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

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: 24220201

Project Title: Chugach Regional Ocean Monitoring (CROM) Program

Principal Investigator(s): Willow Hetrick-Price, Allison Carl, Chugach Regional Resources Commission (CRRC), Alutiiq Pride Marine Institute (APMI). Allison Carl is the author of this report, and it has been reviewed and approved by Willow Hetrick-Price.

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

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

Project Website: https://www.alutiiqprideak.org/crom

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 have been several changes to staff funded under this program (Table 1). Allison Carl, a Sugpiaq descendant and Chugach Alaska Corporation shareholder, is the Biology Laboratory Manager and has replaced Maile Branson as the Co-Principal Investigator. Allison is working to complete her Master of Science through the University of Alaska Anchorage Biological Sciences program and is expected to graduate in spring 2026. CRRC has hired Sierra Lloyd as the APMI new Chemistry Laboratory Manager. Sierra recently graduated from the University of Alaska Fairbanks College of Fisheries and Ocean Sciences with a Bachelor of Science in Fisheries and Marine Science with a concentration in oceanography. CRRC has hired Jana Wheat as the APMI Biology Laboratory Technician. Jana holds a Bachelor of Science in biochemistry and has extensive experience with assays performed in the APMI Biology Laboratory. Below is the current list of employees that are supporting Project Number 24220201.

Table 1. CRRC CROM Personnel

Position	**Employee Name**
CRRC Executive Director	Willow Hetrick-Price
APMI Science Director	Vacant
APMI Biology Laboratory Manager	Allison Carl
APMI Technician #1 (Biology)	Jana Wheat

APMI Chemistry Laboratory Manager	Sierra Lloyd
APMI Technician #2 (Chemistry)	Vacant
Grants Administrator	Tara Miller

1. Summary of Work Performed:

A. *Administration:* Over the past year, CRRC's administrative employees have ensured management of the award funds and maintained compliance with regulatory and financial requirements. The Executive Director has provided strategic oversight and managed staff, while the Grant Accountant and Staff Accountant have managed financial reporting, budgeting, and expense tracking to ensure fiscal responsibility. The Grants and Contracts Administrator has overseen compliance, reporting, and subaward and contract management. The Administrative Assistant/Travel Coordinator has facilitated logistics, documentation, and support for grant-related activities.

B. *Laboratory updates:* Construction of the new, larger biological laboratory space was completed during the project period and includes distinct work areas for molecular and toxicology analyses. The chemistry laboratory recently underwent a minor remodel which included repairs to water-damaged drywall, addition of new chemical safety storage cabinets, and basic electrical work to ensure secure power supply to laboratory equipment. Both the biology and chemistry lab spaces have been outfitted with uninterrupted power supply units to power laboratory equipment. To date, all budgeted equipment pieces under the initial phases of this award have been purchased and delivered.

C. *Sample Coordination:* From February 1, 2024, to January 31, 2025, APMI sent out sampling kits for dissolved inorganic carbon sampling (to monitor marine water quality parameters), phytoplankton net tows (to monitor for the presence of harmful algae and harmful algae blooms (HABs)), and shellfish sampling (to monitor for the presence of harmful algal toxins) to participating communities In the fiscal year 2024, APMI received 303 samples for dissolved inorganic carbon analysis, 146 phytoplankton samples, 218 water filters for quantitative PCR (qPCR) analysis, 122 samples for total saxitoxin concentration detection, and 105 samples for domoic acid concentration detection. Samples received, samples analyzed, and data finalized are outlined in Tables 2-6. Sample storage protocols were implemented in this project period to ensure that all samples are processed and reported on within the reporting period moving forward. The sample sets not only include Chugach communities in the spill affected region but also include partners outside the funded scope of this project who have requested to be included in monitoring efforts; these data are included in both this report and the final submitted dataset.

Table 2. Dissolved inorganic carbon sample status

Samples collected through CROM Program (CRRC staff/Community Samplers)			
Community	Samples Received	Lab Analysis Completed	Data Finalized
Chenega	36	24	24
Eyak	80	57	57
Nanwalek	5	0	0
Port Graham	24	24	24
Seward *	9	0	0

Tatitlek	0	0	0
Valdez	19	0	0
Total CROM Samples	173	105	105
Samples collected through collaborations (partner Tribes, citizen science, research)			
The City of Adak	20	20	20
Kachemak Bay National Estuarine Research Reserve (Homer)	55	31	31
Seldovia Native Tribe	12	12	12
Kenaitze Indian Tribe	34	12	12
Qawalangin Tribe of Unalaska	29	29	29
Overall Samples Received	303	209	209

*The Seward sample size of dissolved oxygen is lower than one would expect because APMI has a continuous monitoring system, the Burke-O-Later, that acts as a proxy for discrete sampling. The samples collected in Seward are part of a capacity building program for Tribal members and APMI interns.

Table 3. Phytoplankton net tow sample status

Samples collected through CROM Program (CRRC staff/Community Samplers)			
Community	Samples Received	Lab Analysis Completed	Data Finalized
Chenega	31	31	31
Eyak	24	17	17
Nanwalek	0	0	0
Port Graham	9	9	9
Seward	40	40	40
Tatitlek	1	1	1
Valdez	4	4	4
Total CROM Samples	109	102	102
Samplers collected through collaborations (partner Tribes, citizen science, research)			
Kachemak Bay National Estuarine Research Reserve (Homer)	25	25	25
Seldovia Native Tribe	12	12	12
Overall Samples	146	139	139

Table 4. Shellfish samples status (total saxitoxin concentration analysis)

Samples collected through CROM Program (CRRC staff/Community Samplers)			
Community	Samples Received	Lab Analysis Completed	Data Finalized
Chenega	4	4	4

Eyak	2	2	2
Nanwalek	0	0	0
Port Graham	17	17	17
Seward	41	41	41
Tatitlek	10	10	10
Valdez	2	2	2
Lower Cook Inlet	2	2	2
Prince William Sound (Horseshoe Bay)	3	3	3
Total CROM Community Samples	81	81	81
Samples collected through collaborations (partner tribes, citizen science, research)			
Prince William Sound Stewardship Foundation	22	22	22
Seldovia Native Tribe	19	19	19
Overall Samples	122	122	122

Table 5. Shellfish samples status (domoic acid concentration analysis)

Samples collected through CROM Program (CRRC staff/Community Samplers)			
Community	Samples Received	Lab Analysis Complete	Data Finalized
Chenega	2	2	2
Eyak	2	2	2
Nanwalek	0	0	0
Port Graham	6	6	6
Seward	55	55	55
Tatitlek	8	8	8
Valdez	2	2	2
Lower Cook Inlet	2	2	2
Prince William Sound (Horseshoe Bay)	3	3	3
Total CROM Samples	80	80	80
Samples collected through collaborations (partner tribes, citizen science, research)			
Prince William Sound Stewardship Foundation	12	12	12
Seldovia Native Tribe	13	13	13
Overall Samples	105	105	105

Table 6. Water filters status (qPCR analysis)

Samples collected through CROM Program (CRRC staff/Community Samplers)			
Community	Samples Received	Lab Analysis Complete	Data Finalized
Chenega	0	0	0
Eyak	12	0	0
Nanwalek	0	0	0
Port Graham	0	0	0
Seward	172	0	0
Tatitlek	0	0	0
Valdez	24	0	0
Total CROM Samples	208	0	0
Samples collected through collaborations (partner Tribes, citizen science, research)			
Alaska Sealife Center	10	0	0
Overall Samples	218	0	0

APMI Ocean Chemistry Laboratory, Sierra Lloyd, Chemistry Laboratory Manager:

A. *New laboratory staff and training:* Sierra Lloyd was hired January 6, 2025, and has since been trained on the CROM program. Additionally, Sierra recently travelled to the Hale Lab at Oregon State University (OSU) for intensive training on the Burke-O-Lator protocols, continuous monitoring, and discrete sample analysis.

B. *Dissolved inorganic carbon analyses (discrete samples):* Since February 1, 2024, a total of 303 dissolved inorganic carbon samples were received from CRRC communities (Table 2). A periodic collection of triplicate samples was requested for QA/QC purposes. Of the 303 samples received in the reporting period, 209 samples were analyzed and included in the 2024 data set. Of the 209 samples analyzed, 2 were excluded during QA/QC analysis. One of the excluded samples was from Chenega, which had an average standard deviation value of ±749.586 and was considered an extreme outlier when compared to the other average standard deviation values for triplicate sets analyzed. The other excluded sample was from Homer, which had an average standard deviation value of ±495.826 and was considered an extreme outlier when compared to the other average standard deviation values for triplicate sets analyzed. This occurs frequently with samples that did not receive adequate preservatives or were overfilled, underfilled, frozen, or cracked during transport. The 209 samples were analyzed and are presented in cumulative time series for each region containing data from all analyzed samples under this project (Figures 1-20). Triplicate sampling events are denoted with error bars representing standard deviations, which are often too small to be visualized but are referenced in the figure captions. Dissolved inorganic carbon trends are best recognized over a longitudinal time scale, making comprehensive figures important, therefore all data presented here are from the full duration of sampling efforts at each site.

C. *Dissolved inorganic carbon analysis (continuous monitoring):* Procurement of a new Burke-O-Lator was completed during this project period; the equipment was installed in April 2024 by Dr. Burke Hale. The AMPI chemistry laboratory now has two Burke-O-Lators allowing the organization to run discrete samples without disrupting the Burke-O-Lator that provides continuous monitoring of incoming seawater at APMI. The APMI's chemistry lab supports

continuous ocean chemistry monitoring efforts in Resurrection Bay, using the facility's marine water intake. The data from the continuous monitoring efforts are live streamed to the AOOS Ocean Data Explorer (https://portal.aoos.org/?#metadata/48037/station/data).

D. *Nutrient analyses:* APMI has procured a small spectrophotometer with the intent of establishing and validating protocols for nutrient analysis prior to procurement of larger equipment that was budgeted for fiscal year 2026. APMI has conducted nutrient sampling through the reporting period and started the development of standard protocols for collection and preservation. Further determination of the accuracy and precision of current equipment is ongoing.

APMI Biology Laboratory, Allison Carl, Biology Laboratory Manager & Jana Wheat, Biology Laboratory Technician:

A. *Phytoplankton net tows and microscopy:* Since February 1, 2024, a total of 146 phytoplankton net tow samples have been received by participating communities. A total of 139 of these samples have been analyzed via microscopy for harmful algae species identification by APMI staff (Table 3; Figures 21-23). Samples not yet analyzed were received at the end of the reporting period and have not yet been processed.
    i. ***Alexandrium* spp. results:** No *Alexandrium* spp. Were detected via microscopy during the reporting period (Figure 21)
    ii. ***Pseudo-nitzschia* spp. results:** Most collections yielded observations with no *Pseudo-nitzschia* spp. (Figure 22). 2023 samples analyzed during this reporting period resulted in no detections. In 2024 samples, elevated levels occurred most often during September and October, with few low detections in April, and one community (Valdez) experiencing high levels of *Pseudo-nitzschia* spp. during June 2024.
    iii. ***Dinophysis* spp. results:** *Dinophysis* spp. was frequently observed at low levels throughout the region in 2023 and 2024 samples (Figure 23).

B. *Harmful Algae Bloom Modeling:* CRRC contracted Ocean and Earth Environmental (O&EE) to develop a preliminary report and data model for HAB forecasting using CROM monitoring data from inception to current (Appendix A). Although in the preliminary stages, CROM data provides valuable information for areas that were not previously monitored. These sample locations are directly associated with Tribal communities that are often overlooked in monitoring efforts. These communities rely heavily on intertidal and marine food systems and CROM is making the connections between environmental research, human health, public education, and cultural continuity.

C. *Shellfish toxin testing:* during the 2024 project period, APMI analyzed a total of 122 shellfish samples via receptor binding assay (RBA) for the detection of total saxitoxin concentration (Table 4); a total of 105 shellfish samples were analyzed via enzyme-linked immunosorbent assay (ELISA) for the detection of domoic acid (Table 5). To establish toxin monitoring protocols, CRRC's APMI biology staff worked alongside partners from National Oceanic and Atmospheric Administration National Centers for Coastal Ocean Science (NOAA NCCOS), O&EE, and the University of Alaska Fairbanks College of Fisheries and Ocean Sciences (UAF CFOS). While not listed as a method to be used in this proposal, RBA is often another method used in addition to the ELISAs, due to its ability to detect all saxitoxin congeners. The RBA is one of the few currently approved methods for paralytic shellfish toxin testing in blue mussels *Mytilus edulis* accepted by the US Food and Drug Administration (FDA). For long-term monitoring as part of the CROM program, APMI now uses a combination of RBA (which was funded by the USGS

Climate Adaptation Science Center Cooperative Agreement No. G21AC10676) and ELISA for both saxitoxin and domoic acid, respectively, in blue mussels. The equipment used for the RBA has been stored and used in the UAF Seward Marine Center during the 2024 fiscal year; equipment was held here while CRRC's APMI staff trained on the assay and while the biology laboratory space at APMI was being completed. The APMI biology lab space was completed during the reporting period and is ready for equipment to be moved to the APMI facility.

i. **Saxitoxin detection results:** detection of total saxitoxin concentration was determined using the RBA for all 2024 samples. Total saxitoxin concentration detections for blue mussels collected in the region exhibited concentrations well below the FDA regulatory limit (80 µg/100 g of tissue) (Figure 24). Elevated concentrations were observed in other species throughout the reporting period, and one detection above the FED regulatory limit was observed in a sample of butter clams in May 2024.

ii. **Domoic acid detection results:** domoic acid concentration levels were determined through the Gold Standard Diagnostics [ON0021] ABRAXIS® Domoic Acid (Onsite Technologies) ELISA. Domoic acid detections for blue mussels collected in the region exhibited concentrations well below the FDA regulatory limit (20 ppm). Low concentrations were observed in other species throughout the reporting period (Figure 25); one sample of razor clams was above the limit of detection.

D. *Environmental DNA (eDNA) and quantitative PCR (qPCR) for phytoplankton detection:* Procurement of the necessary laboratory equipment and supplies for this portion of the project was completed in fiscal year 2024; all required equipment was installed in the new biology laboratory space. During the project period, CRRC's APMI biology staff participated in an in-house training with O&EE the week of April 1, 2024, for an initial walk-through of environmental DNA (eDNA) sample protocols and qPCR assay procedures (Appendix B). Once all molecular equipment was installed in the new biology laboratory, CRRC staff participated in a follow-up training with O&EE the week of November 11, 2024. During this training, plated samples were frozen and sent on ice to Oregon State University (OSU) for validation. Unfortunately, the validation was inconclusive; it was speculated that samples were contaminated during the shipping process and/or there was an issue with re-running the plated samples in the OSU lab due to discrepancies in laboratory equipment. In-state validation options are currently being explored.

i. **Sample collection:** APMI staff began collecting preliminary water samples in Resurrection Bay. Samples are collected using a Smith-Root eDNA citizen Scientist; this consists of a vacuum pump attached to a 2-liter collection reservoir and tubing, a sterile filter can be attached to the tubing. Through collaborative efforts with CRRC's Tribal Fish and Wildlife Department's Herring Monitoring Project funded by the Administration of Native Americans, APMI has also received water filter samples from Cordova that will be analyzed for HAB species. Through a partnership with Prince William Sound College, student samplers began collecting eDNA samples. All samples received in 2024 have had DNA extracted and/or have been stored at -80C until laboratory equipment can be fully validated. Samples will be fully processed, analyzed, and reported on after the validation of laboratory equipment.

Annual Sampler Workshop (all CROM staff):
APMI hosted the annual water sampler workshop in Seward on May 2, 2024. All Tribal samplers involved in the CROM Program were invited, as were samplers and partners from other regions. This workshop included educational talks on harmful algae, shellfish toxins, ocean acidification, and the role of marine nutrients in the development of harmful algal bloom events (Appendix C). This workshop was also used as a time to complete training for sample collection protocols. Tribal samplers also had the opportunity to share their perspectives and traditional knowledge around environmental needs in their communities, and to discuss the overall significance of ocean monitoring efforts.

Community Travel (all available CROM staff):
Immediately following the annual workshop, APMI staff traveled to each participating village to identify and train community samplers specifically in the communities with low sampling efforts. Additionally, visits were used to host community informational meetings; these meetings were used to disseminate data from the CROM program and receive feedback from communities. CRRC staff were able to host meetings with Eyak, Nanwalek, Tatitlek, and Qutekcak; Chenega declined a community visit, and CRRC staff will coordinate the remaining two visits with Valdez and Port Graham in fiscal year 2025. Below is an overview of feedback and community interests identified during the meetings:

A. *Eyak (10/03/2024):* the current community sampler is a CRRC staff member who lives in Cordova. Despite the Native Village of Eyak having a Department of Environment and Natural Resources (DENR), they welcomed CRRC staff collecting samples in the community. The community is interested in having shellfish tested given a quick turn-around time. Community members are also interested in testing other traditional food sources for HABs, other contaminants, and/or potential zoonotic pathogens. Feedback from the community included data turn-around time; they suggested that CRRC share community derived data more frequently and that their DENR team would like to be able to use the data to complete their own analysis.
B. *Nanwalek (06/27/2024):* CRRC has partnered with Kachemak Bay National Estuarine Research Reserve (KBNERR) to identify and train interns in the community to attempt to bridge the gap in samples from Nanwalek as the Tribe's Environmental Protection Agency (EPA) Indian General Assistance Program (IGAP) is not currently functioning (see *education and outreach* for more details). During the meeting, community members showed a great interest in marine monitoring and had various ideas for other food sources they would like to monitor. Other areas of interest largely included monitoring of contaminants in the coastal foods and waters (e.g., hydrocarbons and heavy metals). CRRC staff were invited back to other events after this meeting and the community was interested in how CRRC can become more involved with the school.
C. *Qutekcak (08/16/2024):* APMI staff typically conduct the community sampling in Seward, however, after the community meeting, an elder with the Tribe expressed interest and has been sampling with their grandchild since November 2024. Overall, the Tribe was interested in marine sampling and would like to see other potential contaminants explored (e.g., hydrocarbons and heavy metals). They also suggested providing a sign-up sheet for newsletters at the Tribal office for those who do not use social media but want to receive information from CRRC on how community members can be more involved at the APMI facility. Community members also suggest that APMI should increase engagement with the Alaska SeaLife Center (ASLC).
D. *Tatitlek (07/09/2024):* A youth in Tatilek was trained virtually after this community meeting (08/02/2024) but has struggled completing weekly sampling on top of school and travel. Community members were interested in having food sources tested for HABs and their feedback

included expanding testing season into fall and summer months (when they are more likely to harvest shellfish). Community members were also interested in having CRRC staff come back to work with the school frequently.

Data Dissemination and Management):

A. *Axiom Research Workspace:* during the project period, 2022 and 2023 program data for dissolved inorganic carbon, phytoplankton monitoring, and toxins have been archived within the Axiom Research Workspace. 2024 program data have been uploaded and included dissolved inorganic carbon, phytoplankton monitoring, domoic acid, and shellfish toxin data sets. This dataset is currently being reviewed for quality control purposes prior to archival.
B. *Reports:* one technical report was shared during fiscal year 2024 with the Prince William Sound Stewardship Foundations (PWSSF) (Appendix D). A similar interim report on regional baseline ocean water quality data and trends was developed as part of CRRC's Environmental Protection Agency Indian General Assistance Program (EPA IGAP) to share with Chugach tribes and CROM Partners (Appendix C).
C. *Public Service Announcements (PSAs):* when HAB toxin levels were elevated or above regulatory limits, CRRC shared community PSAs directly with Tribals leaders (Appendix D). CRRC supports its Tribes by providing information to Tribal leaders and their communities to support informed shellfish harvests; CRRC is not a regulatory agency and does not implement any regulations in any Tribal or local community.
D. *CRRC Story Map*: CRRC's APMI has created a portal designed by tribes and CROM partners to not only view data but better understand the breadth of capacity APMI has been developing to support the Spill area. The data portal is titled "Ocean Monitoring Data & Maps" and can be found by following this link: https://experience.arcgis.com/experience/c318019b9de74b118644953ca17cee0a/. The maps show maps of ocean monitoring sample locations, as well as maps for visualizing different factors such as pH and water temperature, the Data Explorer allows users to filter data to view specific locations and timeframes and generate charts to compare ocean monitoring data and find patterns and correlations, and the Seward Live Data links to real-time data from Seward, Alaska provided by APMI (supported in part by AOOS).

Networks and Working Groups:

Staff working under the CROM Program participate in the following networks and working groups:

A. *Alaska HAB (AHAB) Network:* the APMI Biology Lab Manager attained a seat on the AHAB steering committee and attended the Network's annual workshop during the Alaska Marine Science Symposium (AMSS). Biology staff also attended the virtual, monthly AHAB meetings.
B. *Alaska OA (AOA) Network:* The Chemistry Lab Manager attended the annual workshop during AMSS, and chemistry staff attended the virtual, monthly AOA meetings.
C. *The Alaska/Washington (AKWA) eDNA working group:* The Biology Lab Manager attended the AMSS workshop and the virtual, monthly AKWA meetings.
D. *CROM quarterly meetings:* staff hosted these meetings through CRRC's IGAP program. These are a set of two meetings: one for CROM samplers in the regional communities, and another for state-wide samplers and managers. Sampler meetings give APMI staff an opportunity to talk about results and give those who are sampling in the communities an opportunity to ask questions and give feedback. The state-wide meetings are for those sampling or managing sampling programs around the state; these meetings were used as a time to trouble shoot assays, discuss partnerships and outreach opportunities, and highlight upcoming events or funding opportunities.

Next Steps:

A. *APMI Annual Workshop:* APMI staff are currently planning the CROM sampler workshop in the spring of 2025. This year's workshop will include a section on eDNA sampling methods and how APMI can incorporate eDNA into marine monitoring.

B. Laboratory:

i. **Validation for qPCR equipment and assays:** APMI staff is currently working to validate molecular methods for detecting HAB species. It is anticipated that the equipment will be validated in spring 2025.

ii. **Protocol adjustments:** In the original project proposal, phytoplankton net tows were to be used for molecular analysis to identify HAB species; it has since been identified that the way these samples have been collected is not an appropriate method for molecular analysis. Samplers collect week net tows, the nets are rinsed after collections, but not properly sanitized. These sampling protocols have the potential for false positives. Additionally, samples are preserved with Lugol's iodine solution and stored at room temperature for weeks at a time. Lugol's iodine and room temperature storage conditions may cause DNA degradation. CRRC staff will adjust methods of sample collection and are working to incorporate and validate effective molecular sample collection methods in regional communities during fiscal year 2025.

iii. **Autoanalyzer procurement and protocols:** the final piece of equipment funded under this program is the autoanalyzer for nutrient analysis to be housed in the APMI chemistry lab. Procurement will begin in fiscal year 2025 and the equipment will be purchased in fiscal year 2026. The Chemistry Lab Manager is currently working to select key analytes, develop sample methods and lab protocols to be implemented and validated in the upcoming reporting period.

C. *Travel:* Due to scheduling conflicts, APMI staff were unable to host community meetings with Valdez and Port Graham. APMI plans to schedule these remaining community meetings in spring 2025.

D. *Reporting Schedule:* as recommended by the Trustee Council, CRRC will complete quarterly reports to increase oversite on program goals and deadlines. Along with quarterly reports to EVOSTC, quarterly updates will be given to regional communities to include reports and raw data. Quarterly updates will also be made to CROM data shared through Axiom's Research Workspace.

Project Setbacks:

Setbacks:

A. *Communication and participation:* during the reporting period, the program has struggled maintaining samplers in Nanwalek, Port Graham, and Tatitlek. APMI will work to engage these communities through the upcoming spring workshop. APMI staff are also engaging with the Nanwalek IRA Council and KBNERR to help identify and train interested samplers in the community. Additionally, samples are often obtained from a dock or harbor; Nanwalek does not have a harbor, which makes water sampling difficult in their community. Community members have collected various water chemistry samples from different areas; APMI staff will continue to work with samplers in the community to identify safe and accessible areas to appropriately collect samples. Shortly after the spring workshop, CROM staff plan to travel to Port Graham to complete the in-person training in the community.

B. *Staff turnover:* CRRC has experienced staff turnover within this program and has maintained limited full-time staff. Regular staff turnover often results in delayed sample coordinating and processing, program communications, and data analysis. Through the CRRC IGAP Coordinator position, CROM staff hosted quarterly meetings with samplers in 2022 and 2023, but due to turnover in this position, sampler communications and quarterly meetings were disrupted. To help remedy gaps in sample coordinating, the Biology Lab Manager took over the coordination responsibility and is currently working to train all new APMI CROM staff to help with coordinating samples. The IGAP Coordinator position has recently been filled (February 2025) and will begin by assisting in scheduling the APMI annual workshop to help introduce them to the program. Additionally, current staff will be working to develop program protocols and procedures, to help with onboarding any future program staff.

C. *Laboratory Infrastructure:* The Chemistry lab experienced several setbacks including water damage from multiple storms and electrical insufficiencies; these setbacks were addressed by CRRC's APMI Facility department in December 2024. Additionally, the Burke-O-Lator supported in part by AOOS that is designed for continuous monitoring experienced malfunctions during a time when the Chemistry Laboratory Manager position was vacant. To preserve the asset, the Burk-O-Lator intended for continuous monitoring was shut down (April 29, 2024). The recently hired Chemistry Lab Manager completed her training with OSU the week of February 17, 2025; she has since returned to APMI to re-establish continuous monitoring in Resurrection Bay and begin analysis on the backlog of discrete community samples. It is anticipated that the continuous monitoring equipment will be up and running by March 2025.

D. *Laboratory analysis turnover time:* During the construction of the new biology laboratory on the APMI campus, UAF provided space for APMI to place the RBA equipment in their Endocrinology Lab at the Seward Marine Center. Because APMI staff had to go through the university's training process and be supervised while working in the Endocrinology Lab, sample analysis was often delayed due to university staff turnover and long absences of remaining staff. This resulted in APMI staff only having access to the equipment on three occasions between May 2024 and February 2025. During those three uses of the Endocrinology Lab, CROM staff used all RBA reagents, and processed all samples agreed upon with UAF in their lab and has since been attempting to decommission the UAF laboratory space. Decommissioning coordination with the UAF began in December 2024 and is ongoing with no end in sight. It is anticipated that the equipment and supplies will be returned to APMI by spring 2025 prior to the start of the shellfish sampling season, but CROM program requests and needs are not a priority of UAF which is an unfortunate setback for the EVOS TC investment in CRRC but out of CRRC's control.

2. Products:

Peer-reviewed publications:
N/A

Reports:
Analytical Report: Prince William Sound Stewardship Foundation Paralytic Shellfish Toxin Report, June 6, 2024 (Appendix D).
Chugach Regional Ocean Monitoring Program Annual Project Status Summary, January 21, 2025 (Appendix D).

Popular articles:
N/A

Conferences and workshops: Within the reporting period, APMI staff presented the CROM Program significance, methods, and data at the following conferences and workshops (presentations are included in Appendix E)

Mariculture Conference of Alaska, Anchorage, AK, February 26-29, 2024.

1. Branson, M. APMI: 30 years of mariculture in Alaska. Oral presentation.

Chugach Regional Resources Commission Annual Subsistence Memorial Gathering: Anchorage, AK March 21, 2024

1. Branson, M. Mariculture and Research at the Alutiiq Pride Marine Institute. Oral presentation.

2. Carl, A. Chugach Regional Ocean Monitoring Program Overview Oral presentation.

American Fisheries Society Alaska Chapter: Seward, AK, March 26 – 29, 2024

1. Jarosz, A., Atkinson, S., Branson, M. Evaluation of Paralytic Shellfish Toxin Congeners in Bivalves from Resurrection Bay, 2021-2022. Oral Presentation.

APMI Annual Water Sampler workshop: Seward, AK, May 2, 2024 (Appendix C)

1. Carl, A. Chugach Regional Resources Commission, Alutiiq Pride Marine Institute, and CROM Overview. Oral presentations.

2. Jarosz, A. HABs Shellfish Sampling Methods and Results. Oral presentation.

3. McKean, C. Ocean Acidification Sampler Training. Oral presentation.

4. Cohen, J. Ocean Acidification Results and Impacts. Oral presentation.

Native American Fish and Wildlife Society Annual Conference: Prairie Island, MN, May 13-17, 2024

1. Carl, A., Jarosz, A., Carl, D., Mailman, E., Leighfield, T., Atkinson, S., Mashburn, K., Branson, M. Chugach Regional Ocean Monitoring Program: Developing techniques and capacity for HAB monitoring to support informed subsistence harvests. Poster presentation.

Kodiak Area Native Association Water Quality Workshop: Kodiak, AK, June 16 – 20, 2024

1. McKean, C. Ocean Acidification Sampler Training. Oral presentation.

Pacific Northwest Indigenous Aquaculture Summit: James Tows S'Klallam Tribe, WA, August 26-28, 2024

1. Carl, A. Chugach Regional Ocean Monitoring (CROM) Program and eDNA Sampling. Oral presentation.

Seward Science Symposium: Seward, AK, September 6 and 7, 2024

1. Branson, M. APMI: 30 Years of Mariculture in Alaska. Oral presentation.

National Tribal and Indigenous Climate Conference: Anchorage, AK, September 9-12, 2024.

1. Kiokun, J. Addressing OA in Southcentral Alaska. Oral presentation.

Global Ocean Acidification Observing Network. November 19, 2024

1. Branson, M. Community Sampling for Ocean Acidification. Virtual oral presentation (OA Week 2024 - Arctic Hub Session start: 49:00).

Alaska Marine Science Symposium: Anchorage, AK, January 27-31, 2025

1. Carl, A., Branson, M., Jarosz A., Carl D., Hetrick-Price, W. Chugach Regional Ocean Monitoring Program: Community Driven Monitoring in Southcentral Alaska. Poster Presentation.

2. Haas, M., Carl, A., Jarosz, A., Branson, M., Conant, C., Hetrick, J. Domoic Acid Concentrations in Blue Mussels (*Mytilus edulis*) in Resurrection Bay, Seward, Alaska. Poster presentation.

Public presentations: Within the reporting period, CRRC staff presented this project at the following public events (presentations included in Appendix F).

PWSSF Natural History Symposium, Whittier, AK, May 14th, 2024
McKnight, R. Introduction to the Chugach Peoples and Land Acknowledgement. Oral Presentation.

Stewards of the Bay: Community Connections Series, Seward, AK, October 2024.
McKnight, R., McKean, C. Ocean Wellbeing and Ocean Acidification. Oral presentation.

Chugach School District Science Week, Whittier, AK, September 12, 2024.
Murphy, B., McKnight, R. CRRC: Kelp and Ocean Acidification and Algae. Oral presentation and student activity.

Prince William Sound Science Center's Tuesday talks, Cordova, AK. October 1, 2024
McKnight, R., Conant, C. Community Wellness. Oral presentation.

Mt. St. Ellis elementary school culture week, Cordova, AK, October 3, 2024
Kiokun, J., Carl, A. Introduction to Scientific Marine Monitoring. Oral presentation and student activity.

Data and/or information products developed during the reporting period:
CRRC is currently finalizing a GIS story map, funded through this grant and the EPA IAGP program. CRRC is also featured in the AOOS GIS story map (Gulf of Alaska Data Portal: Map portal). Both products report data collected from this program.

Data sets and associated metadata:
Complete datasets for all activities under this award are available to the public online at the Alutiiq Pride Marine Institute website (www.alutiiqprideak.org/crom). Data sets are also uploaded annually to the

Axiom Research Workspace and are available to the public through the AOOS Gulf of Alaska Data Portal (https://gulf-of-alaska.portal.aoos.org/#metadata/7825fa08-4bc8-4032-836c-1b3f08fcd0a1/project/files).

Data from this program are shared to the Alaska Ocean Observing System through both the AHAB Network (https://ahab.aoos.org) and the Alaska Ocean Acidification Network (https://aoan.aoos.org/).

Additional Products not listed above:
CRRC recently updated their Alutiiq Pride quarterly newsletter format (Appendix G). The recent addition included an update to the biology laboratory space used for processing program samples. Newsletters are shared via social media and are available to the public through the CRRC website (https://crrcalaska.org/category/news/).

3. Coordination and Collaboration:

The Alaska SeaLife Center or Prince William Sound Science Center:
Through CRRC's involvement with the Community Organized Restoration and Learning (CORaL) Network (Project Number 24220400), CRRC has kept the Alaska SeaLife Center or Prince William Sound Science Center apprised of efforts of this funding. Efforts to share data will continue. See more details under *the EVOSTC Education and Outreach Program* for more information.

EVOSTC Long-Term Research and Monitoring Program:
N/A

EVOSTC Mariculture Projects:
Samples and environmental data for this project are collected near kelp farm test sites funded by EVOSTC (Project Number 24220300), Prince William Sound Kelp Mariculture Development for Habitat Restoration and Local Economy. The near-shore costal data collected through the CROM project will supplement the kelp project data collection and should serve to inform performance assessments for current and future aquatic farm sites.

EVOSTC Education and Outreach Program

A. Data from this project are shared through the CORaL Network, an EVOSTC funded collaboration between the Alaska SeaLife Center (ASLC), Prince William Sound Science Center (PWSSC), Center for Alaskan Coastal Studies, Alaska Sea Grant, the Alutiiq Museum & Archaeological Repository, and Chugach Regional Resources Commission (EVOSTC Project Number 24220400). The CORaL Network is designed to build upon existing resources within the spill effected region through collaborative efforts. The overarching goals are to ensure that science outreach is relevant, co-created, and culturally responsive to regional communities encouraging public use of available knowledge & resources related to the EVOS region. CROM data and information was shared with the public, Tribes, and researchers through the following CORaL program events:
    i. Seward Science Symposium: The CROM Program posters and oral presentations were featured during the Symposium on September 6 and 7, 2024 (Appendix F). The APMI

facility also gave tours and local students learned about the CROM program throughout the tours.

ii. Collective Alaska Native Perspective (CANP): The CROM Program was featured at the CANP workshop that was hosted in Kodiak, April 8-10, 2024. CROM staff participate in CANP to understand impacts from research and western science on Indigenous communities.

iii. Stewards of the Bay: Community Connection Series: CROM discussions were held during these series events in October 2024 (Appendix F).

iv. Community Coastal Experience: CRRC is working with ASLC, APMI, and the Qutekcak Native Tribe to provide a dynamic science and cultural education program called the Community Coastal Experience in partnership with CORaL Network. CROM efforts were included in this project as well.

v. Southcentral Alaska Collaborative for Resilience through Education and Decision-making (SACRED) Project: CRRC is a partner in the SACRED project, established to deepen the exchange of knowledge and experiences on the topics of environmental change, community engagement, and long-term relationship building to advance community resilience in Southcentral Alaska. This program maintains a specific focus on environmental observation skill building, hands-on activities, and shared learning together. The CROM Program is among the topics discussed at SACRED gatherings. CRRC has also collaborated with KBNERR through their internship program to increase sampling efforts in Nanwalek.

vi. Site Visits and School Tours: APMI & CRRC has successfully supported general outreach and education related to APMI CROM efforts through the CORaL Program. Local school groups have visited APMI for site tours, led by APMI staff. CRRC's education and outreach team has begun to develop a procedure for sharing work and data in regional communities. This development included educational materials to reinforce understanding of marine health & mariculture related to APMI projects.

Other Collaborations and efforts funded under this program:

A. Prince William Sound Stewardship Foundation: CRRC Regularly participates the PWSSF projects and events. The PWSSF hosts their annual summer projects, during which time, participants will collect blue mussel samples from Prince William Sound, which are then frozen and sent to APMI for HAB toxin analysis. The Foundation also hosted the annual Natural History Symposium in Whittier and CRRC staff were invited to start the day with an introduction to the region and highlights from the CROM program (Appendix F).

B. Kodiak Area Native Association water quality workshop: CRRC regularly partnered with other Tribal organizations through the CROM Program; in the reporting period, CRRC staff travel to Kodiak to help present water sampling methods to neighboring Tribes (Appendix C).

C. NOAA NCCOS HAB Cyst Cruise: The biology lab tech participated in a research cruise to Kodiak to sample sea floor sediments for HAB species from March 24, 2024 – April 6, 2024. The APMI facility has attempted culturing certain HAB species with little success. Participation in the research cruise allowed CRRC staff to network and build relationships with other researchers studying HABs.

D. CRRC Tribal Fish and Wildlife Department (TF&WD): The Biology Laboratory Manager participates in various TF&WD programs including regulatory training and marine mammal management meetings. For regulatory training, CRRC brings Tribal members, management

agencies, and other professionals together to discuss regulatory processes in the State of Alaska, how they impact subsistence resources, and how Tribal members can get involved in the regulatory process. Participating in this training allows CROM staff to better understand community needs related to access to subsistence resources. TF&WD has also hosted marine mammal workshops with tribal, state and federal agencies. During these workshops the Biology Laboratory Manager gave brief overviews of the CROM program and laboratory updates related to molecular monitoring capabilities. CRRC staff engaged in discussions about management of subsistence species and field and laboratory methods of monitoring them.

E. Seldovia Village Tribe (SVT): During the project period, staff from APMI collaborated with Seldovia Village Tribe on CROM sampling protocols. APMI made two trips to Seldovia for sampler training and review; during these trips, APMI staff worked with SVT on beach surveys in Jackolof Bay to collect various substance use species for biotoxin analysis. These surveys were also used in part for out planting efforts to help understand mariculture methods related to bivalve out planting initiatives.

EVOSTC Individual Projects not listed above:

APMI has been able to support the following students that have used CROM data as part of their educational development:

A. *APMI Internships:* APMI hosts a marine science internship for youth (high school, recent high school graduates, and new college students). In Seward, APMI participated in internship development in collaboration with Seward High School which allows local students to receive school credit for internship participation. This internship is designed to inform students of the scientific fields represented at APMI and how they relate to marine health and cultural continuity. The internship exposes students to three tracks of focus: Mariculture, Chemistry, and Biology, and includes a focused project at the end of the internship.
    i. A Seward High School student participated in CRRC's Internship program during the spring and fall semesters in fiscal year 2024. Her fall in internship was an introduction to all projects at the APMI facility. Her second semester was an in-depth analysis of domoic acid presence in blue mussels in resurrection bay. Under the supervision of APMI staff, this student conducted three ELISAs on Seward blue mussels from the years 2022-2024. Results from this project were detailed in a poster presentation and presented at the 2025 Alaska Marine Science Symposium (Appendix E).
    ii. A 2024 high school graduate with familial ties to Seward, participated in the internship during the summer of 2024. She completed the general APMI overview of programs, then focused her project on marine sampling and processed samples in the chemistry lab. Her project consisted of analyzing dissolved inorganic carbon in marine samples taken from different depths using a Niskin water sampler. The internship concluded with a presentation to CRRC Staff on project findings.

B. *PWSC Undergraduate:* in the fall semester 2024, a student in Valdez participated in eDNA sampling. She is studying eDNA and her project involved investigating different sample preservation methods sample preservation methods. Throughout the reporting period she collected water filters and sent them to APMI for DNA extractions and concentrations. Samples will be reported on after equipment has been validated.

C. *University of Alaska Graduate Programs*:

i. The Current APMI Mariculture Director is enrolled in the Master of Science program at UAF CFOS using CROM data for her thesis. Her project focuses on saxitoxin congener profiles in various species throughout different seasons and analyzes the correlations between size and toxicity in butter clams.
ii. The APMI Biology Lab Manager was admitted into the University of Alaska Anchorage's Department of Biological Sciences Graduate Program in the fall of 2023 to pursue a Master of Science. Her thesis project focuses on intertidal eukaryotic diversity and, in part, produces data related to harmful algal species presence in multiple areas of Resurrection Bay. This project is also working to validate self-preserving filters for field use in rural communities and remote sampling areas.

Trustee or Management Agencies:
CRRC's APMI staff submit annual holding permits through the Alaska Department of Fish and Game (Appendix H). Blue mussels are collected in bulk in April and are held in a mussel net at the dock where samples are collected. Permits allow community samplers to hold blue mussels on the dock throughout the sampling season.

Indigenous and Local Communities: CROM was created at the request of CRRC's board, that is 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's Executive Director provided detailed updates at the following CRRC's Board of Directors' meetings through distribution of Board packet material. The Executive Director also requested each Board member to encourage their Tribe to heighten the participation of their community samplers.

1. March 20, 2024
2. June 24, 2024
3. September 24, 2024
4. December 10, 2024

The inception of this program was a desire for shellfish safety monitoring in the CRRC communities, as expressed to CRRC staff by Tribal members. Below is a list of outcomes from the CROM program through Indigenous and local community engagement that occurred during the reporting period:

A. *CROM Travel outcomes:* Through the CROM community visits designed to identify and train program samplers, CRRC staff were able to engage Tribal communities about a variety community interest. All communities visited requested increased collaborations with CRRC largely relating to education.
   i. Nanwalek extended the invitation to Sea Week and has encouraged CRRC to engage with the community's school.
   ii. Tatitlek extended the invitation to CRRC to engage with the school to talk to students about marine resources and sampling.
   iii. Qutekcak encouraged increased news updates from CRRC and APMI. This meeting also resulted in a Tribal elder and her granddaughter volunteering to complete CROM sampling in Seward.

iv. Eyak expressed interest in monitoring additional clam beds for HABs toxins.

B. *Regional Samplers:* a Kenai Peninsula Borough School District student participated in APMI's 2024 Summer internship and focused on their project on mariculture initiatives. This participant is currently a student at PWSC and started to collect ocean chemistry and HABs samples in Valdez during the project period.

C. *Additional Sampling Sites:* In addition to monitoring Chugach communities, the CROM program accepts samples through various partnerships which include Tribes and citizen scientists throughout the region and state (Table 7). These samplers expressed an interest in specific environmental parameters related to their communities. They are responsible for coordinating samples with APMI staff, and the CROM program provides sampling supplies (e.g., reusable bottles, phytoplankton nets, mussel bags, preservatives, data sheets, etc.). Samples collected through collaborative efforts are included in CROM datasets and samples coordinated are included in Tables 2-6.

Table 7. Types of samples received from external entities

Participating Entity	**Sample Types Received**
The City of Adak	Ocean chemistry
KBNERR (Homer)	Phytoplankton tows and Ocean chemistry
Kenaitze Indian Tribe	Ocean chemistry
Kodiak Area Native Association	Ocean chemistry
PWSSF	Blue mussels
Seldovia Village Tribe	Shellfish, phytoplankton tow, ocean chemistry
Qawalangin Tribe of Unalaska	Ocean Chemistry

4. Response to EVOSTC Review, Recommendations and Comments (if applicable):
Previous comments received on Project 24220201 were omitted from this report. Those can be found in the Biennial Review of FY22-FY23 Program and Projects, Report to the Truste Council, Drafted October 7, 2024, and Updated February 4, 2025. 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.

Science Panel Comments
Date: September 2024
The SP recognizes and fully supports the substantial advances in capacity building in analytical techniques accomplished by the project, especially in analytical lab capabilities and the building of a sampling network. However, we continue to have grave concerns about the ability of the program to achieve its broader goal of filling the gap in informing native subsistence and aquaculture harvests about the distribution of HABs and shellfish toxins in SE Alaska. Unless addressed, issues we previously raised regarding the timing and number of samples will prevent the network from attaining its goal. The low number of samples, while understandable given logistical and personnel issues described by the PIs, will render the goal of providing timely information to native communities unrealized. Even with likely disclaimers about the utility of the data, we raised a concern that undersampling resulting in false negatives for HAB or toxin levels in shellfish could provide a false sense of safety that could endanger human health. Before rolling out any sort of publicly available information, we strongly suggest that the PIs ensure that sampling protocols (including frequencies, locations, and sample sizes) are sufficient to

ensure detection or conform to published guidelines. Since State or Federal guidelines do not currently exist, the following reports may be helpful: Framework for the National Harmful Algal Bloom Observing Network: A Workshop Report and Implementation Strategy for a National Harmful Algal Bloom Observing Network (NHABON).

PI Response: As proposed, Project 24220201 is a ten-year project and was designed as such. The Science Panel's concerns about sample numbers and timing fail to recognize that this is a long-term monitoring project still in its early phases. Expecting comprehensive, decision-ready data within the first two years of a multi-year effort is unrealistic and inconsistent with the trajectory of similar programs. Gulf Watch Alaska (GWA), for example, took years to build the datasets necessary to inform predictive models, despite benefiting from decades of prior research. Developing robust, reliable monitoring takes time—there are no shortcuts.

In order to have a successful, long-term monitoring program, in-house analytical lab capabilities and the building of a sampling network are required to come first. Developing this capacity takes a substantial amount of time. Despite these early-stage challenges, CRRC has already made significant progress in laboratory capacity, field sampling infrastructure, and community engagement. Expanding sampling coverage requires sustainable partnerships, trained personnel, and logistical coordination, all of which are being systematically addressed. The alternative—rushing incomplete, low-quality data—would do more harm than good.

Our organization takes data integrity seriously and will not compromise quality for the sake of faster reporting. While CRRC acknowledges the need for more samples, this issue is being actively addressed through increased outreach, expanded partnerships, and improved methodologies. The assertion that this program may provide a false sense of security due to under sampling ignores the fact that every dataset includes limitations, and risk communication strategies are already in place.

In short, the CROM Program staff are fully aware of the challenges of early-stage data collection, and we are taking the necessary steps to ensure this program delivers credible, long-term results—just as other successful monitoring programs have done.

Lastly, this project supports communities in Southcentral (SC) Alaska, not Southeast (SE) Alaska.

Executive Director Comments
Date: October 2024
Annual reports were submitted on time but required major revisions. Revisions required multiple email reminders to the PI. The PI has not been very responsive to staff communications, some FY23 invoices were held until an acceptable FY23 annual report revision was submitted and staff questions were answered. 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. We would like future annual reports to be reviewed before submitting to Council staff and an improvement in PI responsiveness to staff communications. We also suggest that the PI alert staff to any long absences that may affect report submission deadlines and responsiveness.

PI Response: The current PIs acknowledge the challenges related to the timely submission and revision of the FY23 annual report and appreciate the Council staff's feedback on improving the process. CRRC has spent months preparing for the FY24 annual report and committed to enhancing internal review procedures to ensure that future reports, starting with FY24, meet the expectations of the EVOS TC upon initial submission. In FY25, CRRC will switch from annual to quarterly reporting to increase oversight on the CROM project.

Regarding staff communications, the Co-PI of this project/Executive Director of CRRC takes full responsibility for this identified shortfall. Proper internal protocols to ensure that EVOS TC staff inquiries and revision requests were not handled efficiently during a long absence of the previous Co-PI and assumptions from a place of trust were made that all was well. Post staff turnover, CROM staff have established clearer internal protocols for communication with EVOS TC staff. Additionally, both PIs, with support of CRRC's administrative department, will proactively notify Council staff of any extended PI absences that may impact reporting deadlines or answering other inquiries.

While we acknowledge that the volume of supporting documents can occasionally lead to minor administrative oversights, we remain committed to maintaining transparency and accuracy in financial reporting. This practice is mutually beneficial as CRRC annually conducts a federal and state single audit. We appreciate the acknowledgment of the Fiscal Manager's responsiveness and are pleased to have hired a seasoned Grant Accountant to support this project who comes to CRRC with significant experience managing EVOS TC 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 alternate sampling strategies and the potential for utilizing other professionals. Branson stated they obtained funds to support a full-time CRRC staff member in each community to address sampling issues. They explored working with school districts; Prince William Sound College is taking all their samples in Valdez. Cook Inlet Aquaculture also does a great job.

PI Response: To address sampling limitations and enhance coverage, CRRC has actively explored alternative sampling strategies and professional collaborations. We have secured funding from NOAA's Coastal Habitat Restoration and Resilience Grants for Tribes & Underserved Communities notice of funding opportunity to support CRRC staff in each participating Chugach community, ensuring more consistent sampling efforts. Not only will there be staff in each community, but existing CRRC and APMI staff will be trained in the spring of 2025 to sample when their departments are traveling to the communities. Additionally, CRRC is partnering with local school districts, such as Prince William Sound College in Valdez, to engage students in sample collection, fostering both education and workforce development. Collaborations with organizations like Cook Inlet Aquaculture Association, Prince William Sound Aquaculture Corporation, the Prince William Sound Stewardship Foundation, and the KBNERR further supplement sampling efforts, extending monitoring capacity beyond CRRC personnel. CROM staff continue to assess best practices and implement strategies that increase efficiency, improve geographic coverage, and strengthen community-based monitoring to achieve project goals.

CRRC's also make every effort to ensure strong Tribal participation, recognizing that engagement must be built on respect, trust, and cultural sensitivity. Our communication approach prioritizes relationship-building with community members and leaders, acknowledging that participation depends on local priorities, traditions, and resource availability. We remain committed to working collaboratively with Tribes to develop solutions that align with their needs while strengthening long-term monitoring efforts.

5. Budget:

~~At~~

Budget Category:		Proposed FY 22	Proposed FY 23	Proposed FY 24	Proposed FY 25	Proposed FY 26	5- YR TOTAL PROPOSED	ACTUAL CUMULATIVE
Personnel		$343,695	$352,287.38	$361,094.56	$370,122	$379,375	$1,806,574	$569,200.07
Travel		$17,452	$35,860.00	$17,452.00	$35,860	$17,452	$124,076	$59,413.81
Contractual		$23,925	$17,725.00	$17,725.00	$22,725	$18,925	$101,025	$46,893.83
Commodities		$21,150	$16,800.00	$17,050.00	$16,800	$19,900	$91,700	$112,254.66
Equipment		$150,000	$0.00	$0.00	$0	$40,000	$190,000	$192,903.88
Indirect Costs	Rate = 14.92%	$60,608	$63,062.72	$61,667.58	$66,470	$64,999	$316,808	$121,919.31
SUBTOTAL		$616,830	$485,735.10	$474,989.14	$511,977	$540,651	$1,102,586	$1,102,585.56
General Administration (9% of subtotal)		$55,515	$43,716	$42,749	$46,078	$48,659	$236,716	N/A
PROJECT TOTAL		$672,345	$529,451	$517,738	$558,054	$589,310	$2,866,899	
Other Resources (In-Kind Funds)		$0	$0	$0	$0	$0	$0	

INSTRUCTIONS: The above table provides a five-year overview (FY 22-26) of proposed funding and actual cumulative spending for **non-trustee agencies**. **The formulas reference the cells in the budgets below and should automatically populate. Please make sure the totals given are correct. Other Resources (In-Kind Funds) will need to be entered manually. Enter the agency indirect rate in cell C9.** 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: Rebudget request, year 2. Adjustments are to remove 86k in personnel and move 54k to Commodities and 35k to Equipment, in addition to an indirect adjustment based on the equipment expense and updated indirect rate of 15.26%.

***Exxon Valdez* Oil Spill Trustee Council**

Long-Term Research and Monitoring, Mariculture, Education and Outreach

Annual Project Status Summary

Budget Category:	Proposed FY 22	Proposed FY 23	Proposed FY 24	Proposed FY 25	Proposed FY 26	5-YR TOTAL PROPOSED	ACTUAL CUMULATIVE
Personnel	$343,695	$266,046	$361,095	$370,122	$379,375	$1,720,332	$583,619
Travel	$17,452	$35,860	$17,452	$35,860	$17,452	$124,076	$65,440
Contractual	$23,925	$17,725	$17,725	$22,725	$18,925	$101,025	$53,553
Commodities	$21,150	$71,044	$17,050	$16,800	$19,900	$145,944	$119,635
Equipment	$150,000	$35,443	$0	$0	$40,000	$225,443	$159,439
Indirect Costs (report rate here)	$60,608	$59,617	$61,668	$66,470	$64,999	$313,362	$160,655
SUBTOTAL	$616,830	$485,735	$474,989	$511,977	$540,651	$2,630,182	$1,142,340
General Administration (9% of subtotal)	$55,515	$43,716	$42,749	$46,078	$48,659	$236,716	N/A
PROJECT TOTAL	**$672,345**	**$529,451**	**$517,738**	**$558,054**	**$589,310**	**$2,866,899**	
Other Resources (In-Kind Funds)	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	

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 worksheets. 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.

FY22-26

Project Number: 22220201
Project Title: CROM
PI(s): Branson (CRRC)

SUMMARY TABLE

~~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 a 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.~~

6. Figures:

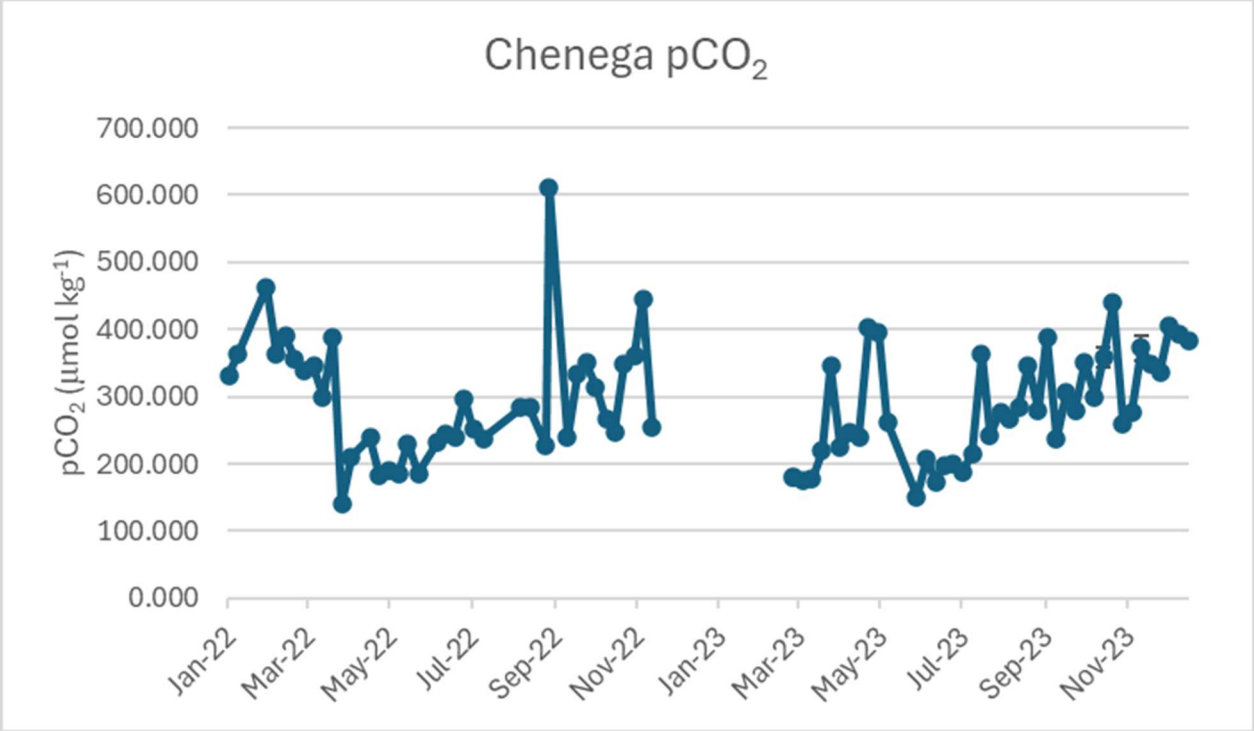

Figure 1. pCO_2 at Chenega for samples collected from 01/16/2022 - 12/31/2023. The Chenega sample set contains 4 triplicates (05/26/2022, 06/26/2022, 10/29/2023, and 12/31/2023) and 1 duplicate (11/26/2023). Standard deviation between triplicate and duplicate samples denoted by error bars are as follows, respectively: ±1.225, ±2.301, ±18.753, ±14.079, and ±12.126.

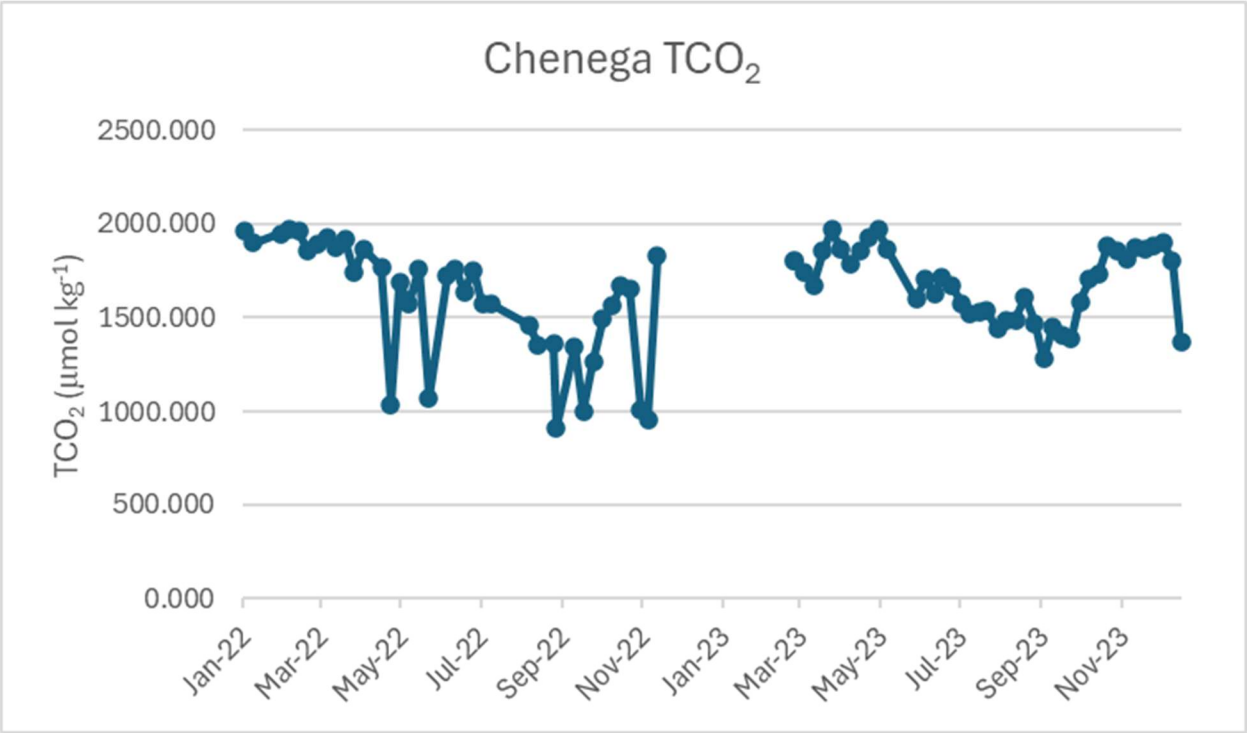

Figure 2. TCO_2 at Chenega for samples collected from 01/16/2022 - 12/31/2023. The Chenega sample set contains 4 triplicates (05/26/2022, 06/26/2022, 10/29/2023, and 12/31/2023) and 1 duplicate (11/26/2023). Standard deviations between duplicate and triplicate sets are as follows, respectively: ±4.045, ±2.966, ±0.740, ±18.119, and ±7.290. Error bars are not visible due to small standard deviation values.

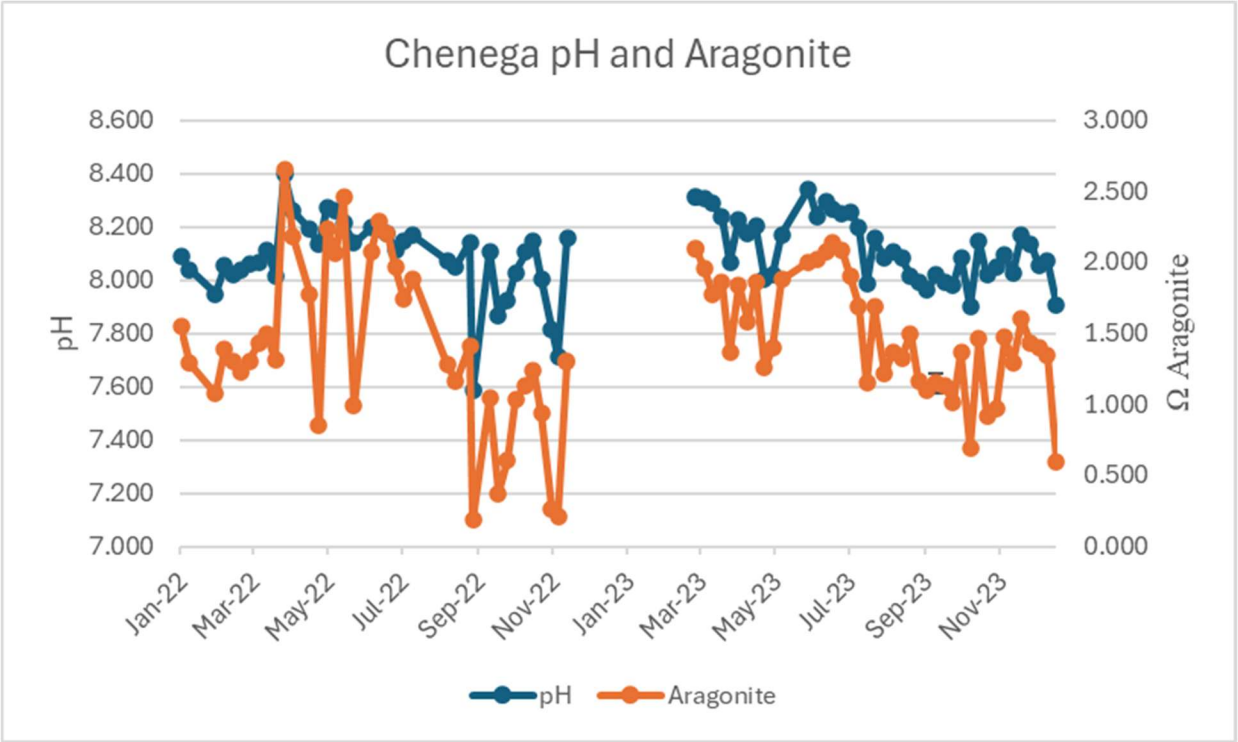

Figure 3. pH and aragonite saturation at Chenega for samples collected from 1/16/2022 - 12/31/2023. The Chenega sample set contains 4 triplicates (05/26/2022, 06/26/2022, 10/29/2023, and 12/31/2023) and 1 duplicate (11/26/2023). Standard deviation between triplicate and duplicate sample pH measurements denoted by error bars and are listed as follows, respectively: ±0.003, ±0.004, ±0.022, ±0.021, and ± 0.016. Standard deviation between triplicate and duplicate sample aragonite measurements denoted by error bars and are listed as follows, respectively: ±0.019, ±0.019, ± 0.054, ±0.071, and ± 0.026.

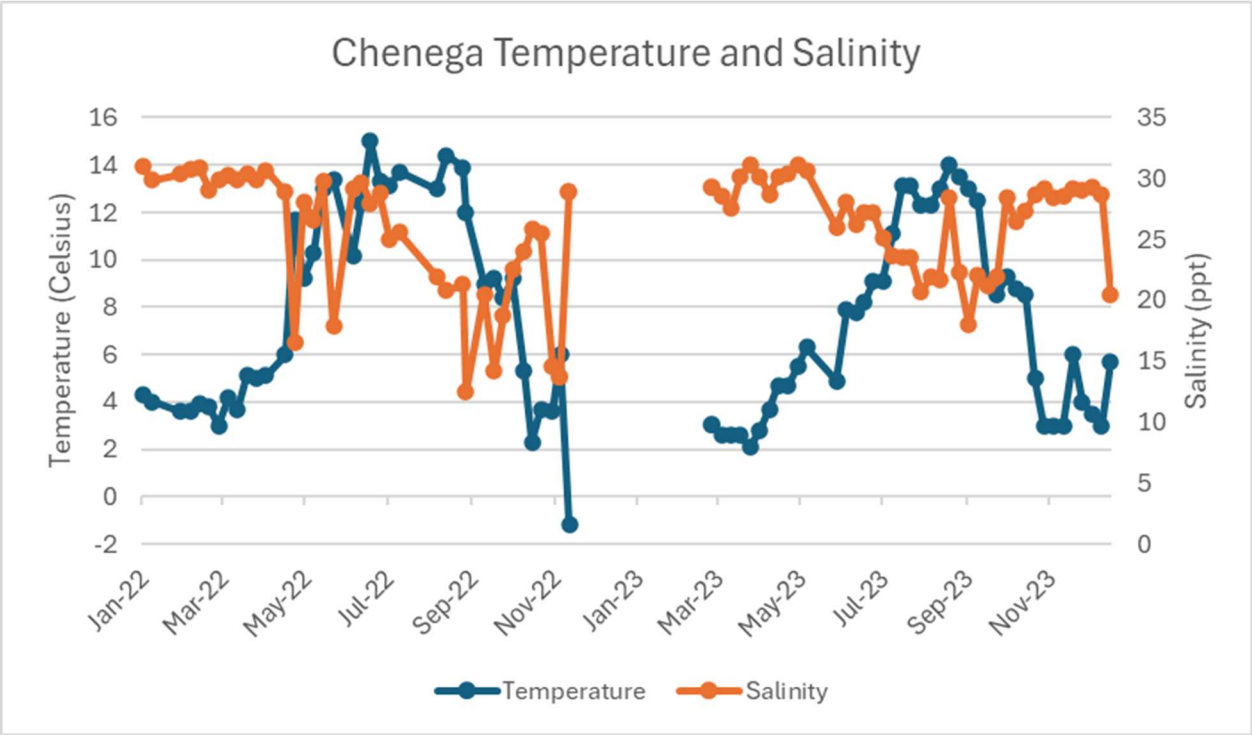

Figure 4. Temperature and salinity at Chenega for samples collected from 01/16/2022 - 12/31/2023. The Chenega sample set contains 4 triplicates (05/26/2022, 06/26/2022, 10/29/2023, and 12/31/2023) and 1 duplicate (11/26/2023). Standard deviation between salinity measurement for 11/26/2023 duplicates at ±0.071 and standard deviation between salinity readings for 12/31/2023 triplicates at ±0.058. Error bars are not visible due to small standard deviation values.

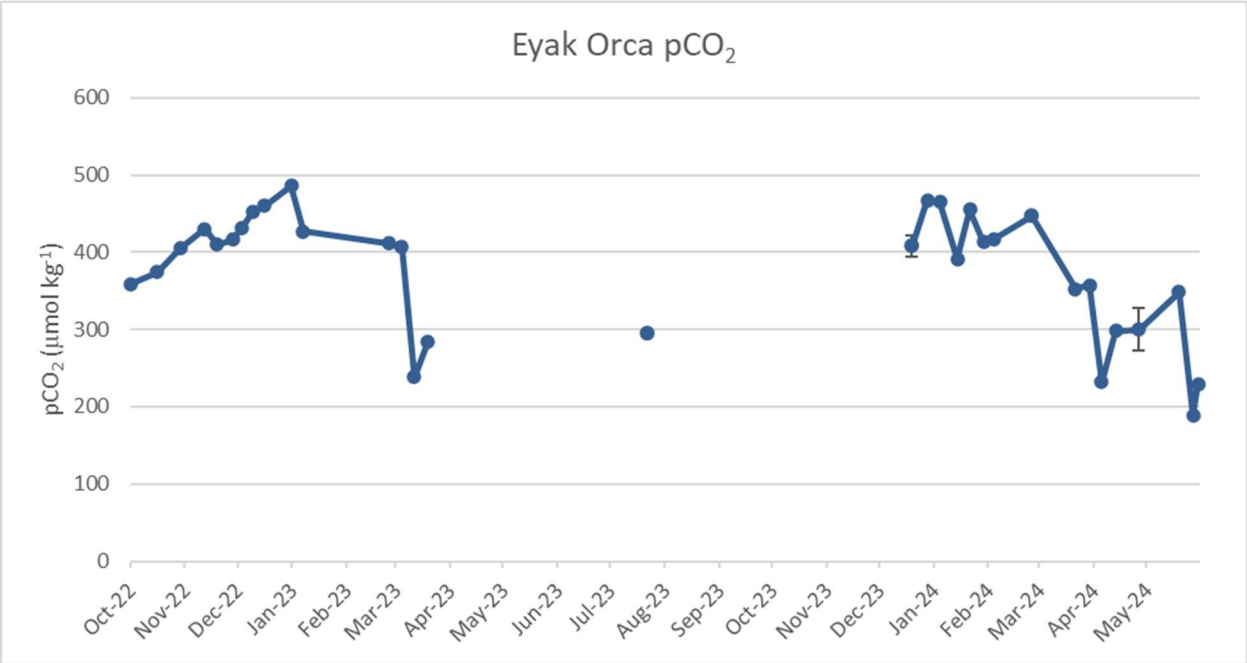

Figure 5. pCO_2 at the Eyak Orca site for samples collected from 10/19/2022 - 06/17/2024. The Orca data set contains 5 triplicates (01/06/2024, 02/08/2024, 04/08/2024, 05/14/2024, and 06/14/2024). Standard deviations between triplicate samples denoted by error bars and are listed as follows, respectively: ±13.614, ±2.838, ±3.261, ±27,287, and ±0.994.

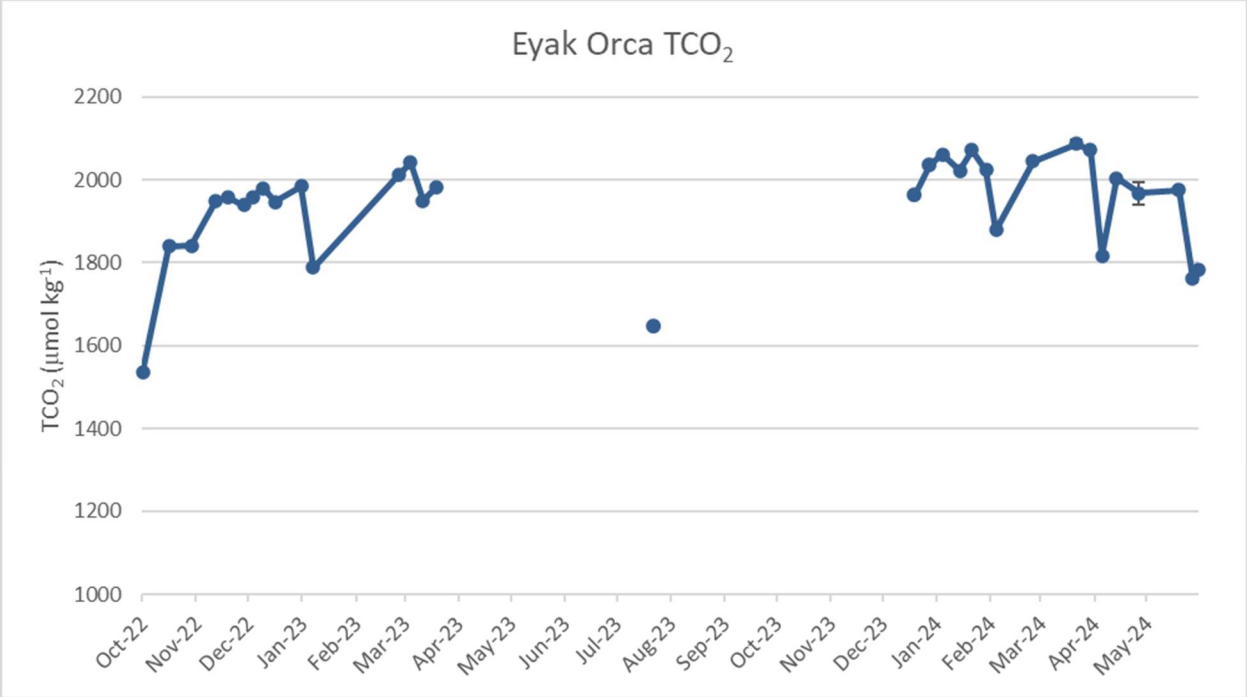

Figure 6. TCO_2 at the Eyak Orca site for samples collected from 10/19/2022 - 06/17/2024. The Orca data set contains 5 triplicates (01/06/2024, 02/08/2024, 04/08/2024, 05/14/2024, and 06/14/2024). Standard deviations between triplicate samples denoted by error bars and are listed as follows, respectively: ±7.139, ±5.798, ±9.791, ±27.071, and ±7.0334.

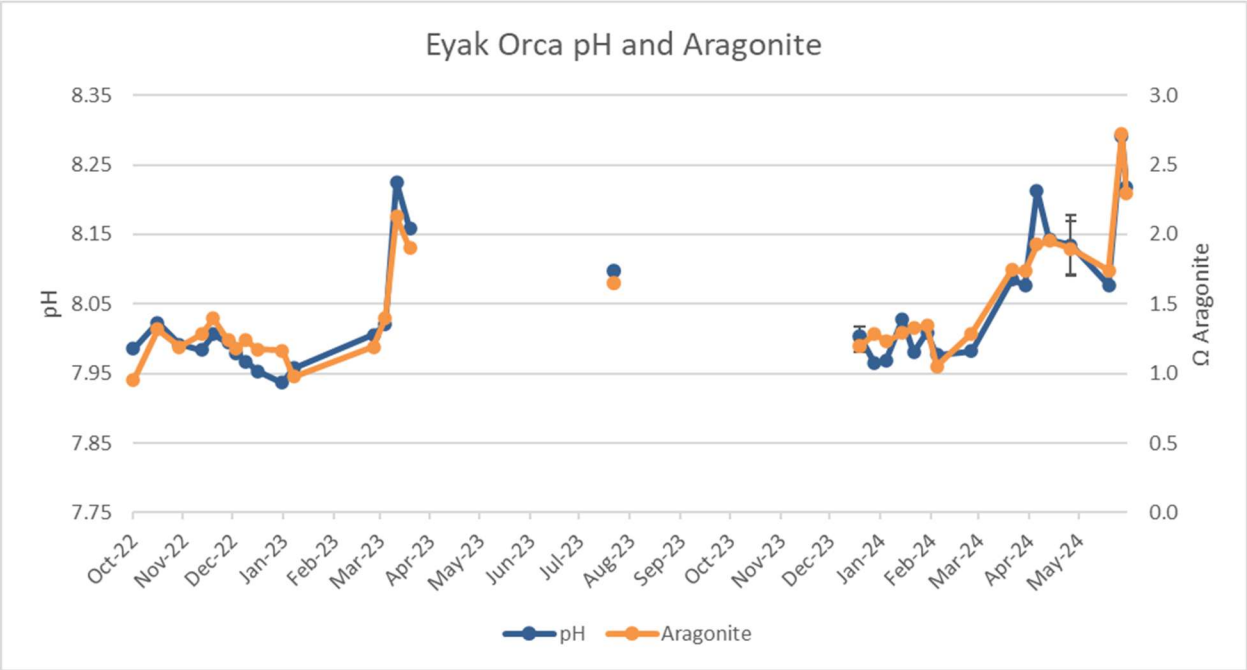

Figure 7. pH and aragonite saturation at the Eyak Orca site for samples collected from 10/19/2022 - 06/17/2024. The Orca data set contains 5 triplicates (01/06/2024, 02/08/2024, 04/08/2024, 05/14/2024, and 06/14/2024). Standard deviations between triplicate sample pH measurements denoted by error bars and are listed as follows, respectively: ±0.015, ±0.002, ±0.003, ±0.042, and ±0.001. Standard deviations between triplicate sample aragonite measurements denoted by error bars and are listed as follows, respectively: ±0.044, ±0.002, ±0.014, ±0.196, and ±0.008.

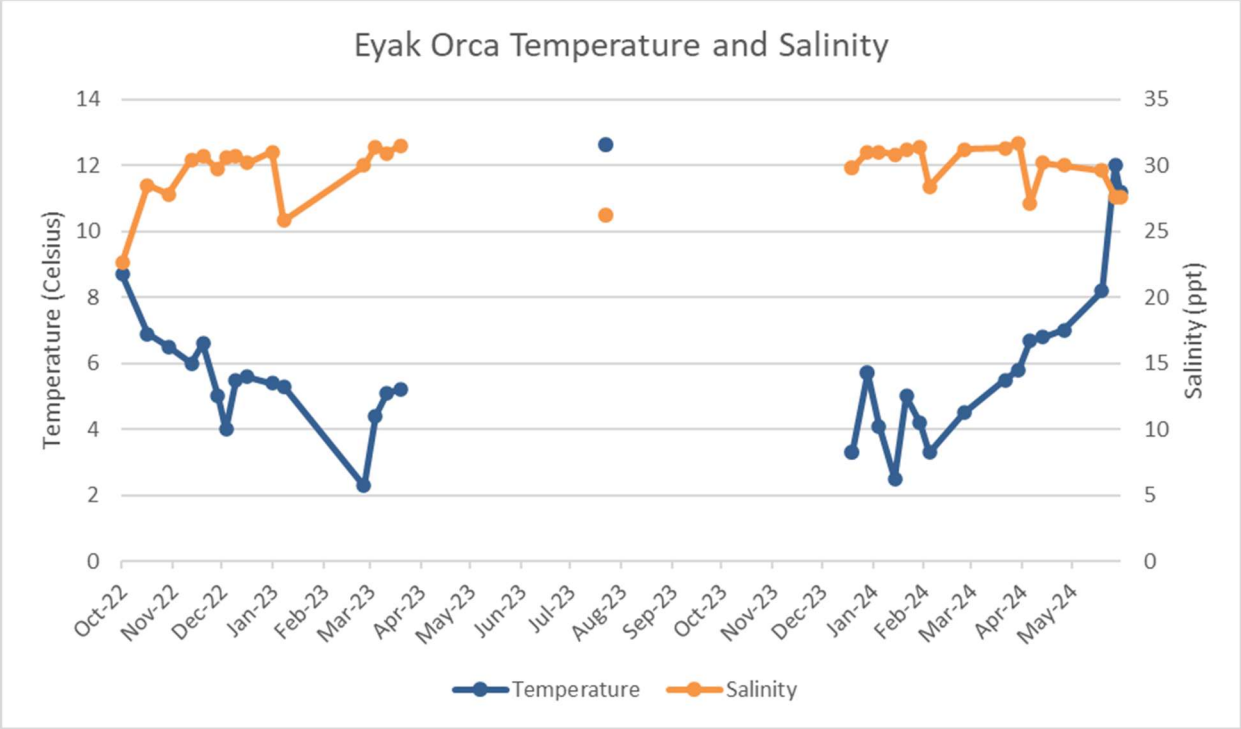

Figure 8. Temperature and salinity at the Eyak Orca site for samples collected from 10/19/2022 - 06/17/2024. The Orca data set contains 5 triplicates (01/06/2024, 02/08/2024, 04/08/2024, 05/14/2024, and 06/14/2024). Standard deviation between salinity measurement for 02/08/2024 triplicates at ±0.058. Error bars are not visible due to small standard deviation values.

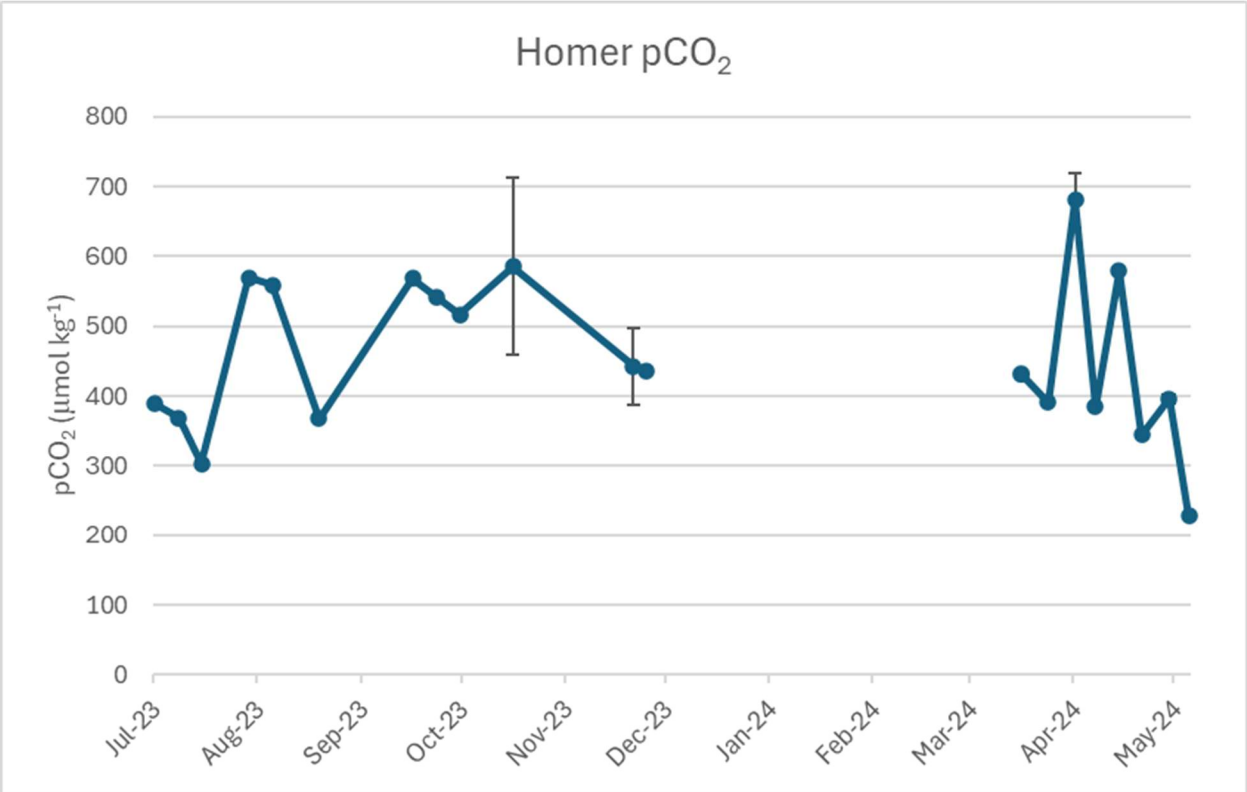

Figure 9. pCO_2 at Homer site for samples collected from 07/11/2023 - 05/15/2024. The Homer data set contains 3 triplicates (07/25/2023, 04/11/2024, and 05/09/2024) and 2 duplicates (10/26/2023 and 12/01/2023). Standard deviation between triplicate and duplicate sets denoted by error bars and are listed as follows ±3.418, ±126.453, ±54.705, ±39.259, and ±6.144.

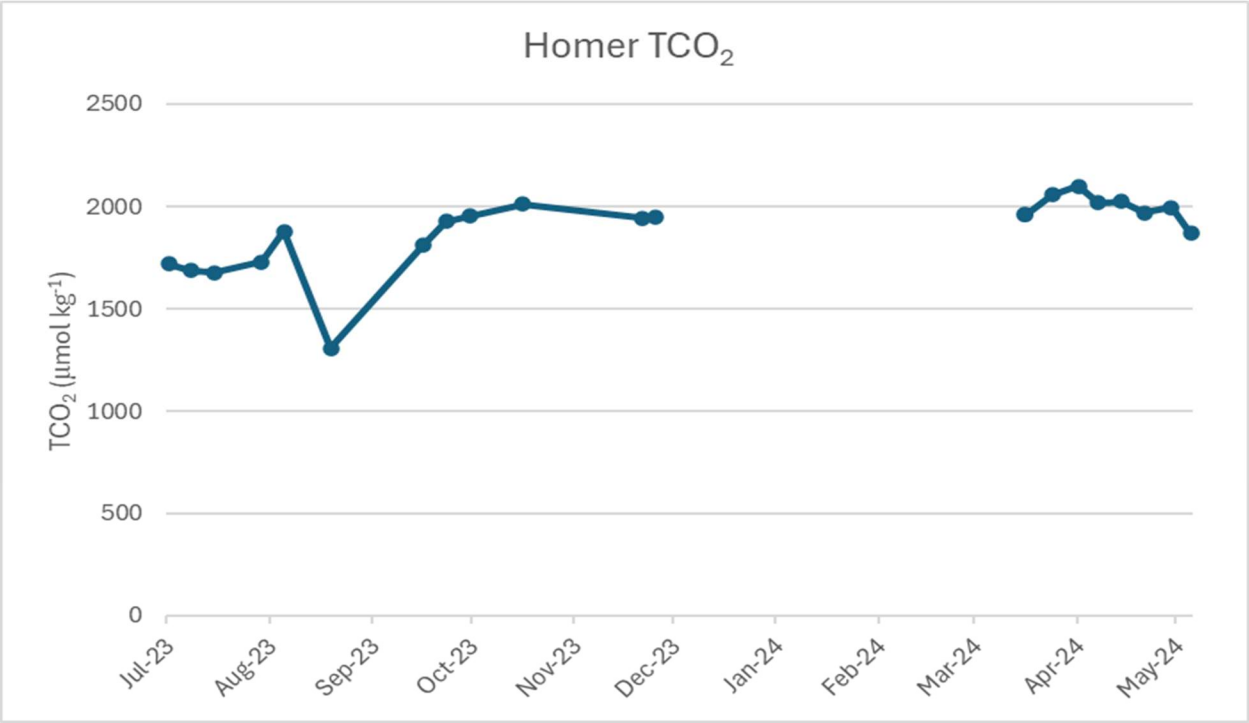

Figure 10. TCO_2 at Homer site for samples collected from 07/11/2023 - 05/15/2024. The Homer data set contains 3 triplicates (07/25/2023, 04/11/2024, and 05/09/2024) and 2 duplicates (10/26/2023, and 12/01/2023). Standard deviations between duplicate and triplicate sets are as follows, respectively: ±5.093, ±3.955, ±9.715, ±2.351, and ±1.009. Error bars are not visible due to small standard deviation values.

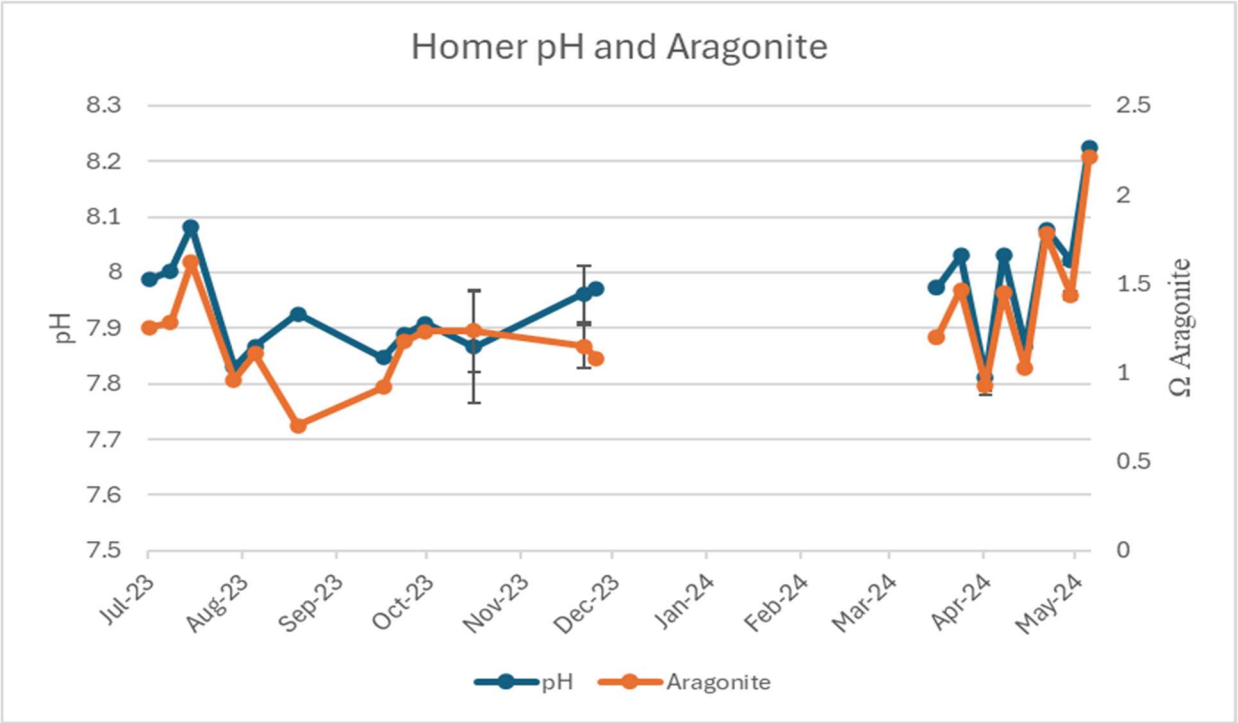

Figure 11. pH and aragonite saturation at Homer site for samples collected from 07/11/2023 - 05/15/2024. The Homer data set contains 3 triplicates (07/25/2023, 04/11/2024, and 05/09/2024) and 2 duplicates (10/26/2023, and 12/01/2023). Standard deviation between triplicate and duplicate sample pH measurements are denoted by error bars and listed are as follows, respectively: ±000.4, ±0.100, ±0.050, ±0.0.046, and ±0.007. Standard deviation between triplicate and duplicate sample aragonite measurements denoted by error bars and are listed as follows, respectively: ±0.012, ±0.231, ±0.051, and ±0.0221.

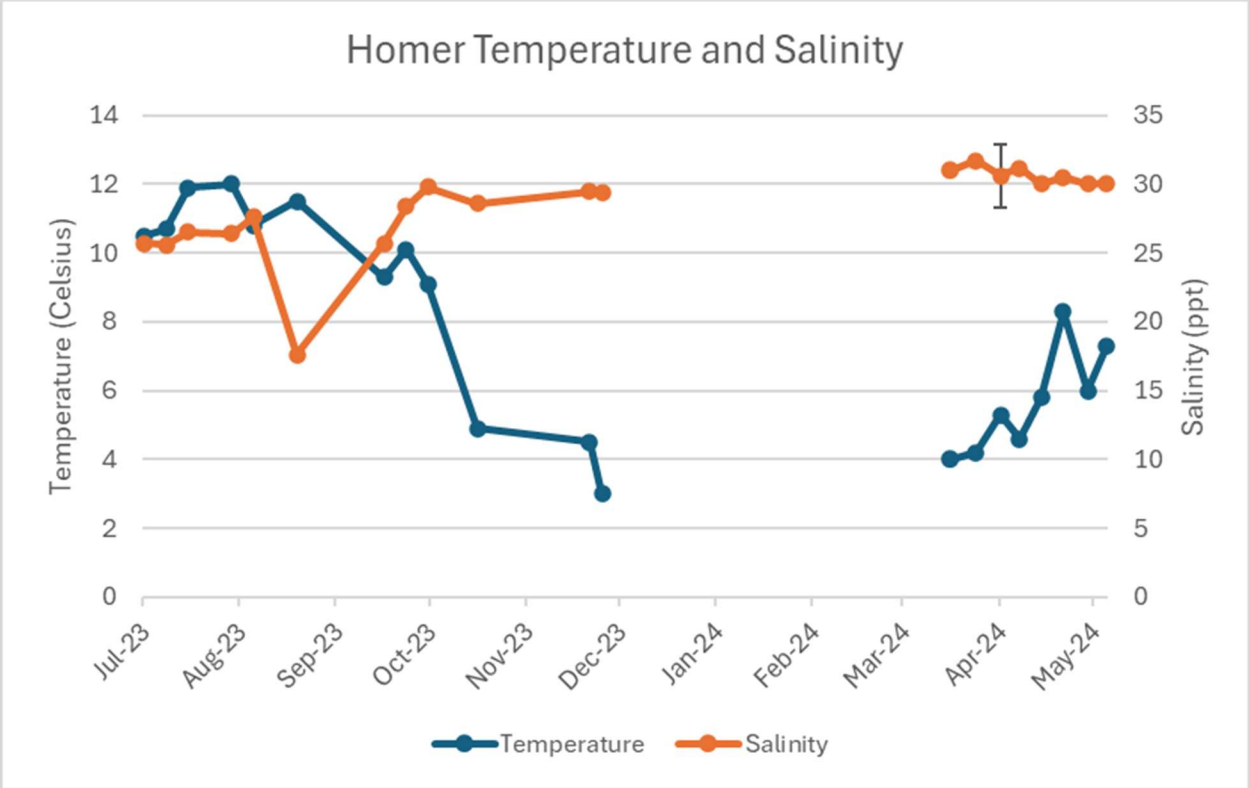

Figure 12. Temperature and salinity at Homer site for samples collected from 07/11/2023 - 05/15/2024. The Homer data set contains 3 triplicates (07/25/2023, 04/11/2024, and 05/09/2024) and 2 duplicates (10/26/2023, and 12/01/2023). Error bars for salinity measurements denote standard deviation between 04/11/2024 triplicates at ±2.351.

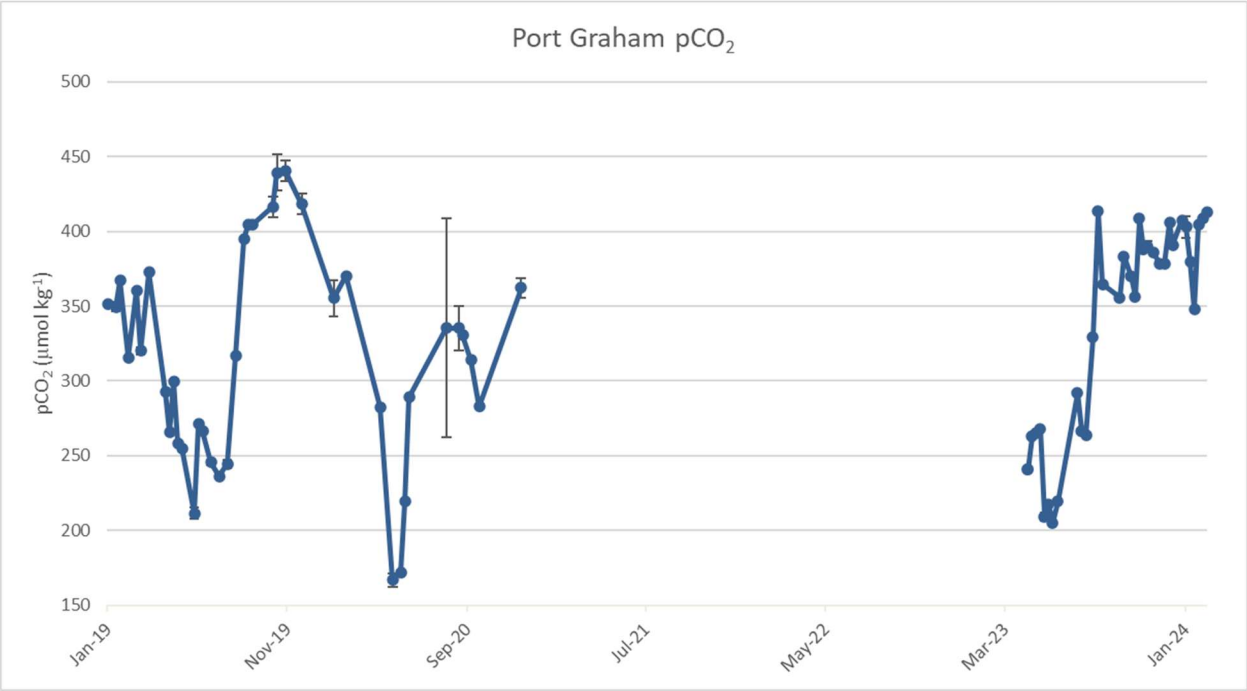

Figure 13. pCO_2 at the Port Graham site for samples collected from 01/18/2019 - 02/23/2024. The Port Graham sample set includes 21 triplicates: 02/01/2019, 03/15/2019, 05/10/2019, 06/14/2019, 07/12/2019, 08/09/2019, 09/20/2019, 10/25/2019, 11/01/2019, 11/15/2019, 12/13/2019, 02/05/2020, 05/15/2020, 06/05/2020, 08/14/2020, 09/04/2020, 12/18/2020, 05/24/2023, 06/16/2023, 11/15/2023, and 01/19/2024. Standard deviation between triplicate samples denoted by error bars are as follows, respectively: ±3.251, ±2.220, ±1.075, ±4.123, ±1.755, ±2.828, ±0.088, ±7.175, ±12.083, ±6.976, ±7.035, ±12.318, ±4.211, ±1.435, ±73.353, ±14.819, ±6.438, ±2.892, ±0.116, ±4.055, and ±7.179.

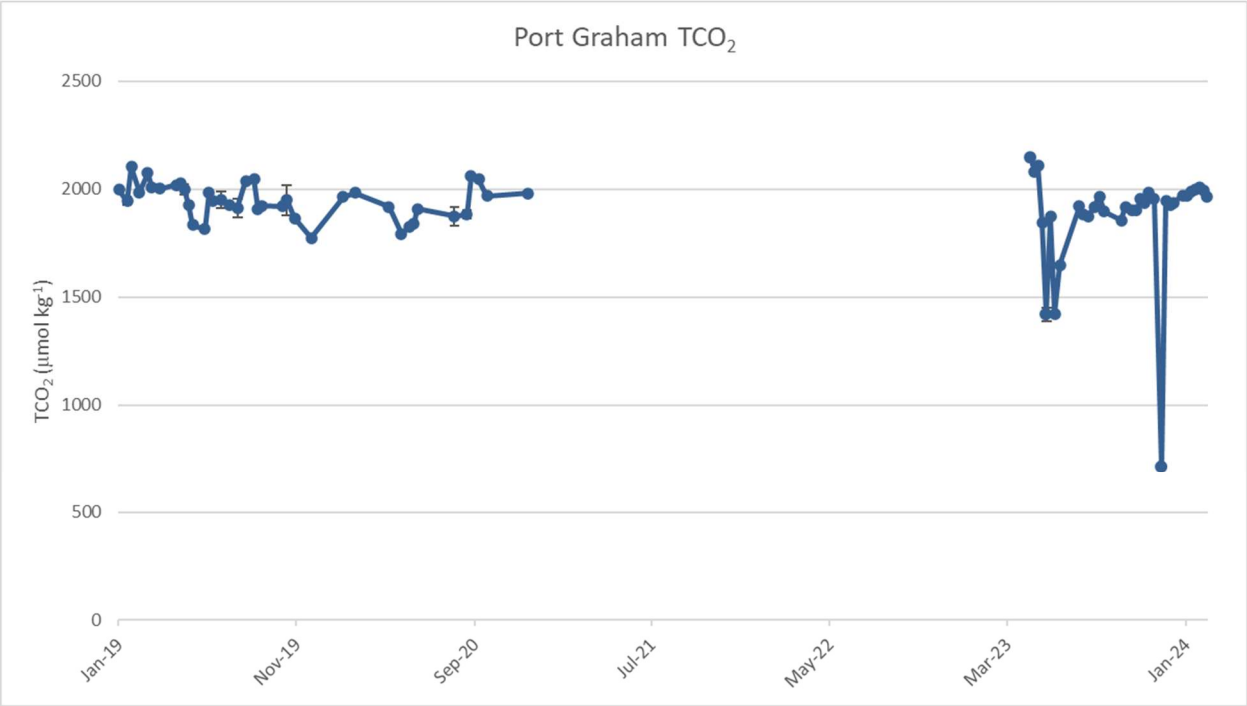

Figure 14. TCO_2 at the Port Graham site for samples collected from 01/18/2019 - 02/23/2024. The Port Graham sample set includes 21 triplicates: 02/01/2019, 03/15/2019, 05/10/2019, 06/14/2019, 07/12/2019, 08/09/2019, 09/20/2019, 10/25/2019, 11/01/2019, 11/15/2019, 12/13/2019, 02/05/2020, 05/15/2020, 06/05/2020, 08/14/2020, 09/04/2020, 12/18/2020, 05/24/2023, 06/16/2023, 11/15/2023, and 01/19/2024. Standard deviation between triplicate samples denoted by error bars are as follows, respectively: ±20.094, ±16.161, ±23.824, ±8.181, ±37.284, ±44.090, ±11.427, ±4.858, ±69.672, ±1.351, ±11.023, ±2.800, ±7.089, ±6.261, ±42.752, ±18.695, ±9.066, ±32.145, ±7.311, ±5.644, and ±10.120.

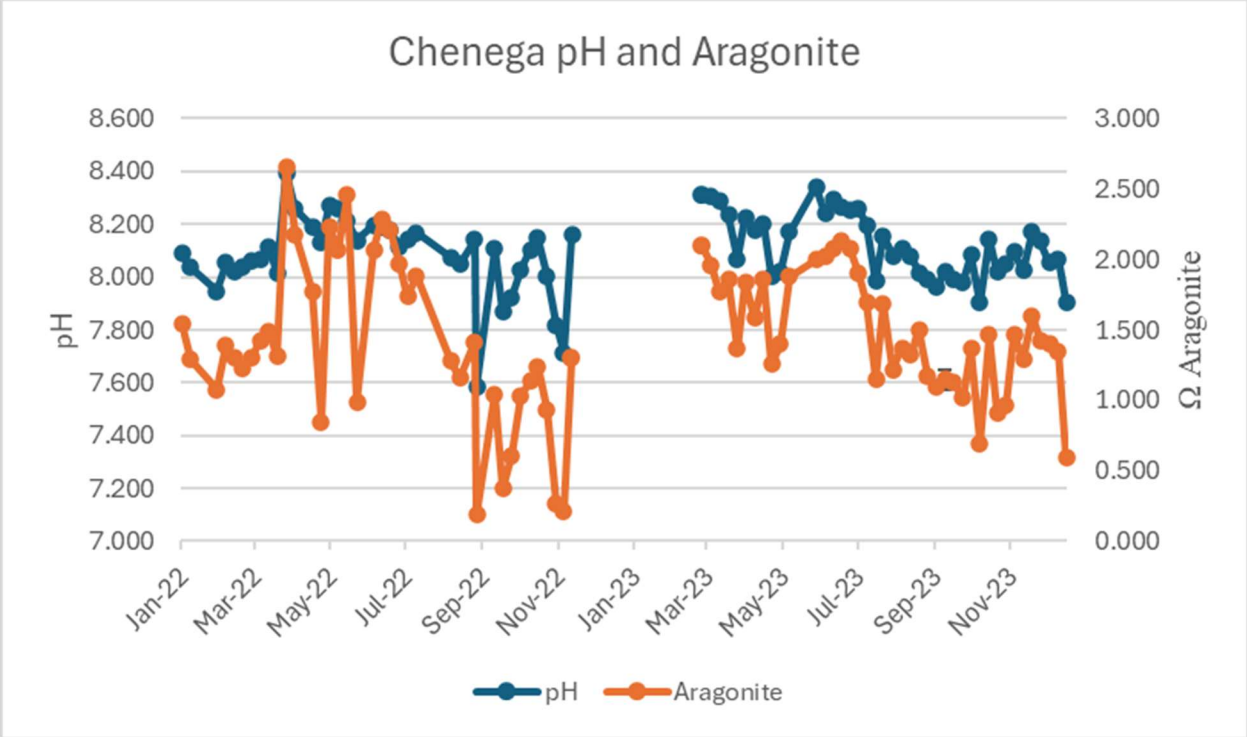

Figure 15. pH and aragonite saturation at the Port Graham site for samples collected from 01/18/2019 - 02/23/2024. The Port Graham sample set includes 21 triplicates (02/01/2019, 03/15/2019, 05/10/2019, 06/14/2019, 07/12/2019, 08/09/2019, 09/20/2019, 10/25/2019, 11/01/2019, 11/15/2019, 12/13/2019, 02/05/2020, 05/15/2020, 06/05/2020, 08/14/2020, 09/04/2020, 12/18/2020, 05/24/2023, 06/16/2023, 11/15/2023, and 01/19/2024). Standard deviation between triplicate sample pH measurements are denoted by error bars as follows, respectively: ±0.007, ±0.003, ±0.006, ±0.006, ±0.004, ±0.005, ±0.002, ±0.007, ±0.013, ±0.008, ±0.009, ±0.015, ±0.010, ±0.004, ±0.076, ±0.018, ±0.008, ±0.010, ±0.002, ±0.006, and ±0.008 . Standard deviation between triplicate sample aragonite measurements are denoted by error bars as follows, respectively: ±0.039, ±0.023, ±0.048, ±0.023, ±0.100, ±0.092, ±0.018, ±0.013, ±0.165, ±0.011, ±0.031, ±0.048, ±0.062, ±0.031, ±0.297, ±0.090, ±0.030, ±0.060, ±0.015, ±0.019, and ±0.029.

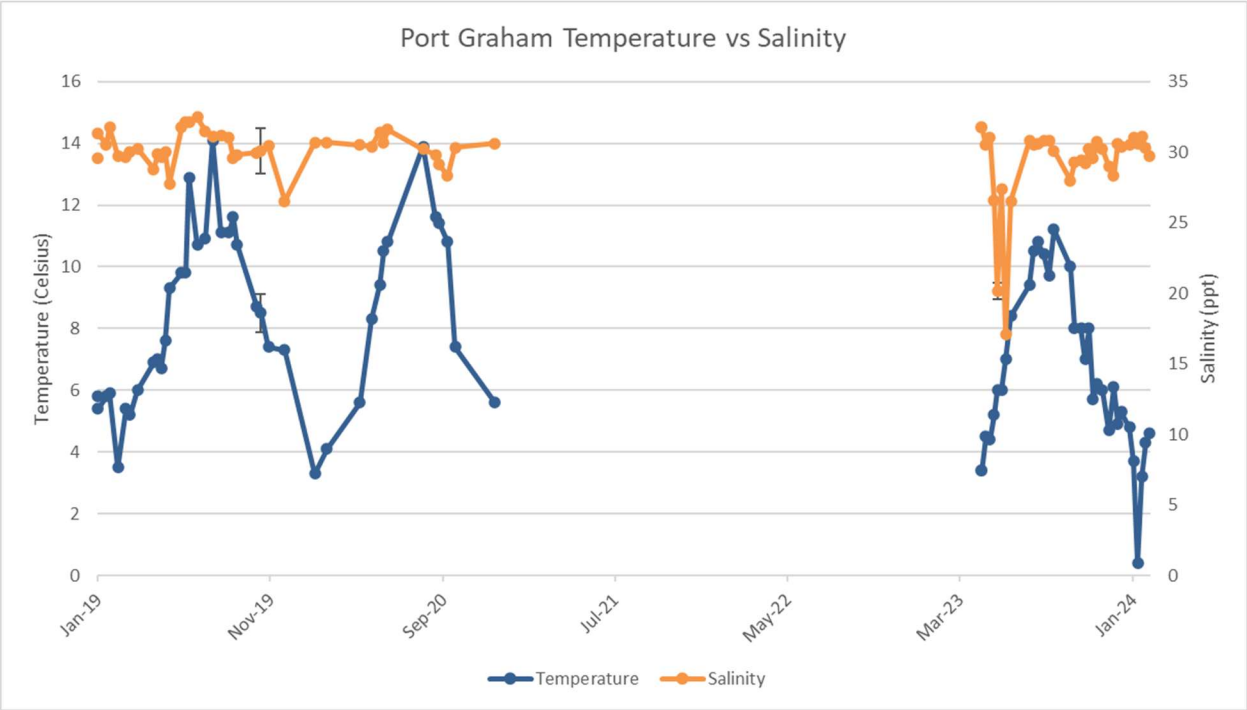

Figure 16. Temperature and salinity at the Port Graham site for samples collected from 01/18/2019 - 02/23/2024. The Port Graham sample set includes 21 triplicates (02/01/2019, 03/15/2019, 05/10/2019, 06/14/2019, 07/12/2019, 08/09/2019, 09/20/2019, 10/25/2019, 11/01/2019, 11/15/2019, 12/13/2019, 02/05/2020, 05/15/2020, 06/05/2020, 08/14/2020, 09/04/2020, 12/18/2020, 05/24/2023, 06/16/2023, 11/15/2023, and 01/19/2024). Error bars denote standard deviation between 11/01/2019 triplicates at ±0.625 for temperature. Standard deviation between triplicate sample salinity measurements are denoted by error bars as follows, respectively: ±0, ±0, ±0, ±0, ±0, ±0.100, ±0.153, ±0.058, ±1.595, ±0, ±0.383, ±0.153, ±0.707, ±0, ±0, ±0, ±0, ±0, ±0, ±0.577, ±0.058, ±0.058, and ±0.

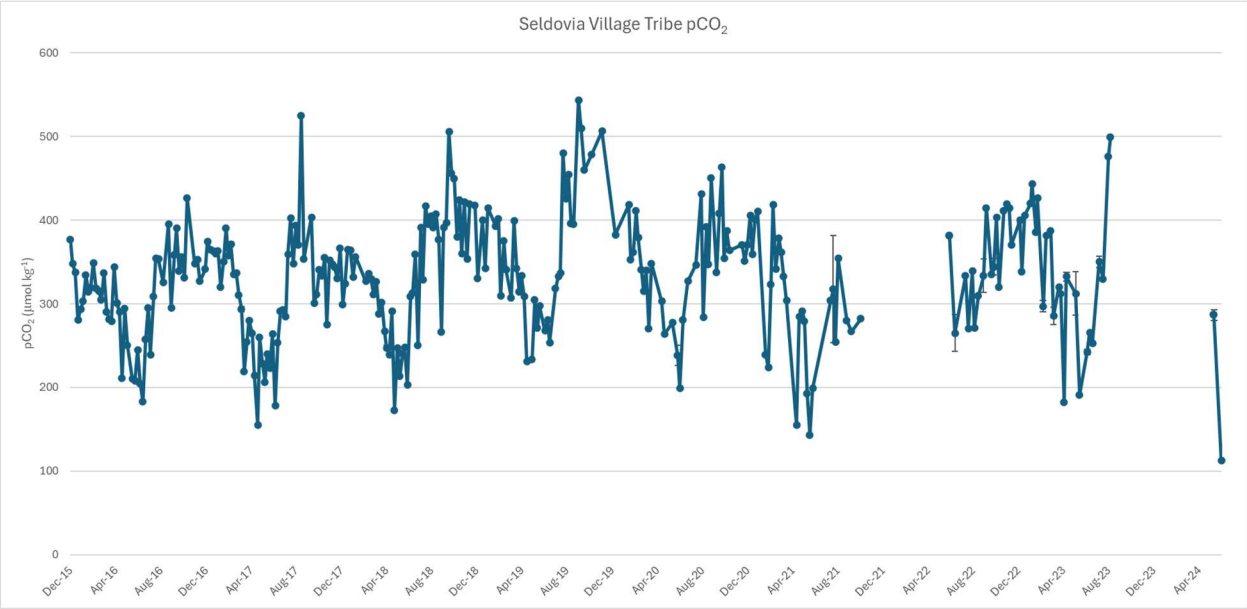

Figure 17. pCO_2 at the Seldovia Village Tribe site for samples collected from 12/10/2015 - 06/11/2024 The Seldovia sample site includes 19 triplicates (03/16/2017, 05/18/2017, 06/08/2017, 01/18/2018, 04/12/2018, 06/05/2020, 07/30/2021, 06/23/2022, 08/15/2022, 10/06/2022, 11/01/2022, 12/16/2022, 02/16/2023, 03/16/2023, 04/20/2023, 05/15/2023, 06/15/2023, 07/17/2023, and 05/22/2024). Standard deviation between triplicate samples denoted by error bars are as follows, respectively: ±3.003, ±0.933, ±1.717, ±0.859, ±3.030, ±11.811, ±64.156, ±22.255, ±1.104, ±10.031, ±1.444, ±2.891, ±6.999, ±10.375, ±5.166, ±25.999, ±3.351, ±6.621, and ±6.095.

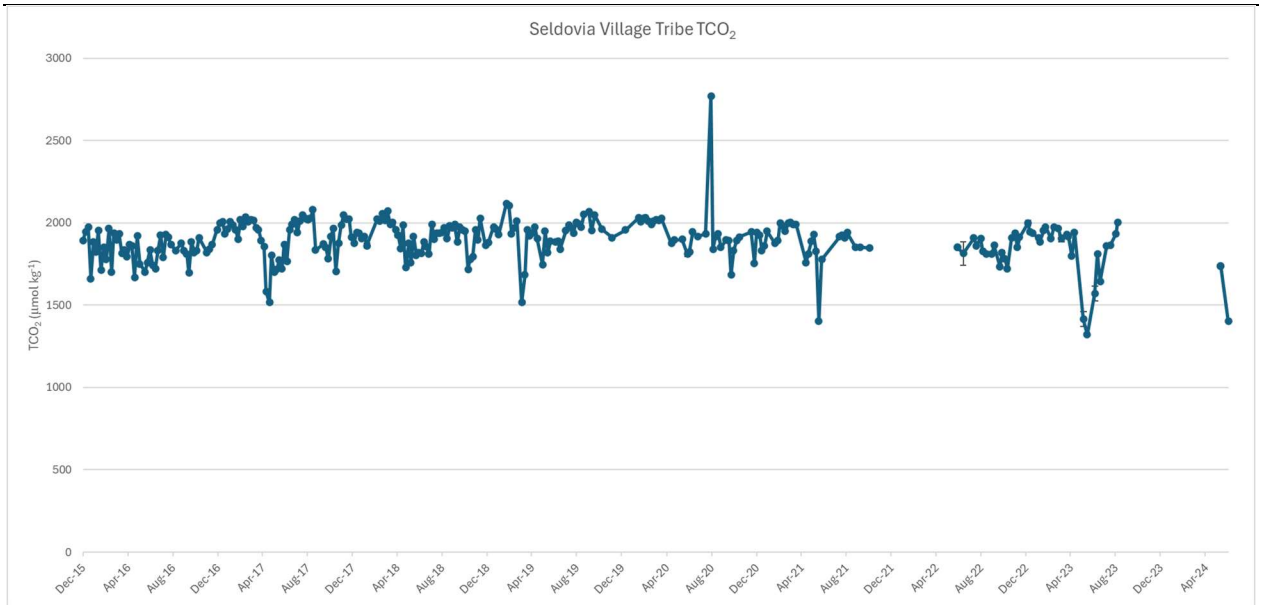

Figure 18. TCO_2 at the Seldovia Village Tribe site for samples collected from 12/10/2015 - 06/11/2024 The Seldovia sample site includes 19 triplicates (03/16/2017, 05/18/2017, 06/08/2017, 01/18/2018, 04/12/2018, 06/05/2020, 07/30/2021, 06/23/2022, 08/15/2022, 10/06/2022, 11/01/2022, 12/16/2022, 02/16/2023, 03/16/2023, 04/20/2023, 05/15/2023, 06/15/2023, 07/17/2023, and 05/22/2024). Standard deviation between triplicate samples denoted by error bars are as follows, respectively: ±6.832, ±3.052, ±2.445, ±11.775, ±11.775, ±13.744, ±14.841, ±70.774, ±8.886, ±13.625, ±8.785, ±16.707, ±5.917, ±5.962, ±109.856, ±44.157, ±8.593, and ±0.960.

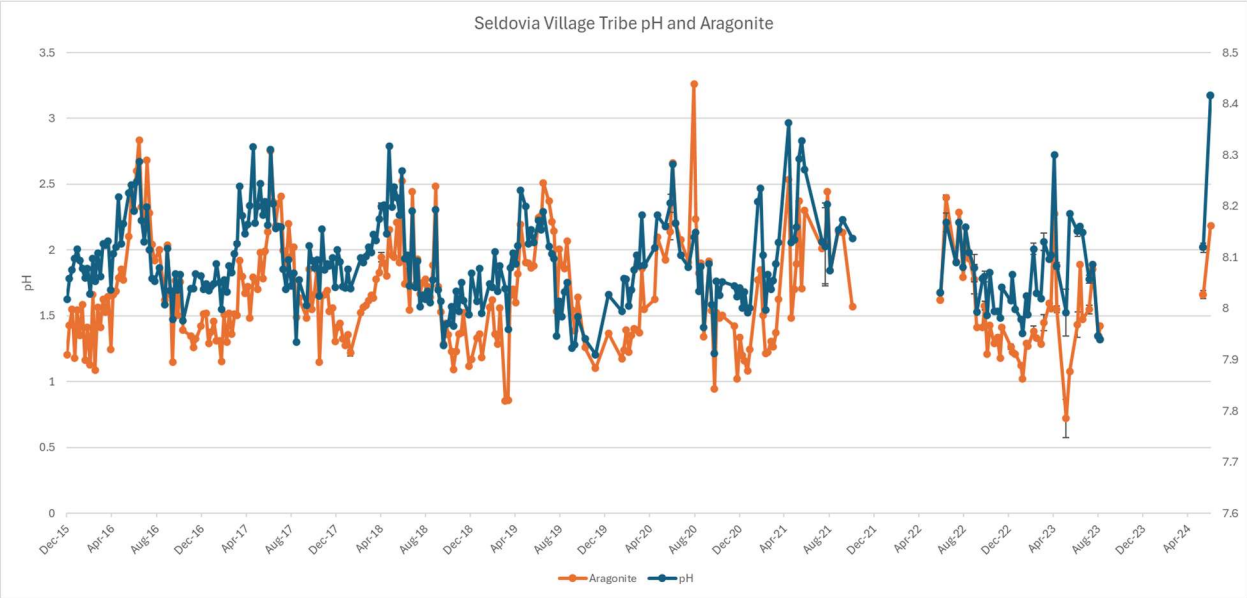

Figure 19. pH and aragonite saturation at the Seldovia Village Tribe site for samples collected from 12/10/2015 - 06/11/2024 The Seldovia sample site includes 19 triplicates (03/16/2017, 05/18/2017, 06/08/2017, 01/18/2018, 04/12/2018, 06/05/2020, 07/30/2021, 06/23/2022, 08/15/2022, 10/06/2022, 11/01/2022, 12/16/2022, 02/16/2023, 03/16/2023, 04/20/2023, 05/15/2023, 06/15/2023, 07/17/2023, and 05/22/2024). Standard deviation between triplicate sample pH measurements are denoted by error bars as follows, respectively: ±0.003, ±0.001, ±0.003, ±0.004, ±0.006, ±0.017, ±0.076, ±0.019, ±0.002, ±0.011, ±0.001, ±0.003, ±0.011, ±0.017, ±0.006, ±0.045, ±0.011, ±0.008, and ±0.009. Standard deviation between triplicate sample aragonite measurements are denoted by error bars as follows, respectively: ±0.006, ±0.002, ±0.013, ±0.021, ±0.036, ±0.063, ±0.307, ±0.018, ±0.015, ±0.033, ±0.006, ±0.019, ±0.042, ±0.062, ±0.025, ±0.145, ±0.098, ±0.032, and ±0.032.

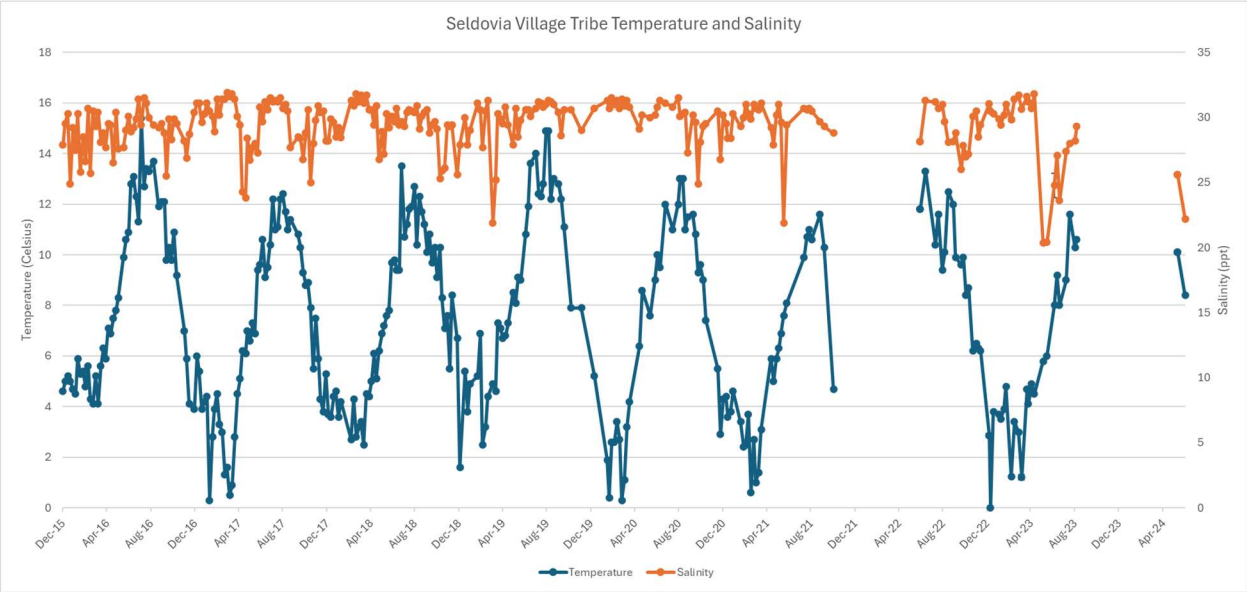

Figure 20. Temperature and salinity at the Seldovia Village Tribe site for samples collected from 12/10/2015 - 06/11/2024 The Seldovia sample site includes 19 triplicates (03/16/2017, 05/18/2017, 06/08/2017, 01/18/2018, 04/12/2018, 06/05/2020, 07/30/2021, 06/23/2022, 08/15/2022, 10/06/2022, 11/01/2022, 12/16/2022, 02/16/2023, 03/16/2023, 04/20/2023, 05/15/2023, 06/15/2023, 07/17/2023, and 05/22/2024). Error bars for temperature measurements denote standard deviation between 12/16/2022 triplicates at ±0.057, standard deviation between 02/16/2023 triplicates at ±0.057, and standard deviation between 03/16/2023 triplicates at ±0.100. Standard deviation between triplicate sample salinity measurements are denoted by error bars as follows, respectively: ±0.058, ±0.058, ±0, ±0.058, ±0.115, ±0.100, ±0.153, ±0.058, ±0, ±0.058, ±0.058, ±0.153, ±0.058, ±0.100, ±1.880, ±0.929, ±0, and ±0.

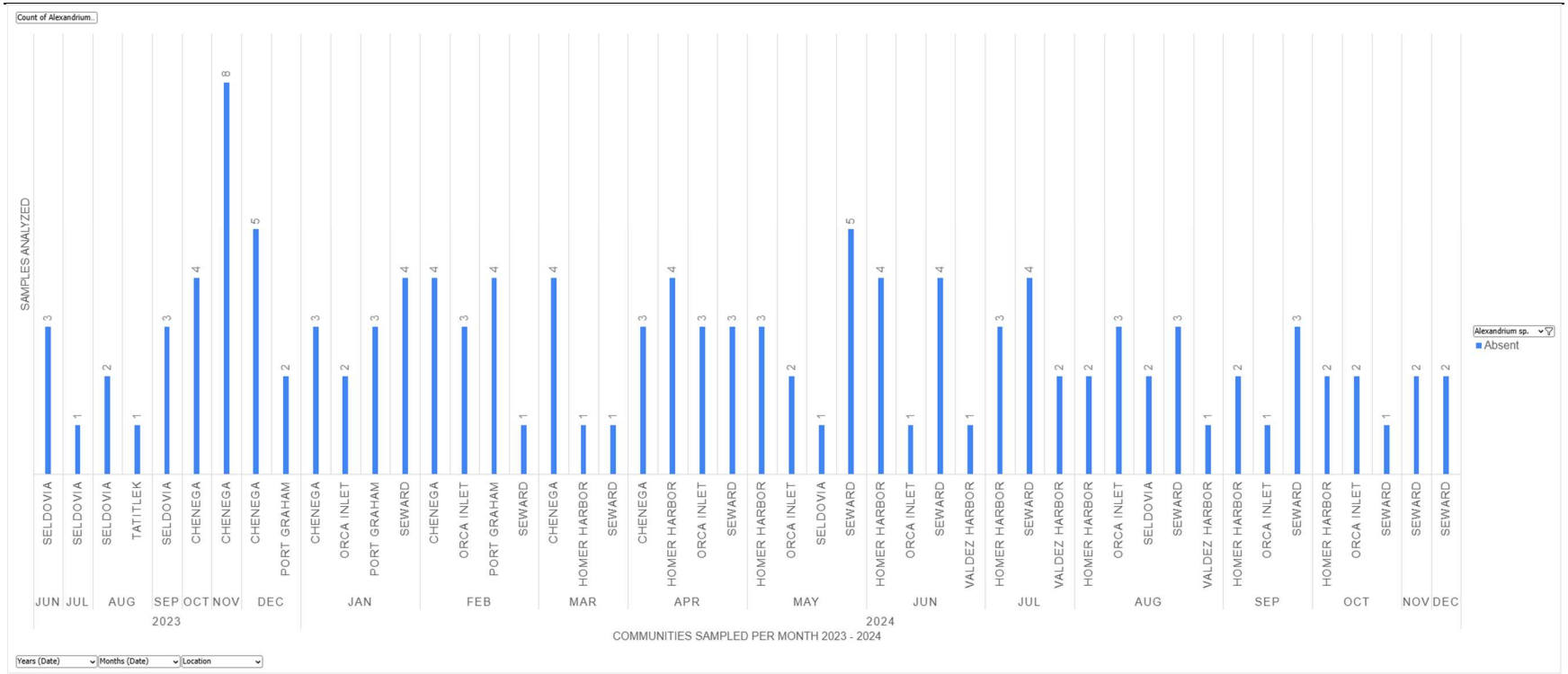

Figure 21. Prevalence of Alexandrium spp. from phytoplankton tows analyzed via microscopy from June 1, 2023, to December 31, 2024.

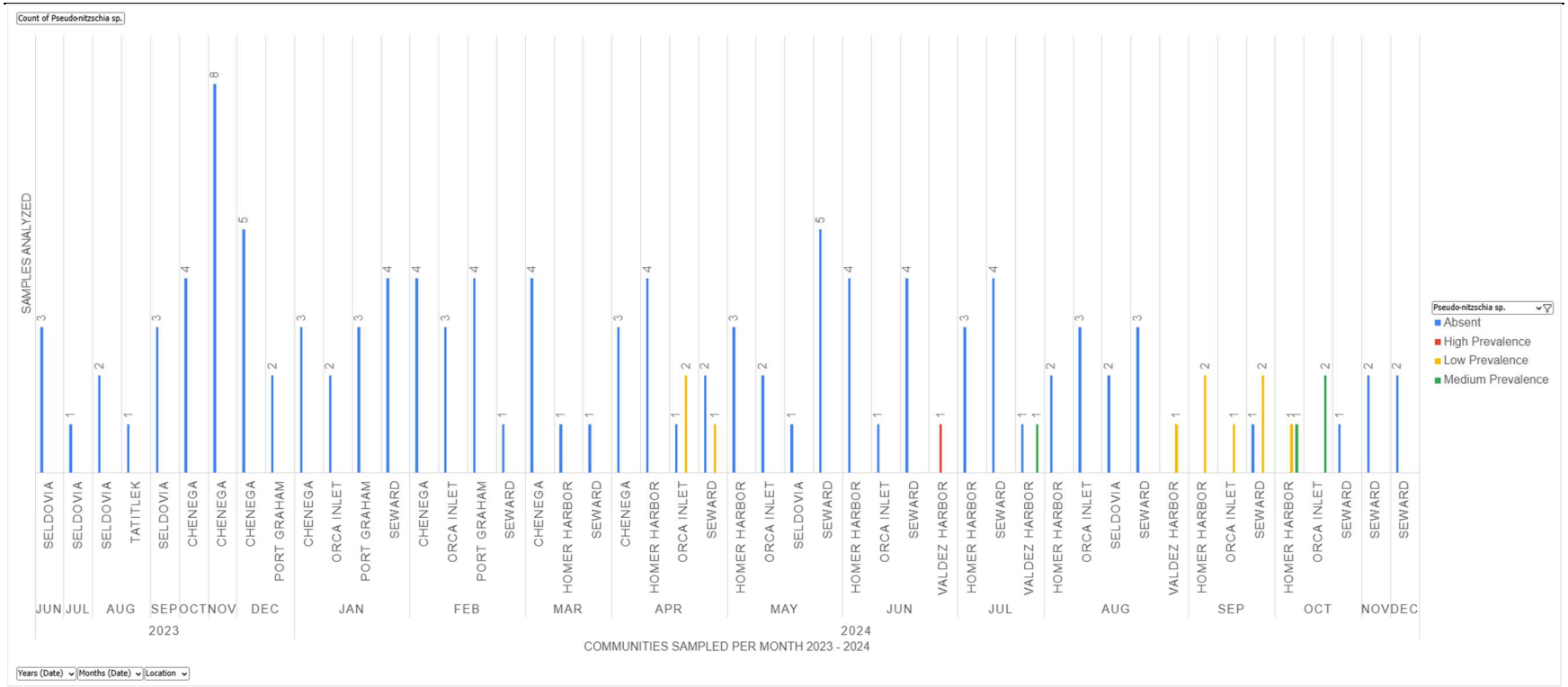

Figure 22. Prevalence of Pseudo-nitzschia spp. from phytoplankton tows analyzed via microscopy from June 1, 2023, to December 31, 2024.

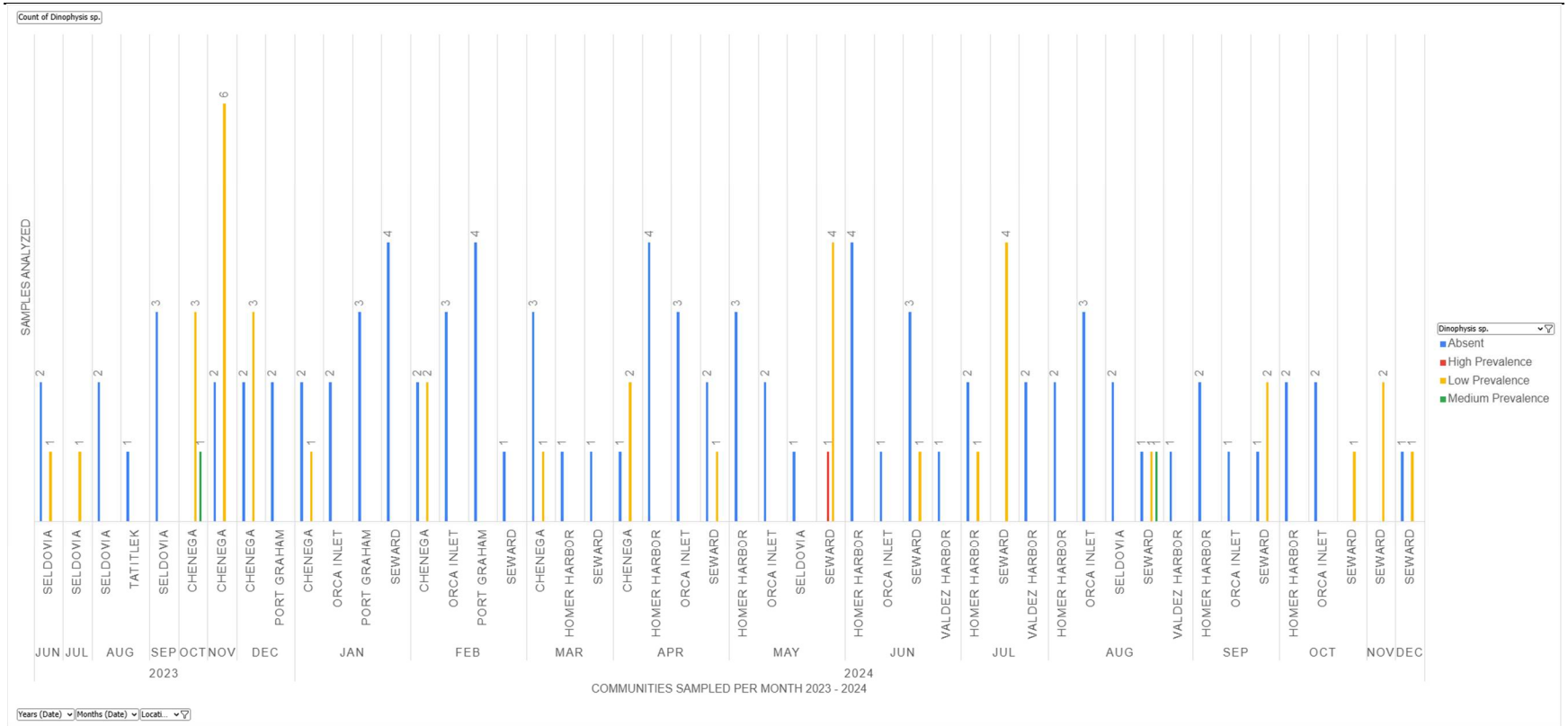

Figure 23. Prevalence of Dinophysis spp. from phytoplankton tows analyzed via microscopy from June 1, 2023, to December 31, 2024.

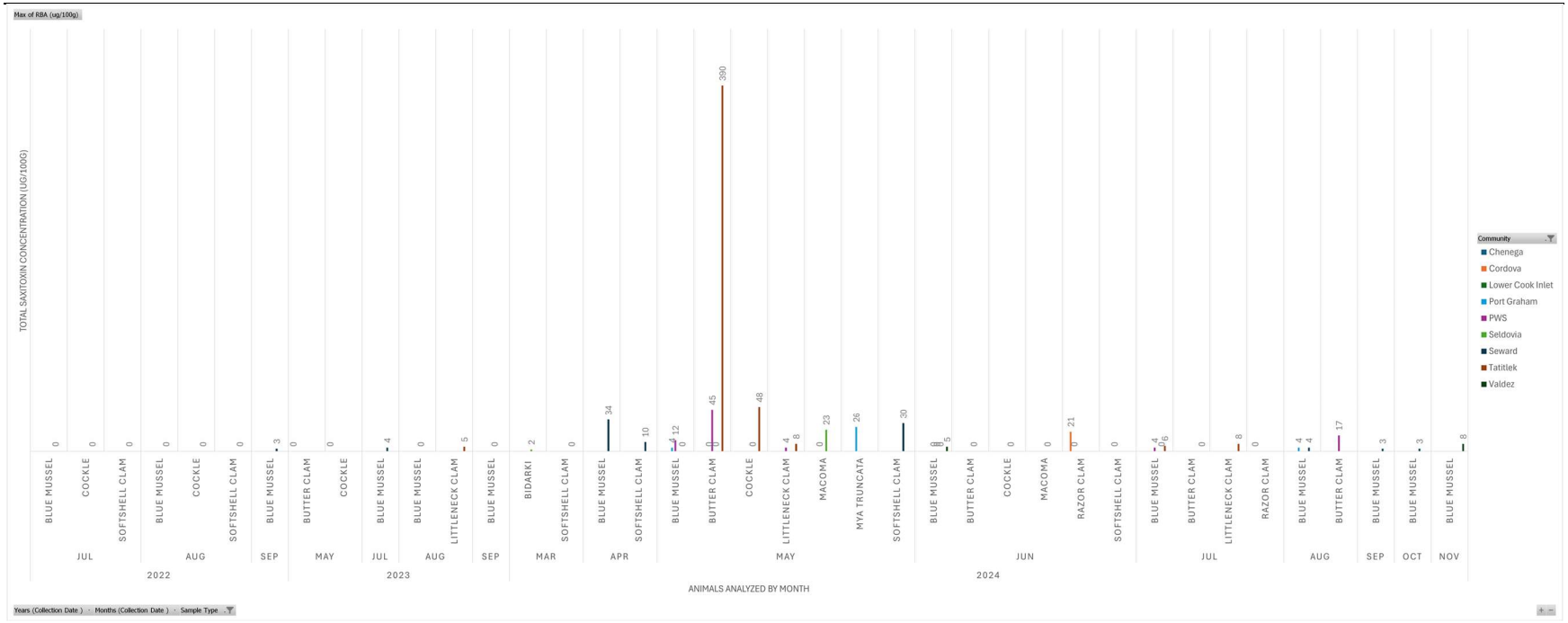

Figure 24. Total saxitoxin concentrations evaluated through RBAs on shellfish collections from July 1, 2022, to November 31, 2024

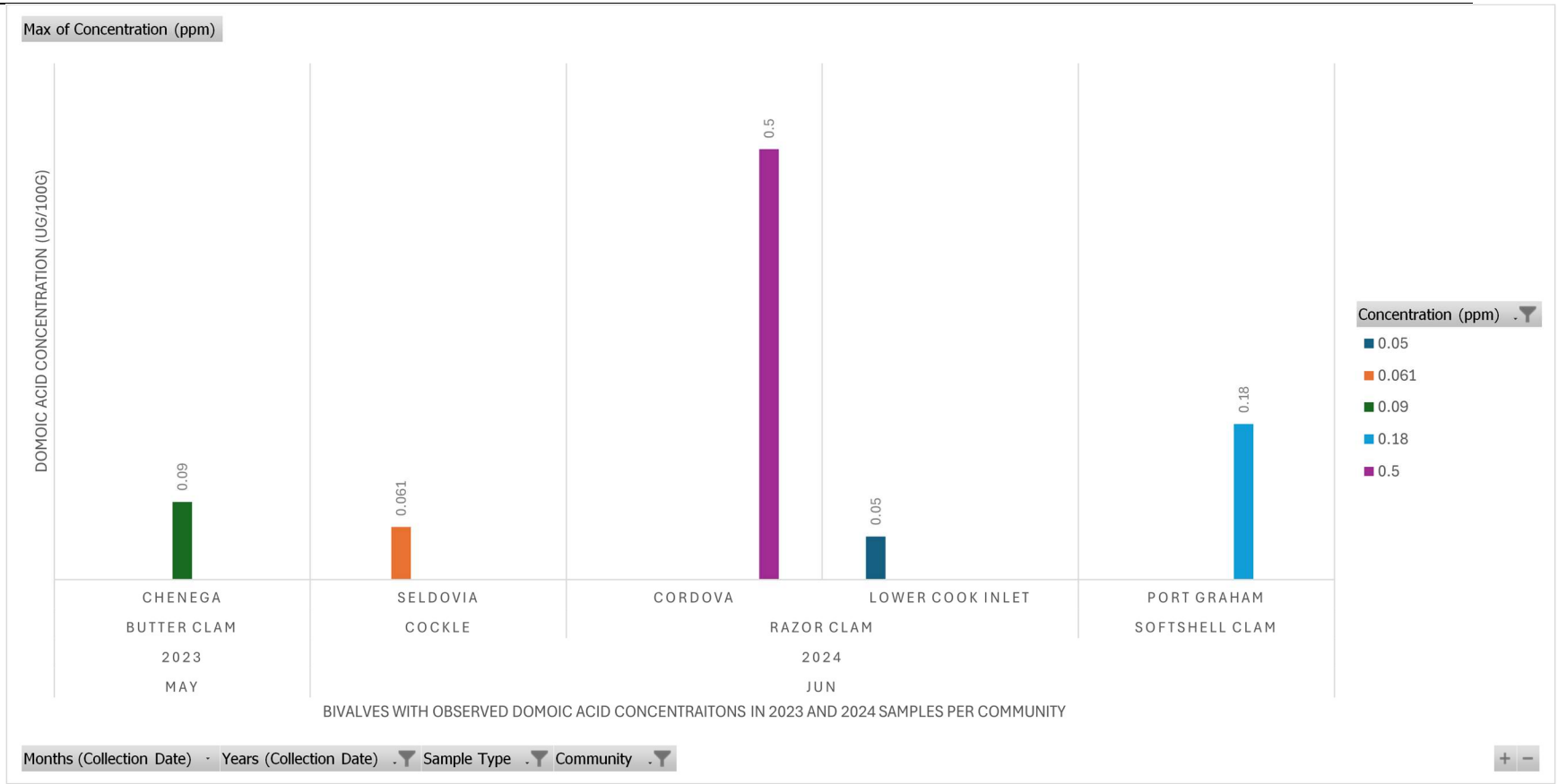

Figure 25. Domoic acid concentrations evaluated through ELISAs on shellfish collections from May 1, 2023, and June 31, 2024.

***Exxon Valdez* Oil Spill Trustee Council**

Long-Term Research and Monitoring, Mariculture, Education and Outreach

Annual Project Status Summary