Exxon Valdez **Oil Spill Trustee Council**
Long-Term Research and Monitoring, Mariculture, Education and Outreach
Annual Project Reporting Form

For Instructions for each section below, see Reporting Policy, II (B); the Reporting Policy can be found on the website, https://evostc.state.ak.us/policies-procedures/reporting-procedures/

Project Number: 24220300

Project Title: Prince William Sound Kelp Mariculture Development for Habitat Restoration and Local Economy

Principal Investigator(s): Willow Hetrick-Price, Executive Director, Chugach Regional Resources Commission (CRRC). This report was written by Briana Murphy, CRRC's Mariculture Liaison. In FY25, CRRC will request that Ms. Murphy be added as a Co-PI.

Reporting Period: February 1, 2024– January 31, 2025

Submission Date (Due March 1 immediately following the reporting period): 3/1/2025

Project Website: https://www.alutiiqprideak.org/kelp-farming

Please check all the boxes that apply to the current reporting period.

☒ **Project progress is on schedule.**

☐ **Project progress is delayed**

☐ **Budget reallocation request.**

☒ **Personnel changes.**

There were no personnel changes at CRRC. In Spring of 2024, CRRC's subawardee, the Native Conservancy (NC) underwent a significant internal restructuring period, during which, due to the remote nature of their location and the limited workforce available in Cordova, some data gaps arose as their usual monitoring team was not available. The issue has since been rectified, and NC has hired Dr. Tiffany Stephens, a kelp mariculture biologist, to head NC's Oceanback Program and be their point of contact for subaward responsibilities on this project. During and since this personnel transition, CRRC has organized weekly calls with the NC team to increase collaboration and communication between project partners, and ensure that this project's long- and short-term goals are met.

1. Summary of Work Performed:

Throughout FY24, significant progress was made in expanding and optimizing infrastructure to support the operational efficiency of two kelp seed nurseries supported by this funding. The Community Kelp Seed Nursery (CKSN) in Cordova achieved early completion of its scaling efforts, increasing seed string production capacity and efficiency. The Alutiiq Pride Marine Institute (APMI) hatchery also saw notable advancements, with the facility operating at full capacity, supporting both research and commercial farming needs. A total of 97,600 linear feet of kelp seed string was produced, with significant redundancy measures in place to mitigate the challenges of seed string production and ensure robust outplanting efforts. APMI was the largest producing kelp hatchery in North America in 2024.

FY24 marked the continuation and expansion of efforts to develop sustainable and effective kelp farming techniques. Multiple research and commercial farm sites were established and expanded. Additionally, seed collection and propagation strategies were enhanced to improve seedling reliability, with research efforts focused on addressing statewide hatchery challenges. In FY24, CRRC outplanted its first commercial farm site near Passage Island in Lower Cook Inlet, equidistant from its communities of Port Graham and Nanwalek. Through the outplanting and monitoring of this farmsite, CRRC has been able to provide economic opportunities to community members in both Port Graham and Nanwalek.

Comprehensive landscape analysis continued through the deployment of research kelp sites and dropper lines, assessing site viability for commercial farming. Water quality monitoring, kelp tissue composition analysis, and site condition evaluations were conducted across various regions, with data integration into the Axiom database. The collection and management of field data remained a key focus, with datasets from the 2022-2023 and 2023-2024 growing seasons successfully archived in the Axiom database.

Overall, FY24 saw substantial achievements in kelp nursery scaling, farming innovation, and research-driven commercial site evaluations. Continued efforts in refining kelp seed cultivation methods and enhancing regional aquaculture capacity position this initiative for long-term sustainability and success.

Numerous other mariculture funding initiatives, both state and federal, have coincided with the development of this project. The support from the EVOSTC of this project has enabled CRRC to leverage approximately $1.89 million to the APMI kelp mariculture program in additional grants, specifically from the Alaska Mariculture Cluster. CRRC has received funding, either as the Principal Investigator or a partner and collaborator, for many projects that augment and complement the ongoing work in the kelp mariculture space under this project.

FY24 Deliverables:

Objective 1: Scale the infrastructure to increase the production capacity of the APMI and Community Kelp Seed Nurseries (CKSN) to meet projected kelp seed string demands of the region.

Deliverables: CRRC projected two deliverables to be completed during the FY24 reporting period:

- Field data collected and made available to the public.
    - Completed—data collected from the first growing season of this project, October 2022-June 2023, has been archived into the Axiom database in compliance with the EVOSTC data management plan. Data collected from the 2023-2024 growing season is in the process of being uploaded to Axiom database and is attached to this report in Appendix B; field data for the 2024-2025 growing season is in the process of being collected and is attached to this report in Appendix A.
- CKSN seed nursery scaled.
    - Completed—although this deliverable was expected to be completed in FY24, it was completed early in FY23. During the 2023-2024 growing season, CKSN was able to improve its seed nursery systems to produce approximately 67,200 feet of seed string. NC was able to double production from the previous year using half the space. For the 2024-2025 growing season, the CKSN facility inoculated 25,800 feet of seed string, with ample room to increase seed string production in future growing years. The CKSN was re-designed to hold an additional 9 tanks, with each tank holding twice the number of spools as originally anticipated, scaling the CKSN facility to produce a significantly larger amount of seed string. NC also increased its sorus tissue collection efforts in Fall 2024 to deliver extra sorus tissue to the APMI hatchery facility. The purpose of this was to grow redundant seed string for NC research sites at APMI's facility, to ensure that quality seed string was available for outplanting during this year's kelp growing season for this project. This measure was implemented based on the acknowledgement across the industry and throughout the state, of the difficulty in producing healthy seed string and the obstacles hatchery operators face in quantifying what constitutes "healthy" seed string.

Milestones/Tasks Projected to be achieved in FY24:

- Produce seedline—APMI Kelp Hatchery Production Statistics in FY24:
    - A total of 97,600 linear feet (approximately 18 miles) of kelp seed string was grown at APMI's hatchery facility in FY24.
    - 14,400 linear feet of seed string was grown for research purposes at APMI's hatchery facility during the fall 2024 growing season:

- 9,600 linear feet of seed string was grown for research sites at Fox Farm Bay and Latouche Passage. Species include bull kelp, ribbon kelp, sugar kelp, and three-ribbed kelp.
- 7,200 linear feet of seed string was grown for research sites on the Eastern side of Prince William Sound for test sites in Sheep Bay, Simpson Bay, Port Gravina, and Tatitlek Narrows. Species included bull kelp, sugar kelp, and ribbon kelp; APMI and NC's CKSN both grew seed string for the Eastern Prince William Sound sites as a redundant measure to ensure each research site had adequate material for outplanting. This measure ensured that there would be adequate seed string available for outplanting on the research sites, even in the event of a hatchery failure.

- 83,200 linear feet of seed string was grown for commercial purposes during the fall 2024 growing season:
  - 14,400 feet of seed string was grown for commercial farmers in Kachemak Bay, including bull kelp, sugar kelp, ribbon kelp, split kelp, three-ribbed kelp, and five-ribbed kelp.
  - 12,000 feet of ribbon kelp seed string was grown for a commercial farmer in Southeast Alaska.
  - 40,000 feet of seed string was grown for commercial kelp farmers in Cordova, including sugar, ribbon, and split kelp.
  - 10,400 feet of seed string was grown for CRRC's commercial farmsite located on the south side of Passage Island, approximately equidistant between the communities of Port Graham and Nanwalek. 8,000 feet of seed string was outplanted, including bull kelp, sugar kelp, ribbon kelp, split kelp, and three-ribbed kelp.
- APMI-grown seed string was also deployed at added dropper line locations, including Applegate Island. Dropper lines were also put in place at Eshamy Bay, and Copper Bay near Knight Island. Dropper lines consist of one or two growlines connected to an anchor and a buoy, and can provide a sense of a site's potential for a full-scale farm without the additional equipment and material required to operate a small-scale research site.
- APMI hatchery was fully scaled to 45 operation tanks for the fall 2024 growing season, as well as one "flow-through" tank with a capacity of approximately 1,100 liters of water which housed approximately 6,400 feet of seed string (sugar kelp) for the 2024 growing season. This seed string was grown as a means of testing the flow-through system set up, to eliminate the need for time- and labor-intensive weekly tank changes, but ultimately seed string from this tank was not outplanted.
- APMI's hatchery's Basic Management Plan was amended on 1/15/2025 to permit for the cultivation of new species, including sieve kelp, to explore niche markets for possible commercial development.

- Produce seedline—CKSN Kelp Hatchery Production Statistics in FY24:
  - CKSN inoculated 16,600 feet of sugar kelp seed string, 7,200 feet of ribbon kelp seed string, and 1,000 feet of bull kelp seed string
    - 600 feet of each species, including seed string grown redundantly at APMI, was outplanted at each research site on the Eastern side of Prince William Sound in Simpson Bay, Sheep Bay, Port Gravina, and Tatitlek Narrows.
      - 200 feet of seed string was outplanted on 100-foot growlines at each site. Two 100-foot sections of seed string were wrapped around each growline to test the ability of increasing pounds of kelp harvested by adding seed string to the same growline.
    - 200 feet of ribbon and sugar kelp were outplanted at a dropper line test site in Boulder Bay.
  - Several improvements were made to the CKSN facility, including capturing effluent in a new septic system. NC also made careful and informed cultivation observances when "selecting samples from wild forests" this year tied to well-distinguished and previously visited key sites even though the seed collection was conducted approximately five weeks later in the year than previous growing seasons. Relocation of the CKSN facility to a new site allowed for better processing systems and more efficient seed production. NC was able to streamline knowledge on collection methodologies with the sorus being processed immediately after collection.
  - NC managed close and regular oversight throughout the spore release process:
    - As in past years, sugar kelp continues to be the most effective at multiple releases. Multiple spore releases were also successful with bull kelp, but often produced non-moving spores.
- Collect seed:
  - APMI and CKSN staff collected sorus tissue for five different kelp species: *Saccharina latissima* (sugar kelp), *Nereocystis luetkeana* (bull kelp), *Alaria marginata* (ribbon kelp), *Macrocystis pyrifera* (giant kelp), and *Cymathere triplicata* (three-ribbed kelp).
    - Sorus tissue for *Saccharina latissima, Cymathere triplicata,* and *Alaria marginata* was collected at Latouche Island for test sites and transported back to APMI for preparation and spore release.
    - Additional sorus tissue for *Saccharina latissima* was collected in Jakolof Bay for CRRC's commercial kelp site at Passage Island and for its direct seeding project, partially funded through an Alaska Mariculture Cluster grant. This project focuses on seed development research to produce more consistent, reliable hatchery seed for kelp farmers. More information about this project can be found on page 4 of this report, under the bullet "Seed development research."

- Sorus tissue for *Nereocystis luetkeana* and *Macrocystis pyrifera* was collected in Latouche Passage and Elrington Island for test sites and transported back to APMI for preparation and spore release. Release for *Macrocystis pyrifera* was not successful.
- Sorus tissue for *Saccharina latissima* was collected at Simpson Bay for test sites and transported back to the CKSN for preparation and spore release.
- Sorus tissue for *Nereocystis luetkeana* was collected in Shelter Bay on Hinchinbrook Island and transported back to the CKSN for preparation and spore release.
- Sorus tissue for *Alaria marginata* was collected at Sheep Bay for test sites and transported back to the CKSN for preparation and spore release.

  - NC, in partnership with the Organized Village of Kake, the Metlakatla Indian Community, and Spruce Root, led a diver certification course for six new divers in Metlakatla, Alaska in December 2024. The purpose of this certification was to provide community members from those villages with training to collect fertile sorus tissue confidently and safely for commercial kelp propagation. More information about this program can be found in **Section 2**, **Products**, *Conferences and Workshops*, of this report.

- Operate nursery at full capacity:
  - Completed. Both hatchery facilities at APMI and CKSN were operated at full capacity during the 2024-2025 growing season.
- Seed development research:
  - As previously mentioned in this report, consistent, quality kelp seed string has been a challenge for hatcheries throughout the state of Alaska to produce, to such an extent that seed quality is assumed to have impacted the commercial kelp harvest yields in Spring 2024.[1] The challenges faced by hatcheries throughout the state to consistently produce reliable, strong seed string led the AMC to release a funding opportunity for seed string research and improvements; CRRC responded to this RFP and funding for this project is currently pending. CRRC and NC are in the process of working with hatchery managers and operators throughout the state to establish protocols for kelp seed string production and identify changes to equipment and processes that need to be made.
  - In Spring 2024, CRRC was awarded a Joint Innovations Project Grant (funded through the Alaska Mariculture Cluster program), on the order of $99,473 for establishment of an experimental kelp hatchery focused on the growth of gametophytes. The project is funded for 18 months. The goal of this project is to enhance production consistency at the hatchery level and eliminate the time-

[1] McKinley Research Group, LLC. "Report: 2024 Alaska Mariculture Industry Overview." Alaska Mariculture Cluster, December 12, 2024. https://alaskamariculturecluster.org/announcements/alaska-mariculture-industry-overview-2024/.

consuming and seasonal dependence on collecting fertile sorus tissue for seed string cultivation. European kelp farming operators, as well as several labs on the East coast of the US have been pursuing gametophyte seeding as an alternative hatchery method for greater predictability in farm production—this project aims to establish this capacity in Alaska to ensure the state is keeping pace with other regions, and to test growth methods for optimization and performance. This includes the gametophyte growth stage in the laboratory, the seeding stage and induction of reproduction and a sporophyte growth stage. This project is ongoing; more information will be included in the FY25 Annual Report.

- Install automatic seawater filtration for CKSN:
  - Although this deliverable was projected to be completed in FY24, the CKSN facility has pushed this deliverable to be completed by FY26. The cause of the delay in the completion of this deliverable was due in part to the staffing issues and changes in personnel encountered by NC in Winter 2023/2024, when the nursery was not operational and during the ideal time period to make renovations and complete planned updates to the facility. NC has hired Dr. Tiffany Stephens to manage their Oceanback Program, and a new filtration and water management systems are in the process of being designed and integrated into the CKSN facility for the 2025-2026 growing season, though current plans do not include implementing an automatic seawater filtration system. An automatic seawater system would require the nursery location to be immediately adjacent to a suitable seawater source for direct uptake, which is not possible for Native Conservancy to secure considering property availability in Cordova (location and cost).~~An automatic seawater system would require the nursery location to be immediately adjacent to a suitable seawater source for direct uptake, which is not possible for Native Conservancy to secure considering property availability in Cordova (location and cost).~~
  - This project will be sure to keep the EVOSTC updated through submission of annual reports on the development of new water filtration systems and improvements made to both APMI's kelp hatchery facility and NC's CKSN. When this proposal was originally submitted, NC was anticipating moving their mobile seed nursery to be located on waterfront property, where a seawater intake could be established, obviating the need to collect and transport seawater and maintain a reservoir for tank changes. Since the submission of this proposal, the CKSN has moved to a permanent location on NC's property and is not likely to move the facility to waterfront property where an automatic seawater filtration system could be installed. Instead, they will upgrade the capacity and functionality of their on-site seawater storage tanks and seawater filtration system -- including access to a ready-to-use 'day tank' (pre-filtered and chilled). They also are investigating whether they can form an official relationship with the Prince William Sound Science Center to access pre-filtered seawater from their facility

for regular use, greatly reducing the labor and resources required to collect seawater using a boat. ~~Instead they will upgrade the capacity and functionality of their on-site seawater storage tanks and seawater filtration system – including access to a ready-to-use 'day tank' (pre-filtered and chilled). They also are investigating whether they can form an official relationship with the Prince William Sound Science Center to access pre-filtered seawater from their facility for regular use, greatly reducing the labor and resources required to collect seawater using a boat.~~ Due to similar waterfront access limitations, GreenWave, one of the largest kelp seed production facilities in the United States, located on the East Coast, also operates a nursery where hauling water and maintaining a reservoir with highly filtered seawater are regular aspects of their protocol with no impediments to quality of seed string or efficiency of production.

  - The delay in achieving this objective does not impact project goals in any way, as the installation of an automatic seawater filtration system was intended to help the facility scale to maximize production and output of seeded string as this project has already surpassed its production goals. In the original proposal, the CKSN facility was anticipated to be fully scaled by FY24 with 12 tanks operational, each holding 9 spools, or 1,800 linear feet of seed string per tank. As of FY23, and as noted in that year's annual report, upgrades and changes to the facility have enabled the CKSN to expand its capacity to operate an additional 9 tanks (a total of 21 operational tanks), and increased the capacity of each tank from holding 9 spools to 16 spools; allowing for a production capacity of 67,200 feet of seed string every growing season. The lack of an automatic seawater filtration system has not impeded the CKSN from achieving its overall goal of supporting indigenous farmers in the production of seed string and supporting the development of a commercial kelp farming industry throughout Prince William Sound.

- Monitor wild kelp beds:
  - Wild kelp beds have been monitored opportunistically by CRRC's farm managers; information on location of kelp beds and timing of presence of sorus tissue has been shared with indigenous and local kelp farmers. A map of identified kelp beds, species, and timing of the presence of sorus tissue is in the process of being developed using CRRC and NC's past collection areas and dates of collection.
  - CRRC's farm managers, mariculture liaisons from the Kenai Peninsula and Prince William Sound, and APMI's director met with NOAA staff to share observations about the locations of wild kelp beds. This initiative is part of NOAA's broader Aquaculture Opportunity Areas framework in Alaska, which seeks to identify areas evaluated through spatial analyses and National Environmental Policy Act (NEPA) review processes that are environmentally, socially, and economically suitable for multiple commercial aquaculture operations, including kelp

mariculture. APMI staff shared insights on kelp collection areas to create a comprehensive wild kelp bed map, to better inform farm locations, particularly in relation to ADF&G's 50-50 rule.[2]

Objective 2: Develop effective, affordable, and sustainable practices for Native kelp farming through specific array designs, deployment methods, and seed cultivation strategies that will lead to the long-term restoration of oil-spill impacted areas of Prince William Sound.

FY24 Deliverables:

- Annual test site data: Completed, please see data uploaded into the EVOSTC-approved data management portal for the 2022-2023 growing season. Data collected from the 2023-2024 growing season is in the process of being uploaded to the Axiom database in compliance with the EVOSTC data management plan and has been attached to this report in Appendix B. Please see Appendix A for preliminary data for the 2024-2025 growing season.

Milestones/Tasks projected to be completed in FY24:

- Expand and deploy grow lines:
    - Completed. CRRC has maintained the expansion of its test sites from the previous growing season and has currently outplanted five, 100-foot growlines on its farm sites in Fox Farm and Latouche, growing sugar kelp, bull kelp, ribbon kelp, and three-ribbed kelp, and maintaining a blank line to identify opportunistic species and compare growth of wild kelp with that of kelp grown from hatchery-cultivated seed string.
    - CRRC has also added an additional dropper line site for the 2024-2025 season at Applegate Island, in Prince William Sound, in addition to deploying dropper line sites at Eshamy Bay and Copper Bay on Knight Island, in continuation of site monitoring at those locations from the 2023-2024 growing season.
    - The NC outplanted test sites at Sheep Bay, Port Gravina, and Simpson Bay. Each site has three, 100-foot growlines, seeded with ribbon, sugar, and bull kelp seed string.
    - Despite going through the permitting process to obtain three commercial permits for kelp sites at Passage Island, in Lower Cook Inlet, and Latouche and Tatitlek Narrows/Boulder Bay in Prince William Sound, in this report year, CRRC only completed the permitting process for the site at Passage Island based on feedback and interest from each site's respective community. The commercial site at Passage Island was outplanted on November 7th 2024. A map of the kelp lines at this commercial site has been included in Appendix D.

[2] ADFG has implemented a policy that requires aquatic farmers to source fertile sorus material for commercial kelp propagation from at least 50 different parent stocks, from within a 50-km radius of where hatchery-cultivated seed string will be outplanted. This policy is colloquially referred to within the industry as "the 50-50 rule."

  - An updated map of permitted and operational commercial sites, research sites, and dropper lines has been attached to this report in Appendix C.
- Harvest and analyze kelp at test sites:
  - Completed. Harvest data was collected at each of the test site locations; please see the report attached in Appendix B for harvest data from the 2023-2024 growing season.
    - Kelp tissue analysis was completed at Simpson Bay, Latouche, and Boulder Bay. Due to extensive, external lab errors, all kelp tissue samples were not able to undergo desired testing and processing. This error is in the process of being corrected. Tissue sampling testing that has been completed has been attached to this report in Appendix B and will be updated and uploaded to the Axiom database once complete. A full discussion of the results from this sampling process will be included in the FY25 Annual Report.
- Site monitoring and data collection:
  - Completed. Please see the data attached to this report in Appendix A for preliminary site monitoring data collected for the 2024-2025 growing season. Please see Appendix B for data from the 2023-2024 growing season; these data are in the process of being uploaded to the Axiom database in compliance with the EVOSTC data management plan.

Milestones/Tasks rolled over from FY22: Two milestones projected to be completed in FY22 were rolled over, due to the late awarding of funds and signed contracts for this project. Of these two milestones, one has been completed and one is projected to be completed by 2026, pending findings from other projects under the Alaska Mariculture Cluster grant; both milestones are discussed below:

- Launch a bull kelp-only test site: Completed. As noted in the FY23 Annual Report, throughout the 2023-2024 growing season, NC operated a bull kelp only commercial farm site located at Port Etches in Southwestern Prince William Sound. 16,000 feet of bull kelp seed string was outplanted at this site in Fall 2023. This site was selected based on previous years' farming experience indicating that site locations with high rates of current are particularly well suited for the commercial cultivation of bull kelp. It should be noted that this site was not a test site but was permitted as a commercial farm site that NC leased from a commercial farmer. Commercial sites allow for greater exploration of processing and marketing opportunities, which will be an essential hurdle to overcome to achieve the project's overarching objective to establish a conservation-based mariculture industry led by indigenous farmers. Research sites and commercial sites have the same monitoring requirements throughout the year as required by the U. S. Army Corps of Engineers, therefore the costs to outplant and maintain a research site and a commercial site are equivalent. Material harvested from a research site cannot enter commerce, and therefore CRRC and NC have been limited in the amount of product development and

market research they have been able to conduct. Permitting sites as commercial allows CRRC and NC to conduct more effective research on market opportunities for the burgeoning kelp industry and provides an additional opportunity for economic development for Tribal members interested in participating in the operation and harvest of kelp biomass.
    - Following the harvest of this site in April and May 2024, CRRC and NC developed a growth report analyzing the challenges involved in harvesting, stabilizing, processing, and removing gear from this bull kelp only site. This report has been attached in Appendix E and was funded in part by the Alaska Mariculture Cluster through funds awarded to CRRC to conduct a Processing Feasibility study. Primary takeaways from the operation of this bull kelp only site include the importance of site selection when commercially farming bull kelp, in order to have a site with adequate water and nutrient exchange that is also located in a protected enough area to allow access for outplanting, monitoring, and harvest; and the need for a significantly different farm structure to allow for kelp to grow without entangling growlines by floating on the water's surface, as was experienced by the CRRC and NC harvesting crew.
- Test two new anchor types: 600-pound danforths and 400-pound dormors: Not completed—this objective has been shifted to be accomplished by FY26. CRRC and NC are awaiting the publication of final findings from these projects to determine the best use of project funds prior to purchasing equipment or altering test site designs, and to avoid duplicating efforts being conducted and analyzed in other parts of the state.

Objective 3: Conduct a comprehensive landscape analysis by deploying research kelp sites and kelp dropper lines to develop commercial farm capacity rating per region. Collect, analyze, and share data related to water quality, kelp tissue composition, sea life and other factors that may indicate the viability of a site for commercial kelp farms.

FY24 Deliverables:

- Annual test site data: Completed. Data from the 2022-2023 growing season has been archived to the Axiom database in compliance with the EVOS data management plan; data from the 2023-2024 growing season is in the process of being uploaded to the Axiom database, while data collection from the 2024-2025 growing season is in progress. Please see Appendix B for the test site data collected for the 2023-2024 growing season; please see Appendix A for the partially completed collection of test site data collected for the 2024-2025 growing season.

Milestones/Tasks projected to be completed in FY24:

- Single-seeded dropper lines to be deployed in identified sites:
    - Completed. Single-seeded dropper lines have been deployed at sites identified near Applegate Island, Eshamy Bay, and Copper Bay on Elrington Island.

- As noted in the FY23 Annual Report, additional dropper lines were permitted in South Bay (Perry Island), Squaw Bay (Esther Island), and Wells Bay. Coordination with permitted oyster farmers in these regions is ongoing, as access to the northern region of Prince William Sound throughout the winter has been difficult, impeding consistent monitoring plans.
- Dropper lines at Applegate, Copper Bay, Eshamy Bay, and Boulder Bay were outplanted in November 2024; a final growth report on the performance of these sites will be developed following the completion of the 2024-2025 growing season.

- Water quality and tissue sample data recorded at all sites throughout grow-out season:
  - Partially completed. Harvest data was collected at each of the test site locations; please see the data attached in Appendix B for harvest data and Appendix E for the 2023-2024 growth report.
    - Kelp tissue analysis during growing season 2023-2024 was completed at Simpson Bay, Boulder Bay, and Latouche; samples were collected once in April 2024 and once in May 2024 at all three sites. Samples from the Simpson Bay and Latouche harvest in May 2024 were damaged during transportation to the Eurofins lab; as a result, not all tests were able to be completed on all samples, resulting in data gaps that render a thorough analysis and comparison difficult. Additional samples from these sites are in the process of being sent to the Eurofins lab for further tissue analysis. This issue with kelp samples being damaged while in transit to the Eurofins lab was corrected in last year's sampling SOP, by requiring samplers to collect additional samples, for backup sampling material in case tissue was impacted by shipping logistics. Additional back up tissue samples have been sent to the Eurofins lab to complete tissue testing for the 2024 harvest year. Additionally, through increased coordination with the Eurofins lab manager, samples are now shipped from APMI's facility exclusively at the beginning of the week (Monday or Tuesday) to ensure that samples arrive at the Eurofins lab during the work week to ensure staff is present to stabilize samples upon arrival.
- Site monitoring and data collection:
  - Completed. Please see the data for growing season 2023-2024 attached to this report in Appendix B and the preliminary data for growing season 2024-2025 in Appendix A. Data from the 2022-2023 growing season has been archived to the Axiom database in compliance with the EVOSTC data management plan; data from the 2023-2024 growing season is in the process of being uploaded to the Axiom database, while data collection from the 2024-2025 growing season is in progress.

2. Products:

Peer-reviewed publications:

None.

Reports:

This project's program manager and APMI's previous Science Director contributed to an interagency, congressional report on seaweeds and seagrasses, *Farming Seagrasses and Seaweeds: Responsible Restoration and Revenue Generation*, produced by Bigelow Laboratories. Contributions were solicited from APMI's experience in farming kelp and cultivating seed string at the hatchery stage. This report will be provided to congressional lawmakers to inform them of best practices in cultivation of seaweeds and to highlight areas where funding and legislative support may be needed to move the industry forward in an equitable way. The report can be found online here; due to its length, it has not been attached to this report, but can be made available by contacting the program manager, Briana Murphy at briana@alutiiqprideak.org.

Popular articles:

Diep, Jamie. "Mariculture Bill Streamlines Leasing Process for Shellfish and Kelp Farmers." KBBI.org: Serving the Kenai Peninsula, October 17, 2024.

O'Hara, Ashlyn. "Econ 919: A New Grant for Mariculture." Public Radio for the Central Kenai Peninsula, August 2, 2024.

Yan, G. (2024, November 25). *The Future of Alaska: The Alutiiq Pride Perspective*. The Fish Site.

Erickson, Nancy. "Aquaculture North America September/October 2024 Page 24." Aquaculture North America, 2024.

Oxendine, Chez. "Alaska's $49m Mariculture Cluster Creating Opportunities for Native Communities." Tribal Business News Home, January 11, 2025.

Conferences and workshops:

A host of additional conferences, workshops, and public presentations were held throughout FY24. A short description of the event, targeted audience, and approximate attendance is

included below. Many of these events were supported in part by funding from the Alaska Mariculture Cluster program.

- **Aquatic Farm permitting workshop at Seward Library**
  - The Kenai Peninsula mariculture liaison hosted an aquatic farm permitting workshop at the Seward Library in March of 2024 to provide an overview of the necessary materials and information applicants must submit in applying for an aquatic farm. Approximately 6 participants were in attendance.
- **Chugach Regional Resource Commission's 22nd Annual Subsistence Gathering**
  - The theme of CRRC's Annual Subsistence Memorial Gathering in March 2024 was mariculture and was co-hosted by this project's program manager. Approximately 100 attendees were present throughout the day of the conference, including Tribal members from each of the seven Tribal communities CRRC represents, as well as agency, regulatory, and industry representatives. Close to 300 participants attended the conference's evening events, including a traditional foods feast and dancing. This project's program manager shared two separate presentations, focused on work conducted by CRRC and NC under this project, as well as upcoming commercial kelp farm opportunities for the communities of Port Graham and Nanwalek, Tatitlek, and Chenega. The Gathering was sponsored in part by the Alaska Conservation Foundation and funded in part by the EVOSTC as part of CRRC's role in EVOS project 22220301, "Social, cultural and economic assessment of kelp mariculture opportunities for coastal villages within the EVOS spill zone," led by the Alaska Conservation Foundation. Please see Section 3, **Coordination and Collaboration**, *EVOSTC Education and Outreach Projects*, for additional updates on work conducted in collaboration with this project. Please see Appendix F for a copy of the report compiled by CRRC staff summarizing the Gathering conference and evening events.
- **Healthy Land and Sea Planning Workshop**
  - The day after CRRC's Annual Subsistence Gathering, CRRC and this project's program manager (Alaska Conservation Foundation) hosted a Healthy Land and Sea Planning workshop for CRRC's Tribal Communities. Approximately 30 Tribal members attended from Valdez, Port Graham, Nanwalek, Eyak, and one Tribal member from the Village of Kake, interested in learning more about mariculture projects in advance of a cockle project taking place in the Village of Kake. The Alaska Conservation Foundation led a two-hour portion of the morning's meeting which consisted of an open discussion about mariculture opportunities, interests, and perception of the mariculture industry by the Tribes, including a presentation of CRRC's kelp farm operations under this project and economic opportunities within Alaska's commercial kelp mariculture industry. Slido was used to engage participants and elicit opinions about specific species of culture or enhancement, general feelings about mariculture, and how CRRC and

other agencies or regulatory bodies could increase outreach to Tribes to provide better quality Tribal engagement. This workshop involved approximately 10 industry participants from NC, the Alaska Conservation Foundation, ADF&G, and University of Alaska Southeast. This workshop provided an opportunity for networking and outreach to Tribal members for project objectives under the EVOSTC 24220301 project, "Social, cultural and economic assessment of kelp mariculture opportunities for coastal villages within the EVOS spill zone," led by the Alaska Conservation Foundation. Please see Section 3, **Coordination and Collaboration**, *EVOSTC Education and Outreach Projects*, for additional updates on work conducted in collaboration with this project.

- **Sorus Tissue and Identification Workshop for Prince William Sound College students hosted at APMI**
    - APMI hosted students from Prince William Sound College's Marine Natural Resources Technician Program in Seward for a sorus tissue collection and kelp identification workshop led by this project's program manager and CRRC's Education and Outreach specialist. Activities included taking participants to Lowell Point Beach in Seward, for a sorus tissue and kelp identification workshop, during which participants were given field guides for identifying various species of seaweed that could be found on the beach. This project's program manager also used a ribbon kelp bed to show participants examples of sorus tissue and walked participants through the hatchery process that APMI goes through to produce seed string for commercial kelp farmers and provided an overview of regulatory hurdles for hatcheries involved in the industry.
- **Port Graham Kelp Processing Workshop and Sea Week Activities**
    - CRRC partnered with the Kachemak Kelp Hub, a Homer-based organization, to host a kelp processing workshop with the Port Graham School. This project's program manager spent three days in the community of Port Graham with students during their sea week and held a kelp processing and stabilization workshop for the community. During Sea Week, students (approximately 31 students from kindergarten to high school) were led in a seaweed collection and species identification workshop in the morning to collect various seaweed samples and procure ribbon kelp sorus tissue. Throughout the afternoon, APMI's director Jeff Hetrick and Kachemak Kelp Hub owners and operators Evie Witten and Kathryn Carovano led students and community members through a seaweed processing workshop where participants were taken through the steps of salting and fermenting kelp. Kelp for this workshop was procured through CRRC's test sites operated under this project and donated to Tribal members for their personal use. Kits and ingredients were provided so community members could make a soil amendment through fermentation and preserve kelp for food consumption through salting. Approximately 40 participants from the community attended, including students from the Port Graham School. This workshop involved

Christian Woodard, from the ADF&G, to provide an opportunity for networking and outreach to Tribal members for project objectives under the EVOSTC 24220301 project, "Social, cultural and economic assessment of kelp mariculture opportunities for coastal villages within the EVOS spill zone," led by the Alaska Conservation Foundation. Please see Section 3, **Coordination and Collaboration**, *EVOSTC Education and Outreach Projects*, for additional updates on work conducted in collaboration with this project.

- **Aquatic Farm Tour in Kachemak Bay**
  - CRRC partnered with the Kachemak Kelp Hub, a Homer-based organization, to host an aquatic farm and familiarization tour for Tribal members from Qutekcak Native Tribe, Ninilchik Native Association, Port Graham, Nanwalek, and a representative from KPEDD, for a total of 12 participants. Participants from Nanwalek were unable to attend due to flights being grounded because of high winds. The aquatic farm tour took place in Homer and Kachemak Bay. Participants visited Ebb Tide Ocean farm's commercial kelp farmsite in Halibut Cove; participants were able to observe sugar kelp being harvested and have the general structure and design of the farm, as well as harvesting equipment, be outlined by owner and operator Evie Witten. Upon returning to the Homer harbor, participants were brought the Kachemak Kelp Hub's processing facility on the Spit, in Homer. Co-founders Evie Witten and Kathryn Carovano walked participants through drying processes, salting and fermenting processing efforts, and various kelp products in development at the Kachemak Kelp Hub.
- **Kelp Processing Workshop with Qutekcak Native Tribe Members at APMI**
  - CRRC partnered with the Kachemak Kelp Hub, a Homer-based organization, to host a kelp processing workshop for members of the Qutekcak Native Tribe. The workshop focused on methods of primary stabilization of kelp that require rudimentary, accessible materials, and minimal amount of labor and time. The purpose of this workshop was to provide participants with an understanding of different ways to use kelp and means of processing large volumes of kelp quickly and efficiently. The processing methods included salting kelp, to quickly reduce moisture content and stabilize kelp for later use as a food commodity, and fermenting kelp, to use as a garden amendment. Kelp for this workshop was procured through CRRC's test sites operated under this project and donated to Tribal members for their personal use. This workshop involved David Guilfoyle from Applied Archeology, to provide an opportunity for networking and outreach to Qutekcak Native Tribe members for project objectives under the EVOSTC 24220301 project, "Social, cultural and economic assessment of kelp mariculture opportunities for coastal villages within the EVOS spill zone," led by the Alaska Conservation Foundation. Please see Section 3, **Coordination and Collaboration**, *EVOSTC Education and Outreach Projects*, for additional updates on work conducted in collaboration with this project.

- **Sorus Tissue and Identification Workshop at APMI for Community Coastal Experience participants**
    - In partnership with the Community Organized Restoration and Learning (CORaL) Network, participants from the Community Coastal Experience (CCE) group spent a day at CRRC's mariculture technical facility APMI in Seward with this project's program manager and CRRC's Education and Outreach specialist. Activities included taking participants to Lowell Point Beach in Seward, for a sorus tissue and kelp identification workshop, during which participants were given field guides for identifying various species of seaweed that could be found on the beach. This project's program manager also used a ribbon kelp bed to show participants examples of sorus tissue and walked participants through the hatchery process that APMI goes through to produce seed string for commercial kelp farmers and provided an overview of regulatory hurdles for hatcheries involved in the industry. When participants returned to APMI's facility for lunch, CRRC's Education and Outreach Specialist and this project's program manager discussed kelp mariculture industry challenges and opportunities and shared findings from CRRC's operation of kelp test sites under this project. Approximately 15 participants attended. Outreach efforts have built off this program to involve community members in CRRC's kelp mariculture activities in Cook Inlet; please see section 3, **Coordination and Collaboration**, *Native and Local Communities*, for additional information on how this program has been leveraged to increase participation of Indigenous community members in the kelp mariculture industry.
- **Kelp Farming Overview and Processing Workshop at Whittier School for Chugach School District's Science Week**
    - This project's program manager and CRRC's Education and Outreach team were invited to work with students from the Chugach School District to host a course introducing kelp mariculture and conducting a kelp processing workshop with students. The presentation focused on CRRC's kelp mariculture goals, the ecosystem services and environmental benefits that kelp farming may be able to provide; the processing workshop included ribbon kelp harvested from CRRC's test sites in May 2024, from which students made seaweed salad, and introduced students to other kelp products including popcorn seasoning made by Barnacle Seafoods in Alaska and kelp chocolate made by Chugach Chocolates. The course was conducted for three different classes throughout the day, including one middle school grade course and two high school groups, with approximately 10 students attending throughout each course.
- **Kelp Processing and Farmer Knowledge Exchange Trip:**
    - APMI's Director Jeff Hetrick, APMI's Mariculture Director Annette Jarosz, and this project's program manager Briana Murphy traveled to Kodiak in late October 2024 to utilize kelp processing equipment at the Kodiak Seafood and Marine Science Center. The purpose of this trip was to blend kelp to reduce it to a slurry

that could be compatible with the specifications provided by a tolling and manufacturing company CRRC is contracting with to produce dried kelp and marketing specifications that can be shared with possible purchases of dried kelp, as the first step to establish new markets for Alaskan-grown kelp product.

  - While waiting for materials to be prepared to utilize the machine, CRRC staff met with kelp farmers and hatchery operators at Alaska Ocean Farms at their facility in Kodiak. This meeting provided an opportunity to tour another Alaskan-based hatchery to note equipment improvements and innovations in operations, and to see various equipment alterations and upgrades that had been made after years in the field operating kelp farms of various scales. CRRC staff shared findings and noteworthy observations from this trip with NC staff at its weekly check-in meeting and plans to incorporate some changes in equipment observed in this trip in its 2025-2026 growing season. Additional updates will be included in the FY25 Annual Report.

- **Native Conservancy-Led Diver Certification Course for 6 New Divers**
  - NC, in partnership with The Organized Village of Kake, the Metlakatla Indian Community, and Spruce Root, hosted a two-week Advanced Open Water Diver certification program in Metlakatla, Alaska from December 6-20th 2024. The training served to empower Indigenous participants to safely and effectively scuba dive for mariculture purposes providing critical training and pathways to locally impactful, culturally aligned careers. The program led by NC invests in communities, by facilitating skill development and capacity building in villages. An Open Water Diver Certification strengthens food security for communities by enabling access to a broader range of subsistence foods available only through diving and empowers community members to be able to safely and responsibly source their own fertile sorus material for commercial propagation of kelp seed string. Obtaining a diver certification can also open the door to a wide array of other maritime careers and recreational opportunities. Many of the participants in this round of diver certification expressed an interest in mariculture pursuits, but also were excited about the other enrichments the certification provides.

Public presentations:

The following public presentations were held throughout FY24. A short description of the event and targeted attendance is included below.

- **Chugachmiut Laugh N Learn presentation**
  - In partnership with Chugachmiut, this project's program manager held an hour-long zoom presentation on the Alaska Mariculture Cluster grant's goals,

objectives, and funding opportunities targeted at participants, or interested participants, in Alaska's kelp mariculture industry. The goals and current findings of EVOSTC project 24220300 were presented to participants from each of the seven Tribal communities CRRC represents as well as participants attending virtually from Anchorage. Approximately 23 participants attended throughout the hour-long presentation.

- **Industry Outlook Forum, hosted by the Kenai Peninsula Economic Development District**
    - This project's program manager was invited to participate in a mariculture panel at the Kenai Peninsula Economic Development District's Industry Outlook Forum to present on funding opportunities and goals of the Alaska Mariculture Cluster grant, and shared CRRC's progress in kelp mariculture activities conducted under this project. Approximately 100 participants were in attendance. Please see the article "Econ 919: A New Grant for Mariculture" by Ashlyn O'Hara referenced in the "Popular Articles" section of this report for additional information.
- **Alaska Tribal Conference on Environmental Management (ATCEM)**
    - This project's program manager gave a 20-minute presentation in person at the Alaska Tribal Conservation on Environmental Management conference in Anchorage on this project's current progress and overarching goals to increase opportunities for Indigenous farmers to participate in the kelp mariculture industry. Approximately 40 participants were in attendance.
- **Seward Science Symposium**
    - This project's program manager gave a 20-minute presentation in person at the Seward Science Symposium conference in Seward on this project's current progress and overarching goals to increase opportunities for Indigenous farmers to participate in the kelp mariculture industry. Approximately 15 participants were in attendance.
- **Mariculture Film Screening and Panel for World Wildlife Fund**
    - APMI's Director Jeff Hetrick was invited to attend a mariculture film screening and following Q&A hosted by the World Wildlife Fund at the 49th State Brewing Company in Anchorage. Hetrick spoke to the progress CRRC has made in developing kelp mariculture opportunities under this project and its overarching goals for the remainder of the project's timeline. Approximately 100 participants were in attendance.
- **Ocean Sciences Festival in Cordova hosted by Prince William Sound Science Center**
    - CRRC's Prince William Sound's mariculture liaison hosted a presentation focused on kelp farming and ongoing kelp mariculture work in the Prince William Sound Region at the Ocean Sciences Festival in Cordova. Approximately 30 students and teachers from Cordova's school district attended.
- **2024 Chugach Summit Annual Meeting**

- Willow Hetrick-Price, CRRC's Executive Director and the Principal Investigator of this proposal, gave a 15-minute presentation on mariculture to Chugach Alaska Corporation shareholders.

Data and/or information products developed during the reporting period:
None

Data sets and associated metadata:

Please see data attached to this report in Appendix A for preliminary, site monitoring data collected during the 2024-2025 growing season; please see Appendix B for site monitoring, harvest data, and water sample nutrient data collected during the 2023-2024 growing season. Data from the 2022-2023 growing season have been uploaded and archived to the Axiom Research Workspace database in compliance with this project's data management plan.

Additional Products not listed above:

N/A

3. Coordination and Collaboration:

The Alaska SeaLife Center or Prince William Sound Science Center

Through CRRC's involvement with the CORaL Network (Project No. 24220400), CRRC has kept the Alaska SeaLife Center or Prince William Sound Science Center apprised of efforts made through this funding. More information on the collaboration between this project and the CORaL network in the *EVOSTC Education and Outreach Projects* section and in **Section 2**, *Conferences and Presentations* and *Workshops* of this report.

EVOSTC Long-Term Research and Monitoring Projects

APMI continues to collaborate, internally, to develop synergy between the water sample nutrient data collected under this project and other water samples collected through the Chugach Region Ocean Monitoring project (24220201).

EVOSTC Mariculture Projects

- CRRC's 22nd Annual Subsistence Gathering, held in March 2024, was a collaboration between CRRC and the Alaska Conservation Foundation, funded in part by the EVOSTC as part of CRRC's role in EVOSTC Project 24220301 project, "Social, cultural and

economic assessment of kelp mariculture opportunities for coastal villages within the EVOS spill zone."

- CRRC held an additional meeting, the day after the Gathering, for project participants from Project 24220301 and CRRC's Tribal members at the Aloft Hotel in Anchorage. Approximately 30 Tribal members attended from the communities of Valdez, Port Graham, Nanwalek, Eyak.
    - CRRC has included staff from Project 24220301 in additional workshops held throughout the spring to facilitate opportunities for ADF&G staff to conduct life history mapping at kelp processing workshops, and to provide opportunities for networking and community involvement with Healthy Land and Sea Planning staff at other processing workshops. The specifics of those workshops can be found in **Section 2**, *Conferences and Presentations*.
    - This project's program manager, APMI's mariculture director, and APMI's kelp biologist working on kelp seed development research, also attended the Alaska Conservation Foundation's Kelp Values Workshop at an evening event during the Alaska Marine Science Symposium. APMI staff participated in discussions and shared perspectives on necessary questions and data points for scientists and kelp industry participants to consider to allow for the development of a sustainable and ethical kelp mariculture industry.
- The PI of this project as well as this project's program manager and APMI's Mariculture Director had a working lunch with Dr. Ginny Eckert, one of the project leads for Project 24220302, "Sustainable Mariculture Development for Restoration and Economic Benefit in the EVOS Spill Area," in October 2024, immediately following presentations to the EVOSTC Public Advisory Committee. The purpose of this lunch was to discuss overarching objectives under Projects 24220302 and 24220300 and identify possible areas of collaboration.
    - Major takeaways included a commitment to keeping in touch about monitoring equipment upgrades, particularly those that can autonomously record oceanographic data, easing the burden of data collection placed on community samplers and ensuring that accurate and consistent data could be collected. CRRC will be looking into such equipment upgrades for Project 24220300 during the 2025-2026 growing season.
    - Discussion also included the perception of kelp mariculture operations, and the challenges of building up and integrating a new industry throughout CRRC's communities.

EVOSTC Education and Outreach Projects

CRRC's Education and Outreach Team has collaborated frequently with this project's program manager to provide opportunities to share CRRC's progress in the kelp mariculture space through this project and to provide opportunities for kelp processing, kelp collection, and sorus

tissue identification workshops with students and participants from programs funded through the CORaL Network (Project No. 24220400). Notably, participants from the CCE, funded through the CORaL Network, spent several days at APMI's facility in Seward. This project's program manager facilitated a kelp collection and identification workshop, where participants were taken to Lowell Point Beach and given field identification guides to collect and identify various species of seaweed in the area. APMI staff also led a sorus identification and collection workshop, to guide participants through the process of identifying healthy and fertile sorus of various species of seaweed, demonstrate responsible and sustainable ways to collect sorus tissue, and shared an overview of the cleaning process kelp hatchery operators must use to prepare sorus tissue for spore release for commercial kelp cultivation. During the afternoon portion of the CCE group's time at APMI, participants were guided through two kelp processing techniques, including preparing and pickling bull kelp, collected with a Qutekcak Native Tribe elder, and salting and fermenting ribbon kelp for food consumption and to create a soil amendment, respectively. All participants were able to engage in hands-on preparation of these three different methods to preserve and process kelp, while APMI staff shared challenges and obstacles in marketing and processing commercial kelp material. Kelp used for this workshop was harvested from test sites outplanted under this project and this project's program manager was able to talk with participants at great length about various challenges and opportunities within the kelp mariculture industry in Alaska.

- Following this program, two participants from this CCE group reached out to this project's program manager about additional mariculture opportunities, including one resident of Nanwalek who has assisted CRRC with outplanting and monitoring of the commercial kelp farm site at Passage Island, near Nanwalek. Both participants of this program were selected for funding for travel assistance provide by the Alaska Fisheries Development Foundation, to attend Alaska's 4th Annual Mariculture Conference of Alaska. These successes highlight the time and patience involved in building off educational and workforce development programs to assist with the development of commercial kelp mariculture operations throughout the Chugach region.

Trustee or Management Agencies

CRRC's Executive Director and the Principal Investigator for this project, Willow Hetrick-Price, and this project's program manager, Briana Murphy, attended the EVOSTC biennial review meeting and gave a five-minute presentation in front of the Public Advisory Committee on progress made under this project, followed by a Q&A period.

APMI's Director Jeff Hetrick attended a two-day kelp genetics workshop in Juneau, hosted by the ADF&G, with industry participants and researchers.

To establish our kelp farm, we engaged in a coordinated permitting process with the ADF&G. This process involved multiple steps to ensure compliance with state regulations and environmental considerations.

Our team worked closely with the ADF&G to complete the necessary applications, including site assessments and environmental impact evaluations. We also consulted with the Department of Natural Resources for lease approvals and coordinated with the National Oceanic and Atmospheric Administration, a Trustee agency, and the U.S. Army Corps of Engineers for additional regulatory requirements, namely, ESA-consultation.

Native and Local Communities

In April 2024, this project's program manager and CRRC's Education and Outreach Director traveled to Aialik Bay, approximately 25 miles south of the city of Seward outside of Resurrection Bay, to harvest wild bull kelp with a Qutekcak Native Tribe (QNT) elder. Bull kelp was harvested and returned to APMI's facility in Seward, where staff prepared and preserved bull kelp for participants arriving at APMI from the CCE Program. This kelp was then used to walk CCE participants through the process of pickling bull kelp, and to provide them with jars of bull kelp pickles they could take home with them from the program. The elder from QNT participated in all aspects of the process and shared traditional methods of pickling and his experiences harvesting bull kelp for subsistence use.

The FY23 Annual Report highlighted work conducted through this project with a resident of Port Graham. At the time of submission of the FY23 Annual Report, this resident was in the process of attending Prince William Sound College's Marine Natural Resources Technician program to receive an Occupational Endorsement Certificate. This resident, upon completion of the program, secured a position, with references provided by CRRC staff, as a part-time research assistant for the Green Energy in Mariculture Project, another program funded by an Alaska Mariculture Cluster grant. This resident is currently in talks with the Qawalangin Tribe in Southwestern Alaska to contract with them as the Mariculture Liaison for the Southwest district, again through the Alaska Mariculture Cluster program. This example demonstrates CRRC staff's persistent efforts to build off ancillary workforce-development projects and to leverage its participation in other EVOSTC-funded projects, such as the CORaL Network, to recruit interested participants in its kelp mariculture activities and identify strategic partners in building a kelp mariculture workforce in the communities it serves.

As noted earlier in this report, in Spring 2024, CRRC permitted a commercial kelp farm near Passage Island in Lower Cook Inlet, approximately equidistant from CRRC's community of Port Graham and Nanwalek. This farm was ouptlanted November 10th, 2024, with assistance from a resident of Nanwalek, who has continued working with this project to collect water samples and conduct farm monitoring when possible. This participant applied and was selected for funding

from the Alaska Fisheries Development Foundation to travel to Sitka for the 4th Annual Alaska Mariculture Conference to connect with industry participants and researchers. In addition to working with a local farm monitor, CRRC contracted with the Port Graham Corporation to transport farm materials from Homer to Port Graham and to collect water samples after outplanting the kelp farm in the month of December.

Please refer to the sections "*Conferences and Workshops*" and "*Public Presentations*" in **Section 2** of this report for additional information on specific workshops, conferences, and presentations conducted for Native and local communities.

Alaska Native community involvement is inherent in the structure of CRRC's organization. CRRC's involvement with kelp was in direct response to a request of the board, comprised of seven Tribal governing members. The CRRC Board serves at the direction of each Tribal Council and Board Members are chosen specifically because of their natural resource management inclinations. As part of this project, CRRC provided regular updates to the Board of Directors and Tribal members through quarterly board reporting. During this report period, reports on progress of this project were given at the following CRRC's Board of Directors' meetings and Tribal members to keep them apprised of the project's progress and current findings through distribution of Board packet material:

- March 20, 2024
- June 24, 2024
- September 24, 2024
- December 11, 2024

In addition to the quarterly updates given to the CRRC board as noted above, CRRC's Executive Director and the Principal Investigator for this project, Willow Hetrick-Price, presented on CRRC and APMI's mariculture operations at the 2024 Chugach Alaska Corporation Summit.

4. Response to EVOSTC Review, Recommendations and Comments:

Previous reviewer comments received on Project 24220300 were omitted from this report, but can be provided to reviewers by reaching out to this project's point of contact. Those comments can be found in the Biennial Review of FY22-FY23 Program and Projects, Report to the Trustee Council, Drafted October 7, 2024, and Updated February 4, 2025, as well as in the FY22 and FY23 Annual Reports for this project. Only those comments received during the 2024 biennial review of projects conducted by EVOSTC staff, the Public Advisory Committee, and the Science Panel are included below. Due to the in-person nature of the presentation by the PI at the Public Action Committee meeting in October, an elaboration on the response to comments has been

included below each response. For the Science Panel and Executive Director comments, provided in writing, the PI response follows the comment in its entirety.

Science Panel Comments
Date: September 2024

The FY22 and FY23 annual reports provide substantial detail about how the work in this multi-faceted project has proceeded. It is clear that the activities are designed to dovetail with other independently funded activities in the geographical areas supported by EVOSTC funding. All such activities, however, are connected to mariculture development.

The connection to pure hypothesis-based scientific activity, that is the mainstay of most other projects examined by the EVOSTC Science Panel, is not tight. The normal measure for assessing science validity and productivity is the production of reports, especially peer-review reports, or perhaps the production of valuable, publicly-accessible data. This has been an especially strong part of the recent EVOS TC activity. That is not the case for this project but this is not a criticism. The work has different objectives: economic, sociological, and also ecological, but this aspect is not emphasized. There are aspects of the work that involve scientific methodology and activity. However, other metrics would be required to assess the merits or success of the work and activities conducted within the project. Therefore, it is a challenge for us to provide a rigorous assessment of this project, but we note that the FY22 and FY23 annual reports are thorough and detailed.

Insofar as we can assess this project, the Science Panel does not have any concerns at this time.

PI Response: Many reviewer comments to the original proposal submitted, to which the PI had the opportunity to respond in August, 2022, noted that the original submission contained language that would be difficult to defend scientifically and as a result, the proposal and objectives for Project 24220300 shifted considerably to be focused more on integrating Native communities throughout the coastal Chugach region in building a strong, commercial kelp mariculture industry. CRRC appreciates the Science Panel's acknowledgement of the importance of the non-scientific objectives this project supports. This project has increased communication and built relationships between CRRC and APMI staff and community members from nearly all the seven Tribes it serves, through increased on-water operations. The expansion of CRRC's kelp mariculture operations has built a team of industry leaders in Alaska, who have been able to provide visiting students and community groups with hands-on experience about various facets of the kelp mariculture industry and answer specific questions about challenges the kelp mariculture industry faces and its future in Alaska. Already this program has been able to build off relationships forged through outreach activities to recruit a community samplers and collaborators, which will lay the groundwork for a skilled, confident workforce to move into operation of commercial kelp sites at the close of this project's funding. Additional outreach and educational programs will only enhance this work throughout the duration of this project.

This project is producing valuable, publicly-accessible data for the kelp farm test and commercial sites growth rates and water quality parameters at each site. This will help inform future kelp farming efforts throughout the Spill Area.

Executive Director Comments
Date: October 2024

This project is progressing as planned. Annual reports were submitted on time and were well-organized and comprehensive. The PI is responsive to staff communications and easy to work with. Funding for this project is co-managed by ADF&G and the EVOSTC Office. Invoices and supporting documents are easy to review. Periodically, due to the large volume of supporting documents, some are inadvertently not included or incorrect documents are included. The expenses on the annual reports are easy to track. The Fiscal Manager is very responsive to budget and/or invoice questions. Staff do not have concerns at this time.

PI Response: Thank you for your comments and feedback. This practice is mutually beneficial as CRRC annually conducts a federal and state single audit. CRRC has hired a seasoned Grant Accountant to support this project who comes to CRRC with significant experience managing EVOSTC funding. CRRC's administrative department will continue working to ensure invoices and reports are submitted in a timely and organized manner.

PAC Comments
Date: October 2024
Whissel asked about data collected from sites. Murphy stated they collected harvest and water sampling data. The U.S. Army Corps of Engineer permits require monitoring sites twice a month, and they collect water and air temperature, salinity, turbidity, and oxygen data at those times. They processed most water samples from the last growing season and are developing the capacity to process samples in house.

PI Response: Most water samples collected from the 2023-2024 growing season have been processed and data collected have been attached to this report. Some water samples from that growing season remain unprocessed, but stabilized, at APMI's facility in Seward. A full water sample nutrient data set from the 2023-2024 growing season will be included in the FY25 Annual Report and will be uploaded to the Axiom database by December 2025, in compliance with the EVOS TC data management plan for this project. Shortly after this presentation, in October 2024, based on recommendations from APMI's Mariculture Director and after reviewing inconsistencies from the previous year, it was determined that oceanographic data should include just temperature, salinity, and turbidity readings (removing the monitoring of dissolved oxygen). The purpose of this change in sampling protocol arose with the incorporation of additional community samplers, particularly in Port Graham and Nanwalek, where YSIs could not be consistently calibrated throughout the growing season. Monitoring equipment now

requires only a thermometer, a refractometer, and a secchi disk, which are much more weather-resistant than YSIs, and renders training for community samplers easier and more accessible.

Whissel asked about kelp growth trends and dropper lines. Murphy suggested they only have harvest data from two seasons and cannot determine trends yet, but growth has been very inconsistent. The focus of the project is to advise potential and interested kelp farmers, but given the amount of external variables, it was difficult to identify the cause of growth variability. Dropper lines did not show growth last year.

PI Response: Kelp growth trends remain an extremely difficult area to navigate for kelp farmers throughout Alaska, this is not unique to CRRC's farms. As such, CRRC has been in conversation with farmers, both close to its kelp farm sites and those from different regions of the state, to compare growth rates and determine a better means to approximate kelp harvests from outplanted seed string. Multiple years of harvest data, collected from the same test sites operated under this project, will provide a more comprehensive data set from which clearer patterns or trends can hopefully be distinguished by the end of this project.

Stekoll asked about seeding. Murphy stated they seeded three dropper lines with sugar kelp last year. They collaborated with oyster farmers near Perry Island and hoped the oyster operations could help them increase monitoring efforts. Based on their oceanographic and harvest data, Hetrick and Murphy speculated that bull kelp seems to grow better on the west side of Prince William Sound (PWS), and sugar and ribbon kelp may grow better on the east side, noting growth was very good the first year and poor the second year. The lack of sugar kelp growth on the west side may have been a nursery or seed string issue, and dropper lines were planted late.

PI Response: A more in-depth discussion of growth results can be found in the Growth Report attached to this report in Appendix E. The variation in kelp growth and harvest yields, as noted in the previous comment's response, is not unique to this project or to CRRC, but CRRC staff on this project have been collaborating with farmers throughout the region and state to determine better methods for accurately estimating harvest yields and producing more consistent harvest quantities.

Hetrick also noted they transferred ownership of one permitted farm to the Chenega IRA Council and will transfer another at the close of EVOS funding. Their goal was to get Tribes involved.

PI Response: Paperwork for this transfer was completed in this fiscal year; as noted in this report, CRRC did not complete the final documentation for commercial farms at Tatitlek or Chenega based on community feedback and interest in operating those sites. Both permits have been shared with each community's administration for their use and reference should the need for them arise. CRRC staff have been working with community members from Port Graham and Nanwalek, as well as the Port Graham Corporation, to provide outreach and training

opportunities for involvement in the commercial farmsite at Passage Island. Additional updates will be included in the FY25 Annual Report.

Stephens asked how they measure growth. A problem within the mariculture industry is how to measure productivity due to variability in seed strings. It is difficult to reduce seed string variability and then determine how the location affects growth. She recommended working with others to brainstorm how to reduce variability.

PI Response: This comment has been noted and addressed in earlier responses to comments in this section; CRRC has been working with industry participants throughout the state to respond to this question. Progress updates on this issue will be included in the FY25 Annual Report.

Whissel introduced a motion to proceed with no concerns. Borer seconded, and Cunningham recused herself. There was no opposition, and the motion passed with unanimous support from all voting members.

PI Response: CRRC appreciates any opportunity to respond to Trustee feedback or questions about this project and is happy to share progress updates to illustrate the ways that EVOSTC funding through Project 24220300 is providing opportunities for CRRC's community members to participate in the state's growing kelp mariculture industry.

5. Budget:

~~At the time of reporting CRRC has not closed its January billing period, nor has it submitted an invoice to EVOSTC. This is primarily due to the closing of the CRRC audit as well as notice of the final indirect rate for CRRC's fixed carry forward NICRA rate, which has been approved by DOI at 22.44% for the final FY2023 rate and the preliminary rate for FY2024. Due to these changes, CRRC is not able to provide expenses through January of 2025 at this time, but will provide updates to EVOSTC as soon as available and will work with program staff to reflect changes. For financial questions, please contact Tara Miller at tara@crrcalaska.org.~~

Personnel	$218,268	$218,268	$218,268	$218,268	$61,652	$934,725	491,506
Travel	$11,050	$11,050	$11,050	$11,050	$2,550	$46,750	31,468
Contractual	$254,410	$209,810	$189,810	$194,810	$15,000	$863,840	709,450
Commodities	$107,449	$30,707	$30,707	$30,707	$0	$199,570	190,372
Equipment	$26,900	$0	$0	$0	$0	$26,900	26,347
Indirect Costs (report rate here)	$118,235	$93,967	$89,967	$90,967	$15,840	$408,977	228,065
SUBTOTAL	$736,313	$563,802	$539,802	$545,802	$95,042	$2,480,762	1,677,208
General Administration (9% of subtotal)	$66,268	$50,742	$48,582	$49,122	$8,554	$223,269	N/A
PROJECT TOTAL	**$802,581**	**$614,545**	**$588,385**	**$594,925**	**$103,596**	**$2,704,031**	
Other Resources (In-Kind Funds)	**$500,000**	**$75,000**	**$75,000**	**$50,000**	**$0**	**$700,000**	

INSTRUCTIONS: This summary page provides a five-year overview (FY 22-26) of proposed funding and actual cumulative spending which includes the **non-trustee agency** and **trustee agency workshseets**. **This Summary Page should automatically populate as the formulas reference the cells in the non-trustee agency and trustee agency worksheets. Please make sure the totals given are correct.** The column titled 'Actual Cumulative' will be updated each fiscal year and included in the annual report (include information on the total amount actually spent for all completed years of the project). On the Project Annual Report Form, if any line item exceeds a 10% deviation from the originally-proposed amount; provide detail regarding the reason for the deviation.

COMMENTS: Per EVOSTC Direction,reporting reflect expenses based on invoicing. At the time of reporting CRRC has not closed it's January billing period.