



State of Washington
DEPARTMENT OF FISH AND WILDLIFE

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December 1, 2022

The Honorable Christine Rolfes
Chair, Senate Ways and Means
303 John A. Cherberg Building
Post Office Box 40466
Olympia, WA 98504-0466

The Honorable Timm Ormsby
Chair, House Appropriations
315 John L. O'Brien Building
Post Office Box 40600
Olympia, WA 98504-0600

The Honorable Kevin Van De Wege
Chair, Senate Agriculture, Water
Natural Resources, and Parks
212 John A. Cherberg Building
Post Office Box 40424
Olympia, WA 98504-0424

The Honorable Mike Chapman
Chair, House Rural Development,
Agriculture, and Natural Resources
132B Legislative Building
Post Office Box 40600
Olympia, WA 98504-0600

Dear Chairs Rolfes, Ormsby, Van De Wege, and Chapman,

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 Dec. 14, 2021, as the WDFW Director I submitted an emergency measures request under 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 first in a series of ongoing quarterly progress reports (Q1). The Q1 report will outline the successes and challenges of ongoing EGC emergency response efforts in Washington state from March 1 to September 30, 2022.

Actions taken in Q1 resulted in a significant expansion of management efforts throughout the state. The collective effort of all organizations involved in EGC management resulted in the removal of 190,288 EGC from Washington State marine waters, with 114,431 removed from the Pacific Coast region and 75,857 removed from the Salish Sea region during this timeframe.

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WDFW, WSG, tribal co-managers, and partners achieved significant progress in EGC management efforts in a short timeframe. While challenges remain, the continued efforts of all parties and the clear organizational structure set in Q1 will allow for continued success in Q2.

Additional information on European green crab in Washington and regular updates are available at: wdfw.wa.gov/species-habitats/invasive/carcinus-maenas.

If you have any questions about this report or the Department's efforts in this area, please feel free to contact Tom McBride, WDFW's Legislative Director, at (360) 480-1472.

Sincerely,

A handwritten signature in black ink, appearing to read 'APleus', written in a cursive style.

Allen Pleus
WDFW European Green Crab Incident Commander

cc:

Kelly Susewind, Director, Washington Department of Fish and Wildlife

Kelly Cunningham, WDFW Fish Program Director

Ruth Musgrave, Senior Policy Advisor to Governor Jay Inslee

European Green Crab Quarterly Progress Report – Fall 2022 (March 1 to September 30, 2022)

Washington Department of Fish and Wildlife (WDFW)



December 1, 2022



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Executive Summary

In 2021, the Washington Department of Fish and Wildlife (WDFW), tribal co-managers, and partners identified an exponential increase of invasive European green crab (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 Dec. 14, 2021, WDFW Director Susewind submitted an emergency measures request under RCW 77.135.090 for EGC response to Governor Jay Inslee. On Jan. 19, 2022, Governor Jay 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. The Washington 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 first in a series of ongoing quarterly progress reports (Q1). The Q1 report will outline the successes and challenges of ongoing EGC emergency response efforts in Washington State from March 1 to September 30, 2022.

An Incident Command System (ICS) was established to deal with the complexities of the EGC management effort. WDFW's Aquatic Invasive Species Policy Coordinator was appointed as Incident Commander. This approach provides a clear command structure, standardizes communications and management action implementation across the state. In addition, it allows WDFW to support federal and tribal participants across the state while they retain their autonomy in EGC management decisions and actions. Support for and coordination with our partners and tribal co-managers is essential, as the scale of the EGC 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 EGC populations, closely coordinating with WDFW. In addition, representatives from most entities participating in EGC 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 EGC emergency, and commit and allocate funding and other resources to enhance emergency measures responses. Situation Reports were disseminated among management participants after each two-week operational period to provide information on and ensure transparency regarding management actions taken, grant funding allocations, EGC catch numbers, trapping efforts, media outreach, and other relevant information.

Actions taken in Q1 resulted in a significant expansion of management efforts throughout the state. New staff hires have vastly increased WDFW trapping efforts across the state while also providing a high level of expertise in various fields (e.g., data management, geographic information systems, outreach, and research) which the program had been lacking. The procurement of high-value equipment (e.g., vehicles), gear (e.g., traps), and travel resources allowed WDFW to expand the reach of our efforts throughout the state significantly. Pass-through funding and allocation of equipment provided support for tribal co-managers and partners. Increased mass communication efforts (e.g., public updates, EGC Management update email list, numerous online resources for identification and reporting) and focused outreach (e.g., signage and outreach materials, public presentations) have enhanced public awareness and EGC reporting potential.



The collective effort of all organizations involved in EGC management resulted in the removal of 190,288 EGC from Washington State marine waters, with 114,431 removed from the Pacific Coast region and 75,857 removed from the Salish Sea region. In addition to active removal trapping, trap deployment occurred in areas where EGC had not previously been detected for early-detection monitoring. To date, EGC have not been detected in the Salish Sea south of northern Hood Canal. Data on EGC abundance, body size, sex ratios, and reproductive status were collected for future analysis, along with DNA and RNA samples to assess connectivity between EGC populations.

WDFW, WSG, tribal co-managers, and partners achieved significant progress in EGC management efforts in a short timeframe. While challenges remain (e.g., implementing standardized electronic trapping data submission, and developing the Fiscal Year 2023 Strategic Action Plan), the continued efforts of all parties and the clear organizational structure set in Q1 will allow for continued success in Q2.

Background

European Green Crab

The European green crab (EGC), *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 crab exploits a variety of different habitat types within intertidal and subtidal zones. Along the Pacific coast of North America, EGC inhabit protected shorelines in unstructured sandy and muddy bottoms, saltmarshes and seagrass beds, as well as utilizing woody debris and rocky substrates (Kern et al. 2002). Green crab has 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 EGC has 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 EGC predation average \$22.6 million per year on the East Coast of the United States (Lovell et al. 2007). Similar losses from EGC predation are possible for Salish Sea shellfish fisheries (Mach and Chan 2013) and Pacific Coast fisheries are also at risk. While EGC cannot crack the shell of a mature oyster, they can prey upon young oysters (Dare et al. 1983, Poirier et al. 2017), which could negatively impact oyster fisheries. Lab work has shown that juvenile EGC outcompeted similar sized Dungeness crabs for food and shelter and serve as prey for larger EGC, resulting in potential impacts to wild Dungeness populations. Predation by EGC have led to declines in native bivalve and crab populations in invaded habitats (Grosholz et al. 2000). In addition, burrowing by EGC 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, EGC 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). We are currently not asking the public to kill suspected EGC, which may sound counterintuitive



but is intended to protect native crabs from cases of mistaken identity (native crabs are commonly misreported as EGC by the public; Flannery, personal communication). EGC is most accurately identified by the 5 large spines or marginal teeth on either side of their forward carapace, a unique pattern for crabs on the Pacific coast of North America (Fig. 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 EGC from native crab species.

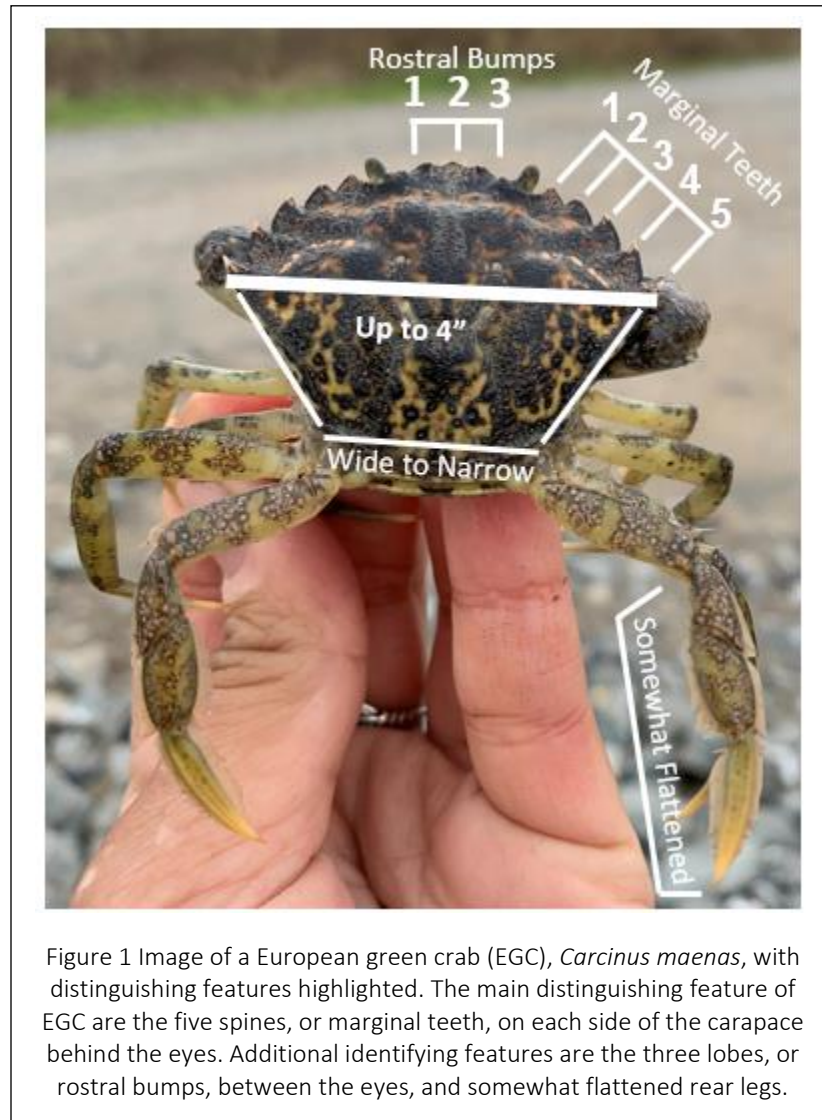


Figure 1 Image of a European green crab (EGC), *Carcinus maenas*, with distinguishing features highlighted. The main distinguishing feature of EGC are the five spines, or marginal teeth, on each side of the carapace behind the eyes. Additional identifying features are the three lobes, or rostral bumps, between the eyes, and somewhat flattened rear legs.

History of the European green crab in Washington state

The first detection of EGC in the waters of Washington was in 1998 in Willapa Bay and Grays Harbor (Carlton and Cohen 2003; Table 1; Fig. 2). Initial management responses took place, but due to a lack of evidence of self-recruitment, few EGCs captured and declining populations the project ended after a few years. In 2012, a population of EGCs were discovered in Sooke Basin, British Columbia, Canada (Gillespie et al. 2015). Out of concerns of new EGC introductions within the Washington portion of the Salish Sea, The Washington Department of Fish and Wildlife (WDFW) designated the Washington Sea Grant (WSG) in 2015 to lead an early detection monthly monitoring



community science network, also known as the Crab Team. The first detections of EGC 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 EGC 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 EGC detections in the Salish Sea and Pacific coastal regions of Washington. In response to continued EGC 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 Department of Fisheries and Oceans Canada in 2019 (Drinkwin et al. 2018).

Table 1. Yearly European green crab captures in Washington from 1998-2021. Data is separated by Incident Command System Branch (Salish Sea Branch and Coastal Branch). Please note that this data only represents crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across years. Years where catch data is still being finalized is marked with *.

Year	Salish Sea Branch	Coastal Branch	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

Emergency Proclamation and Supplemental Funding

In 2021, WDFW, tribal co-managers, and partners identified an exponential increase of invasive EGC 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 EGC 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 EGC 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 EGC 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 EGC 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 EGC 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, tribal co-managers including the Lummi Nation, Makah Tribe, and others, and WSG, WDFW requested \$8,568,000 from the State Legislature during the 2022 supplemental session to control increasing EGC populations. The Legislature fully-funded this request in the 2022 Supplemental Budget, which was signed by Governor Inslee on March 31, 2022.



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 EGC 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 EGC 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.”

In response to the legislative budget proviso directives, this report has been authored as the first in a series of ongoing quarterly progress reports (Q1). This report will serve to outline the successes and challenges of ongoing EGC emergency response efforts in Washington state from March 1 to September 30, 2022.

Successes of European green crab management measures

The following is an overview of the major successes related to European green crab (EGC) management actions for the first quarterly phase of the emergency (Q1). A complete list of all EGC management actions of Q1 can be found in the Appendix A of this report.

Incident Command Structure implementation

The Washington State Emergency Management Division assigned mission #22-1085 on April 18, 2022, for the EGC 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 in delegating authority to Allen Pleus, WDFW's Aquatic Invasive Species (AIS) Policy Coordinator, to serve as Incident Commander (Fig. 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 EGC management decisions and actions. During Q1, successes of the EGC ICS have included:

- Establishing five clear and achievable Incident Objectives to guide statewide management actions:
 - 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 EGC 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 EGC management by local tribal co-managers and partners with WDFW oversight.
- Meetings with tribal entities to discuss ICS structure and solicit recommendations on how 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 two-week operational period summarizing the status of Washington state EGC emergency measures including actions taken, funding allocations, EGC catch numbers, trapping efforts, and other relevant information for dissemination among EGC emergency measure tribal co-managers and partners.
- Creation of Public Updates every two weeks of Washington State EGC Emergency measures for general dissemination to the public.
- Weekly WDFW internal policy coordination meetings.

An important aspect of the EGC ICS structure is the Multi-Agency Coordination (MAC) group. The MAC group consists of representatives from various tribal co-managers 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 EGC 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 8th, 2022, the MAC group has convened nine times. During Q1, the EGC MAC group successes have included:

- Aided in the development of The Washington State Recreation and Conservation Office (RCO) EGC Emergency Measures Fund request for proposals.
- Reviewed and recommended RCO EGC Emergency Measures Fund requests of:
 - \$91,316 U.S. National Oceanographic and Atmospheric Administration (NOAA) funding proposal for an acoustic telemetry pilot study.
 - \$402,220 State of Washington Department of Natural Resources (DNR) funding proposal for staffing and equipment to support EGC management on aquatic lands.
 - \$100,000 Lummi Indian Business Council funding proposal for an initial evaluation of the Lummi sea pond tide gates.



- \$99,312 Pacific County Vegetation Management funding proposal for an American Airboat 2022 18x8 Air Ranger Edition and trailer to dedicate to EGC management in Willapa Bay.
- \$75,154 State of Washington Department of Ecology (Ecology) funding proposal for prospecting and control trapping of EGC to protect the largest eelgrass meadow on the west coast, located in the Padilla Bay reserve.
- \$32,897 U.S. Fish and Wildlife Service Dungeness National Wildlife Refuge and Washington Maritime National Wildlife Refuge Complex funding proposal to support the early detection and rapid response (EDRR) for control and monitoring of EGC within the refuge.
- Began development of the Fiscal Year 2023 EGC Emergency Measures Strategic Action Plan, including establishing priority tasks to be addressed. Further development and completion of the plan is ongoing.

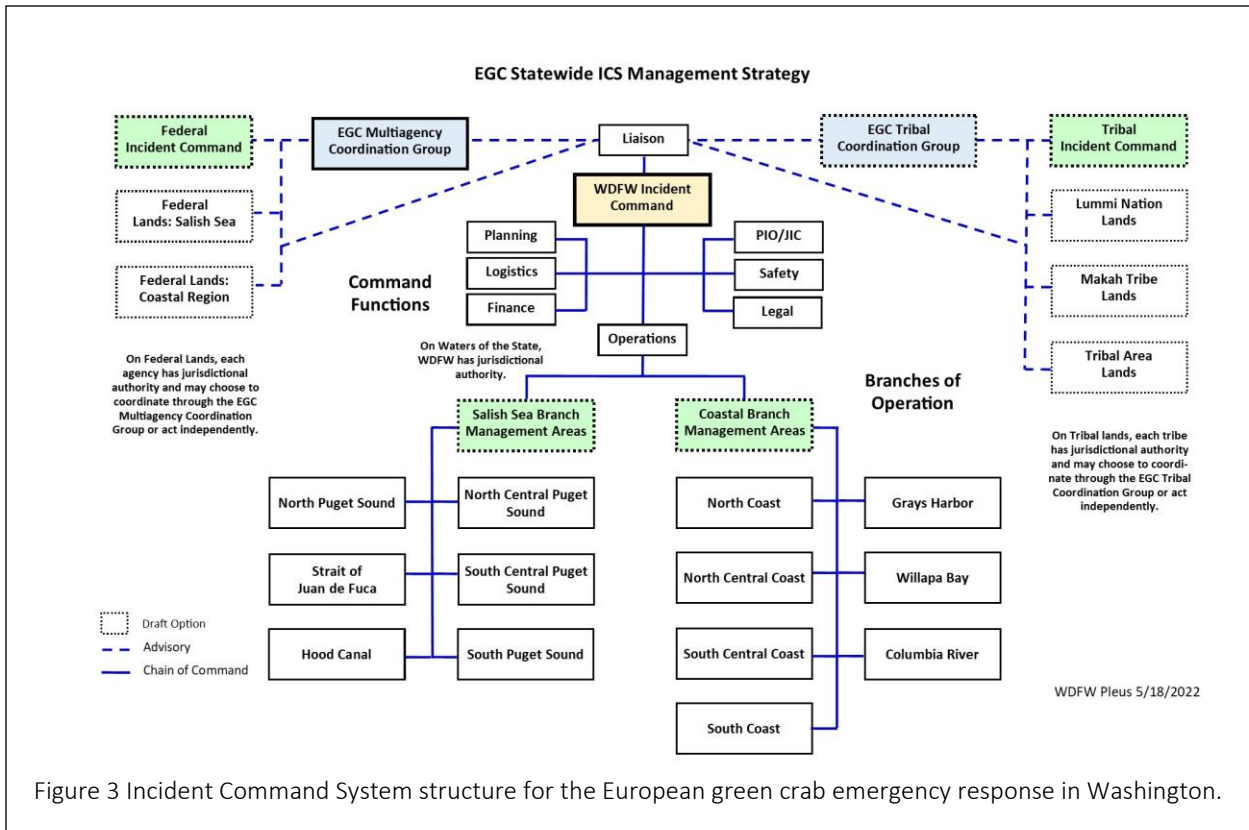


Table 2 List of European green crab (EGC) Multi-Agency Coordination (MAC) group member organizations. Representatives of these organizations share information, establish a common operating picture, and develop common long-term priorities for the EGC emergency

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

Coordination with tribal co-managers and partner organizations

Perhaps the greatest success of EGC management in Washington are the efforts, both independent and collaborative, of the many tribal co-managers and partners within the state (Table 3). The scope of the EGC emergency is such that no one organization can hope to curtail it alone. For years, tribal co-managers and partners such as the Washington Sea Grant (WSG), local, state, federal agencies, shellfish growers have worked with WDFW to implement short- and long-term management actions to support statewide efforts in EGC management. The contributions of all entities involved in EGC control cannot be overvalued. While this report does not go into specifics of the contributions of each group, major partners 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 EGC extend beyond jurisdictional boundaries, management responses require action, collaboration and coordination between various groups. It is important to note that EGC 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 every two weeks 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, EGC catch numbers, trapping efforts, media outreach and other relevant information. The first SitRep was disseminated on June 16, 2022, with nine completed in total for Q1.



Table 3 List of tribal co-managers and partner organizations working with WDFW on control and management efforts of the European green crab in Washington. Participants implement short- and long-term management actions to support statewide efforts in EGC control, including independent and WDFW collaborative trapping, outreach and education, field support, and monitoring. These actions are an essential component of the EGC management in Washington.

European green crab management tribal co-managers and partner organizations
Bay Center Farms
Brady's Oysters
Chuckanut Shellfish
DNR PSC
Drayton Harbor Oyster Co.
Elkhorn Oyster Co.
Goose Point Oysters
Grays Harbor National Wildlife Refuge
Jamestown S'Klallam Tribe
Lower Elwha Klallam Tribe
Lummi Nation
Makah Tribe
Northwest Straits Commission
Pacific County Vegetation Management
Pacific Seafoods
Padilla Bay National Estuarine Research Reserve
Pacific States Marine Fisheries Commission
Penn Cove Shellfish
Port Gamble S'Klallam Tribe
Quileute Tribe
Quinault Indian Nation
Samish Indian Nation
Shoalwater Bay Tribe
Stillaguamish Tribe of Indians
Stillwaters Environmental Center
Suquamish Tribe
Swinomish Indian Tribal Community
Taylor Shellfish Farms
Twin Harbors Waterkeeper Alliance
United States Fish and Wildlife Service
United States Navy
Veterans Corps
Washington Sea Grant
Washington State Department of Natural Resources
Whatcom Community College



Budget Allocation

The \$2,960,000 in funds provided for this report period allowed for a significant expansion of our management efforts.

- Staff (Salaries + Benefits): \$507,866
 - Funds spent on staff. During Q1, our field staff increased significantly with the addition of 12 Scientific Technicians (making a total of 14 in the EGC program) and two supervising Biologists. Additional hires to the WDFW AIS Unit, which manages WDFW's EGC program, include an AIS Research Scientist, an Intellectual Technologies Specialist to support data management and GIS services, an Environmental Planner for managing the Coastal EGC Local Management Grant Program, and an Outreach Specialist to support more public education and outreach.
- Equipment: \$604,347
 - Funds spent on high value equipment. This included the purchase of several new vehicles (two trucks and three boats). These vehicles have greatly expanded the program's ability to conduct and assist with EGC management activities throughout the state.
- Goods & Services: \$151,926
 - Funds spent on general field supplies and gear including the purchase of over 650 new crab traps. These traps were not only utilized by the WDFW EGC team but were provided to trapping partners (e.g., shellfish growers) to support their local removal efforts.
- Travel: \$26,303
 - 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.
- Contractual Services: \$1,346,512
 - Funds spent on pass through contracts for our various partners, including Washington Sea Grant, Lummi Nation, Makah Tribe, and others. In addition, this includes funding the awarded through the WDFW Coastal EGC Local Management Grant and the RCO EGC Emergency Measures Grant programs.
- Agency Indirect: \$323,200
 - Funds spent on agency-wide, general administration costs.

European green crab monitoring and removal

To facilitate effective EGC ICS communications and management, the state was divided into Coastal and Salish Sea Branches (Fig. 4). These branches were then further divided into 13 Management Areas based on WDFW recreational fishing marine areas.

Traps were deployed across Washington's marine shorelines, with trapping efforts highest in locations where available observations indicated EGC were likely most abundant (Lummi Sea Pond,



Willapa Bay, etc.) or where relative catch per unit effort was high. However, traps were also deployed to monitor locations where EGC had not been detected previously, but where conditions were suitable for EGC establishment. This system provides the basis for rapid response actions if new EGC populations were detected.

As with previous years, trapping efforts were undertaken by WDFW, WSG, tribal co-managers and other partner organizations. The catch numbers presented for Q1 represent the collective effort of all organizations, and those efforts should be recognized.

In total, 190,288 EGC were removed in Q1 from Washington State waters, with 114,431 removed from the Coastal Branch and 75,857 removed from the Salish Sea Branch (Table 4). In the Coastal Branch, the majority of EGC were removed from Willapa Bay (87,247), followed by the North Coast (20,786) and Grays Harbor (6,359) Management Areas. In the Salish Sea Branch, almost all EGC were removed from the North Puget Sound (75,766), followed by the Strait of Juan de Fuca (73) Management Areas. All other Management Areas either had Q1 EGC removal numbers of less than 35 EGC (Hood Canal, South Central Coast, Columbia River) or no EGC were captured/detected in Q1 (North Central Puget Sound, South Central Puget Sound, South Puget Sound, North Central Coast, South Coast). To date, EGC have not been detected in the Salish Sea Branch south of northern Hood Canal, though early-detection monitoring continues across the southerly Management Areas. Data on EGC abundance, body size, sex ratios, and reproductive status were collected for future analysis, along with DNA and RNA samples to assess connectivity between EGC populations. Removed EGC were euthanized following humane best practices and disposed of within local landfills or, in the case of EGC collected by the Shoalwater Bay Tribe, utilized as fertilizer in their tribal community garden (Pfleeger-Ritzman, personal communication).



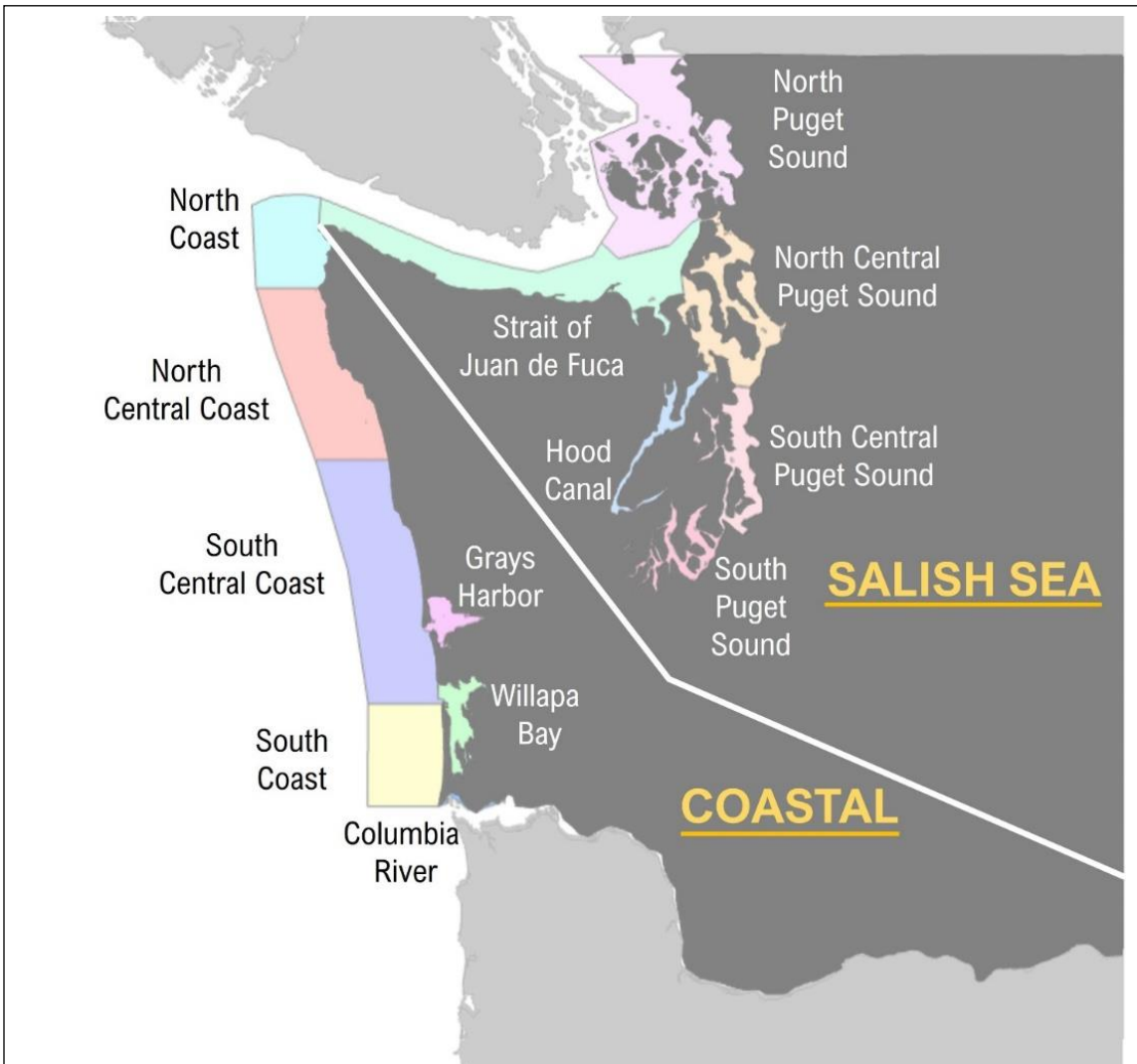


Figure 4 Map of Washington state European green crab management locations. The state has been split into two Management Regions (Coastal and Salish Sea) and thirteen Management Areas (North Puget Sound, Strait of Juan de Fuca, Hood Canal, North Central Puget Sound, South Central Puget Sound, South Puget Sound, North Coast, North Central Coast, South Central Coast, South Coast, Grays Harbor, Willapa Bay, Columbia River).



Table 4 European green crab capture totals for Q1 (3/1/2022-9/30/2022) for each Branch (Coastal and Salish Sea) and Management Area. These totals include not only removal efforts by Washington Department of Fish and Wildlife, but partners and tribal co-managers such as the Washington Sea Grant Crab Team, the Lummi Nation, the Makah Tribe, the Shoalwater Bay Tribe, and participating shellfish growers. Please note that a catch number of zero is not an indication of zero trapping/monitoring effort, but rather that no EGC were captured/detected within that Management Area.

Branch	Management Area	Q1 Total EGC Captured
Salish Sea	North Puget Sound	75,766
Salish Sea	Strait of Juan de Fuca	73
Salish Sea	Hood Canal	18
Salish Sea	North Central Puget Sound	0
Salish Sea	South Central Puget Sound	0
Salish Sea	South Puget Sound	0
Salish Sea	All	75,857
Coastal	North Coast	20,786
Coastal	North Central Coast	0
Coastal	South Central Coast	34
Coastal	South Coast	0
Coastal	Grays Harbor	6,359
Coastal	Willapa Bay	87,247
Coastal	Columbia River	5
Coastal	All	114,431
All	All	190,288

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 also supports effective policymaking and collaboration with local communities, stakeholders and partners. Successes by WDFW to enhance public awareness and reporting potential for Q1 have included:

Mass communication

- General information on EGC such as identification and public reporting is posted at: <https://wdfw.wa.gov/species-habitats/invasive/greatest-concern/egc>
- Creation of fortnightly Public Updates regarding Washington State EGC Emergency measures: <https://wdfw.wa.gov/species-habitats/invasive/carcinus-maenas#conservation>
- Detailed information on EGC ecology and identification, webinar recordings of stakeholder meetings, and an archive of ICS Public Updates are posted on this webpage for EGC



practitioners and the general public:

<https://wdfw.wa.gov/species-habitats/invasive/carcinus-maenas>

- WDFW mailing list for EGC Management updates to provide regular updates and other news regarding coordinated efforts to monitor and control invasive EGC in Washington waters. There are currently ~400 subscribers and average mail traffic is 2-3 emails per month: <https://wdfw.wa.gov/about/lists>
- Current EGC management efforts have been reported in numerous local and national media outlets (Appendix).

Focused/Local communication

- WDFW in conjunction with the Washington Invasive Species Council have produced EGC identification and outreach signage/materials and distributes free of charge to raise awareness of the EGC emergency and promote reporting of potential detections (Fig. 5).
- WDFW staff have presented at various professional and public meetings on the status of the EGC in Washington and the WDFW EGC program.

Program Challenges

WDFW, tribal co-managers and partners have achieved significant progress towards the five Incident Objectives in a short timeframe. However, as we progress through the initial stages of the EGC emergency, there are several challenges we must address. These challenges include:

- Identifying the scope of a Fiscal Year 2023 Strategic Action Plan to meet Incident Objectives, the statewide and Management Area leadership required to implement plan tasks, and the resources required to support them.
- Completing the implementation of a standardized electronic trapping data submission system for use across all participating entities. Currently, the collection

The image shows a rectangular outreach sign with a red header. The header text reads "REPORT INVASIVE EUROPEAN GREEN CRAB" in white, bold, sans-serif font. Below the header, the text "European green crabs may be present in this area" is centered. There are three photographs: a group of crabs, a hand holding a crab with a ruler for scale (labeled "Up to 4\"

Figure 5 European green crab outreach signage. This durable, informative, and visually striking sign is provided to State Parks, NGOs and other potential partners to increase public awareness of the green crab emergency and promote reporting potential detections.



and amalgamation of EGC catch data from our various tribal co-managers and partners is slower and more cumbersome than is ideal. Working with Esri, a geographic information system (GIS) company, we are developing software to allow direct uploading of catch data in real time to greatly enhance our data collection capability, while also eliminating errors resulting from data transfers from physical to digital formats.

- Establishing relationships with community partners for the use of euthanized EGC as compost. As removal efforts for EGC continue, disposal of euthanized EGC will continue to be an issue. Currently, euthanized EGC are disposed of in landfills. We believe this to be a waste of a potentially valuable resource and counter to HB 1799 (2022) relating to diversion of organic materials to productive uses, as EGC have been used as agricultural compost by farmers in California (Turner, personal communication) and are currently utilized as fertilizer in the Shoalwater Bay Tribe's tribal community garden (Pfleeger-Ritzman, personal communication).
- Creating opportunities for community engagement in EGC management with WDFW. While WSG's Crab Team has been actively engaged in successful outreach and community science efforts, members of the public and educational institutions have also expressed interest in working directly with WDFW on EGC activities. To further support the goals of local EGC management, WDFW is exploring opportunities for safe and productive opportunities for the community to assist us with our ongoing management efforts.

Next steps

The EGC emergency management priority actions for next quarter (October 1, 2022, to December 31, 2022) include:

- Completion and implementation of the Fiscal Year 2023 EGC Emergency Measures Strategic Action Plan to fulfill the five Incident Objectives.
- Trapping for EGC over the winter months (at a reduced level and boat-based) to support control of EGC in highest density areas and to assess the potential benefits of year-round trapping efforts in other locations.
- Ongoing MAC group meetings every two weeks through October and once per month in November and December.
- Establishment of a Scientific Task Force to lead the analysis of 2022 EGC monitoring and control data, and to guide research activities.
- Development and distribution of Situation Reports every two weeks in October and once per month in November and December
- Ongoing advocacy for increasing federal partner support and funding.
- Continue development of an online reporting tool for efficient EGC data management.
- Identifying additional proposals for emergency measure grants.
- Ongoing outreach to tribal co-managers on policy and technical coordination.
- Initial drafting of a 2022 EGC annual report.
- Setting Branch and Management Area meetings for early 2023 with tribal co-managers and partners to identify 2022 successes, gaps, and challenges, and to help plan for 2023 actions.



Glossary

- AIS – Aquatic Invasive Species
- DNR – Department of Natural Resources
- Ecology – Department of Ecology
- EDRR – Early Detection Rapid Response
- EGC – European green crab (*Carcinus maenas*)
- ICS – Incident Command System
- MAC Group – Multi-Agency Coordination Group
- NOAA – National Oceanographic and Atmospheric Administration
- Q1 - First quarterly phase (3/1/2022 – 9/30/2022)
- RCO – Recreation and Conversation Office
- SitReps – ICS Situation Reports
- WDFW – Washington Department of Fish and Wildlife
- WSG – Washington Sea Grant

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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 Clariidae: All members of the walking catfish family.
 - (c) Family Cyprinidae:
 - (i) Carp, Bighead, *Hypophthalmichthys nobilis*.
 - (ii) Carp, Black, *Mylopharyngodon piceus*.
 - (iii) Carp, Silver, *Hypophthalmichthys molitrix*.
 - (iv) Carp, largescale silver, *Hypophthalmichthys 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 - 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

List of Washington European green crab management actions in chronological order as outlined in Q1 Situation Reports

Date	EGC Management Action
3/3/2022	EGC Emergency Measures presentation as part of an EGC session for the National Invasive Species Awareness Week.
3/4/2022	WDFW briefs staff representing Congresswoman Jaime Herrera Beutler.
3/4/2022	WDFW supports Governor’s staff in presenting EGC Emergency Measures response and needs to other congressional and federal staff (NOAA, USFWS, USGS, BIA, EPA).
3/10/2022	EGC Emergency Measures update to Washington Invasive Species Council.
3/11/2022	Governor Inslee sends letter to Department of Interior Secretary Deb Haaland to support a joint proposal advanced by staff of the U.S. Geological Survey, U.S. Bureau of Indian Affairs, and U.S. Fish and Wildlife Service to take early action against the European green crab invasion in Washington State.
3/18/2022	\$8.568 million in ongoing funding for European green crab emergency management is appropriated by the State Legislature in 2022 Supplemental Operating Budget.
3/21/2022	WSG and WDFW engage shellfish growers in starting green crab trapping efforts in partnership with the Willapa Bay-Grays Harbor Oyster Growers Association (WGHOGA); WDFW begins providing support and equipment
3/22/2022	EGC Emergency Measures presentation to Grays Harbor Marine Resource Committee (WDFW and WSG)
3/24/2022	Coastal Management Grant Program Scope of Work established to set the goals, scope, objectives, and deliverables to be administered by the Pacific and Grays Harbor County Conservation District.
3/25/2022	WDFW decision to begin development and implementation of an Incident Command System (ICS) for EGC Emergency Management response.
3/28/2022	WDFW and Washington Invasive Species Council release new EGC reporting form, identification, and outreach resources: wdfw.wa.gov/greencrab



3/31/2022	Governor Inslee signs 2022 Supplemental Operating Budget with \$8.568M funding. \$3.2 million passthrough funding to Lummi Nation, Makah Tribe, Washington Sea Grant + \$1.5 million to be available in grants.
4/1/2022	Coordinated field work and EGC removals with Lummi Nation, Northwest Straits Commission, shellfish growers, and other partners begins for 2022 season.
4/1/2022	Participation on development of a national EGC Management Plan through the ANS Task Force.
4/4/2022	Beginning of WDFW trapping support at Lummi Sea Pond.
4/18/2022	Washington Emergency Management Division assigns Mission # 22-1085.
4/26/2022	EGC Emergency Measures presentation as part of an EGC session for the Salish Sea Ecosystem Conference.
4/29/2022	EGC Emergency Measures as part of a WA Invasive Species Council invasive species discussion with NOAA.
5/5/2022	Goals and objectives formalized for ICS and delegation of authority for Allen Pleus as the Incident Commander.
5/12/2022	First tribal meeting to discuss ICS structure and solicit recommendations on how tribes would like to engage on the policy level.
5/17/2022	European green crab (1) detected in Hood Canal at Seabeck by WSG Crab Team.
5/24 - 5/27/2022	Rapid response actions for Seabeck area from Guillemot Cove to Anderson Landing – total of 12 captured, 10 of which from Nick’s Lagoon in Seabeck Bay.
6/1/2022	WDFW AIS and Puget Sound Shellfish (PSS) Units inspect oyster clutch bags to assess transfer permit conditioning options.
6/3/2022	WDFW PSS and AIS Units meet with tribal shellfish staff to discuss EGC detection and transfer permit conditioning options.
6/3/2022	WDFW leadership meets with Tribal leaders and staff regarding ICS, invites them to participate and/or join Multi-Agency Coordination (MAC) Group.
6/5/2022	UW update on EGC Gut Contents Study (Willapa Bay Oyster Reserves Funded Research).
6/6/2022	Planning meeting with WDFW, NOAA and Pacific Shellfish Institute to draft EGC research proposals for Willapa Bay/Grays Harbor.
6/8/2022	First MAC Group meeting: overview of process, roles, and responsibilities
6/13/2022	EGC discussion on tribal policy coordination at regional co-managers meeting with Lummi Nation and Nooksack Tribe.
6/13/2022	WDFW Shellfish Unit evaluation of risk in presence of EGC in Seabeck Coordination Area oyster cultch bags.
6/13 - 6/17/2022	WDFW Shellfish Unit research in collaboration with Hood Canal Oyster Company on methods to mitigate EGC transfer risks in oyster cultch bags.
6/13 - 6/17/2022	WDFW Shellfish Unit outreach to improve compliance with wet storage requirements among shellfish buyers.



6/14/2022	Planning meeting for MAC Group training sponsored through the WISC.
6/14/2022	Congressman Derek Kilmer (D-Gig Harbor) called out funding for European green crab during Tuesday's vote on the Recovering America's Wildlife Act.
6/15/2022	Planning meeting with WDFW IT staff on GIS mapping status, AIS support hiring status, and next steps.
6/15 - 6/17/2022	WDFW, WSG, DNR Grays Harbor Management Area/Elk River/ Beardslee Slough prospect trapping – 105 EGC captured.
6/16/2022	Governor 10-day EGC Emergency Measures report issued.
6/16/2022	EGC update to WISC and discussion on role of WISC in EGC response.
6/17/2022	WDFW issues Situation Report (SitRep) #1.
6/17/2022	WDFW issues "Emergency measures deployed to control invasive European green crabs in Washington waters" press release.
6/17/2022	WDFW EGC Policy meeting update and discussion on SitRep #1 and press release.
6/21 - 6/24/2022	Repair of 2 WDFW boats due to equipment and supply thefts.
6/21 - 6/24/2022	Interviews for 2 WDFW regional EGC biologists (Coastal and Lummi Sea Pond).
6/23/2022	EGC update to Columbia River Basin Team (WA, OR, BC, AK, ID, MT).
6/23/2022	MAC Group meeting: discussion of RCO Emergency Measures Grant request for proposal draft, SitRep#1 report, and general ICS status.
6/23/2022	WDFW Shellfish Unit implementation of Shellfish Transfer Permit conditions for waters where EGC have been found.
6/23/2022	Updated EGC content on agency shellfish transfer webpage.
6/24/2022	WDFW EGC Policy meeting update and discussion on SitRep Status Summary Report data management form and protocols.
6/24/2022	Washington Sea Grant Crab Team receives "Organization of the Year" award from WDFW for their EGC early detection program.
6/27/2022	WDFW PS Shellfish and AIS Unit Meeting with Pacific Shellfish Growers Association, Willapa/Grays Harbor Oyster Growers Association, Taylor Shellfish, and Pacific Seafoods; discussion of EGC shellfish transport risks and mitigation options
6/27 - 7/10/2022	Continued research and development of shellfish transfer permit conditions to reduce risk of spread of EGC; coordination efforts with shellfish industry
6/28/2022	Coastal EGC Technical Working Group meeting.
6/29/2022	MAC Group meeting: review of final draft RCO Emergency Measures Grant request for proposals and general ICS status.



7/1/2022	WDFW and WSG worked with Puget Sound Institute (Christopher Dunagan) for an update on EGC in their popular blog.
7/1/2022	PIO worked with reporters on various EGC media articles in The Seattle Times, The Center Square, Tacoma News Tribune, Skagit Valley Herald, and Northwestern Outdoors Radio.
7/7/2022	10-day EGC emergency report issued by WDFW to Governor Inslee.
7/7 - 7/9/2022	WDFW began implementing special conditions on some shellfish transfers to reduce risk of spread of EGC.
7/7 - 7/9/2022	Distribution of EGC identification and outreach signage continued, including meeting with State Parks, and connecting with NGOs in Whatcom and San Juan counties.
7/11/2022	European Green Crab Public Update published online, distributed via WDFW EGC Management Updates email list, posted to social media, and sent to local reporters.
7/11 - 7/15/2022	Continued working with stakeholders on transfer permitting to mitigate EGC risk.
7/11 - 7/15/2022	Hiring activities for positions related to invasive pest/shellfish transfers risk management.
7/13/2022	MAC Group meeting: Coordinator staffing change; Purpose statement discussion; SitRep#2 briefing; Joint Information Center discussion including communications and outreach planning, work to date, and priorities for rest of 2022; Internal MAC Group information needs discussion; Update on WDFW Coastal Management Grant program; RCO EGC Emergency Interagency funding program update.
7/15/2022	Observed and implemented shellfish transfer conditions; inspected shellfish for EGC.
7/15/2022	Distribution of EGC identification and reporting signs and outreach materials continued, including to sites and non-governmental partners in San Juan Islands, Bellingham, and La Conner.
7/18/2022	Deadline to receive EGC Coastal Grant Program proposals, 2 proposals received, one each from Pacific and Grays Harbor Conservation Districts.
7/18/2022	10-day EGC Emergency Report provided to Governor's Office.
7/19/2022	NWIFC Commissioners meeting- EGC Briefing to Western WA Treaty Tribes.
7/19/2022	WDFW continued Facebook ads and a boosted Facebook post promoting EGC identification and reporting, garnering 673 shares including by many community groups, local agencies, and tribal pages. EGC PIO responded to many of the 196 comments providing green crab information and answering questions.
7/21/2022	Coastal Grant Program Funding Advisory Committee met to review proposals, give feedback to applicants, and decided to move forward with both proposals with minor modifications.
7/25 - 8/4/2022	Observed and implemented shellfish transfer conditions; inspected shellfish for EGC.
7/26/2022	Attended Coastal EGC Technical Work group meeting, shared proposal statuses and updates on contracts. Worked on scope and deliverables for new contracts with applicants.
7/26/2022	Hiring activities for positions related to invasive pest/shellfish transfers risk management.



7/27 - 8/1/2022	Continued working with stakeholders on transfer permitting to mitigate EGC risk.
7/28/2022	MAC Group meeting: SitRep#4 review; MAC Group member updates; review/discuss 2 emergency measures funding proposals; recommendation to develop minimum qualification standards and funding proposal review protocols
7/28/2022	Coastal Salmon Partnership Board Meeting: General EGC emergency measures overview presentation
8/4/2022	EGC update to Lummi Nation and Nooksack Tribe at monthly regional meeting
8/5/2022	WDFW EGC Policy Group meeting.
8/8 - 8/21/2022	Ongoing WDFW contract development with ESRI for spatial EGC database.
8/10/2022	EGC MAC Group meeting: SitRep4 briefing; discussion of internal and external joint communications roles and request for additional coastal media coverage; RCO EGC Emergency Measures Interagency Agreement funding program intent and process discussion; discussion and approval of a \$402,220 DNR funding proposal for staffing and equipment to support EGC management on aquatic lands; discussion and approval of a \$91,316 NOAA funding proposal for an acoustic telemetry pilot study; discussion and approval of a \$100,000 Lummi Nation funding proposal for an initial evaluation of the Lummi sea pond tide gates.
8/19/2022	Tribal communications/coordination training with WDFW EGC staff.
8/22/2022	Public Update on European Green Crab Management issued, distributed to WDFW's European Green Crab Management Updates email list, and published online.
8/22/2022	PIO coordinated with media and facilitated several inquiries and interview requests.
8/22 - 8/25/2022	Fidalgo Bay Trapping Coordination of 23 participants led by NW Straits Commission with eight partner organizations (WDFW, WSG, DNR, WA CC, PBNERR, Samish Indian Nation, Swinomish Indian Tribal Community, Veterans CC, PSC). No EGC captured in the 736 trap-sets. Over 75 public education interactions occurred during trapping, as well as further outreach with signage and social media. This was the final week for WCC Crew supporting EGC trapping in North Puget Sound Management Area this year.
8/24/2022	MAC Group meeting: The MAC Group was briefed on incident response spanning July 27th to August 7th (Situation Report #5) from Incident Commander Allen Pleus. The MAC Group reviewed and discussed a Fiscal Year 2023 EGC Strategic Action Plan, guiding response actions for all organizations between July 1, 2023, and June 30, 2024. The MAC Group also reviewed and recommended support of two Recreation and Conservation Office EGC emergency measures funding proposals including a request from Pacific County Vegetation Management to purchase a new airboat for operations in Willapa Bay, and a Washington Department of Ecology proposal to support prospecting and control trapping throughout Whatcom and Skagit counties, with a focus on the Drayton Harbor, Samish Bay, and Padilla Bay Coordination Areas.
8/28/2022	WSG Crab Team and the University of Washington hosted a field trip for Congressional staffers, with a session on EGC in Ocean Shores. Congressional staffers present represented Senator Murray and Representatives Kilmer, Schrier, and Herrera Beutler. Also in attendance were Allen Pleus of WDFW, David Bingaman and Joe Schumacker of the Quinault Indian Nation, David Beugli of the Willapa Grays Harbor Oyster Growers Association, Barbara Hayford and Bruce Rittenhouse of the Coastal Interpretive Center.



8/30/2022	Coastal EGC Technical Work Group meeting: MAC Group update, review of funding sources and available grants for fall, review of staff turnover and timelines, and discussion of fall trapping plans and coordination needs.
8/30/2022	EGC Coastal Grant Management Contracts with Pacific and Gray Harbor Conservation Districts were approved and are fully available to those entities and partners.
9/1/2022	WSG lead an EGC field demonstration on September 1st for Congressional Representative Derek Kilmer at Nick's Lagoon near Seabeck on Hood Canal. Also in attendance were Allen Pleus of WDFW, Neil Harrington of the Jamestown S'Klallam Tribe, WSG Crab Team volunteers Brian Gregory and Victoria Poage, and journalists from the Kitsap Sun.
9/6 - 9/16/2022	WDFW Shellfish Unit continued implementing conditions to reduce risk of EGC spread in shellfish permitting and conducting outreach to shellfish aquaculture partners.
9/6/2022	WDFW met with commercial crab fisherman out of Nahcotta and a manager from the Port of Peninsula on how and what they would need to submit a proposal and budget under the Coastal EGC Local Management Grant program. The Port was considering being a lead on a proposal/contract similar to WGHOGA and the Conservation Districts. They would work from Nahcotta north toward Stackpole running a series of crab trap strings from an 18-foot skiff at high tide.
9/7/2022	EGC MAC Group meeting: Review of SitRep6; Presentation by WDFW Shellfish Unit's Chris Eardley on conditioning shellfish transfers for EGC risk; Discussion on the Fiscal Year 2023 EGC Emergency Response Strategic Action Plan – recommendation to send out a survey poll to assess task priorities; Update on EGC Emergency Measures Interagency Agreement fund.
9/20/2022	September Public Update on European Green Crab Management issued by PIO, distributed to WDFW's EGC Management Updates email list and media contacts, shared on social media, and published online.
9/20/2022	WDFW and University of Washington provided a presentation to Pacific Coast Shellfish Growers Association in Wenatchee. Conference included ~1,500 shellfish grower professionals, researchers, students, and science community.
9/21/2022	Incident Commander Pleus provided an EGC update at the annual Aquatic Nuisance Species Task Force (ANSTF) Western Regional Panel (WRP) in Anchorage, Alaska. The WRP includes 19 western states with 80 people attending the meeting representing over 35 local, state, federal and tribal governments, NGOs, Canadian province, and industry entities across both animal and plant aquatic invasive species.
9/21/2022	EGC MAC Group Meeting: MAC group met virtually (as with all past meetings) and reviewed and discussed survey results prioritizing response actions for state fiscal year 2023, ending June 30, 2023. Thirteen highest priority tasks were identified, and the Washington Department of Fish and Wildlife is now finalizing the action plan. The MAC Group reviewed and determined a recommendation of support for a \$32,897 Recreation and Conservation Office European green crab response funding request by the U.S. Fish and Wildlife Service Dungeness National Wildlife Refuge and Washington Maritime National Wildlife Refuge Complex.
9/21/2022	WDFW and WSG provided a presentation to ~20 Snohomish County Marine Resources Committee (MRC) members. Presentation was requested MRC to provide a brief overview of EGC Management thus far, how they can get involved through outreach or other activities, how the local MRC can get involved with eyes on the beach and preparing for any potential future detections as Snohomish County has zero EGC reports to date.
9/23/2022	WDFW provided a presentation to ~20 people at the Coastal Marine Resources Committee (MRC) Summit. WDFW provide a general update of the Washington Department of Fish and Wildlife's emergency response to the Governor's emergency declaration on European green



	crab including current trapping efforts, emergency measures and management actions taken to date, infrastructure and capacity building, and funding resources.
9/26/2022	WSG Crab Team temporary project staff starting the development of a volunteer-based Molt Early Detection program (Eyes on the Beach).
9/29/2022	Incident Commander Pleus provided an EGC update at the quarterly WISC meeting in Spokane, Washington. WISC is comprised of 22 members representing county, state, federal and tribal governments, Public Utility Districts, the Noxious Weed Control Board, NW Power & Conservation Council, Washington State University, and Trout Unlimited.

List of media reporting in chronological order related to Washington European green crab management in Q1

Date	Outlet	Headline	URL
7/11/2022	KUOW	Can whiskey be a solution to the NW's green crab problem?	https://www.kuow.org/stories/can-whiskey-be-the-solution-to-the-nw-s-green-crab-problem
7/12/2022	Q13 Fox News	Invasive European green crab emergency continues in Washington	https://www.q13fox.com/news/invasive-european-green-crab-emergency-continues-in-washington
7/26/2022	Issaquah Reporter	Washington cracks down on invasive European Green Crabs	https://www.issaquahreporter.com/northwest/washington-cracks-down-on-invasive-european-green-crabs/
7/26/2022	Alaska Public Media	Evidence of invasive crab that could wreak havoc on Alaska fisheries found near Metlakatla	https://alaskapublic.org/2022/07/25/evidence-of-invasive-crab-that-could-wreak-havoc-on-alaska-fisheries-found-near-metlakatla/
8/1/2022	Fox 13 News	Volunteers prove critical in the fight against invasive green crabs	https://www.q13fox.com/news/volunteers-prove-critical-in-the-fight-against-invasive-green-crabs
8/16/2022	Ketchikan	Destructive invasive crab species detected in Alaska	https://www.ketchikandailynews.com/news/local/destructive-invasive-crab-species-detected-in-alaska/article_76aaf28a-1dc3-11ed-b7f6-6b07a7e8ef7e.html
8/19/2022	PBS / KBTC	NORTHWEST NOW DIGITAL FIRST European Green Crab Invasion	https://www.pbs.org/video/european-green-crab-invasion-j3ktrm/



8/23/2022	KING 5	More than 100,000 invasive crabs removed from WA waters this year	https://www.king5.com/article/tech/science/environment/wd-fw-tribes-invasive-crabs/281-ec71a9fe-381c-4f3b-a9f8-70536b39b902
8/24/2022	Cascadia Daily News	Invasive green crab detected in Chuckanut Bay	https://www.cascadiadaily.com/news/2022/aug/24/invasive-green-crab-detected-in-chuckanut-bay/
8/24/2022	KUOW	138K green crabs pulled from Washington waters ... so far in 2022	https://www.kuow.org/stories/138k-green-crabs-pulled-from-washington-waters-so-far-in-2022
8/24/2022	Fox News	Washingtonians hatch plan to push back against invasive green crabs	https://www.foxnews.com/us/washingtonians-hatch-plan-push-back-against-invasive-green-crabs
8/24/2022	Associated Press	Agencies, Tribes Work to Stop Growth of Invasive Crab	https://www.usnews.com/news/best-states/washington/articles/2022-08-24/agencies-tribes-work-to-stop-growth-of-invasive-crab
8/25/2022	Patch	Washington Removes 138K European Green Crabs	https://patch.com/washington/seattle/washington-removes-138k-european-green-crabs
8/25/2022	KGMI	Efforts to eradicate European green crabs continue	https://kgmi.com/news/007700-efforts-to-eradicate-european-green-crabs-continue/
8/25/2022	KXRO	Local European Green Crab eradication continues	https://www.kxro.com/local-european-green-crab-eradication-continues/
9/2/2022	Kitsap Sun	Seabeck green crab find helps launch funding push to fight invasion in Hood Canal and beyond	https://www.kitsapsun.com/story/news/2022/09/02/state-battles-green-crab-invasion-hood-canal-puget-sound/7965822001/
9/6/2022	NBC News	Green crabs have already invaded Washington's shorelines. Now they're coming to Alaska	https://www.nbcnews.com/science/environment/green-crabs-already-invaded-washingtons-shorelines-now-re-coming-alaska-rcna44927



9/7/2022	Sequim Gazette	Neah Bay green crab population	https://www.sequimgazette.com/news/neah-bay-green-crab-population-booms/
9/15/2022	KXRO	Rep. Kilmer joins others in push for federal funding to fight invasive species	https://www.kxro.com/rep-kilmer-joins-others-in-push-for-federal-funding-to-fight-invasive-species/
9/18/2022	SyFy / Yahoo News	An army of green crabs are poised to invade Alaska	https://www.yahoo.com/entertainment/army-green-crabs-poised-invade-163029380.html
9/21/2022	Skagit Valley Herald	European green crab populations remain low in Skagit County	https://www.goskagit.com/townnews/politics/european-green-crab-populations-remain-low-in-skagit-county/article_0eef8042-39f8-11ed-814e-034b832f87c8.html
9/22/2022	Yahoo News	176,600 invasive European green crabs removed from Washington waters this year	https://www.yahoo.com/now/176-600-invasive-european-green-182445742.html
9/22/2022	KIRO 7	176,600 invasive European green crabs removed from Washington waters this year	https://www.kiro7.com/news/local/176600-invasive-european-green-crabs-removed-washington-waters-this-year/4VTMTWWIWBHZJLAFQOAEUNQBV4/
9/23/2022	Accuweather	Green crabs are coming for our seafood—and climate change may be to blame	https://www.accuweather.com/en/videos/green-crabs-are-coming-for-our-seafood---and-climate-change-may-be-to-blame/dQf57zMk
9/26/2022	WA Sea Grant	Environmental DNA (Part 4): The Vashon Island Mystery	https://wsg.washington.edu/edna-4/
9/26/2022	Anacortes American / Go Anacortes	Green crab counts still low in Padilla Bay	https://www.goskagit.com/anacortes/news/green-crab-counts-still-low-in-padilla-bay/article_d93d464e-3b84-11ed-91b6-37adb915b6e0.html



Appendix B – Co-manager and Partner Addendums

Makah Tribe



MAKAH TRIBE
P.O. BOX 115 • NEAH BAY, WA 98357 • 360-645-2201



European Green Crab - Quarter 1 Legislative Report (March 1, 2022- Sept 30, 2022)

Trap Effort/Catch

At the start of this reporting period, data entry was finalized for the 2021 season and planning was conducted for the 2022 field season. Trapping began in early April and was primarily conducted biweekly through the end of September. Trapping was conducted in Makah Bay (Wa'atch and Tsoo-Yess Rivers) and Neah Bay; however, no green crab have been caught in Neah Bay to date. In total, we caught 20,770 green crab between March and September; this is significantly more than any other single year of trapping since first detecting crabs in 2017. 18,514 were caught in 2,088 trap sets and 2,256 were caught by hand. Among those, 12,375 were males and 8,395 females. We caught a large number of small, young-of-year crabs including 1,108 crabs that measured less than 25 mm carapace width. Young-of-year crabs <10 mm were observed between March and mid-May and again in August. Juveniles <15 mm continued to be observed throughout the season until the month of September. Number and size of crabs caught varied by trap type, with the majority of crabs being caught in minnow and shrimp traps (1" and ½" mesh.)

Supplies/Equipment

We purchased equipment and supplies for conducting trapping including a new work truck (Toyota Tundra with 8-ft bed) for transporting personnel and traps. We also purchased and tested new trap types. We purchased multiple ½ inch mesh shrimp traps and several more minnow traps. The ½ inch mesh shrimp traps proved very productive for catching small young-of-year crabs. Additionally, we outfitted our new research vessel with a davit and hauler as we began marine trapping in Makah Bay deploying crab traps by boat. This included the purchase and construction of crab buoys to help identify and locate traps deployed by Makah Fisheries.

Hiring

In March, we hired for a Marine Ecology Technician III position who started work in early April largely assisting in the green crab trapping program. We also hired several seasonal technicians in May and June to help with field work and posted and interviewed for a Green Crab Biologist along with two full-time Green Crab Technician II positions in June. During this trapping season, we have also had a wide network of volunteers who have helped with trapping on a regular basis. These



have included staff from Washington Department of Fish and Wildlife, Washington Sea Grant, and the Northwest Indian Fisheries Commission in addition to multiple volunteers from local communities.

Challenges

Throughout this reporting period, multiple challenges have presented themselves as we continue to develop our green crab trapping methods. A primary contributor to this is the large increase in the number of green crab we have seen. As of September 30th, we have caught over 20,700 green crab compared to 1,500 during the entirety of the year of 2021. Because of this vast increase, we have had to adjust our trapping efforts appropriately by purchasing more equipment and hiring additional staff to most effectively trap for green crab. While our increased trapping efforts have been fruitful with regards to the total amount of green crab we are able to remove, they have brought their own obstacles. This includes the securement of long-term funding to hire an adequate number of staff to deploy our traps on a regular basis. We have often found ourselves limited by the number of traps we are able to deploy because of the number of part-time and full-time staff that we are able to support.

Lummi Indian Business Council



Lummi Nation Emergency Measures Response

Legislative report for period of March 1 through September 30, 2022

Introduction

The invasive European green crab (EGC) was first detected on Lummi Reservation tidelands in fall 2019. Of concern were the small numbers of EGC trapped in the Lummi Sea Pond (LSP), a 750-acre aquaculture impoundment in Lummi Bay. Given the multiple threats that the EGC poses to the Lummi People's way of life and the shared resources of the Salish Sea, immediately following first detection, the Lummi Indian Business Council (LIBC), the governing body of the Lummi Nation, declared EGC as serious environmental threat (LIBC Resolution 2020-032). This paved the way for the Lummi Natural Resources Department (LNR) to begin collaborating with other government agencies having similar natural resource management missions. A partnership with the Washington Department of Fish and Wildlife (WDFW) commenced in January 2020, and the two agencies, with help from others (e.g., Washington Sea Grant) have worked together on the problem ever since. Having established this nascent multiagency approach before the population explosion of EGC inside of the LSP in 2021, which resulted in the Lummi Nation's subsequent disaster declaration (LIBC Resolution 2021-158) and the ensuing emergency proclamation by Washington State Governor Jay Inslee (Proclamation 22-02 Green Crab Infestation), an existing cooperative approach



was already in place, which contributed to the success of emergency measures when enacted in the spring of 2022.

Hiring

One of the first challenges incurred by LNR was building capacity within the department to respond effectively to the growing population of EGC on reservation tidelands. This required transferring existing personnel and hiring new ones in early 2022 to appropriately scale up LNR's response. Subsequently, LNR hired an Aquatic Invasive Species (AIS) Coordinator who then completed other personnel actions related to the creation of two field units – one focusing its efforts inside of the LSP, the other, doing the same but outside of the LSP – and additional support staff, including a data specialist and other full-time and seasonal field technicians. By July 2022, LNR's EGC response grew from three dedicated staff to an AIS Division of 12 people.

Supplies/Equipment

Another challenge was gearing up for an emergency response that was commensurate with the expanding EGC population. This required developing an operations hub (i.e., obtaining a dedicated satellite storage and field workspace facility) and procuring hundreds of traps representing three different styles of deployment and trapping (e.g., minnow, Fukui, and recreational shrimp traps) to be used on the Lummi Nation's vast tidelands and inside of the LSP. Early on, post-Covid pandemic supply chain issues were a problem, necessitating alternative solutions. For example, the tribe's sole source vendor for recreational shrimp traps was unable to meet LNR's emergency demand; hence, the department purchased enough raw materials to construct its own shrimp traps in the style of the ones that were unavailable. In addition, cross-boundary market and finance complications related to acquiring the EGC-proven Fukui traps caused delays in some field activities which were ultimately reconciled by the end of the reporting period. The expanded crew required appropriate personal protection equipment (e.g., foul weather gear, boots, and gloves), and capital assets were acquired in the form of two truck/trailer/boat and motor combinations for use by each of the two field units. Finally, sufficient office, computing and communication resources for the newly created AIS Division were acquired, and the necessary building space availed through LNR.

Other Challenges

Access to the LSP provided an early challenge as well. Arranging permissions for non-Lummi field personnel to access sovereign tribal lands and waters was an official prerequisite for the successful dual-agency (LNR and WDFW) response of 2022. Furthermore, to accommodate the largescale trapping effort, improvements and repairs were required to meet the increased level of vehicle traffic, and the need for launching agency work vessels. Hence, improvements were made to the LSP dike road (e.g., grading) and a working boat launch was created along the inside shore of the LSP.

Although working side by side, liability concerns precluded interagency crews from trapping out of each other's official vehicles and vessels. This constraint eliminated the possibility of partial crews being combined and/or deployed together in the field, complicating logistics of the ongoing largescale trapping effort. This was particularly challenging when unexpected reductions in staff occurred.



Finally, a long-forgotten tide gate/culvert, which was located on the east side of the LSP and overgrown with vegetation, was jammed open by drift logs, and only discovered during a drone flight over a nearby restoration project area. A concern was raised about EGC escaping into neighboring estuarine marshlands, and at the prompting of the AIS Coordinator, other LIBC working groups responded to the failed tide gate/culvert, clearing its obstructions in the process. However, over time, drift materials, primarily logs, continued to force open the structure. As of this writing, other divisions within LNR are preparing to place a “stopper” in front of the tide gate/culvert to prevent the flow of seawater from the LSP to the neighboring marshlands.

Trap Effort/Catch

At first detection in 2019, LNR removed only tens of EGC from Lummi Reservation tidelands, including the LSP. In 2020, the department removed hundreds – even thousands – of EGC with help from its partners at WDFW and WSG. By the close of the 2021 trapping season, a multiagency response inside of the LSP resulted in tens of thousands of EGC removed. Based on the previous trapping efforts, the initial projections were that 100,000s of EGC would be trapped in 2022, the result of unchecked, exponential population growth. As the current calendar year winds down, with an increased effort made possible by emergency measures, it is notable that the dual-agency (LNR and WDFW) response inside of the LSP has kept the total EGC catch down to the same level as 2021 (n ~ 80,000) as indicated by the total number of EGC removed.

The Situation Reports prepared by LNR for the statewide emergency response capture the week-to-week or month-to-month details of the Lummi Nation’s trapping activities to date. From the beginning of emergency measures (i.e., spring 2022), LNR and its primary partner, WDFW, responded early with their largescale, concerted trapping effort. Within the first few months, approximately 25,000–50,000 EGC were removed from the LSP, including hundreds of gravid females, with additional weekly removals numbering in the hundreds to thousands of EGC thereafter. By the second week of November 2022, approximately 78,000 EGC were removed from the LSP; however, the pulse of young-of-year that was anticipated in the late summer/early fall only numbered in the hundreds, suggesting a possible recruitment failure here. By any measure and despite its challenges, 2022 was a successful year in the emergency measures response to EGC on Lummi Reservation tidelands.

Conclusion/Summary

While the 2022 emergency measures ostensibly kept EGC catch rates to 2021 levels, and by proxy, the size of the EGC population to the same, the Lummi Nation’s experience indicates that nothing short of a sustained and united, largescale trapping effort will keep the invader at bay on reservation tidelands. For example, a single season is all it took to reach exponential expansion of the LSP EGC population. Consequently, LNR will continue trapping EGC on Lummi Reservation tidelands through the coming winter months, maintaining its pressure on the EGC population into spring 2023. Helping with the effort inside of the LSP will be a small group of Lummi fishers working together as a single contractor. While the contractor was brought on before the end of calendar year 2022, its full impact will not be felt until 2023. To date, the contractor’s EGC catch rates are fast approaching those of the most experienced agency crews, and given the Lummi tribal members’ collective fishing knowledge, experiences, and way of life, there is no doubt the group will improve rapidly, potentially contributing to the emergency measures in a positive way.



Washington Department of Natural Resources



The Washington Department of Natural Resources (DNR) hired Alexa Brown as their coastal region EGC coordinator, who's first day was the third of October. She will be the primary point person within DNR for EGC and will be based out of the Montesano WDFW office thanks to Les Holcomb and the WDFW team. The DNR is in the process of purchasing a landing craft to be used for EGC trapping that will be delivered in 30-60 days. This boat will mostly be used in the Puget Sound but can support trapping efforts along the coast. We are building strong relationships with those executing EGC management in Grays Harbor and Willapa Bay. We are developing work plans for both the coastal and Puget Sound regions. In building these work plans, the DNR is reaching out to partners and discovering gaps and trapping locations where the DNR can help fill without duplicating efforts. We have initiated training for their staff so they can follow the trapping guidelines set out by Washington Sea Grant and WDFW. DNR has also applied for their AIS permit so that we can start our own trapping as winter weather and tides allow. The DNR is also working on finding a centralized location to house traps, freezers, washing station, and boat for EGC trapping efforts in Willapa Bay and Grays Harbor. Blain Reeves at the DNR holds a position on the MAC group and Alexa will be his alternate. Alexa will be attending both Willapa Bay and Grays Harbor EGC Coordination meetings. If you need to reach Alexa Brown her email is alexa.brown@dnr.wa.gov and her phone number is 360-485-2446.

Washington State Department of Ecology



The Department of Ecology has two programs that address the European green crab (EGC) emergency, Padilla Bay National Estuarine Research Reserve (PBNERR) and the Northwest Straits Commission (NWSC). PBNERR manages 11,966 acres including one of the largest eelgrass meadows in the United States. Eelgrass is a habitat favored by European green crabs (EGC) and because of this, PBNERR has prioritized EGC management since 2001 when it began an annual program of early detection monitoring. Since the first capture in 2016, we have responded with intensive trapping to each capture, increased monthly sentinel site monitoring, and initiated general prospecting trapping throughout the bay. Between 2016 and 2021, 23 EGC were captured, from 3,000 traps set. Since the 2022 emergency proclamation, PBNERR has set 1,009 traps and caught 58 EGC. In addition, we assisted several partners trapping in nearby Fidalgo Bay, with the PBNERR crew setting 270 traps. PBNERR's trapping efforts are led by three members of the habitat stewardship team, who were assisted this year by nine other staff, four interns, nine volunteers,



and 24 college marine biology students. Until September 2022, the described effort occurred by re-aligning existing management priorities, without additional funds.

The NWSC provides training, funding, and support to seven county based Marine Resources Committees and manages regional conservation projects such as local coordination for EGC monitoring and control efforts. Since 2020, NWSC has coordinated local EGC trapping efforts in Drayton Harbor (Whatcom County) and expanded its geographic scope in 2022, to include trapping and local coordination across both Whatcom and Skagit Counties. Since the 2022 emergency proclamation, NWSC has set 2,894 traps and captured 313 EGC in Whatcom County and set 3,414 traps and captured 83 EGC in Skagit County. NWSC also participated in outreach efforts reaching over 25,000 people through in person events, radio, printed media, and social media. In 2022, NWSC's trapping and coordination efforts have been led by three staff who were assisted by twelve Washington Conservation Corps members, two Washington Service Corps members, one Veterans Conservation Corps intern, four volunteers, ten WDFW technicians, and three WA Sea Grant staff. Additionally, NWSC collaborated on EGC trapping and removal efforts with DNR, Drayton Harbor Oyster Co., Northwest Straits Foundation, Samish Indian Nation, Swinomish Indian Tribal Community, Taylor Shellfish, Upper Skagit Indian Tribe, and many private landowners, in addition to the ongoing coordination with PBNERR, WA Sea Grant, and WA Department of Fish and Wildlife.

Washington State Parks and Recreation Commission



**Washington State
Parks and Recreation
Commission**

Washington State Parks has been working with our partner agencies to evaluate and develop the most effective and efficient response to the European green crab emergency. To date, these responses have included facilitating and assisting with trapping by WDFW staff and partner organizations, and assisting with public education efforts (e.g., posters at parks and social media posts.)

