Strait & Admiralty Inlet

Figure 12 Map of Eastern Strait & Admiralty Inlet.



Eastern Strait & Admiralty Inlet is split into nine Coordination Areas (Port Angeles, Dungeness Bay, ESAI – Subtidal, Sequim Bay, Protection Island, Discovery Bay, Port Townsend Bay, Oak Bay, and Port Ludlow).

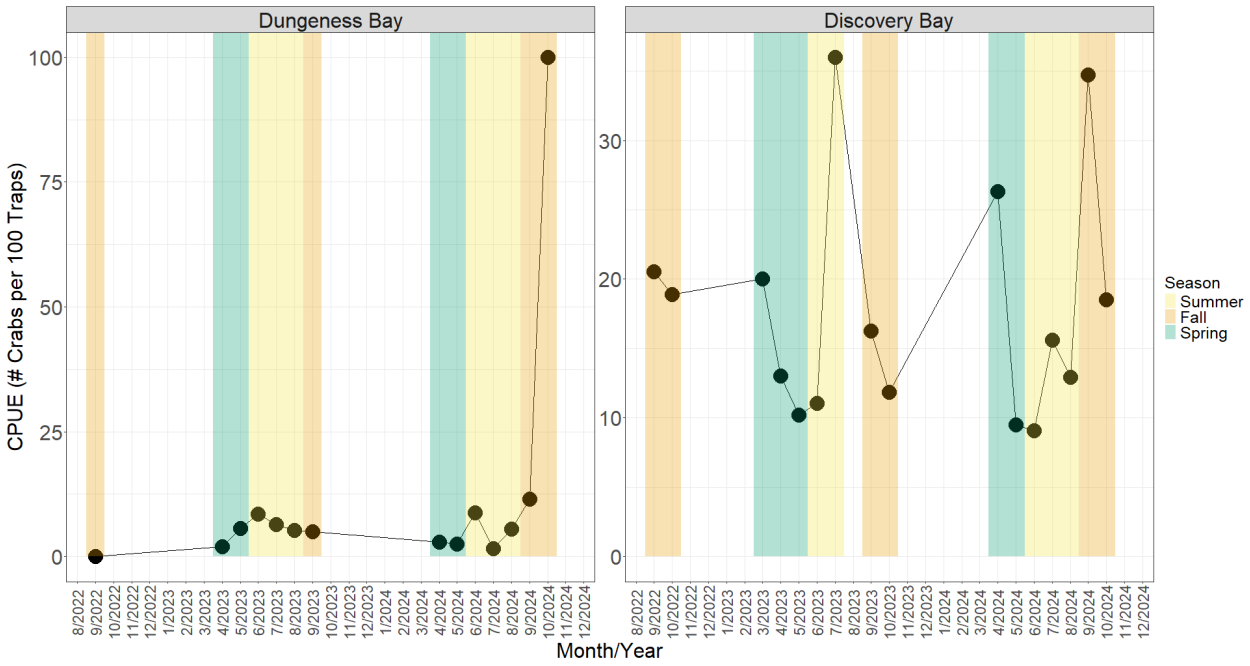
Green crab removal numbers remained relatively consistent between 2023 and 2024 in Eastern Strait & Admiralty Inlet (Table 10). However, the abundance of green crab increased in Discovery Bay, though CPUE remained like previous years (Figure 13). While CPUE showed a dramatic increase in Discovery Bay in October 2024, this resulted from 6 crabs caught across six traps that month and should not be viewed as a massive increase in crab abundance. Unfortunately, a green crab was collected in Sequim Bay after no green crab detections in 2023. While Discovery Bay and Dungeness Bay remain priorities for Eastern Strait & Admiralty Inlet, the continued presence of green crabs in Port Angeles, Sequim Bay, and Port Townsend is concerning.

Table 10 Eastern Strait & Admiralty Inlet Management Area green crab removal totals.

Coordination Area	2022 Green Crabs Removed	2023 Green Crabs Removed	2024 Green Crabs Removed	All Green Crabs Removed
Port Angeles	*	1	1	2
Dungeness Bay	15	109	95	219
ESAI - Subtidal	*	*	*	*
Sequim Bay	2	0	1	3
Protection Island	*	0	0	0
Discovery Bay	76	159	205	440
Port Townsend Bay	0	1	1	2
Oak Bay	0	0	0	0
Port Ludlow	*	*	0	0
Shine Tidelands	*	0	0	0
All	**93**	**270**	**303**	**666**

Green crab removed during 2022, 2023, 2024, and All (the duration of the green crab emergency) based on SitRep reported catch and trapping effort. These numbers are presented for each Coordination Area within Eastern Strait & Admiralty Inlet. These totals include removal efforts by all participating co-managers, tribes, and partners. * = No trapping occurred in these Coordination Areas. Please note that these data only represent crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across time and location.

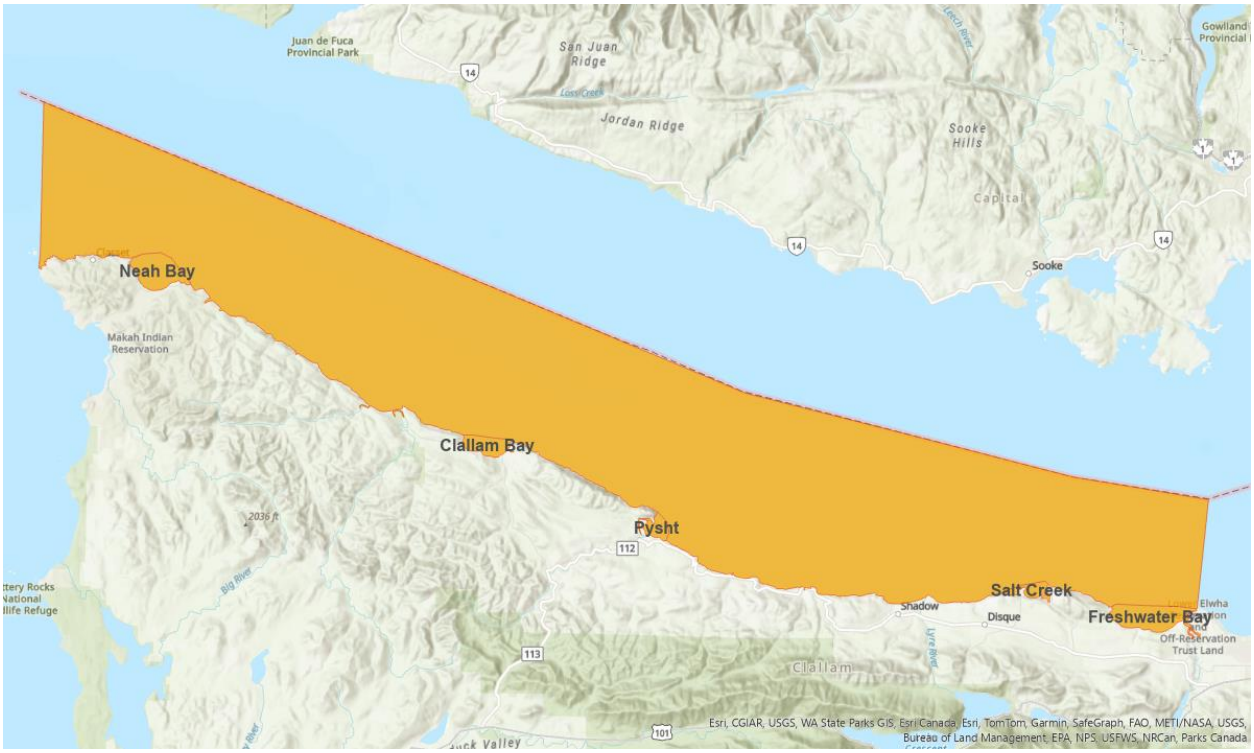
Figure 13 Monthly Catch Per Unit Effort (CPUE) for Coordination Areas in Eastern Strait & Admiralty Inlet.



CPUE is calculated as the number of crabs per 100 trap checks based on SitRep's reported catch and trapping effort. Dungeness Bay and Discovery Bay Coordination Areas were included because they had the most robust datasets for Eastern Strait & Admiralty Inlet. Trap check data was not reported in SitReps before August 2022, so CPUE is not calculated for the beginning of the green crab emergency. The color of each column denotes the season when trapping occurred: Yellow for Summer (June – August), orange for Fall (September – November), blue for Winter (December – February), and green for Spring (March – May). White columns indicate no data (trapping did not occur or no trap check data was available.

Western Strait

Figure 14 Map of Western Strait Management Area.



Western Strait is split into five Coordination Areas (Neah Bay, Pysht, Salt Creek, and Freshwater Bay).

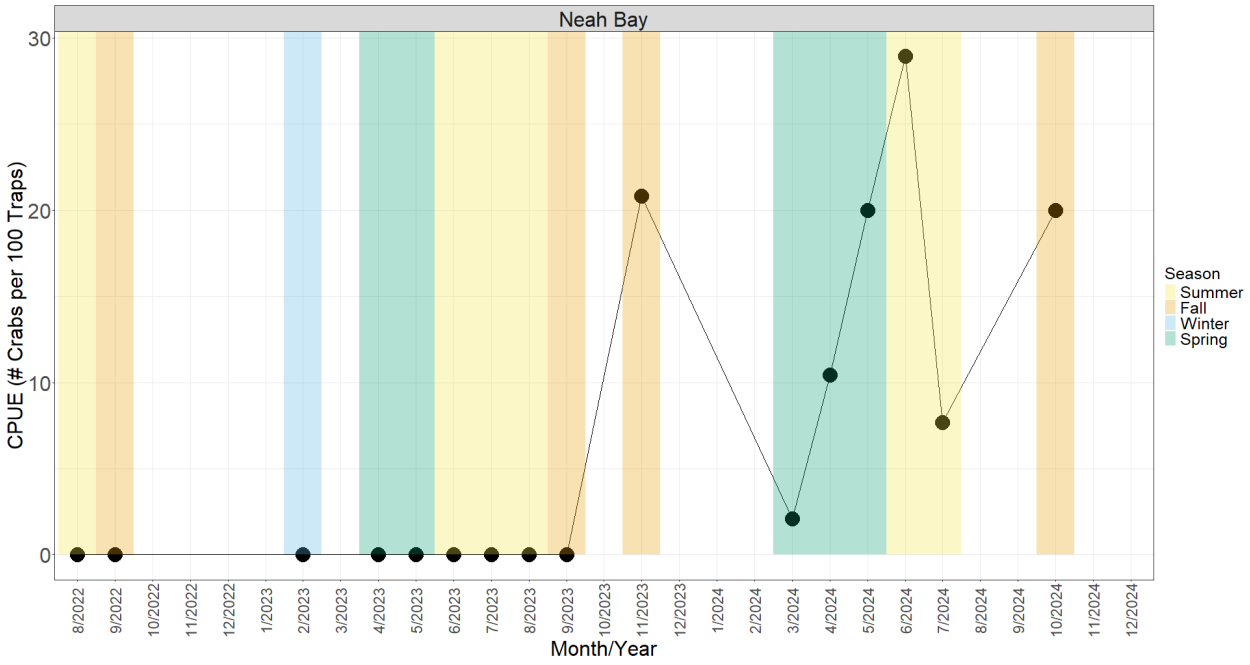
There was an increase in green crab removal numbers in Western Strait, thought overall removal numbers remained low compared to most of Washington (Table 11). Green crabs were detected in Neah Bay and Salt Creek Coordination Areas, and there was no evidence of geographic spread within Western Strait. Green Crab CPUE for Fall 2024 was similar to Fall 2023 (Figure 15). While numbers remain low, the continued presence and slight increase in green crabs in Western Strait remains concerning.

Table 11 Western Strait Management Area green crab removal totals.

Coordination Area	2022 Green Crabs Removed	2023 Green Crabs Removed	2024 Green Crabs Removed	All Green Crabs Removed
Neah Bay	0	15	32	47
Clallam Bay	*	*	0	0
Pysht	0	0	0	0
Salt Creek	*	3	10	13
Freshwater Bay	*	*	*	*
All	**0**	**18**	**42**	**60**

Green crab removed during 2022, 2023, 2024, and All (the duration of the green crab emergency) based on SitRep reported catch and trapping effort. These numbers are presented for each Coordination Area within Western Strait. These totals include removal efforts by all participating co-managers, tribes, and partners. * = No trapping occurred in these Coordination Areas. Please note that these data only represent crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across time and location.

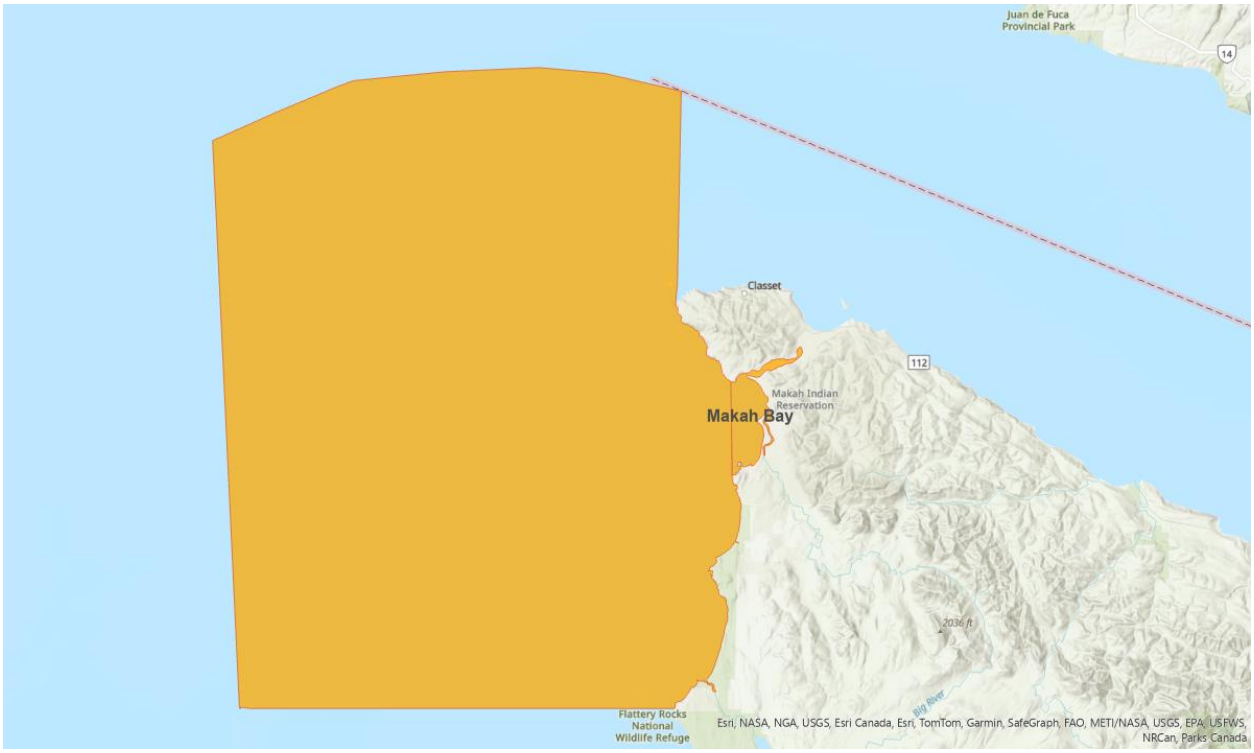
Figure 15 Monthly Catch Per Unit Effort (CPUE) for Coordination Areas in Western Strait.



CPUE is calculated as the number of crabs per 100 trap checks based on SitRep's reported catch and trapping effort. Neah Bay Coordination Area was included because it had the most robust dataset for Western Strait. Trap check data was not reported in SitReps before August 2022, so CPUE is not calculated for the beginning of the green crab emergency. The color of each column denotes the season when trapping occurred: Yellow for Summer (June – August), orange for Fall (September – November), blue for Winter (December – February), and green for Spring (March – May). White columns indicate no data (trapping did not occur or no trap check data was available).

North Coast

Figure 16 Map of North Coast Management Area.



North Coast consists of the Makah Bay Coordination Area.

Green crab removal numbers continued to decline in North Coast in 2024, though numbers remain higher than in most Management Areas (Table 12). Makah Fisheries reported large numbers of hand captures of small young of year crabs in early 2024, suggesting a strong recruitment pulse. A similar strong recruitment event was reported in 2022, so while the ENSO event may have contributed to this recruitment pulse, it was not likely to be the only variable contributing to local recruitment. Even with high potential recruitment, green crab numbers and CPUE are lower than what was observed in 2022 and are evidence of the positive impact of local management actions (Figure 17).

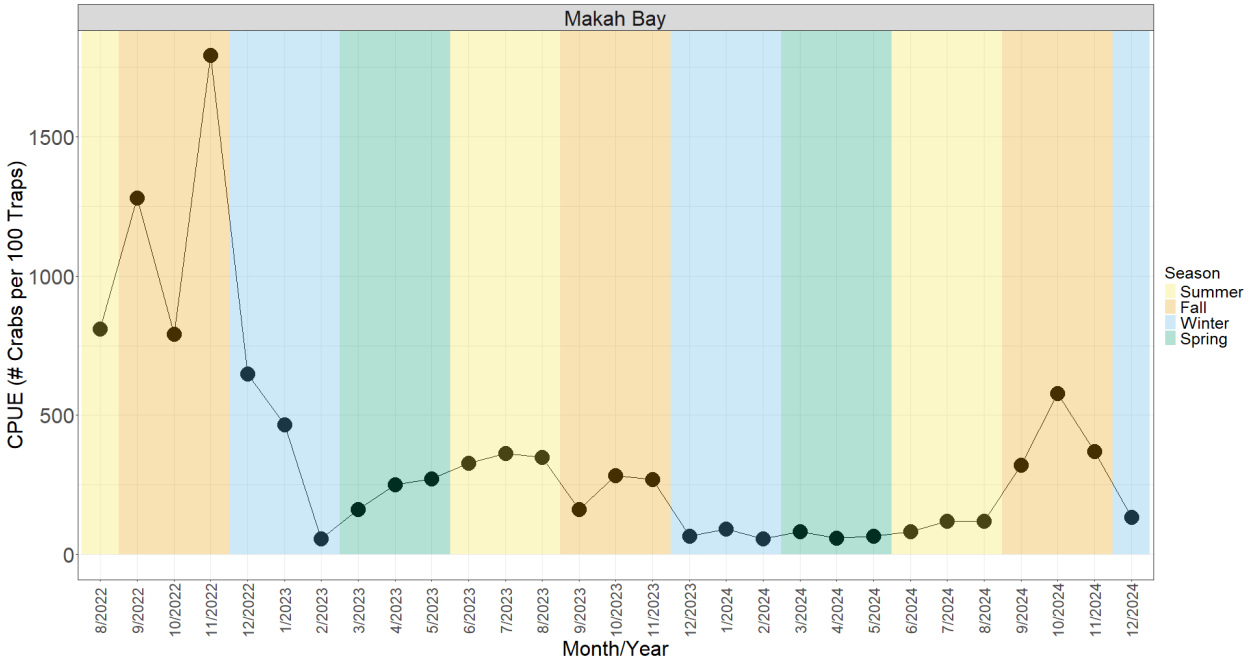
Recent trapping efforts have shown the need to update the structure of the North Coast Management Area. WDFW will coordinate WDFW will be coordinating with Makah Fisheries to establish new Coordination Areas within North Coast to reflect conditions on the ground and ongoing management actions.

Table 12 North Coast Management Area green crab removal totals.

Coordination Area	2022 Green Crabs Removed	2023 Green Crabs Removed	2024 Green Crabs Removed	All Green Crabs Removed
Makah Bay	25,278	9,407	8,016	42,701
All	**25,278**	**9,407**	**8,016**	**42,701**

Green crab removed during 2022, 2023, 2024, and All (the duration of the green crab emergency) based on SitRep reported catch and trapping effort. These numbers are presented for each Coordination Area within North Coast. These totals include removal efforts by all participating co-managers, tribes, and partners. * = No trapping occurred in these Coordination Areas. Please note that these data only represent crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across time and location.

Figure 17 Monthly Catch Per Unit Effort (CPUE) for Coordination Areas in North Coast.



CPUE is calculated as the number of crabs per 100 trap checks based on SitRep's reported catch and trapping effort. Trap check data was not reported in SitReps before August 2022, so CPUE is not calculated for the beginning of the green crab emergency. The color of each column denotes the season when trapping occurred: Yellow for Summer (June – August), orange for Fall (September – November), blue for Winter (December – February), and green for Spring (March – May). White columns indicate no data (trapping did not occur or no trap check data was available).

North Central Coast

Figure 18 Map of North Central Coast Management Area.

North Central Coast is split into four Coordination Areas (NCC – Subtidal, La Push, Hoh, and Queets).

In 2024, the first green detections occurred in the North Central Coast (Table 13). In a joint survey led by Quileute Natural Resources, 33 green crabs were removed in the first detection of green crabs at the mouth of the Quileute River in the La Push Coordination Area. In addition, Makah Fisheries conducted trapping near Cape Alava and the Ozette reservation, capturing more than a dozen green crabs across the open bench intertidal beaches. These detections near Cape Alava echo reports from Oregon, where green crabs have increasingly been captured outside of their typical estuarine habitat.

The presence of green crabs in North Central Coast, while concerning, is not surprising given their populations to the north in Makah Bay and to the south in Grays Harbor and Willapa Bay. However, the presence of green crabs in Cape Alava requires a reevaluation of monitoring efforts in the region. WDFW will be coordinating with Makah Fisheries to establish a new Cape Alava Coordination Area. Additional monitoring within North Central Coast and discussion on how to best respond to these new detections are necessary.

Table 13 North Central Coast Management Area green crab removal totals.

Coordination Area	2022 Green Crabs Removed	2023 Green Crabs Removed	2024 Green Crabs Removed	All Green Crabs Removed

NCC - Subtidal	*	*	*	*
La Push	0	0	33	33
Hoh	*	*	*	*
Queets	*	*	*	*
Cape Alava	*	*	14	14
All	**0**	**0**	**47**	**47**

Green crab removed during 2022, 2023, 2024, and All (the duration of the green crab emergency) based on SitRep reported catch and trapping effort. These numbers are presented for each Coordination Area within North Central Coast. These totals include removal efforts by all participating co-managers, tribes, and partners. * = No trapping occurred in these Coordination Areas. Please note that these data only represent crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across time and location.

South Central Coast

Figure 19 Map of South Central Coast Management Area.

South Central Coast is split into four Coordination Areas (SCC-Subtidal. Moclips, Pacific Beach, and Copalis).

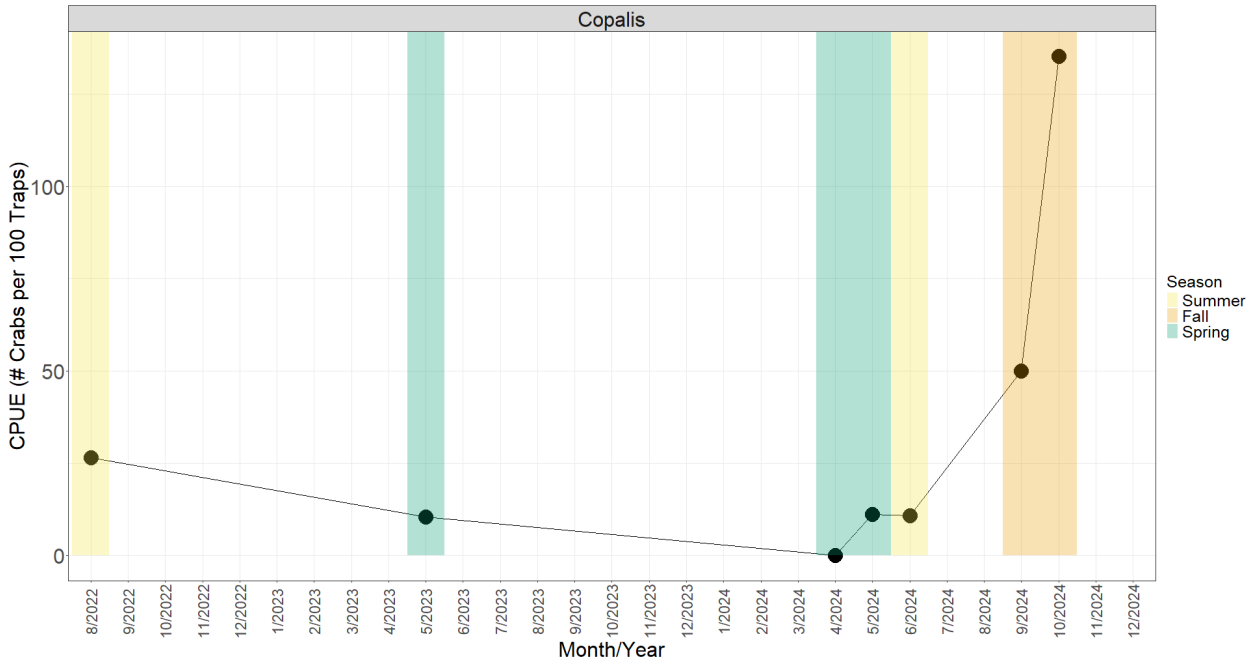
There was an increase in green crab removal numbers in South Central Coast (Table 14). In addition, green crab CPUE increased substantially in 2024 compared to previous years (Figure 20). Green crab management activities have been limited to the Copalis Coordination Area, where green crabs were first detected in 2021. Consideration should be given to expanding monitoring efforts within South Central Coast and how to best respond to the continued presence of green crabs in the Copalis Coordination Area.

Table 14 South Central Coast Management Area green crab removal totals.

Coordination Area	2022 Green Crabs Removed	2023 Green Crabs Removed	2024 Green Crabs Removed	All Green Crabs Removed
SCC - Subtidal	*	*	*	*
Moclips	*	*	*	*
Pacific Beach	*	*	*	*
Copalis	34	4	88	126
All	**34**	**4**	**88**	**126**

Green crab removed during 2022, 2023, 2024, and All (the duration of the green crab emergency) based on SitRep reported catch and trapping effort. These numbers are presented for each Coordination Area within South Central Coast. These totals include removal efforts by all participating co-managers, tribes, and partners. * = No trapping occurred in these Coordination Areas. Please note that these data only represent crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across time and location.

Figure 20 Monthly Catch Per Unit Effort (CPUE) for Coordination Areas in South Central Coast.



CPUE is calculated as the number of crabs per 100 trap checks based on SitRep's reported catch and trapping effort. Trap check data was not reported in SitReps before August 2022, so CPUE is not calculated for the beginning of the green crab emergency. The color of each column denotes the season when trapping occurred: Yellow for Summer (June – August), orange for Fall (September – November), blue for Winter (December – February), and green for Spring (March – May). White columns indicate no data (trapping did not occur or no trap check data was available).

South Coast

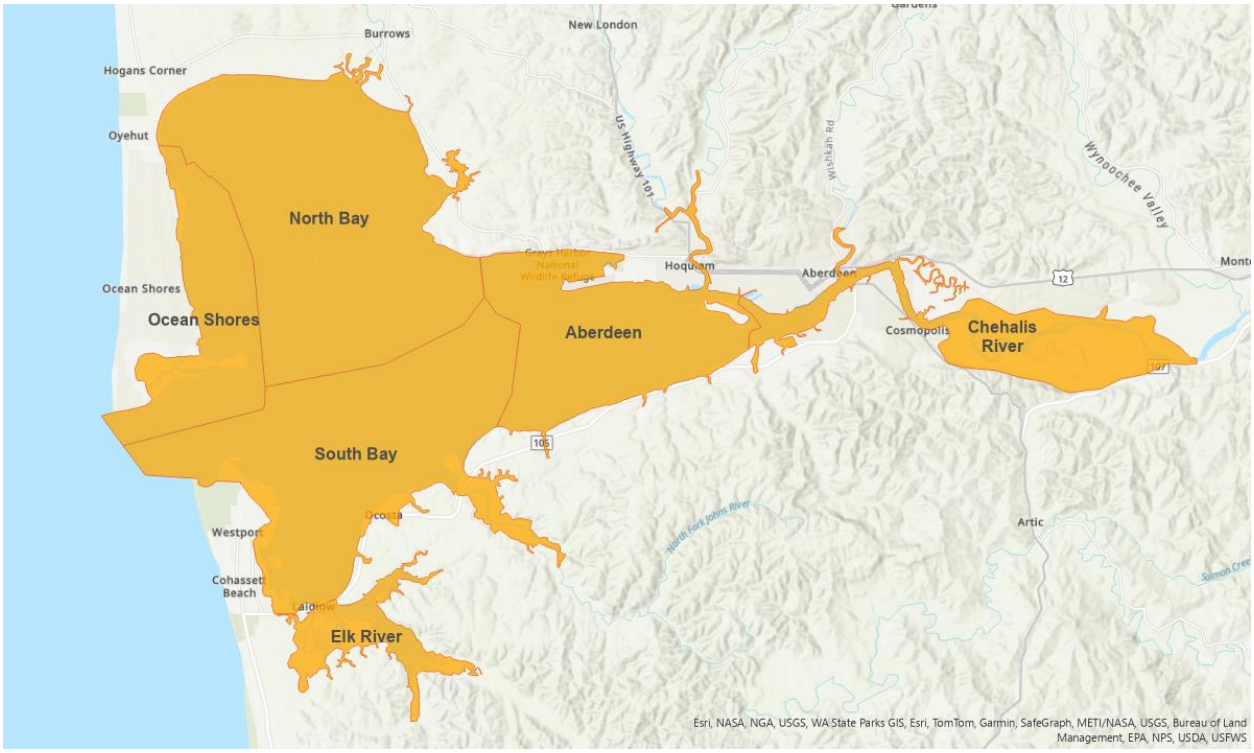
Figure 21 Map of South Coast Management Area.

South Coast is split into two Coordination Areas (SC-Subtidal and Jetty to Point).

South Coast remains the only Management Area where no green crab management activities have occurred. South Coast consists of the western coastline of Long Beach Peninsula, which borders the Pacific Ocean. Most of South Coast is sandy shoreline, except for the rocky shoreline at the southern end around North Head, and the entire area is subject to high wave action. As a result, South Coast is deemed a poor habitat for green crab. WDFW continues to communicate with interested co-managers, tribes, and partners to discuss if management actions are necessary for the South Coast.

Grays Harbor

Figure 22 Map of Grays Harbor Management Area.



Grays Harbor is split into six Coordination Areas (Ocean Shores, North Bay, South Bay, Elk River, Aberdeen, and Chehalis River).

Green crab removal numbers increased for the majority of Grays Harbor in 2024, except for the South Bay Coordination Area (Table 15). Removing nearly 140,000 green crabs from Grays Harbor is an impressive accomplishment, though the continuing increases in removal numbers is a major concern.

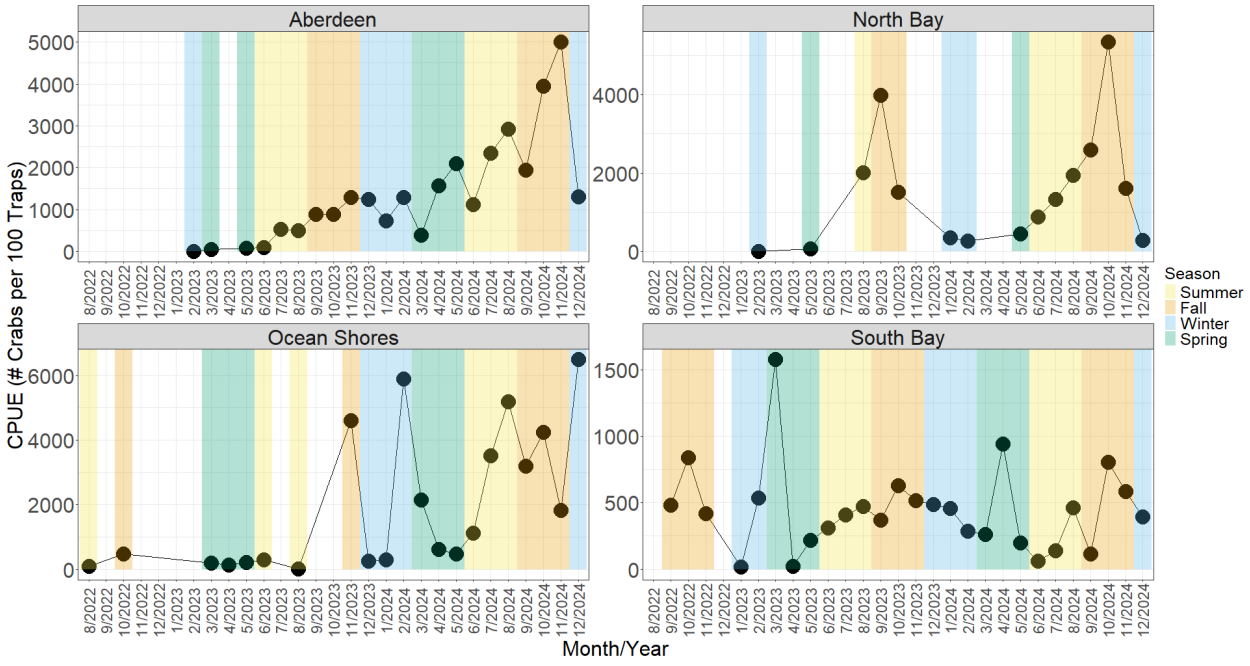
CPUE was not dramatically different between summer and Fall 2023 and 2024 for some coordination areas (Ocean Shores, North Bay, South Bay; Figure 23). Aberdeen Coordination Area has shown a continual increase in CPUE over time since February 2023, suggesting a continual increase in green crab abundance.

Table 15 Grays Harbor Management Area green crab removal totals.

Coordination Area	2022 Green Crabs Removed	2023 Green Crabs Removed	2024 Green Crabs Removed	All Green Crabs Removed
Aberdeen	5	6,994	18,414	25,413
Chehalis River	539	776	974	2,289
Elk River	157	4,803	10,246	15,206
North Bay	*	6,391	36,655	43,046
Ocean Shores	1,140	4,630	27,879	33,649
South Bay	22,423	61,970	43,701	128,094
All	**24,264**	**85,564**	**137,869**	**247,697**

Green crab removed during 2022, 2023, 2024, and All (the duration of the green crab emergency) based on SitRep reported catch and trapping effort. These numbers are presented for each Coordination Area within Grays Harbor. These totals include removal efforts by all participating co-managers, tribes, and partners. * = No trapping occurred in these Coordination Areas. Please note that these data only represent crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across time and location.

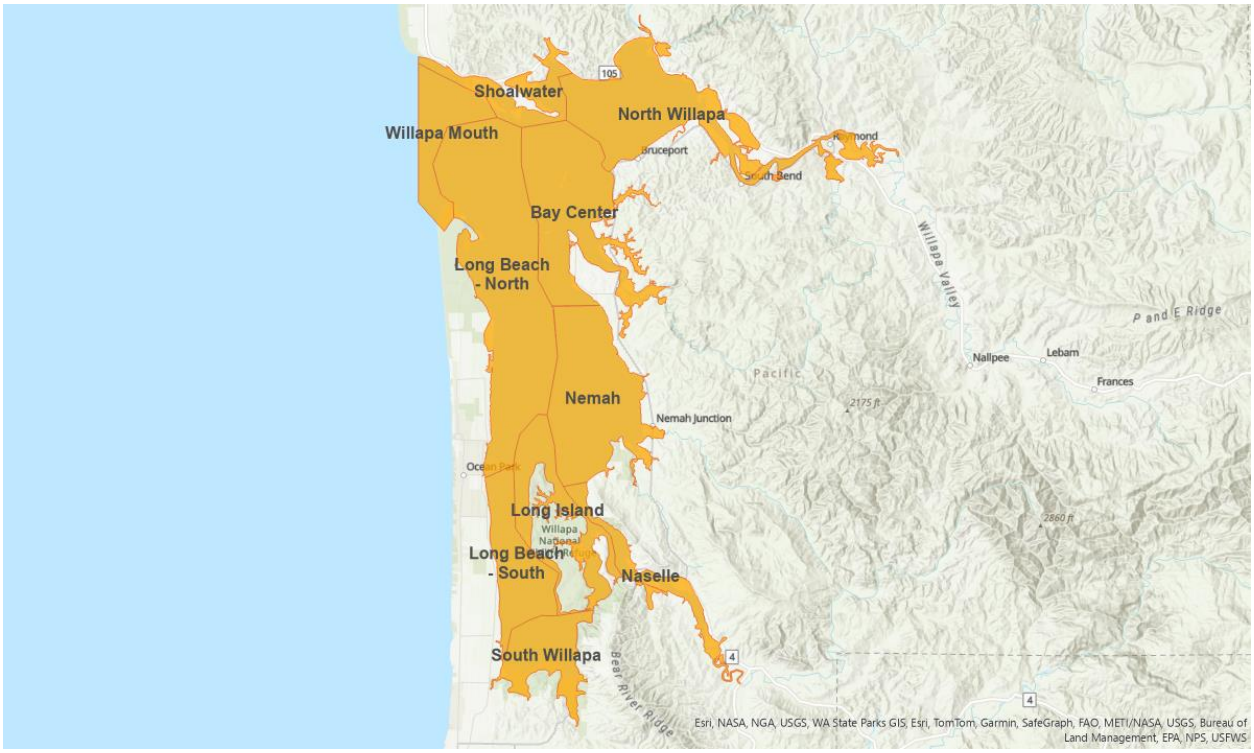
Figure 23 Monthly Catch Per Unit Effort (CPUE) for Coordination Areas in Grays Harbor.



CPUE is calculated as the number of crabs per 100 trap checks based on SitRep's reported catch and trapping effort. Aberdeen, North Bay, Ocean Shores, and South Bay Coordination Areas were included because they had the most robust datasets for Grays Harbor. Trap check data was not reported in SitReps before August 2022, so CPUE is not calculated for the beginning of the green crab emergency. The color of each column denotes the season when trapping occurred: Yellow for Summer (June – August), orange for Fall (September – November), blue for Winter (December – February), and green for Spring (March – May). White columns indicate no data (trapping did not occur or no trap check data was available

Willapa Bay

Figure 24 Map of Willapa Bay Management Area.



Willapa Bay is split into 10 Coordination Areas (Willapa Mouth, Shoalwater, North Willapa, Bay Center, Long Beach – North, Long Beach – South, Nemah, Long Island, Naselle, and South Willapa).

Green crab removal numbers increased substantially in Willapa Bay from 2023 to 2024 (Table 16). Removing nearly 900,000 green crabs from Willapa Bay is an impressive accomplishment, though the continuing increase in removal numbers is a major concern. While green crab numbers remain low in south Willapa Bay compared to the northern areas, the tenfold plus increases in the southern coordination areas may result in dramatic impacts throughout the bay. Past research suggests that green crab larvae released in southern regions are more likely to be retained within Willapa Bay (Banas et al. 2009) and could disproportionately contribute to green crab recruitment bay-wide.

CPUE also increased compared to previous years, though there appears to be a consistent spike in CPUE in the late summer and fall (Figure 25). Interpreting changes in CPUE in Willapa Bay is complicated by the nature of trapping efforts. In their efforts to remove as many green crab as possible, local co-managers, tribes, and partners in Willapa Bay will move to new trapping locations if green crab removal numbers decline. This can unintentionally increase or maintain CPUE levels. However, the observed increases in CPUE for 2024 align with increases seen at WSG Crab Team monitoring sites in the same areas. The Crab Team monitoring sites are at permanent locations with consistent trapping efforts (the same number of trap checks performed monthly). The complimentary increases in CPUE for 2024 for larger trapping efforts and at Crab Team sites suggest that the increases in CPUE cannot only be

explained by efforts to trap locations of the highest green crab abundance but also reflect an increase in green crab abundance.

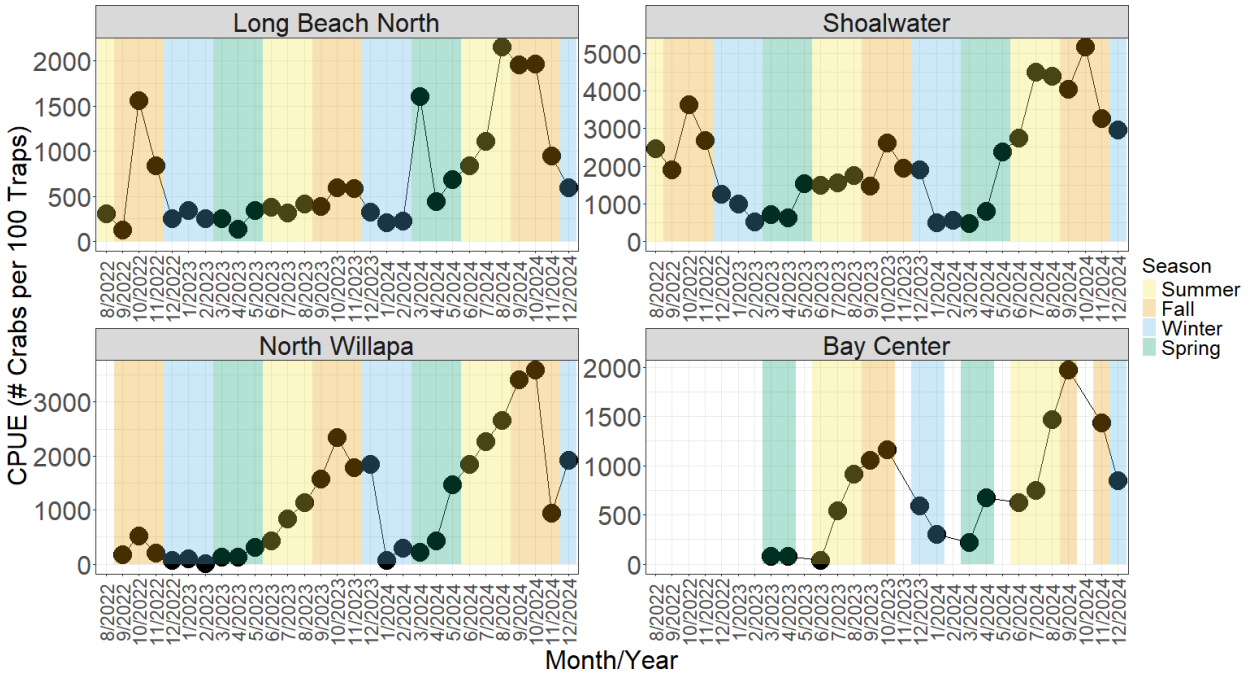
Despite the concerning increases in green crab removal numbers, there is some evidence that removal efforts may be having an impact. The monitoring site summary by WSG found that several sites within Willapa Bay recorded smaller crabs on average and fewer in the > 70mm size group relative to the overall catch in 2024 (see the Crab Team Coastal Monitoring Site Summary 2024). This could indicate "crabbing down" where consistent removal efforts have removed larger-sized crabs from the local populations. Efforts to capture smaller crabs could be a practical next step to control local green crab populations.

Table 16 Willapa Bay Management Area green crab removal totals.

Coordination Area	2022 Green Crabs Removed	2023 Green Crabs Removed	2024 Green Crabs Removed	All Green Crabs Removed
Willapa Mouth	*	*	*	*
Shoalwater	42,711	80,854	118,361	241,926
North Willapa	21,364	30,416	153,198	204,978
Bay Center	*	3,645	8,732	12,377
Long Beach - North	90,678	144,490	610,596	845,764
Long Beach - South	*	282	493	775
Nemah	7	40	469	516
Long Island	7	183	5,691	5,881
Naselle	*	51	677	728
South Willapa	57	24	523	604
All	**154,824**	**259,985**	**898,740**	**1,313,549**

Green crab removed during 2022, 2023, 2024, and All (the duration of the green crab emergency) based on SitRep reported catch and trapping effort. These numbers are presented for each Coordination Area within Willapa Bay. These totals include removal efforts by all participating co-managers, tribes, and partners. * = No trapping occurred in these Coordination Areas. Please note that these data only represent crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across time and location.

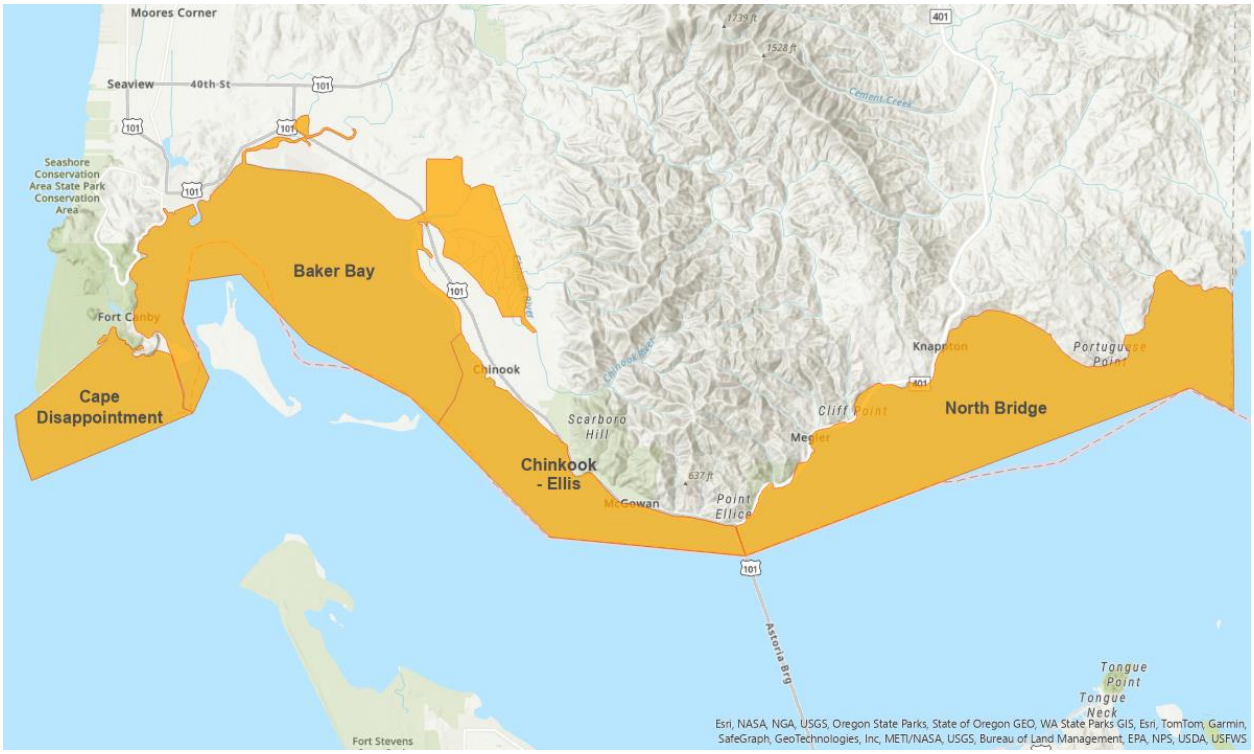
Figure 25 Monthly Catch Per Unit Effort (CPUE) for Coordination Areas in Willapa Bay.



CPUE is calculated as the number of crabs per 100 trap checks based on SitRep's reported catch and trapping effort. Long Beach North, Shoalwater, North Willapa, and Bay Center Coordination Areas were included because they had the most robust datasets for Willapa Bay. Trap check data was not reported in SitReps before August 2022, so CPUE is not calculated for the beginning of the green crab emergency. The color of each column denotes the season when trapping occurred: Yellow for Summer (June – August), orange for Fall (September – November), blue for Winter (December – February), and green for Spring (March – May). White columns indicate no data (trapping did not occur or no trap check data was available).

Columbia River

Figure 26 Map of Columbia River Coordination Area.



Columbia River is split into four Coordination Areas (Cape Disappointment, Baker Bay, Chinook-Ellis, and North Bridge).

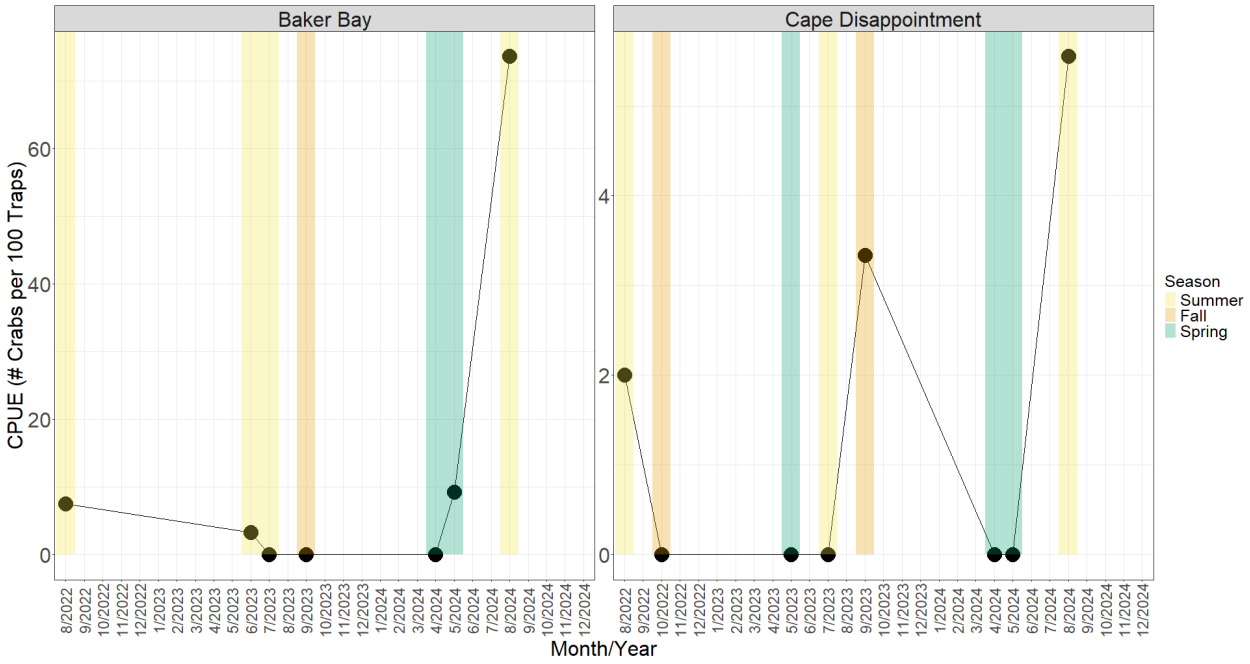
There was a substantial increase in green crab removal numbers and CPUE for the Baker Bay Coordination Area in 2024 (Table 17, Figure 27). In contrast, there has been no substantial change in green crab numbers in Cape Disappointment Coordination Area. Consideration should be given to expanding monitoring efforts within Columbia River and how to best respond to the continued presence of green crabs at established locations.

Table 17 Columbia River Management Area green crab removal totals.

Coordination Area	2022 Green Crabs Removed	2023 Green Crabs Removed	2024 Green Crabs Removed	All Green Crabs Removed
Cape Disappointment	2	1	1	4
Baker Bay	3	1	33	37
Chinook - Ellis	*	*	*	*
North Bridge	*	*	*	*
All	**5**	**2**	**34**	**41**

Green crab removed during 2022, 2023, 2024, and All (the duration of the green crab emergency) based on SitRep reported catch and trapping effort. These numbers are presented for each Coordination Area within Columbia River. These totals include removal efforts by all participating co-managers, tribes, and partners. * = No trapping occurred in these Coordination Areas. Please note that these data only represent crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across time and location.

Figure 27 Monthly Catch Per Unit Effort (CPUE) for Coordination Areas in Columbia River.



CPUE is calculated as the number of crabs per 100 trap checks based on SitRep's reported catch and trapping effort. Baker Bay and Cape Disappointment Coordination Areas were included because they had the most robust datasets for Columbia River. Trap check data was not reported in SitReps before August 2022, so CPUE is not calculated for the beginning of the green crab emergency. The color of each column denotes the season when trapping occurred: Yellow for Summer (June – August), orange for Fall (September – November), blue for Winter (December – February), and green for Spring (March – May). White columns indicate no data (trapping did not occur or no trap check data was available).

Research activity

Effective invasive species management requires a robust understanding of the invader and its impacts. As a prolific global invader, a wealth of research exists regarding green crab. However, many fundamental questions about green crab, particularly regarding their detection, abundance, impacts, and movements in Washington, have yet to be answered.

The Green Crab Research Task Force (RTF) continued to meet every other month in to accommodate increased field operations duration of the field season (April - October 2024). While progress is ongoing for all RTF Tasks, notable progress includes:

- The continued compilation and distribution of green crab research among co-managers, tribes, and partners.
- The continued assessment of early detection methods for green crabs. Initial assessments have been completed on most methods. After initial assessments are completed, the larger RTF will be invited to review.

The RTF has begun the development of a research priorities survey. The survey aims to identify research that is feasible for implementation in a short timeframe and would create the greatest benefit for green crab management along the Pacific Coast. The RTF is developing a list of priority research topics. Once completed, Brain Turner (RTF lead and Research Scientist for WDFW's AIS Division) will work with WDFW social scientists to develop a survey for distribution among green crab co-managers, tribes, and partners. Research topics identified in the survey as the highest priorities will be developed into research proposals for which staff and funding can be pursued. The survey is on track for completion and distribution in late February or early March 2025.

Public communications and outreach efforts

Public education, involvement, and support are essential for effective invasive species management. No matter the effort of government agencies and managers, they will be limited in their ability to monitor and report on the species spread. Public awareness and reporting can complement professional monitoring and allow for earlier detection of species spread. Public awareness, media and external relations also supports effective policymaking and collaboration with local communities, stakeholders, and partners. Highlights for Winter 2024 included:

European Green Crab Outreach Specialist Position

- Mitch Furr, who held the WDFW position of European Green Crab Outreach Specialist since May 2024, took a new position supporting watercraft safety and logistics for WDFW Police. Congratulations, Mitch, and thank you for your work on behalf of green crab outreach!
- WDFW is evaluating next steps and budget availability for a communications specialist (Communications Consultant 3) position to coordinate EGC communications and outreach duties in the future. WDFW communications manager Chase Gunnell remains the EGC Public Information Officer.

Focused/Local communication

- WDFW staff supported several community outreach opportunities where European green crab materials were present, including a booth at Northwest Indian Fisheries Commission's Tribal Youth Salmon Summit on October 16 on the Tulalip Tribes reservation.
- WDFW included a section on the new green crab management plan and more than one million crabs caught in the bi-monthly Director's Bulletin published on October 30.
- Co-managers, tribes, and partners conducted green crab outreach at numerous other public events and community forums.
- All additional communication and outreach efforts are listed in Appendix A. as well as online at: https://wdfw.wa.gov/species-habitats/invasive/carcinus-maenas#conservation.

General public communication

- WDFW communications and operations staff are working on developing new green crabs encased in resin for use in outreach and as materials for partners. The first batch is coming along very well, and more are on the way.
- WDFW communications staff distributed green crab outreach supplies to several partners, including Washington Sea Grant. These included the first batch of new green crab encased in resin, which are very popular for outreach. For materials requests or support, please contact chase.gunnell@dfw.wa.gov or review the Resources tab on our webpage.
- Media inquiries on green crab slowed significantly in November following the release of the green crab long-term management plan in September, local coverage in October, and conclusion of the field season. Typically, media interest on this topic wanes in the winter and picks up again in spring.
- WDFW is reordering green crab outreach materials, signs, and stickers for the 2025 season. For materials requests or support, please contact chase.gunnell@dfw.wa.gov, or review the Resources tab on our webpage. CMTPs are also welcome to print materials for their use.
- Media relations and other external affairs activities continued. Current green crab management efforts have been reported in numerous local and national media outlets (Appendix A).
- Print and online advertisements supporting green crab identification and reporting continued to run in regional fishing, boating, and other outdoor publications and social media channels.

Program challenges

WDFW, co-managers, tribes, and partners have made significant progress toward the five Incident Objectives quickly. However, as we continue to progress through the green crab emergency, there are several challenges we must address. These challenges include:

- Filling vacancies in WDFW permeant green crab staff. Chelsey Buffington, WDFW Green Crab Lead Biologist, has moved on to a new position with WDFWs Habitat Division. Chelsey was with the green crab team since June 2018. Over the years, Chelsey became a prominent member of

the green crab community and played an invaluable role in expanding green crab management actions throughout Washington. Congratulations Chelsey! You will be greatly missed and leave some big shoes to fill.

- Transition of ICS command. With the continued presence of quagga mussels in the Snake River in Idaho, the risk of quagga mussels becoming introduced into Washington has never been higher. If discovered in Washington, a quagga mussel ICS will need to be established and would fall under the command of Justin Bush, WDFW AIS Policy Lead. To avoid the complications of leading multiple ICS simultaneously, Justin Bush, who is the current green crab Incident Commander, will transfer command to the current Deputy Commander Raquel Crosier in February 2025.
- Washington European Green Crab Management Symposium. The Washington Green Crab Symposium will take place in February 2025. Following up on feedback from 2024, there will be a heavy emphasis on green crab research.
- Ensuring sufficient support for co-managers, tribes, and partners. At least two local trapping partners in North Puget Sound anticipate staffing shortages or discontinuities for 2025. Other co-managers, tribes, and partners are facing similar resource shortfalls. WDFW must work with co-managers, tribes, and partners to find additional avenues to acquire the necessary resources to fill these gaps.
- Finding and retaining green crab field staff. WDFW and other co-managers, tribes, and partners, continue to experience challenges finding personnel to fill field positions relating to green crab management activities. In particular, the lack of affordable housing in coastal areas has proven a significant challenge. Discussions are ongoing for options to remove barriers to finding sustainable long-term workforces.
- Increasing communication and coordination of ongoing activities. The increasing number of co-managers, tribes, and partners actively involved in green crab management activities and the expanding scope of those activities necessitates more effective communication and coordination to avoid potential interference and redundancies.

Next Steps

The green crab emergency management priority actions for next quarter (Spring 2025: January 1 – March 31, 2025) include:

- Finalization of planning for 2025 field season.
- Preparation for transition of ICS leadership in February 2025.
- Recruitment of seasonal EGC staff.
- Scheduling the 2025 Washington European Green Crab Management Symposium for February 2025.
- Continued meetings of regional coordination groups.
- Ongoing MAC Group meetings.
- Development and distribution of research priorities survey.
- Development and distribution of monthly SitReps.
- Ongoing advocacy for increasing federal partner support and funding.

Glossary

AIS – Aquatic Invasive Species
DFO – Department of Fisheries and Oceans Canada
DNR – Department of Natural Resources
Ecology – Department of Ecology
EDRR – Early Detection Rapid Response
EGC – European green crab (*Carcinus maenas*)
ENSO – El Niño Southern Oscillation
FY – Fiscal Year
ICS – Incident Command System
MAC Group – Multi-Agency Coordination Group
NGO – Non-governmental organizations
NOAA – National Oceanographic and Atmospheric Administration
NWR – National Wildlife Refuge
PCSGA – Pacific Coast Shellfish Growers Association
RCO – Recreation and Conversation Office
RTF – Research Task Force
SitReps – ICS Situation Reports
WDFW – Washington Department of Fish and Wildlife
WGHOGA – Willapa-Grays Harbor Oyster Growers Association
WSG – Washington Sea Grant
WSU – Washington State University

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Appendix A

WAC 220-640-030 - Prohibited level 1 species.

The following species are classified as prohibited level 1 species:

(1) Molluscs: Family Dreissenidae: Zebra and quagga mussels: *Dreissena polymorpha and Dreissena rostriformis bugensis*.
(2) Crustaceans:
(a) Family Grapsidae: Mitten crabs: All members of the genus *Erochier*.
(b) Family Portunidae: European green crab, *Carcinus maenas*.
(3) Fish:
(a) Family Channidae: China fish, snakeheads: All members of the genus *Channa*.
(b) Family Clarriidae: All members of the walking catfish family.
(c) Family Cyprinidae:
(i) Carp, Bighead, *Hypopthalmichthys nobilis*.
(ii) Carp, Black, *Mylopharyngodon piceus*.
(iii) Carp, Silver, *Hypopthalmichthys molitrix*.
(iv) Carp, Largescale Silver, *Hypopthalmichthys harmandi*.
(d) Family Esocidae: Northern pike, *Esox lucius*.

RCW 77.135.040 - Prohibited and regulated species – Required authorization

(1) Prohibited level 1, level 2, and level 3 species may not be possessed, introduced on or into a water body or property, or trafficked, without department authorization, a permit, or as otherwise provided by rule.

(2) Regulated type A, type B, and type C species may not be introduced on or into a water body or property without department authorization, a permit, or as otherwise provided by rule.

(3) Regulated type B species, when being actively used for commercial purposes, must be readily and clearly identified in writing by taxonomic species name or subspecies name to distinguish the subspecies from another prohibited species or a regulated type A species. Nothing in this section precludes using additional descriptive language or trade names to describe regulated type B species as long as the labeling requirements of this section are met.

RCW 77.135.090 - Emergency measures

(1) If the director finds that there exists an imminent danger of a prohibited level 1 or level 2 species detection that seriously endangers or threatens the environment, economy, human health, or well-being of the state of Washington, the director must ask the governor to order, under RCW **43.06.010**(14), emergency measures to prevent or abate the prohibited species. The director's findings must contain an evaluation of the effect of the emergency measures on environmental factors such as fish listed under the endangered species act, economic factors such as public and private access, human health factors such as water quality, or well-being factors such as cultural resources.

(2) If an emergency is declared pursuant to RCW **43.06.010**(14), the director may consult with the invasive species council to advise the governor on emergency measures necessary under RCW **43.06.010**(14) and this section, and make subsequent recommendations to the governor. The invasive species council must involve owners of the affected water body or property, state and local governments, federal agencies, tribes, public health interests, technical service providers, and environmental organizations, as appropriate.

(3) Upon the governor's approval of emergency measures, the director may implement these measures to prevent, contain, control, or eradicate invasive species that are the subject of the emergency order, notwithstanding the provisions of chapter **15.58** or **17.21** RCW or any other statute. These measures, after evaluation of all other alternatives, may include the surface and aerial application of pesticides.

(4) The director must continually evaluate the effects of the emergency measures and report these to the governor at intervals of not less than ten days. The director must immediately advise the governor if the director finds that the emergency no longer exists or if certain emergency measures should be discontinued.

ESSB 5693 (2022 c 297)- Making 2021-2023 fiscal biennium supplemental operating appropriations

Section 308. (Page 552, Line 16)

(67) $2,472,000 of the general fund—state appropriation in fiscal year 2022 and $6,096,000 of the general fund—state appropriation in fiscal year 2023 are provided solely for the department to implement eradication and control measures on European green crabs through coordination and grants with partner organizations. The department must provide quarterly progress reports on the success and challenges of the measures to the appropriate committees of the legislature by December 1, 2022.23

Fall 2022 (March 1 – September 30, 2022) Green Crab Report

The Fall 2022 report is available at https://wdfw.wa.gov/publications/02372 or via this link: European Green Crab Quarterly Progress Report – Fall 2022

Fall 2022 Catch data clarification

Please note that European green crab catch numbers in the Fall 2022 report included green crab caught from Jan. 31 – Feb. 28, 2022. These months fall outside the official duration of Fall 2022 (March 1 – Sep. 30, 2022) but were included to 1) accurately represent green crab removals for 2022 and 2) the submission process for SitRep 1 included co-managers, tribes, and partners submitting catch data from January 1- June 11, 2022, as a single number.

Winter 2022 (October 1 – December 31, 2022) Green Crab Report

The Winter 2022 report is available at https://wdfw.wa.gov/publications/02414 or via this link: European Green Crab Quarterly Progress Report – Winter 2022

Spring 2023 (January 1 – March 31, 2023) Green Crab Report

The Spring 2023 report is available at https://wdfw.wa.gov/publications/02431 or via this link: European Green Crab Quarterly Progress Report – Spring 2023

Summer 2023 (April 1 – June 30, 2023) Green Crab Report

The Summer 2023 report is available at https://wdfw.wa.gov/publications/02446 or via this link: European Green Crab Quarterly Progress Report – Summer 2023

Fall 2023 (July 1 – September 30, 2023) Green Crab Report

The Fall 2023 report is available at https://wdfw.wa.gov/publications/02460 or via this link: European Green Crab Quarterly Progress Report – Fall 2023

Winter 2023 (October 1 – December 31, 2023) Green Crab Report

The Winter 2023 report is available at https://wdfw.wa.gov/publications/02491 or via this link: European Green Crab Quarterly Progress Report – Winter 2023

Spring 2024 (January 1 – March 31, 2024) Green Crab Report

The Spring 2024 report is available at https://wdfw.wa.gov/publications/02508 or via this link: European Green Crab Quarterly Progress Report – Spring 2024

Summer 2024 (April 1 – June 30, 2024) Green Crab Report

The Summer 2024 report is available at https://wdfw.wa.gov/publications/02524 or via this link: European Green Crab Quarterly Progress Report – Summer 2024

Fall 2024 (July 1 – September 30, 2024) Green Crab Report

The Fall 2024 report is available at https://wdfw.wa.gov/publications/02555 or via this link: European Green Crab Quarterly Progress Report – Fall 2024

Green Crab Management Definitions

Management action type definitions

Assessment means periodically checking positive detection green crab areas using trapping methods to assess presence, geographic scope, and numerical scale of a population, at a relatively comprehensive scale. Assessment trapping efforts can occur on the scale of a water body or site, depending on the purpose. The timing and implementation of assessment trapping efforts is generally opportunistic.

Control means field activities within a given infested area with the intent of reducing that area's green crab population size.

Early detection means field operations in areas that have no prior green crab detections or detections within the past 5 years and with the intent to detect green crab at their earliest point in the invasion process. This includes such activities as trapping and eDNA.

Emphasis response means planned management actions including assessment, prospecting, or control effort over a given Site or Coordination Area that brings in a significant increase of resources as would be normal for that situation. It is similar to a rapid response trapping effort except not expedited as a result of a new detection.

Monitoring means a systematic and designed sampling effort for information-gathering purposes that is implemented consistently and on a routine schedule. Monitoring protocols are well defined and are relatively stable to evaluate changes over space and time. The specific purpose and geographic scope of any individual monitoring effort might vary to suit the project but should remain internally consistent.

Prevention means activities that aim to reduce the arrival of green crabs, either as larvae or adults, resulting from the transport/transfer of green crabs from one location to another – regardless of whether green crabs are present at the receiving location.

Research means field, lab, or other scientific actions implemented to investigate an aspect of the green crab invasion and for with the activities do not fall into standard protocols of any of the above management types. Types of research may include improving efficiency/efficacy of priority management actions, increasing biological knowledge, and predicting/assessing green crab or other impacts.

Other definitions

Catch Per Unit Effort (CPUE) is an indirect metric of the abundance of green crab in relation to a defined geographic area and time scale. It is used to indicate the amount of effort undertaken to collect a given number of green crab. For green crab emergency management data consistency purposes, CPUE must be reported and qualified:

- Per 100 traps as calculated to nearest 0.10 CPUE;

- By aggregate or individual trap type; and
- By cumulative Trap set days or Trap check days over the operational period or other defined time span of interest.
    - Example 1 - 30 green crab caught in 200 shrimp traps and deployed for 1 overnight period then recovered (200 trap set days): 30 ÷ 200 = 0.15 x 100 = 15.0 CPUE.
    - Example 2 -30 green crab caught in 200 shrimp traps and deployed for 3 overnight periods then recovered (600 trap set days): 30 ÷ 600 = 0.05 x 100 = 5.0 CPUE.

Detection means the new discovery of a live, dead, molt or other remains of an green crab specimen as verified by an green crab expert at a specific geographic location. Life stage or remains of green crab may trigger different management response at different geographic scales. This includes finds at locations where green crab have not been found for more than three years.

Education/outreach means providing information on potential pathways of human mediated risk/spread, green crab identification, and green crab reporting to relevant audiences. Examples might include presentations, creating printed collateral/signage, or informal conversations. This category is different from Training in being broader and less targeted in practical applications.

Green Crab Management Scale means a hierarchy of geographically defined areas from largest to smallest scale. This system is used for consistency in communications, planning, operations, and other ICS functions including:

- Regional – this includes states and provinces of Canada along the Pacific coast.
- Statewide – this includes approximately 3,500 miles of coastal area encompassing marine and estuarine habitats where green crab could become established.
- Branch – Statewide operations are divided into Coastal and Salish Sea branches which corresponds to major differences in green crab management strategies due to significant propagule pressures from green crab larvae arriving in Washington State from coastal sources in California, Oregon, and British Columbia.
- Management Area – Branches are further divided into 14 Management Areas based on WDFW's recreational fishing marine areas with seven Management Areas within the Salish Sea Branch and seven within the Coastal Branch.
- Coordination Area – Management Areas are further divided into Coordination Areas based on a place name that best describes a sub-Management Area or it may be based on the jurisdictional lead for that area. Delineation of Coordination Areas continues to evolve based on input from local Management Area co-managers and partners.
- Site – Coordination Areas may be further divided into Sites based on a geographic area of connected, similar habitat suitability, or access limitations and where green crab management actions can be expressed as representing the whole geographic area.
- Sub-Site – Sites can be divided into Sub-Sites in more complex situations based on similar habitat or where different operational actions are required.

Green crab trap means one of four types of enclosed spaces that permit entry and prevent exit by green crab. Types used for green crab trapping operations include:

- "Fukui" trap (Fukui, Promar, etc.) means a single piece trap designed for the capture of small fish. Consists of a vinyl covered steel frame (60 × 45 × 20 cm) covered with square, single-

knotted, polyethylene mesh (12 mm bar length). There are entrances at either end, with the netting panels forming a "V" shape to allow organisms to enter through slits. The traps can be flattened (collapsed) for easier storage and transport.

- "Minnow" trap means a cylindrical two-piece trap designed for capture of smaller green crab. When both halves are connected, the trap is 50 cm long with a 23 cm diameter and two inverted funnel-entrance holes, one at either end of a rigid mesh cylinder. Those used in green crab management efforts by default have holes 25 mm in diameter and mesh that is 6mm at the widest.
- "Shrimp" trap means a single piece trap for capture of shrimp. Consists of vinyl covered steel box 61 cm X 61 cm X 23 cm with a built-in bait box in the center. Mesh size is variable depending on the brand, though usually 25 mm or 50 mm. There are four rectangular entrances (one in the center of each side), lined by inverted funnels of rigid Vexar mesh.
- Other trap type means any other method utilized for the capture of live green crab. Common examples include pitfall traps (holes dug to allow green crab to fall into for collection) or experimental traps.

Established means a population of a green crab where that population is expected to have a sustained presence based on evidence (i.e., three years of capture of multiple age classes and with increasing or relatively stable abundance irrespective of trapping effort intensity).

Habitat structure means the composition and arrangement of material, be it natural or man-made, within a habitat (e.g., vegetation, docks, rocks, and woody debris). Most commonly, elements of three-dimensional (rising off the bottom) and complex (with crevices in which to hide) structure are favorable to green crab survival.

Habitat suitability means the relative ability of a habitat to support green crab. Characteristics that can be used to assess habitat suitability include physical attributes (e.g., exposure to wave energy, depth, and temperature), chemical attributes (e.g., salinity, pH, oxygen) and biotic attributes (e.g., vegetation, available prey, competitors, and predators).

Hot Spot means an area with a substantially greater relative abundance of green crab than surrounding areas. Hot spots can be defined at the site level (e.g., a creek mouth within a water body) or at the Coordination Area-level (e.g., Lummi Sea Pond), and can be spatially nested, sites of high density within Coordination Areas of high density.

Incident Action Plan (IAP) means a concise planning document containing set goals and objectives that guide incident safety, logistics, operations, and other incident actions during a set operational period.

Incident Commander means the individual responsible for all green crab emergency measures activities, including the development of strategies and tactics and the ordering and release of resources. The Incident Commander has overall authority and responsibility for conducting green crab emergency measures operations.

Infested area means a geographic area that carries or contains green crab at a branch, management area, coordination area, or site scale.

Localized detection means green crab detection occurred in a coordination area or other location (ex. bay, lagoon, estuary, or tidelands) where European green crabs have not previously been confirmed, but is within a management area where green crab have been detected. Localized detections are anticipated during the invasion. WDFW will notify relevant agency staff, co-managers, tribes, partners, tidelands owners, and other community members. Depending on need, assessment trapping or rapid response may occur to prevent population becoming established and reduce risk of spread into new management areas.

Operational Period means the interval of time scheduled for execution of a given set of green crab management actions as specified by an Incident Commander.

Rapid response means expedited management actions based on new detections or the finding of a significantly increased population for the time-sensitive intent of determining scope of green crab invasion and containing or eradicating green crab before it spreads or becomes further established. (RCW 77.135.010(20)). Based on the outcome of rapid response actions, subsequent management action types may be implemented.

Training means providing information or instruction on prevention, early detection, rapid response or other green crab emergency management protocols. This category is distinct from Education/outreach in focusing on specific, practical applications.

Trap set days means when a trap is set intertidally or sub-tidally for the action of capturing green crab for a single overnight period. Overnight trap days are standard trapping protocols based on known green crab feeding activity patterns. If a trap is set and retrieved within a single calendar day, count it as a single trap day, but be aware that it may be later counted as a portion of a trap day for comparability with a standard overnight trap day.

- Total set trap days are counted from the day after a trap is set and includes the day the trap is removed. This metric is mostly a qualitative measure of effort during an operational period or season and may be used to estimate a gross level of potential green crab risk/density to help assess if additional support is needed.
    - Example 1 - 50 traps set on Monday, Aug 8, and retrieved Friday, Aug 12: 50 x 4 = 200 trap days.
    - Example 2 - 50 traps set on Monday, Aug 8, and retrieved Sunday, Aug 21: 50 x 13 = 650 trap days.
    - Example 3 - 50 traps set in a prior OP and to be retrieved in a future OP (example OP is 14 days): 50 x 14 =700 trap days.

Trap check days means the number of days within an operational period that a trap is checked for green crab. This metric is mostly a qualitative measure of effort and may be used to estimate a gross level of potential green crab risk/density to help assess if additional support is needed in a given Coordination Area.

- Total trap check days means the cumulative number of traps checked every day the traps are deployed. If traps are checked every day, total trap check days will be the same as total trap days.
    - Example 1 - 50 traps set on Monday, Aug 8, and retrieved Friday, Aug 12, and checked every day: 50 x 4 = 200 trap check days.

- Example 2 - 50 traps set Monday, Aug 8, and retrieved Sunday, Aug 21, and checked every day: 50 x 13 = 650 trap check days.
- Example 3 - 50 traps set in a prior OP and to be retrieved in a future OP and checked every day: 50 x 14 = 700 trap check days.
- Example 4 - 50 traps set Monday, Aug 8, and retrieved Friday, Aug 19, and checked every other day, excluding weekends (i.e., Monday, Wednesday, and Friday): 50 x 5 = 250 trap check days.
- Example 5 - 50 traps set Monday, Aug 8, and retrieved Sunday, Aug 21, and checked on Wednesdays only and the day the traps are retrieved: 50 x 3 = 150 trap check days.

Young of the Year (YOY) means green crab of any life stage that belong to the current-year recruitment cohort of green crab. The size and life stage of those individuals will depend on the time of capture and conditions for the year, locally and regionally. Generally, crabs that are captured in traps under 30mm are safely considered YOY regardless of time of year of capture, but YOY can reach up to ~50mm by the end (fall) of their first year.

List of Washington European green crab management actions in chronological order for Winter 2024 (October 1 – December 31, 2024) as provided in Situation Reports

Date	EGC Management Action
9/30/2024	WDFW hosted a European Green Crab Coastal Open House in South Bend on Willapa Bay in Pacific County, presenting the new long-term management plan and providing management updates to local leaders and more than 30 attendees.
10/4/2024	WDFW submitted a 10-day emergency measures status update to the Governor's Office and Office of Financial Management advising that all emergency measures should continue, as well as other priority green crab updates.
10/6/2024	Washington Sea Grant celebrated Crabstock, an event to celebrate 10 years of Crab Team, thanking Crab Team monitors past and present.
10/8/2024	U.S. Bureau of Indian Affairs announced a new, one-time funding opportunity in the Northwest Region. The Region has received $2.4 million from the Inflation Reduction Act to distribute competitively to tribes and tribal organizations to combat the spread of EGC. All proposals are due Friday, December 13, 2024. Contact Ashton Harp ashton.harp@bia.gov, Regional Fisheries Biologist for more information.
10/9/2024	European Green Crab Multi-Agency Coordination Group Meeting: Incident Situation Report Updates and Briefing, Updates from the Salish Sea Branch, Updates from the Coastal Branch, European Green Crab in Alaska, Tulalip Tribes Early Detection – Strategies, Innovation, and Collaboration, Bureau of Indian Affairs Invasive Species Grant Awards.
10/14/2024	WDFW submitted a 10-day emergency measures status update to the Governor's Office and Office of Financial Management advising that all emergency measures should continue, as well as other priority green crab updates.
10/23/2024	WDFW presented the new long-term management plan, including associated recommendations for federal action and funding, and support for Federal Fiscal Year 2025

	proposed federal funding, at the Western Regional Panel on Aquatic Nuisance Species to managers and officials spanning 19 western states and 4 provinces.
10/23/2024	European Green Crab Multi-Agency Coordination Group Meeting: Prevention, Early Detection, Monitoring, Assessment, and Control: Long-Term Management Plan Management Tactics, Case Studies and Conversation Around Adaptive Management, Synthesis of Ideas on Adaptive Management.
10/24/2024	WDFW submitted a 10-day emergency measures status update to the Governor's Office and Office of Financial Management advising that all emergency measures should continue, as well as other priority green crab updates.
11/4/2024	WDFW submitted a 10-day emergency measures status update to the Governor's Office and Office of Financial Management advising that all emergency measures should continue, as well as other priority green crab updates.
11/13/2024	European Green Crab Multi-Agency Coordination Group meeting: Incident Situation Report Updates and Briefing, Safety Roundtable, Update on Regional Coordination Groups, EGC Management Symposium, and NOAA green crab award.
11/14/2024	WDFW submitted a 10-day emergency measures status update to the Governor's Office and Office of Financial Management advising that all emergency measures should continue, as well as other priority green crab updates.
11/20/2024	Affiliated Tribes of Northwest Indians Natural Resources Summit European Green Crab Panel.
11/25/2024	WDFW submitted a 10-day emergency measures status update to the Governor's Office and Office of Financial Management advising that all emergency measures should continue, as well as other priority green crab updates.
11/27/2024	WDFW submitted European Green Crab Quarterly Progress Report – Fall 2024 (July 1, 2024 - September 30, 2024) to state legislators. The report is available online.
12/4/2024	WDFW submitted a 10-day emergency measures status update to the Governor's Office and Office of Financial Management advising that all emergency measures should continue, as well as other priority green crab updates.
12/5/2024	Washington Sea Grant hosted the annual European Green Crab Trappers Summit at Clearwater Casino in Suquamish.
12/6/2024	Representative Joel McEntire met with WDFW and Washington Sea Grant to get video footage of EGC, do a trap check, and talk about the EGC genome mapping and annotation project funded by the State Legislature.
12/11/2024	European Green Crab Multi-Agency Coordination Group Meeting: Incident Situation Report updates and briefing, briefing from PSP on the Puget Sound Action Agenda update and budget updates from state and federal partners.
12/14/2024	WDFW submitted a 10-day emergency measures status update to the Governor's Office and Office of Financial Management advising that all emergency measures should continue, as well as other priority green crab updates.
12/17/2024	Raquel Crosier designated as Deputy Incident Commander for the European Green Crab Emergency (Washington Emergency Management Division Mission # 22-1085.
12/17/2024	Governor Jay Inslee released his 2025-2027 biennial proposed budget which included EGC funding for DNR, PBNERR (Washington State Department of Ecology), WDFW, and WDFW pass-through funding to co-managers, tribes, and partners.

12/24/2024	WDFW submitted a 10-day emergency measures status update to the Governor's Office and Office of Financial Management advising that all emergency measures should continue, as well as other priority green crab updates.

List of media reporting in chronological order related to Washington European green crab management for Winter 2024 (October 1 – December 31, 2024) as provided in Situation Reports

Date	Outlet	Headline	URL
10/25/2024	Gig Harbor Now	Green crabs, blackberries and knotweed not invited to State of the Watershed address	https://www.gigharbornow.org/news/environment/green-crabs-blackberries-and-knotweed-not-invited-to-state-of-the-watershed-address/
10/8/2024	Salish Sea Currents Magazine	How eDNA is changing the way scientists track species in Puget Sound	https://www.eopugetsound.org/magazine/How-eDNA-is-changing-the-way-scientists-track-species-in-Puget-Sound
10/8/2024	Chinook Observer	More money sought for invasive crab battle	https://www.chinookobserver.com/news/local/more-money-sought-for-invasive-crab-battle/article_e848a3ea-84e3-11ef-a3bd-43c4152f6ddf.html
The following articles are not specific to EGC in Washington state but are shared for awareness given widespread reporting on this story.			
12/12/2024	Elkhorn Slough interagency website	News Release: Endangered sea otters keep invasive green crabs in check at Elkhorn Slough	https://elkhornslough.org/blog/news-release-endangered-sea-otters-keep-invasive-green-crabs-in-check-at-elkhorn-slough/
12/20/2024	USA Today	Out-of-control invasive species has met its match: Cute and hungry otters	https://www.usatoday.com/story/news/nation/2024/12/20/invasive-green-crabs-are-no-match-for-sea-otters/77090472007/
12/26/2024	Washington Post	Green crabs have invaded habitats. Sea otters might be the solution.	https://www.washingtonpost.com/nation/2024/12/26/otters-invasive-crabs-california-study/
12/30/2024	Smithsonian News	Hungry Sea Otters Are Taking a Bite Out of California's Invasive Crab Problem, New Study Finds	https://www.smithsonianmag.com/smart-news/hungry-sea-otters-are-taking-a-bite-out-of-californias-invasive-crab-problem-new-study-finds-180985749/

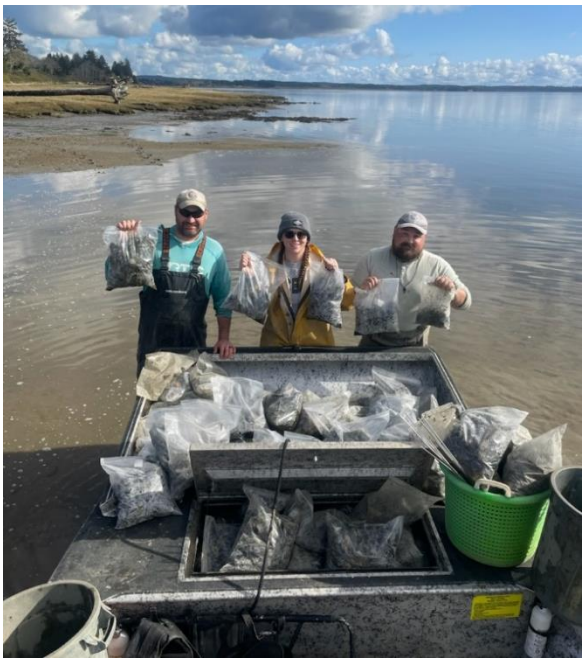
Appendix B – Co-manager and partner addendums

Washington Department of Natural Resources

Washington Department of Natural Resources (DNR) – Addendum for the Operational Period of January 1st - December 31st, 2024, for European Green Crab Emergency Measures.

1) DNR's Aquatic Invasive Species program captured 52,601 EGC from Willapa Bay and Grays Harbor in 2024, over three times the amount of EGC captured in 2023. The purchase of DNR's airboat under project number 22-1970 and funding for two scientific technicians allowed DNR to increase our effort from 2,332 trap set days in 2023 to 3,585 trap set days in 2024 and increased our efficiency of capturing EGC. In October 2024 DNR's Aquatic Invasive Species Program was able to hire a third technician on the coast further increasing our capacity and ability to accomplish DNR's goals outlined in DNR's EGC Work Plan. Each action item in DNR's EGC Work Plan has been incorporated into WDFW's 6-year EGC Management Plan.
2) Within the Puget Sound, DNR Aquatic Reserves Program conducted its third annual Fidalgo Bay Blitz trapping effort in Collaboration with the Northwest Straits Commission, WDFW, the Samish Indian Nation, and the Padilla Bay National Estuarine Research Reserve, 251 traps were deployed in the Fidalgo Bay Aquatic Reserve during the effort and no EGC were detected. DNR Aquatic Reserves Program also performed a trapping event at Quartermaster Harbor that consisted of 140 trap set days with no EGC caught. DNR partnered with WDFW for trapping at South Hood Canal, Discovery Bay, and Cherry Point Aquatic Reserve. DNR collaborated with WDFW, the Squaxin Island Tribe, the Nisqually Indian Tribe, USFW, and Washington Sea Grant in trapping Nisqually Reach Aquatic Reserve and South Puget Sound. DNR Aquatic Reserves Program dedicated approximately 1,036 hours to assisting and collaborating with partner agencies and programs over 13 separate trapping events. DNR Aquatic Reserved program continued trapping the Crab Team (Washington Sea Grants long term monitoring network) sites on Cypress and Anderson Islands through this operational period as outlined in DNR's EGC Work Plan.
3) All EGC captured in 2024 came from DNR coastal managed Natural Areas, Natural Resource Conservation Areas, and the Grays Harbor National Wildlife Refuge as outlined in DNR's EGC Work Plan. DNR Aquatic Invasive Species Program performed 26 separate trapping events within Grays Harbor resulting in 44,275 EGC captured and 13 separate trapping events in Willapa Bay resulting in 8,326 EGC captured. DNR participated in two large scale trappings with partners in response to reported spikes in catch rates and requests for assistance by partner organizations.

4) In 2024 DNR sponsored and utilized the Thurston Conservation District for two trapping events within Grays Harbor resulting in 5,195 EGC removed. DNR also partnered with WDFW on two trapping events within Grays Harbor resulting in 13,780 EGC removed. With our partners' assistance DNR was able to set more EGC traps resulting in an increase in EGC captures.
5) DNR was present at the Coastal Open House hosted by WDFW, Trappers Summit hosted by Washington Sea Grant, South Sound EGC Collaboration Debrief, South Sound Science Symposium, Aquatic Reserves Program CSC All Hands, and the Nisqually Reach Aquatic Reserve Implementation Committee Meeting, as well as attending all associated Regional Coordination Group meetings.
6) In 2025 DNR's Aquatic Reserves Program and Aquatic Invasive Species Program will be conducting more frequent large-scale trappings. Both programs will be collecting additional data on eelgrass, temperature, and salinity at each of our trapping locations to better inform our trapping methods and control EGC in these locations.



Tim Teets (DNR), Emma Ober (DNR), and Neville Magone (DNR) with 6,000 EGC from the North Bay Natural Area Preserve in Grays Harbor.

Kelsey Sapp (DNR) driving the airboat at the Palix River in Willapa Bay with Emma Ober (DNR) and Tim Teets (DNR) as passengers.

Kelsey Sapp (DNR) with the Thurston Conservation District crew at the North Bay Natural Area Preserve in Grays Harbor.

Washington Sea Grant Crab Team

October 1 - December 31, 2024

Following the end of the network monitoring season Crab Team spends fall transforming data into knowledge by aggregating and cleaning data, synthesizing reports, and preparing biological samples for processing. The program also hosts capacity building programming, both for network monitors as well as partner trappers.

Washington Green Crab Trappers' Summit

Washington Sea Grant's Crab Team (Crab Team) hosted the fourth annual Trappers' Summit at the Clearwater Casino in Suquamish on December 5, 2024. More than 50 trappers representing 17 partner groups were in attendance for the full day event. Groups shared trapping observations from 2024. The Trappers Summit continues to be a unique and valued opportunity for co-learning and continuing

education among practitioners, advancing the collective understanding of green crabs and enabling trappers and planners to leverage each other's experience.

A synthesis document incorporating notes from presentations and discussions was shared with attendees. The synthesis document:

- Shares regional and statewide observations of status and trends of green crabs during 2024
- Highlights information and logistical needs of trappers
- Summarizes trapper-prioritized goals

Link: https://wsg.washington.edu/wordpress/wp-content/uploads/2024-Trappers-Summit-Synthesis-and-Notes.pdf

Communications and Outreach

Crab Team prepared and released several annual documents summarizing 2024 both from the perspective of the monitoring network as well as by broadly integrating observations from trappers working across the state. These provide a scientific interpretation of green crab status and trends to the general public.

Crab Team Monitoring Network:

2024 Infographic:
https://wsg.washington.edu/wordpress/wp-content/uploads/2024-Infographic-Final.pdf

2024 Coastal Site Summary:
https://wsg.washington.edu/2024-green-crab-status-summary-part-2-coastal-estuaries/

Washington Green Crab Status and Trends Blog Posts:

Salish Sea Geography:
https://wsg.washington.edu/2024-green-crab-status-summary-part-1-inland/

Pacific Coast Estuaries:
https://wsg.washington.edu/2024-green-crab-status-summary-part-2-coastal-estuaries/

Research Highlights

- Crab Team inventoried and QAed nearly 2,000 green crabs captured from inland geographies during 2024 that were incorporated into the specimen collection. This process enables data reconciliation with partners as well as one of the most comprehensive biometric datasets in the state.
- Crab Team wrote and submitted a manuscript generated with data from the Crab Team monitoring network and including data from partner trappers with WDFW and NWSC on the detection and spread of non-native *Palaemon macrodactylus* in the Salish Sea.

- Staff retrieved and cleaned water temperature data from network sites. Data from 2024 have been submitted to the EPA Water Quality Exchange (WQX) and are publicly available.

Molt Search

Despite being the “off season” for both molts and active engagement, participants submitted 42 Molt Search survey reports via the MyCoast app during this quarter from 12 counties. No reports of green crab molts were made, including the three reports from coastal geographies.

Network Monitoring Participants

- Participants in the Crab Team monitoring network were invited to join staff for Crabstock, a celebration of 10 years of Crab Team at the UW Campus. The event offered monitors the chance to reflect on successes and challenges they faced in the work as some of the longest-tenured trappers in the state. Blog Post: https://wsg.washington.edu/crabstock24/
- Crab Team also hosted a continuing education workshop for network monitors in November. Jasmine Maurer from Kachemak Bay NERR presented an update on green crab detections and activities across Alaska.