Exxon Valdez **Oil Spill Trustee Council**

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

Annual Project Reporting Form

Project Number: 24120114-L

Project Title: Seward Line

Principal Investigator(s): Prof. Russell Hopcroft, University of Alaska Fairbanks, Dr. Seth Danielson, University of Alaska Fairbanks

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

Submission Date (Due March 1 immediately following the reporting period): April 25, 2025

Project Website: https://gulfwatchalaska.org/, https://nga.lternet.edu/

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

☒ **Project progress is on schedule.**

☐ **Project progress is delayed**

☐ **Budget reallocation request.**

☐ **Personal changes.**

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1. Summary of Work Performed:

The Seward Line was sampled in early May and mid-September of 2024. Processing of samples continues year-round, and descriptive aspects evolve as more data becomes available.

Mean temperatures in the upper 100 m during May were slightly below (-0.1°C) the 27-year Seward Line spring average (Figs. 1 and 2), but not significantly so. Chlorophyll was high at nearly all Seward Line stations, which is consistent for May, but the peak of the bloom had passed in Prince William Sound (Fig. 3), although large cells dominated in both domains. The 2024 May bloom ranks as relatively high on the Seward Line Phytoplankton Size Index (Fig. 4), and was composed of primarily large chain-forming centric diatoms that are captures on the 20 µm mesh such as *Thalassiosira, Leptocylindrus, Rhizosolenia,* and *Ditylum*. Large copepod

abundance and biomass seemed to be below average (Fig. 5), and their development appeared to be delayed.

Mean temperatures in the upper 100 m during September were still slightly below (-0.1°C) the 28-year Seward Line fall average, but not significantly so (Fig. 6). A fall phytoplankton bloom appeared to be underway, particularly at offshore stations, but chlorophyll concentration was low as is typical for fall (Fig. 7). Zooplankton community composition appeared to be typical for fall, albeit 2024 continued a string of low biomass for small copepods during September that began with cooler years in 2020 (Fig. 5).

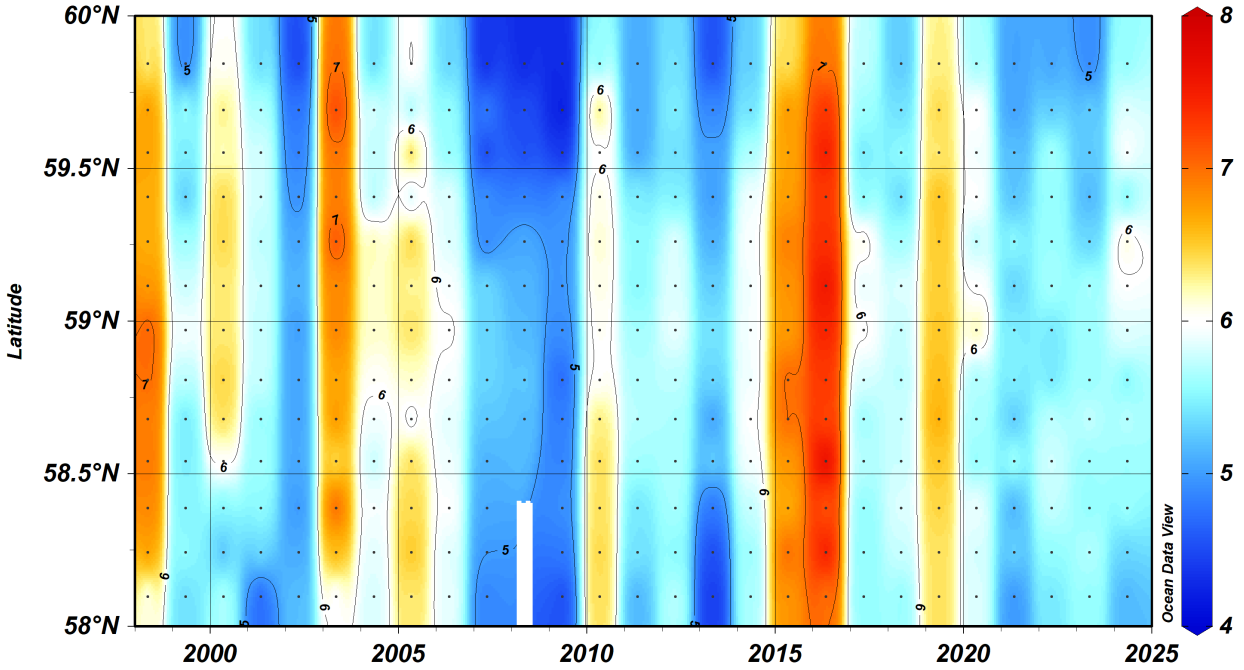

Figure 1. Average temperature in the upper 100 m of the Seward Line during May oceanographic cruises.

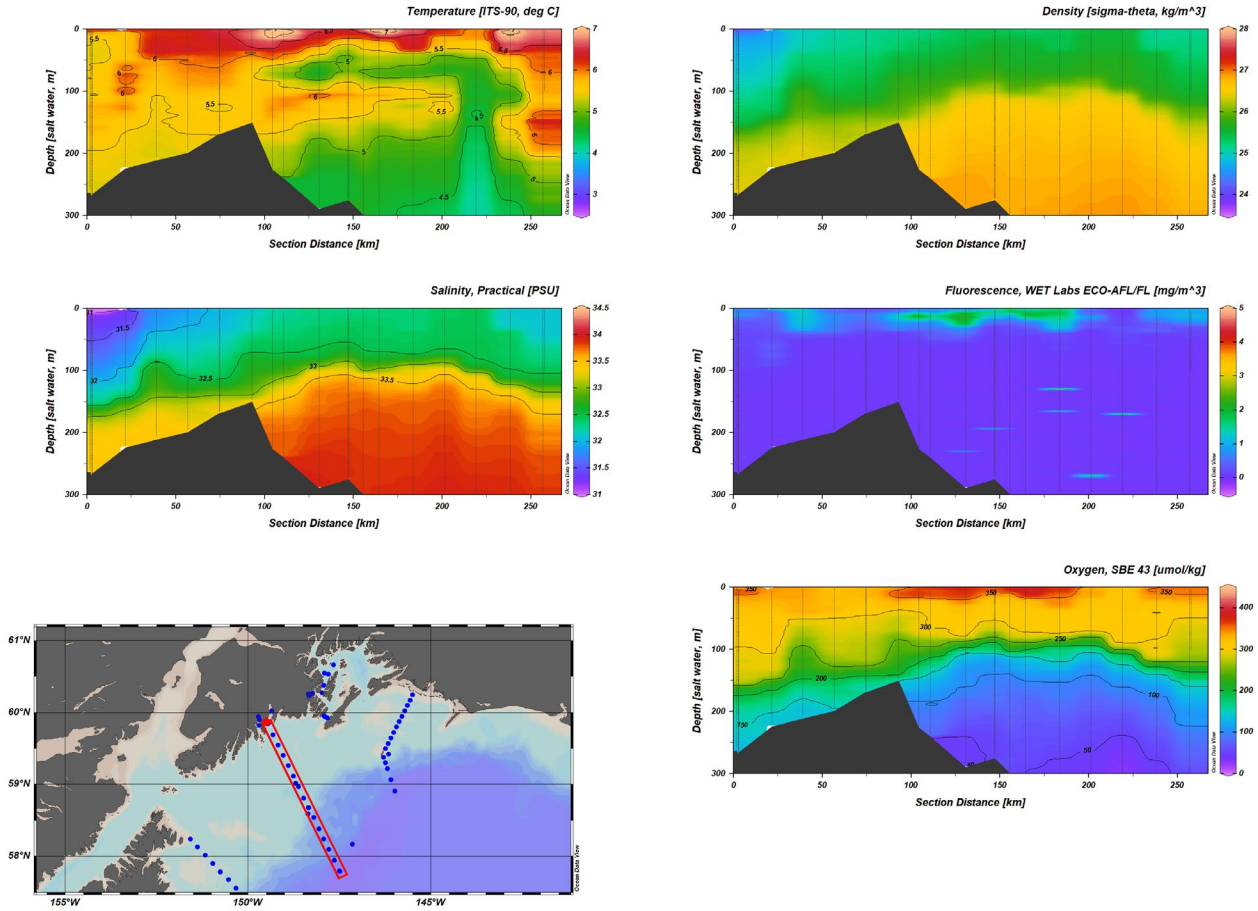

Figure 2. Seward Line transect physical hydrography from the May cruise.

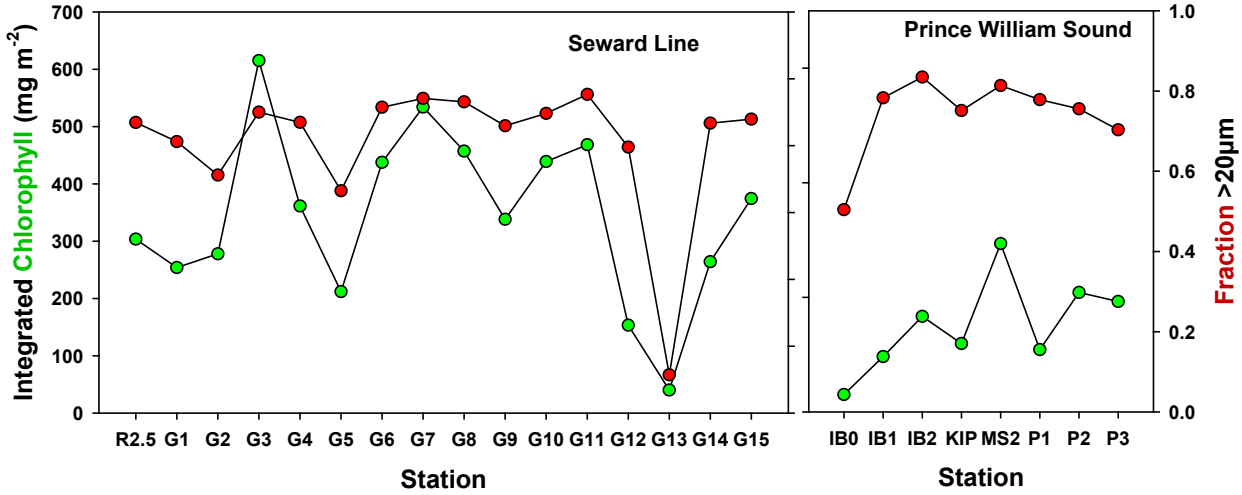

Figure 3. Extracted integrated chlorophyll along the Seward Line and at stations in Prince William Sound, May 2024.

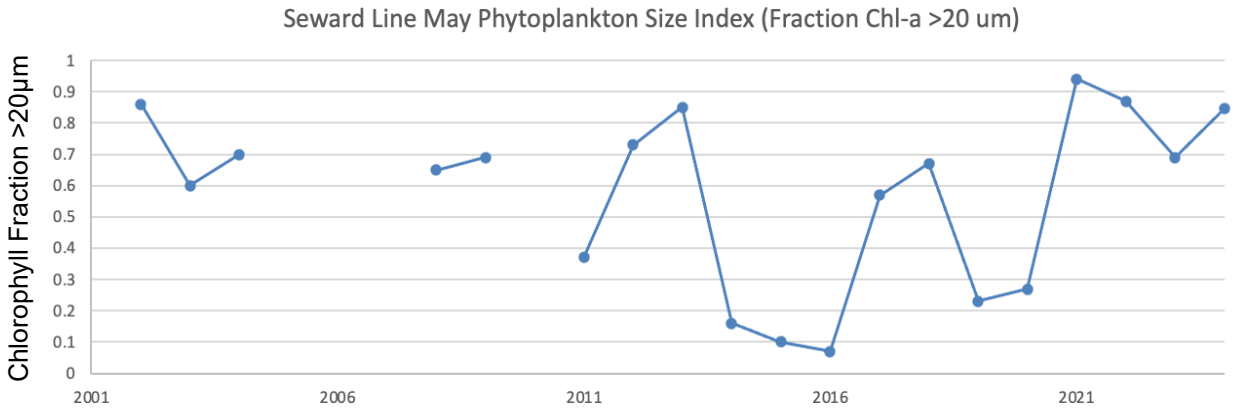

Figure 4. Spring bloom phytoplankton size index time-series along the Seward Line.

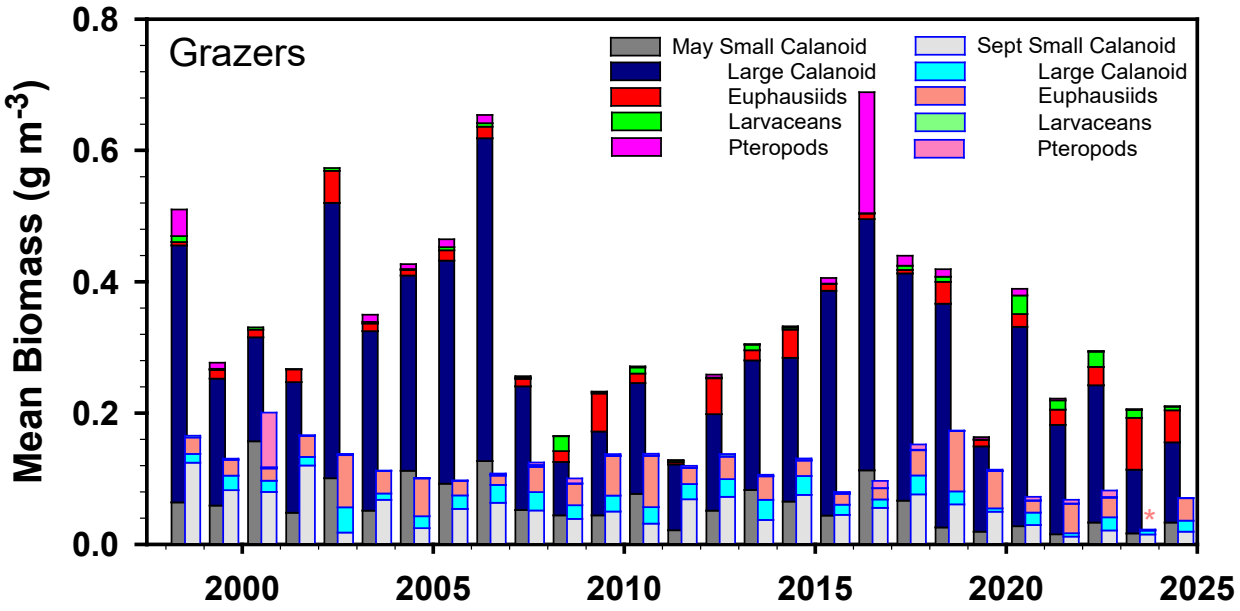

Figure 5. Average zooplankton wet-weight biomass along the Seward Line for major crustacean component. Data from 2022-2024 are preliminary, based on a subset of the stations sampled. Fall 2023 lacks euphausiid data due to equipment failures.

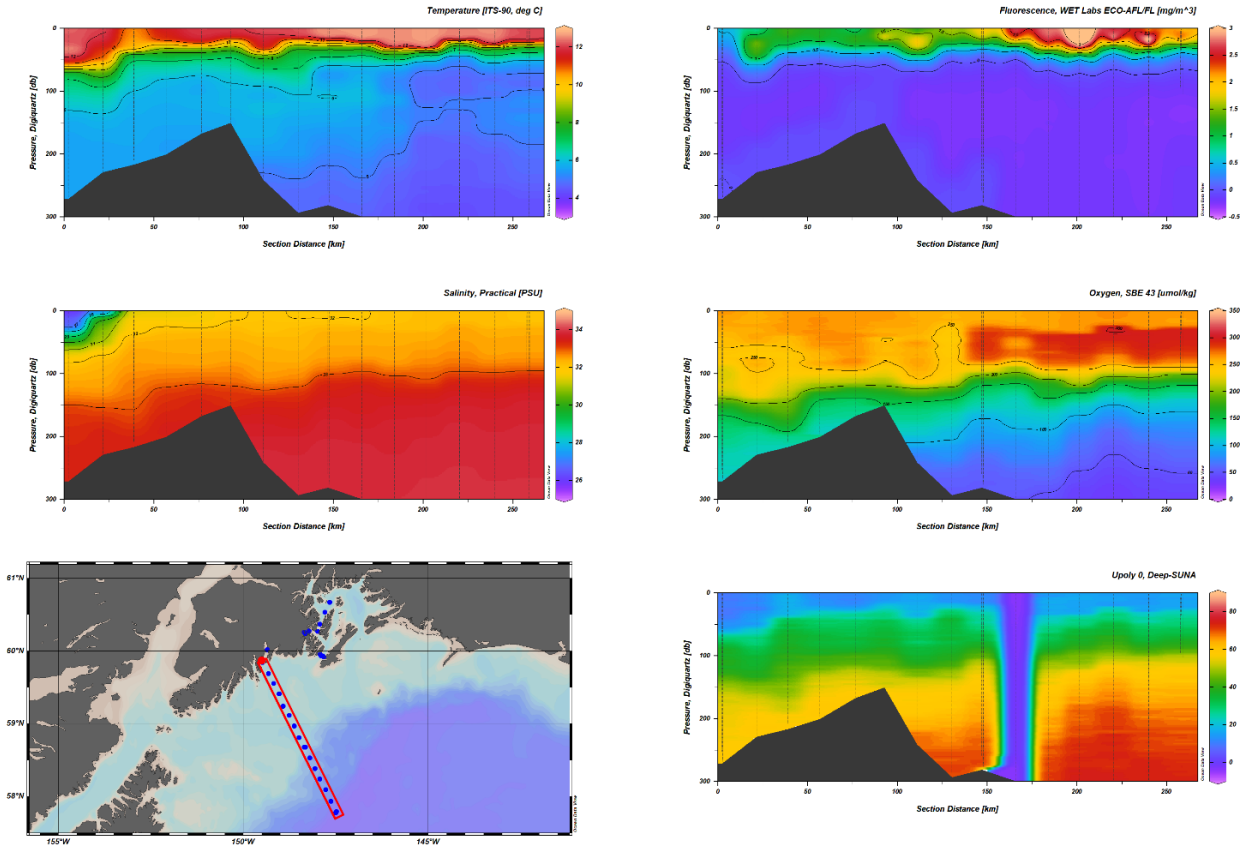

Figure 6. Seward Line transect physical hydrography from the fall (September 2024) cruise. Note artifact on Nitrate section at GAK10 reflects a zero-data cast.

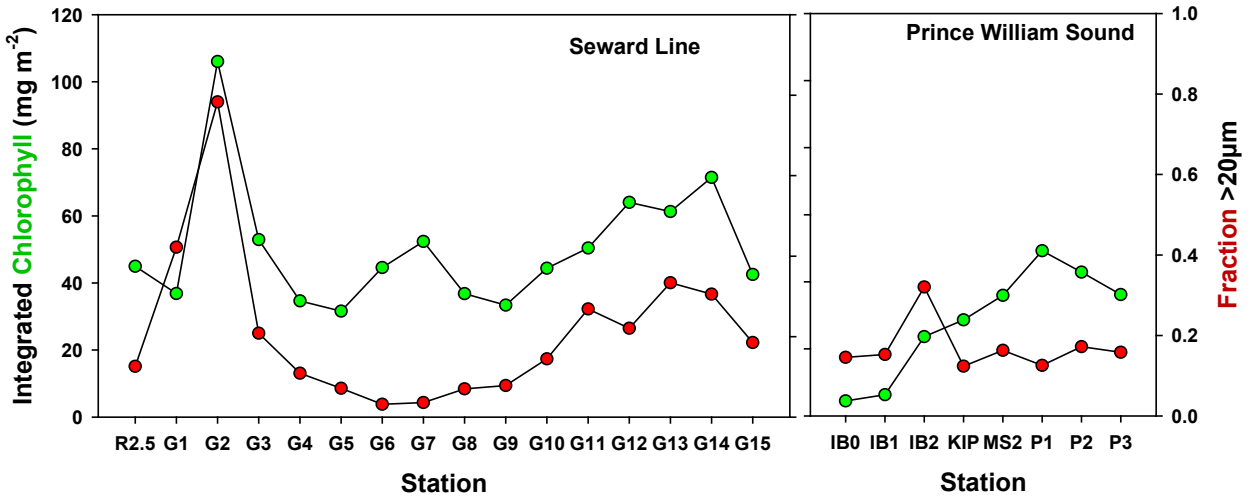

Figure 7. Extracted integrated chlorophyll along the Seward Line, September 2024.

2. Products

Peer-reviewed publications:

Reister, I., S. Danielson, and A. Aguilar-Islas. 2024. Perspectives on Northern Gulf of Alaska salinity field structure, freshwater pathways, and controlling mechanisms. Progress in Oceanography 229:103373. https://doi.org/10.1016/j.pocean.2024.103373.

Conte, L., J. Fiechter, S. Strom, R. R. Hopcroft, and S. L. Danielson. 2024. Modeling planktonic food web interannual variability of the Northern Gulf of Alaska Shelf. Journal of Geophysical Research Oceans 129: e2024JC021116. https://doi.org/10.1029/2024JC021116.

Lowin, B., S. Strom, W. Burt, T. Kelly, S. Rivero-Calle. 2024. Temporal variability in the relationship between line height absorption and chlorophyll concentration: a case study from the Northern Gulf of Alaska. Optics Express 32:20491–20502. https://doi.org/10.1364/OE.521758.

O'Daly, S. H., G. M. Hennon, T. B. Kelly, S. L. Strom, and A. M. P. McDonnell. 2024. Strong and efficient summertime carbon export driven by aggregation processes in a subarctic

coastal ecosystem. Limnology and Oceanography 69:1187-1203. https://doi.org/10.1002/lno.12561.

Reports:

Danielson, S. L., T. D. Hennon, H. Statscewich, and R. Hopcroft. 2024. Seward Line spring oceanography. Pages 74-76 *in* B. E. Ferriss, editor. Ecosystem Status Report 2024: Gulf of Alaska, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, Anchorage, Alaska. https://www.npfmc.org/wp-content/PDFdocuments/SAFE/2024/GOAecosys.pdf.

Hopcroft, R. R. 2024. Spring and fall large copepod and euphausiid biomass: Seward Line. Pages 74-76 *in* B. E. Ferriss, editor. Ecosystem Status Report 2024: Gulf of Alaska, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, Anchorage, Alaska. https://www.npfmc.org/wp-content/PDFdocuments/SAFE/2024/GOAecosys.pdf.

Lemagie. E., M. Callahan, S. L. Danielson, R. R. Hopcroft, E. Fergusson, W. Strasburger, C. O'Leary, K. Siwicke, R. Thoman, B. Brettschneider, K. Axler, L. Rogers, C. Worton, D. Jones, M. Levine, and P. Ressler. 2024. Ocean temperature: Synthesis. Pages 43-56 *in* B. E. Ferriss, editor. Ecosystem Status Report 2024: Gulf of Alaska, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, Anchorage, Alaska. https://www.npfmc.org/wp-content/PDFdocuments/SAFE/2024/GOAecosys.pdf.

Popular articles:

No new contributions for this reporting period.

Conferences and workshops:

Ballantine, K. 2024. Investigating physical drivers of phytoplankton bloom initiation in the Northern Gulf of Alaska. Poster presentation, Ocean Sciences Meeting, New Orleans, Louisiana, February.

Blais, J. 2024. Overlooked marine protists: The unique role of Rhizaria in northern Gulf of Alaska food webs. Poster presented at the Ocean Sciences Meeting, New Orleans, LA.

Brauner, M. 2024. Co-occurrence networks of marine microbes in the Northern Gulf of Alaska. Poster presentation, Ocean Sciences Meeting, New Orleans, Louisiana, February.

Brauner, M. 2025. Iron fertilization effects on microbial communities and interactions in the northern Gulf of Alaska. Poster presentation, Alaska Marine Science Symposium, Anchorage, Alaska, January.

Cushing D., R. Kaler, E. Labunski, and R. Suryan. 2025. Common trends in seabird abundance time-series on the northern Gulf of Alaska shelf. Poster presentation, Alaska Marine Science Symposium, Anchorage, Alaska, January.

Cushing D., E. Labunski, R. Kaler, and R. Suryan. 2025. Seabird community responses to changes in ocean temperatures in the northern Gulf of Alaska. Oral presentation, joint meeting of the Pacific Seabird Group and The Waterbird Society, San Jose, Costa Rica, January.

Hennon, T. 2025. Spatiotemporal modes of temperature and salinity variability in the northern Gulf of Alaska. Poster presentation, Alaska Marine Science Symposium, Anchorage, Alaska, January.

Hopcroft, R. R. 2024. Quantification of gelatinous zooplankton along the Seward Line in the Northern Gulf of Alaska. Oral presentation, Zooplankton Production Symposium, Hobart, Tasmania, Australia, March.

Hopcroft, R. R. 2025. Zooplankton communities in the northern Gulf of Alaska: Seward Line observations through 2024. Poster presentation, Alaska Marine Science Symposium, Anchorage, Alaska, January.

Kepner, H. E. 2024. Fine-scale spatial patterns of gelatinous zooplankton in the Northern Gulf of Alaska. Oral presentation, Zooplankton Production Symposium, Hobart, Tasmania, Australia, March.

Marvy, A. 2024. Diversity in light:growth optimums may occur within not between phytoplankton types in the Northern Gulf of Alaska. Poster presentation, Ocean Sciences Meeting, New Orleans, Louisiana, February.

Poje, A. 2024. Depth-related patterns of zooplankton within the epipelagic zone of Northern Gulf of Alaska. Oral presentation, Zooplankton Production Symposium, Hobart, Tasmania, Australia, March.

Reister, I. 2024. Salinity field structure and freshwater pathways over the Gulf of Alaska continental shelf reflects coastal discharge, bathymetric steering, and wind forcing. Poster presentation, Ocean Sciences Meeting, New Orleans, Louisiana, February.

Reister, I. 2025. Controls of the northern Gulf of Alaska spring bloom over coastal and mid shelf waters. Poster presentation, Alaska Marine Science Symposium, Anchorage, Alaska, January.

Smoot, C. A. 2024. Patterns of zooplankton species and trait diversity in the Gulf of Alaska from the surface to the abyssopelagic. Poster presentation, Zooplankton Production Symposium, Hobart, Tasmania, Australia, March.

Warren, X. 2024. Universal Implementation of Productivity Models in the Gulf of Alaska. Poster presentation, Ocean Sciences Meeting, New Orleans, Louisiana, February.

Webster, N. 2024. The Inception of Two Long-Term Passive Acoustic Monitoring Programs in the Gulf of Alaska. Poster presentation, Ocean Sciences Meeting, New Orleans, Louisiana, February.

Williams, K. 2024. Comparing primary production and vertical export of the picophytoplankton Synechococcus in the Northern Gulf of Alaska. Poster presentation, Ocean Sciences Meeting, New Orleans, Louisiana, February.

Van Pelt, A. 2024. Colloidal trace metals in the Northern Gulf of Alaska: The contrasting size partitioning of iron, nickel, and copper. Poster presentation, Ocean Sciences Meeting, New Orleans, Louisiana, February.

Public presentations:

No new contributions for this reporting period.

Data and/or information products developed during the reporting period:

No new contributions for this reporting period.

Data sets and associated metadata:

Aguilar-Islas, A. 2024. Seasonal profiles and surface dissolved iron from research cruises for the Northern Gulf of Alaska LTER site, 2018-2023. Research Workspace. 10.24431/rw1k594

Aguilar-Islas, A., and M. Kaufmann. 2024. Dissolved inorganic nutrient data from stations sampled on NGA-LTER seasonal cruises, 2018-2022. Research Workspace. 10.24431/rw1k586.

Danielson, S. L. 2025. Water columns properties measured by CTD sensors during seasonal cruises in the Gulf of Alaska for the Northern Gulf of Alaska LTER project, 2018-2022. Research Workspace. https://doi.org/10.24431/rw1k459.

Hauri, C., and B. Irving. 2025. Inorganic carbon data from water samples collected during CTD casts at stations during the Northern Gulf of Alaska LTER seasonal cruises, 2018-2023. Dataset. https://doi.org/10.24431/rw1k45g.

Hennon, G., and A. Piatt. 2024. Picoplankton and nanophytoplankton concentrations as determined from flow cytometry analyses on water samples collected on Northern Gulf of Alaska LTER site seasonal cruises, 2019-2022. Research Workspace. 10.24431/rw1k8f2,

Hopcroft, R. R. 2024. Gelatinous zooplankton abundance and wet weight biomass observations from research cruises for the Northern Gulf of Alaska (NGA) LTER site, 2018 - 2022. Research Workspace. 10.24431/rw1k58z.

Hopcroft, R. R. 2024. Zooplankton abundance and biomass observations determined traditional microscopy, from Multinet samples collected during research cruises for the Northern Gulf of Alaska LTER site, 2018-2022. Research Workspace. 10.24431/rw1k591.

Hopcroft, R. R. 2024. Zooplankton abundance and biomass observations obtained from the QuadNet, as analyzed by traditional microscopy, during NGA LTER seasonal cruises in the Northern Gulf of Alaska, 2018-2022. Research Workspace. 10.24431/rw1k587.

Hopcroft, R. R., and S. L. Danielson. 2025. Temperature and salinity measured by a flow-through thermosalinograph (TSG) during research cruises aboard the R/V *Tiglax* and R/V

Woldstad for the Northern Gulf of Alaska (NGA) LTER site, 2018-2022. Research Workspace. 10.24431/rw1k45o.

Kuletz, K., D. Cushing, and E. Labunski. 2025. Marine bird survey observation and density data from Northern Gulf of Alaska LTER cruises, 2018-2023. Research Workspace. 10.24431/rw1k45w.

Strom, S. L., and K. Fredrickson. 2025. Chlorophyll-a concentrations from research cruises for the Northern Gulf of Alaska (NGA) LTER site, 2018-2023. Research Workspace. 10.24431/rw1k45f.

Strom, S. L., and K. Fredrickson. 2025. Particulate carbon concentrations from research cruises for the Northern Gulf of Alaska (NGA) LTER site, 2018-present. Research Workspace. 10.24431/rw1k45d,

Strom, S. L., and K. Fredrickson. 2025. Primary productivity estimates from NGA-LTER research cruises in the Gulf of Alaska, 2018-2023. Research Workspace. 10.24431/rw1k45b.

Additional Products not listed above:

Kepner, H. 2024. Fine-scale spatial patterns of gelatinous zooplankton in the Northern Gulf of Alaska. MS Thesis. University of Alaska Fairbanks.

3. Coordination and Collaboration:

The Alaska SeaLife Center or Prince William Sound Science Center

The Seward Line project collaborates with Prince William Sound Science Center (PWSSC) at a programmatic level because members of the Gulf Watch Alaska-Long-Term Research and Monitoring (GWA-LTRM) program management team works for PWSSC and PWSSC is the fiscal agent for the University of Alaska's grant through the National Oceanic and Atmospheric Administration (NOAA). The Seward Line team has been working with PWSSC on a synthesis of zooplankton time-series.

EVOSTC Long-Term Research and Monitoring Projects

Seward Line is part of the GWA-LTRM program and coordinates with GAK1 (project 24120114-I, principal investigator [PI] Danielson), ocean acidification (project 24220202, PI Hauri), Prince William Sound oceanography (project 24120114-G, PI Campbell), and Prince William Sound marine bird surveys (24120114-M, PI Kaler) sampling and meets quarterly with other GWA-LTRM projects. The Seward Line team has been working with PWSSC, Cook Inlet/KBay and the Pacific CPR program (including project 24120114-D, PI Ostle) to synthesize zooplankton time-series across the environmental drivers component with substantial progress made on that manuscript.

EVOSTC Mariculture Projects

No new contributions for this reporting period.

EVOSTC Education and Outreach Projects

The Seward Line project has participated in meetings with members of the Community Organized Restoration and Learning (CORaL) Network (project 24220400) funded by the *Exxon Valdez* Oil Spill Trustee Council (EVOSTC) to evaluate ways the programs can work together on outreach activities.

Individual EVOSTC Projects

The Seward Line provided infrastructure for and coordinates with the Ocean Acidification project by Hauri (project 24220202).

The Seward Line project works with the Data Management program to ensure data collected by the project are properly reviewed, have current metadata, and are posted to the Gulf of Alaska data portal within required timeframes. Seward Line PIs will work with other individually funded EVOSTC projects if collaborative efforts make sense based on data collected.

Trustee or Management Agencies

The Seward Line coordinates with NOAA by proving samples for larval fish analysis from each spring cruise, and two-way sharing of data streams from physics to seabirds.

Native and Local Communities

Over the past year, the NGA LTER has focused on creating learning experiences for schools along the coast of the Northern Gulf of Alaska, as well as for middle school students from across Alaska participating in the Alaska Native Science and Education Program (ANSEP).

4. Response to EVOSTC Review, Recommendations and Comments:

September 2024 EVOSTC Science Panel Comment:

This project conducts oceanographic cruises in spring, summer, and fall along a transect south of Seward (Seward line), augmented with stations in the entrances and deep passages of Prince William Sound. The brief annual reports indicate that the spring and fall cruises were conducted, however the summer cruises are not mentioned. The NGA LTER website (https://nga.lternet.edu/about-us/documents/) provides a cruise report for June/July 2023 but not for June 2022. The Science Panel would like to see information about the summer cruises and additional information on the status of sample processing in future annual reports. Aside from these clarifications, this PI has been extremely productive in terms of peer-reviewed publications and presentations at conferences and workshops.

The Science Panel does not have any concerns about this project.

PI Response:

Thank you for your ongoing support for this project. EVOSTC does not provide funding to the Seward Line project for summer cruises aside from seabird surveys (which are reported under the Prince William Sound marine bird survey project, 24120114-M) so these cruises have not been appearing in GWA-LTRM reports. Additionally, beginning with NGA LTER Phase-II summer cruises will only occur in odd-numbered years with emphasis on process studies. Delinquent cruise reports have been posted.

Executive Director and Public Advisory Committee Comments:

None.

5. Budget:

Spending is behind plans and expectations because of the EVOSTC delay in releasing funds and delay in issuance of the NOAA grant in FY22. The FY24 delay by NOAA in releasing grant funds until January 2025 meant that the Seward Line project did not receive FY24 funds from PWSSC until February 2025.

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
PROJECT BUDGET PROPOSAL AND REPORTING FORM

Budget Category:	Proposed FY 22	Proposed FY 23	Proposed FY 24	Proposed FY 25	Proposed FY 26	5- YR TOTAL PROPOSED	ACTUAL CUMULATIVE
Personnel	$164,676	$168,792	$173,013	$177,340	$160,099	$843,922	$329,385
Travel	$1,555	$1,564	$1,573	$1,582	$1,592	$7,866	$4,759
Contractual	$6,000	$6,000	$6,000	$6,000	$6,000	$30,000	$10,110
Commodities	$1,059	$1,265	$1,476	$1,693	$1,915	$7,408	$7,900
Equipment	$0	$0	$0	$0	$0	$0	$0
Indirect Costs Rate = 25% non-equipment	$43,323	$44,405	$45,515	$46,654	$42,402	$222,299	$86,449
SUBTOTAL	$216,613	$222,026	$227,577	$233,269	$212,008	$1,111,494	$438,603
General Administration (9% of subtotal)	$19,495	$19,982	$20,482	$20,994	$19,081	$100,034	N/A
PROJECT TOTAL	$236,108	$242,009	$248,059	$254,264	$231,089	$1,211,529	
Other Resources (In-Kind Funds)						$0	

COMMENTS:
Spending is behind plans and expectations because of the EVOSTC delay in releasing funds and delay in issuance of the NOAA grant in FY22. The FY24 delay by NOAA in releasing grant funds until January 2025 meant that the Seward Line project did not receive FY24 funds from PWSSC until February 2025.

FY22-26	Project Number: 24120114-L Project Title: Seward Line PI(s): Hopcroft & Danielson (UAF)	NON-TRUSTEE AGENCY SUMMARY PAGE