Northern Gulf of Alaska Long-Term Ecological Research

Cruise Report April/May 2022

Cruise ID: SKQ2022-07S

Funding Sources: NSF, NPRB, AOOS, EVOS/GWA

Purpose:

The NGA is a highly productive subarctic Pacific marine biome where intense environmental variability has profound impacts on lower trophic level organisms and community dynamics that, directly or indirectly, support the iconic fish, crabs, seabirds and marine mammals of Alaska. In the NGA, a pronounced spring bloom and regions of sustained summer production support a stable base of energy-rich zooplankton grazers that efficiently transfers primary production up the food chain and a substantial sinking flux of organic matter that exports carbon to the sea bottom communities. The LTER research cruises examine features, mechanisms and processes that drive this productivity and system-wide resilience to understand how short- and long-term climate variability propagates through the environment to influence organisms.

This cruise represents a continuation of sampling begun in fall 1997 under the NSF/NOAA NE Pacific GLOBEC program, and subsequently a consortium of the North Pacific Research Board (NPRB), the Alaska Ocean Observing System (AOOS), and the Exxon Valdez Oil Spill Trustee Council's (EVOSTC) Gulf Watch. This is the fifth year with expanded domain, measurements and investigators under the NSF's Northern Gulf of Alaska Long-term Ecological Program (NGA-LTER). This cruise marks the 25th consecutive spring cruise for the Seward Line in the NGA, including Prince William Sound (PWS), and the 52nd year of observations at GAK1.

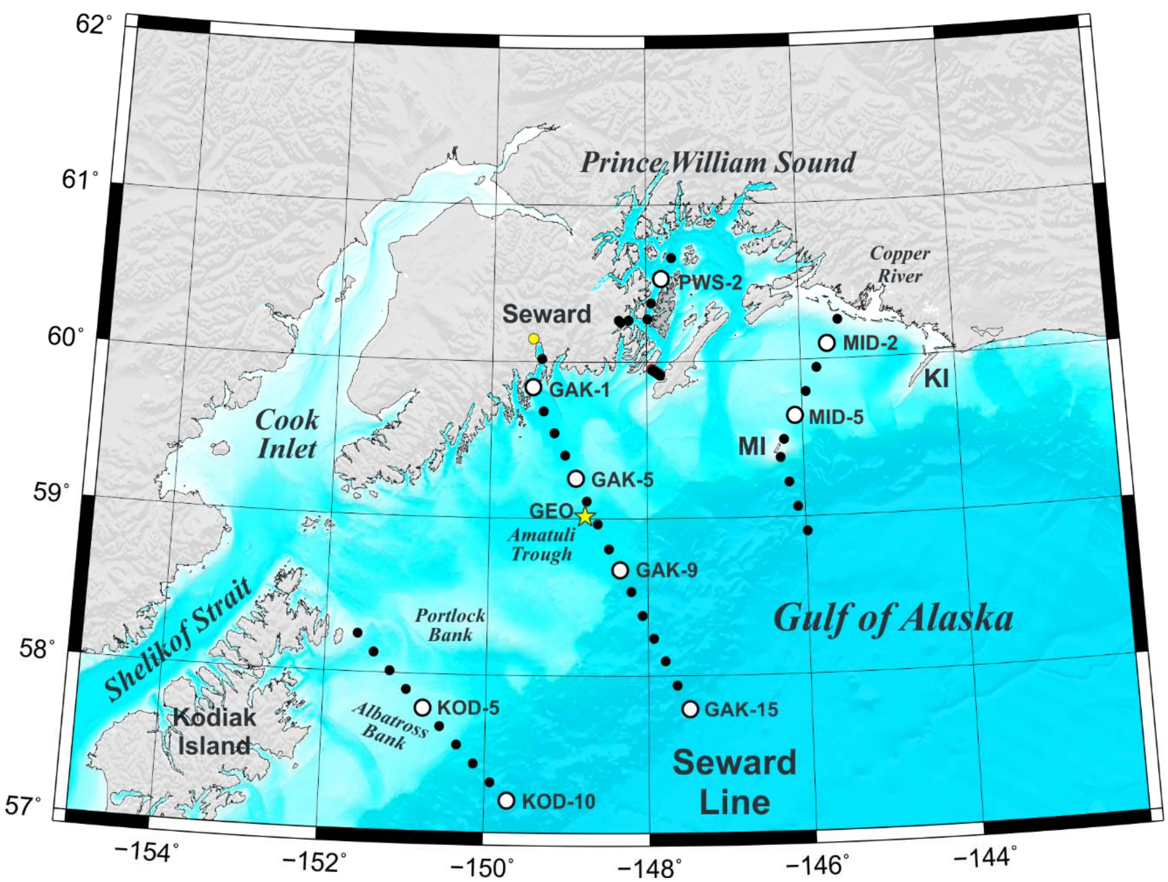


Figure 1. The LTER sampling stations. CTD casts without water sampling as open symbols. Yellow diamonds represent locations of meteorological data from NOAA buoys or ground stations. Star shows position of LTER mooring. Cape Suckling is low priority and not sampled during this cruise.

Scientific Personnel:

1	Ana **Aguilar-Islas** (UAF)	Chief scientist, NGA LTER PI	Macro- and micronutrients
2	Lauren **Block** (UH)	Graduate student	Zooplankton (days)
3	Jake **Cohen** (UAF)	Graduate student	Microbes and genetics
4	Dan **Cushing** (USFWS)	Scientist	Seabird, mammals
5	Kerri **Fredrickson** (WWU)	Scientist	Phytoplankton/microzoopalnkton, organic carbon
6	Josianne **Haag** (UAF)	Graduate student	Ra, Rn isotopes
7	Gwenn **Hennon** (UAF)	Scientist, Project PI	Microbes and genetics
8	Russell **Hopcroft** (UAF)	Scientist, NGA LTER Lead PI	Zooplankton (lead on days)
9	Mette **Kaufman** (UAF)	Scientist	Macro- and micronutrients
10	Thomas **Kelly** (UAF)	Scientist, Post-doc	Biogeochemistry and particle cycling
11	Hannah **Kepner** (UAF)	Graduate student	Zooplankton (nights)
12	Addie **Norgaard** (UAF)	Graduate student	Inorganic carbon
13	Emily **Ortega** (UAF)	Graduate student	Macro- and micronutrients
14	Jaide **Phelps** (UAF)	Graduate student	Inorganic carbon (volunteer)
15	Alex **Poje** (UAF)	Scientist	Zooplankton (nights)
16	Isaac **Reister** (UAF)	Graduate student	Physical parameters, moorings
17	Peter **Shipton** (UAF)	Scientist	Physical parameters, moorings
18	Caitlin **Smoot** (UAF)	Scientist	Zooplankton (lead on nights)
19	Emily **Stidham** (UAF)	Graduate student	Zooplankton (nights)
20	Suzanne **Strom** (WWU)	Scientist, NGA LTER PI	Phytoplankton/microzoopalnkton, organic carbon
21	Kathryn **Williams** (WWU)	Graduate student	Phytoplankton/microzoopalnkton
22	Carmen **Greto** (UAF)	Marine Technician (Lead)	
23	Dan **Naber** (UAF)	Marine Technician	
24	Charles Cousin	Developer	Onboard only on 4/21 testing DPI

SKQ2022-07S followed mitigation measures outlined by UNOLS to reduce the risk of COVID-19 transmission. These included a molecular test (5-10 days prior to the cruise), mindful public behavior, temperature logs, and a rapid testing onboard during the first mobilization day.

Cruise Overview:

General Notes: The cruise was scheduled earlier than other spring cruises and coincided with two large storm systems, dictating the order in which station transects were conducted and resulting in the loss of 4 working days. High winds during these storms mixed the surface layer, and the presence of mesoscale eddies at the end of the MID and GAK lines impacted shelf and offshore waters propertiesalong these transects. These features were observed with satellite images and onboard instrumentation.

Station Transects: Most of the cruise was dedicated to transect station work. Due to a developing storm at the onset of the cruise, station work started in Prince William Sound, followed by the MID Line, because of its proximity. The outlook called for good weather and we moved to work on the KOD Line, which had to be cut short due to an impending second storm. The Seward Line (GAK stations) was sampled last as it needs to be sample during May for historical consistency. The time spent at each line was roughly 2 days on the KOD Line, 3 on the MID Line, 2 in PWS, and 5 on the GAK Line. As per standard design while occupying these transect lines, operations were generally divided into distinct day and night tasks, thus requiring each station to be occupied twice. This structure results in some back-tracking but avoids individual projects needing to supply 2 shifts of scientists. Additionally, day and night station occupation ensures all organisms – especially larger diel-migrating zooplankton – are captured with minimal time-of-day bias. During most morning, an “intensive” station was occupied for primary production experimental work. Intensive stations involve a greater number and types of collections than other stations occupied that day. Stations profiles were supplemented by underway measurements, as is typical of NGA cruises. A subset of stations, including all intensive stations, were also sampled for iron parameters using a dedicated winch and trace metal clean rosette. At these stations the Fe-fish was deployed to collect the surface most sample. As it is done during all NGA cruises, bird and mammal observations were conducted continuously during daylight hours while the ship was underway.

Sediment Traps: This cruise involved the deployment of five drifting sediment traps with subsequent-day recovery, one each on PWS, the KOD and the GAK lines, and two along the MID line. The reoccupation of stations as characteristic of our normal sampling design facilitates the integration of sediment traps into the cruise logistics.

Moorings: This cruise involved mooring operations at GAK 1 and the GEO site. At the GEO site we recovered GEO 2, GEO1, and GEO3, and deployed GEO 1 and GEO3. At GAK1 we recovered the GAK1-21 mooring and deployed the GAK1-22 mooring.

Tow vehicle: An undulating tow vehicle – the ISIIS-DPI – outfitted with line-scan cameras and seawater sensors (CTD, oxygen, fluorometers, LISST, ACS, SUNA) was deployed from the GEO station to Resurrection Bay, and while hiding in Resurrection Bay from one of the storms.

Underway Instrumentation: Three instruments were plumbed into the Sikuliaq’s uncontaminated seawater system: A spectrophotometer (AC-s sn338), a particle backscatter (BB3 sn6077), and a fast-repetition-rate fluorometer (FRRf sn12-8679-004). The ship also has a nitrate sensor (ISUS) interfaced with the underway seawater system.

Other: During this cruise an opportunity was provided for a UAF student to collect samples from the underway system for radium and radon isotope analysis. Also, a new oxygen titration system was used onboard to analyze a subset of CTD bottle samples.

Daily summary:

4/18/2022 – Science party from UAF and WWU travels to Seward. Cruse gear and supplies are also transported from UAF to Seward. Science party spends the night at hotels/SMC apartments. We have a fully vaccinated science party and ship personnel. Upon arrival, the nutrient group boards the ship for preliminary set-up. They are given a rapid test. All are negative.

4/19/2022 – As science party members arrive to the ship in the morning, they are tested for COVID-19. This is a slow process because there are only two readers and one malfunctions. The morning is taken up by testing. Everyone is negative. Loading begins ~13:00 because the offload for the previous cruise takes entire morning to complete. Set up starts around the same time. The rest of the science party from UAF, AFWS, and UH arrive in Seward. All also test negative for COVID-19.

4/20/22 – Set up continued through the day. The welcome briefing from ship personnel and chief scientist takes less time than usual because all of the party personnel had view the safety videos prior to boarding. Setup continues through the night, as ½ day was lost on 4/19. Unlike other cruises we are unable to get underway this evening because of the late start setting up, and because we are waiting for the arrival of a crew member.

4/21/22 – We get underway at 08:30. We stay in Resurrection Bay for several hours testing the tow vehicle (DPI). Tests are successful and the developer (Charles Cousin) is taken back to shore around 12 noon. The offshore forecast calls for gale warnings starting tomorrow with seas building to 12ft for the next couple of days, so the best approach is to start in the sound. We get underway around 1 pm. Calm seas on our way out as we head to PWS2 to commence station work. We start at around midnight with multinet casts. Unfortunately, the winch needed to deploy the sediment trap is not functioning properly, and we are unable to deploy a sediment trap at PWS2. Night work at PWS2 and PWS3 is accomplished, as well as pumping for Ra/Rd isotope samples at the end of PWS3 station. We sit at PWS3 waiting for 8 am to commence daytime work.

4/22/22 – We start at PWS3 and work our way down to KIP2. Rain and building seas expected throughout the day. Because there are issues with the CTD communicating, we start later than expected. The Prod cast at PSW2 takes place at ~ 12 noon. With the winch fixed, a sediment trap is deployed. There is also a problem with the TM winch rendering during recovery. The crew is able to recover the TMCT rosette manually, but no samples were collected. We finish day work at KIP2 around midnight. The night crew samples KIP2 and PWS1, and the sediment trap is recovered around PWS2. We transect towards IB0. There is scattered rain during the day and night.

4/23/22 – Start of day ops at around 10:30 not quite in IB0 because of sea ice conditions. The snow layer and thicker ice meant it would take ~2.5 hrs to open up a hole for the CTD at IB0. Samples were collected at ~ 2miles from the station. The rendering of the TM CTD might be related to software updates. Fixes recommended by the winch pool technician are tested at Station KIP0, but the winch still is not fixed. Transect to MS stations. The marine tech (Carmen Greto) figures out the problem with the TM winch is mechanical, the level wind hitting the drum and blocking movement. At MS4 the CTD hits the bottom and the conducting cable is damaged. No MS2 CTD was possible. It rains throughout the day. No net deployments tonight. The CTD cable is re-terminated while transecting to the MID Line (MID 7i) to deploy a sediment trap. We encounter rough seas (remnants of the storm) while transecting to the MID Line.

4/24/22 – There is a swell, but winds are down to about 15 kt, and there is no rain. However, it starts becoming cloudy in the afternoon. The day work starts at around 6 am at MID6i. Work at the intensive station MID 5 commences at ~ 9:30 am. The TM CTD malfunctions and there is no TM cast at MID5, but Fe-Fish sample is collected. We continue sampling the line towards MID1. Night work samples the line in the opposite direction without incident. A TM CTD for MID 5 is taken in the middle of the night. We transect to MID 9

4/25/22 – The weather is calm today. A sediment trap is deployed at MID 9. There is no intensive station today. The day work progresses from MID9 to MID7, with a TM CTD conducted at MID 8. A Sperm whale is spotted at MID 9. A small transect is added from MID 7 to MID 6i for bird observations. Night work samples from MID7 to MID10 without incident, and a sediment trap is deployed towards the end of the line.

4/26/22 – A sunny, calm morning. A transect to MID9 and back to MID10 is added to allow for bird observations in this section which was missed yesterday. Day work commences ~10 am at MID10. The main CTD is experiencing problem writing to the file, but the data has not been lost. After ops are completed at MID10, the ship transects to obtain HNLC water. Instead of the expected HNLC water, we encounter shelf water that had been advected near MID10. After 2 hrs of looking, we abort operation (unfortunately we did not have a Chl image for the day as satellite passes over at 3pm), and move to collect the sediment trap. As luck will have it, we recover the sediment trap in water with some HNLC characteristics. We deploy the Fe-fish and begin the transect towards KOD10 (9-10 knots) hoping to collect the needed HNLC water, but disappointedly the transect takes us out of HNLC waters back to advected inshore water for the next 2 hrs. The Fe-fish is pulled out without collecting water. This highlights the patchiness of the margin region in the NGA (especially when eddies are present).

4/27/22 – The ship was able to make up time by going 12 knots. The weather was calm and the currents were in our favor. We arrived at the sediment trap deployment site at 6:30 am. After the sediment trap is deployed and we head towards KOD10. At this station we start with arriving fish. We are now sitting in HNLC water (a cyclonic eddy has moved into the region). Intensive station work is conducted at KOD10. Once that is finished, we collect HNLC water for Fe dissolution experiment and for molecular work. Day work takes place at KOD 9 and KOD 8. The day ends with a TM cast at KOD 8 that came out of the water at 22:40. We had a long, but beautiful calm sunny day. Night ops (all Bongos) take place from KOD7 to KOD10

4/28/22 – Day work begins by recovering the sediment trap at KOD10 at ~6 am. We then transect to KOD7 to begin station work (at 9:15 am). The weather forecast is changing starting Friday night (4/29). The KOD line will need to be cut short to ensure enough time to complete the Seward Line. The large forecasted storm will potentially make Sun-Tuesday morning unworkable. We are able to complete day-time and night-time station operations up to KOD 2, finishing around 2:30 am, and head to the Seward Line.

4/29/22 – We arrived at the GEO mooring site ~ 11 am. Our risk assessment meeting (at 10:30 am) determined mooring operations were safe to conduct today (a total score of 8, which is on the high end of the low risk scenario). The weather and sea state are still quite calm, although the day is cloudy. A CTD is deployed at the GEO mooring site. The order of mooring ops is as follows. Recover GEO2, GEO1, GEO3. Deploy GEO1 (anchor last), deploy GEO3 (anchor first). We finish recovery and deployments by 20:00. Unfortunately, the walker and water sampler were not on the mooring (GEO2), so it was decided not to redeploy the mooring to avoid losing the water sampler again. It appears the issue is the materials used in the threaded rod allowed for corrosion because the rod was not 316 stainless steel, as the design had called for. The DPI is deployed at 20:30 and we are on our way to Resurrection Bay. The weather is starting to deteriorate. After sometime in the water, the DPI elevators are not responding and the package is recovered. The issue is communication cables that had come loose. After communication was re-established, and the cables better secured, the package is re-deployed and able to be towed into Resurrection Bay. We arrive around 9 am on 4/30/22.

4/30/22 – In the morning we transected to RES 2.5 and sampled the station. We stayed in Resurrection Bay the rest of the day waiting out the storm. Science caught up with work. Mooring for GAK1 was prepared. There appears to be a weather window for work in the innershore on 5/1, and for the deployment of GAK1 mooring on 5/2

5/1/22 – GAK1 station work is attempted at 11:00 am. We are able to do a shallow CTD cast for productivity and gases, but conditions were marginal even at this inshore station. We are unable to do the TM CTD casts, and nets because the winds and swell conditions are not conducive for this work. We then return to Resurrection Bay. We plan to attempt to finish the station at 20:00, but conditions do not improve.

5/2/22 – Weather conditions are still unworkable. Barometric pressure fell throughout the day from 996 hPa to 988. High winds and seas even at GAK1. DPI was tested in the evening around Resurrection Bay.

5/3/22 – Conditions are workable at GAK1. Got underway at 8:45 will arrive at GAK1 at 9:45 to assess the conditions. Conditions at GAK1 were much better than expected. All ops were possible including the mooring work. Nanooq was out today as well going to Bear glacier. Transect to GAK2 to see if workable. The conditions at GAK2 were similar to GAK 1 and we were able to work the station. Transect to GAK 3. Conditions were poor at GAK3, after some discussion we worked GAK3 (without Fe Fish) and returned to GAK1 to begin night ops knowing that GAK 4 would likely be worked during day break. The reason to run to GAK1 was to allow the night crew much better working conditions

5/4/22 – Started with bird surveys from GAK4 to GAK3i (to complete segment missed the previous night). Day work started at GAK4 at 8 am. The CTD software is still having communication issues during the cast. It appears the autoarchive feature on the ship prevents the seabird software from writing on to the open file. Weather conditions are marginal. Hoping it is not worse as we move offshore throughout the day. Weather and sea conditions improved throughout the day. We are able to complete GAK4 to GAK7 and reposition to GAK5 for night ops to start (21:30) This will allow enough time for nights to do stations GAK5 to 8 and for repositioning to cover GAK7 to 8 for bird observations.

5/5/22 – Started day ops with bird survey from GAK7 to GAK8. Station work at GAK8 to GAK12. Still having issues with the CTD software, and it is not the ship's archiving that causes the software crash. Files that had this issue were named the number of the cast plus "a" (CTD 35a goes with CTD 35). If the crash happened during the upcast, then the bottles need to be re-fired at the depth at which the crash happened, so the "a" file will have the shallower depths and the regular file the deeper depths. TM cast was re-done at GAK 9. No TM cast at GAK11. Finished GAK11 at 19:45. Arrive GAK12 at 20:40 and finished the station at 22:30 after deploying the sediment trap. Night starts at GAK12 (23:00) and worked towards GAK9. Heading back to GAK 13 at the end of their work. Much improved weather throughout the day. Mostly cloudy, but the seas were still around the 6-7 ft range.

5/6/22 – Arrived earlier than expected at GAK 13 (8:45). Ship was able to transect at 12 knots. Seas have come down substantially, but the wind is similar to yesterday. The surface GEO mooring is not giving the correct GPS position (gives Seward instead), and it is not transmitting data. Might have to pick it up if there is time on our way home. Some sun throughout the day. We were able to complete GAK13 to GAK15. The last sets of Multinets at GAK15 took longer than 1.5 hr estimate, thus night ops at GAK15 started at 23:00 instead of 22:00. The sediment traps will likely be recovered at 5 am instead of 4. We might not make it into port by 17:00. Some people started packing. GAK15 multinet had a bad flow meter. A meter got swapped and the multinets were OK at GAK14 and 13. Sediment trap recovery went well and the ship was on its way home by 04:05

5/7/21 – Sunny and flat calm seas. We are able to transect at 12 knots and there is time to pick up the mooring (~ 1hr). Packing and tearing down in full swing. Will be to the SMC by 16:30. Beautiful view of the mountains with clear and distinct outlines since GAK10.

Physical Parameters:

PI: Seth Danielson
Participants: Peter Shipton and Issac Reister

On SKQ202207S we conducted 64 CTD casts for water column hydrography at 52 stations using a 24-place rosette with 10 liter Niskin bottles. Bottles were tripped on 55 of these 64 casts. For normal operations, bottles were made at standard levels: 0, 10, 20, 30, 40, 50, 75, 100, 125, 150, 200, 250, 500, 750, 1000, 1250 and 1500 m depths and within 5 m of the bottom when the bottom depth was less than 1500 m. On many casts we also collected water at the depth of the chlorophyll a maximum.

The SBE9-11 CTD was outfitted with pressure, dual temperature, dual conductivity, and dual oxygen sensors. Ancillary sensors included a WetLabs fluorometer, WetLabs ECO-Triplett optical sensor, a WetLabs C-Star transmissometer, a Biospherical PAR sensor, and a Tritech altimeter. One channel was assigned to a self-logging Sequoia LISST particle size spectra instrument; one channel provided power and communication to a self-logging SUNA nitrate sensor. The CTD stations were occupied on three shelf transects (MID, GAK, and KOD Lines; Figures 1 and 2) plus stations in Western Prince William Sound.

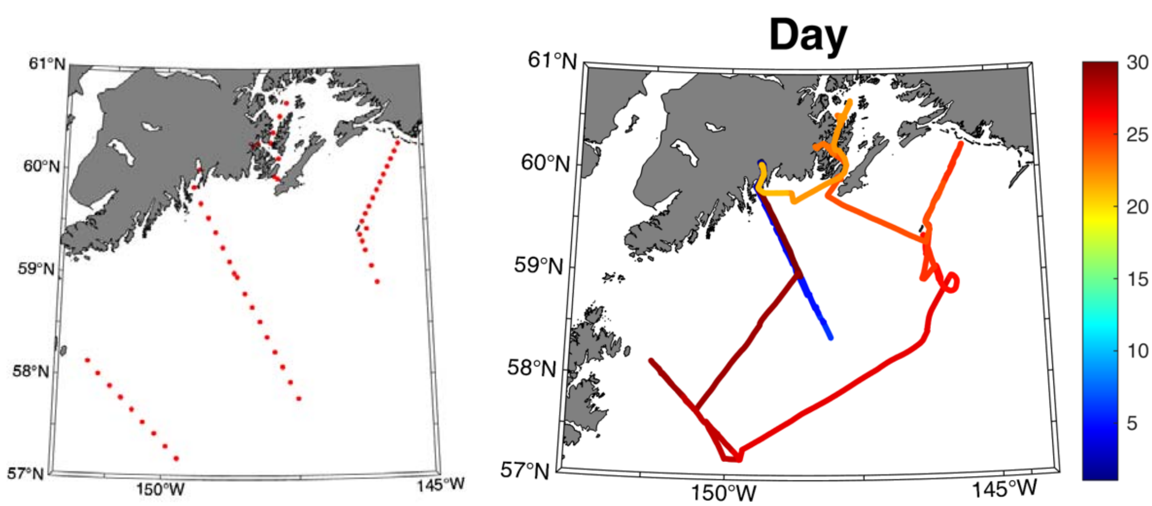


Figure 2. Map of CTD stations occupied in SKQ202207S (left) and trackline (right) with colors denoting the day of the month over 18 April to 7 May 2022. The CTD stations were occupied on three shelf transects KOD, MID and FAK Lines, plus stations in PWS, including stations across Montague Strait, in Icy Bay, and along Knight Island Passage.

Hydrography:

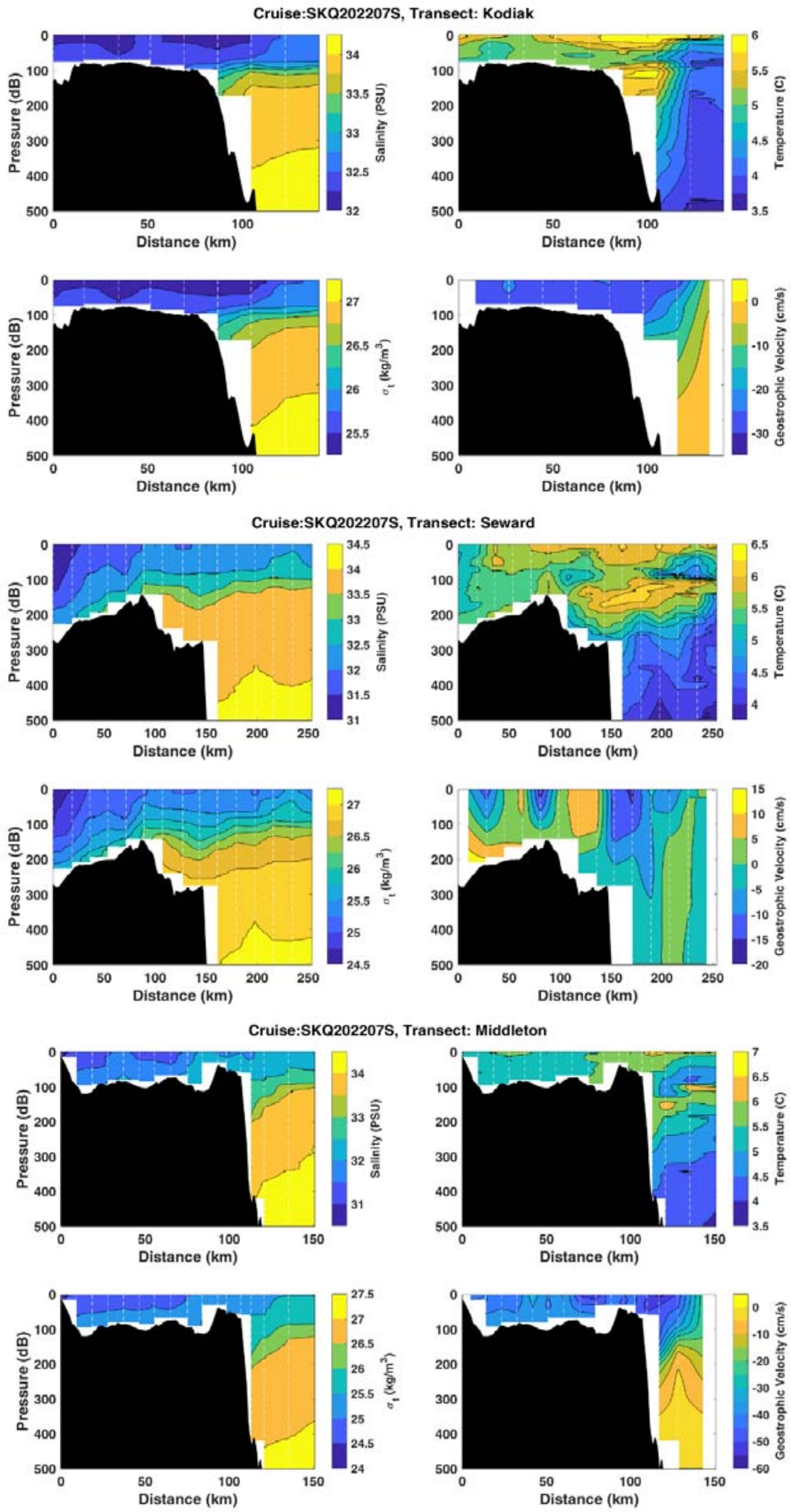


Figure 1: Hydrographic sections over 500 dB of the Cape Suckling, Kodiak, Seward and Middleton lines in four-panel grouping showing (clockwise from upper left) temperature, salinity, density (sigma-t) and geostrophic velocity referenced to 500 dB.

Ocean velocity data was collected using a hull-mounted Teledyne RDI 75 kHz Ocean Surveyor instrument and a centerboard-mounted Teledyne RDI 300 kHz Workhorse instrument. The 75 kHz instrument collected data using 16 m bin thickness and the 300 kHz instrument collected data in 2 m bins. Due to hull depth and bubble sweep along the hull, the first good bin of the 75 kHz ADCP was typically at 18 m below the surface or deeper. The 300 kHz instrument measured good data starting at 11 m depth. We ran the ADCPs triggered from the K-sync system so as to provide an interference-free time interval for the EK-60 fisheries acoustics pings. Over shallow waters (< 1000 m depth) all acoustic instruments could be run simultaneously. In deep water (>1000 m depth) the time for the return acoustic pings become exceedingly long so we ran in one of two modes in deeper water. In “night operations mode” we secured the EM302 multibeam and operated only the ADCP and EK-60 so as to have concurrent acoustics data alongside the nighttime trawl operations. In the “day operations mode” we would run the EM-302 so as to map the seafloor along our trackline. Regions previously unmapped by multibeam acoustics were preferentially selected for ship routes in order to map uncharted areas of the seafloor. Many portions of the cruise occurred in previously unmapped regions, including especially portions of Prince William Sound. Future cruises will continue to fill in mapping coverage gaps.

Other underway data collected include the ship’s operational and navigation data, meteorological data, and ocean surface data. Operational data of ship’s equipment (e.g., navigation and winch payout and tensions) were logged and will be archived at the R2R data repository. Navigation data parameters include GMT date time, latitude, longitude and water depth. Atmospheric data parameters measured by the ship’s underway system included atmospheric pressure, wind speed/direction, air temperature, humidity, CO2, shortwave downwelling irradiance, longwave downwelling irradiance, and PAR. Surface seawater underway data samples included temperature, salinity, chlorophyll-a fluorescence, partial pressure of CO2, and nitrate. Two nitrate dataloggers were used on the cruise. An ISUS instrument was plumbed into the underway uncontaminated seawater throughflow system that feeds the thermosalinograph sensors. This instrument was set to take three samples every five minutes. The ISUS had a new lamp installed just prior to SKQ202010S. The second nitrate sensor was a deep SUNA instrument strapped to the CTD frame. This SUNA was powered by a stand-alone battery pack energized when the CTD sent power to the bulkhead connectors. These data were stored internally on the SUNA and this full dataset will require matching time stamps to align the nitrate profile with the rest of the CTD profile. However, a simple analog signal recorded in the CTD data file also provides preliminary estimates. The lamp for the Deep SUNA was determined to have burned out prior to the start of the cruise and was inoperable. A replacement SUNA was used which had a depth rating of only 500 meters.

Underway Sensor Data:

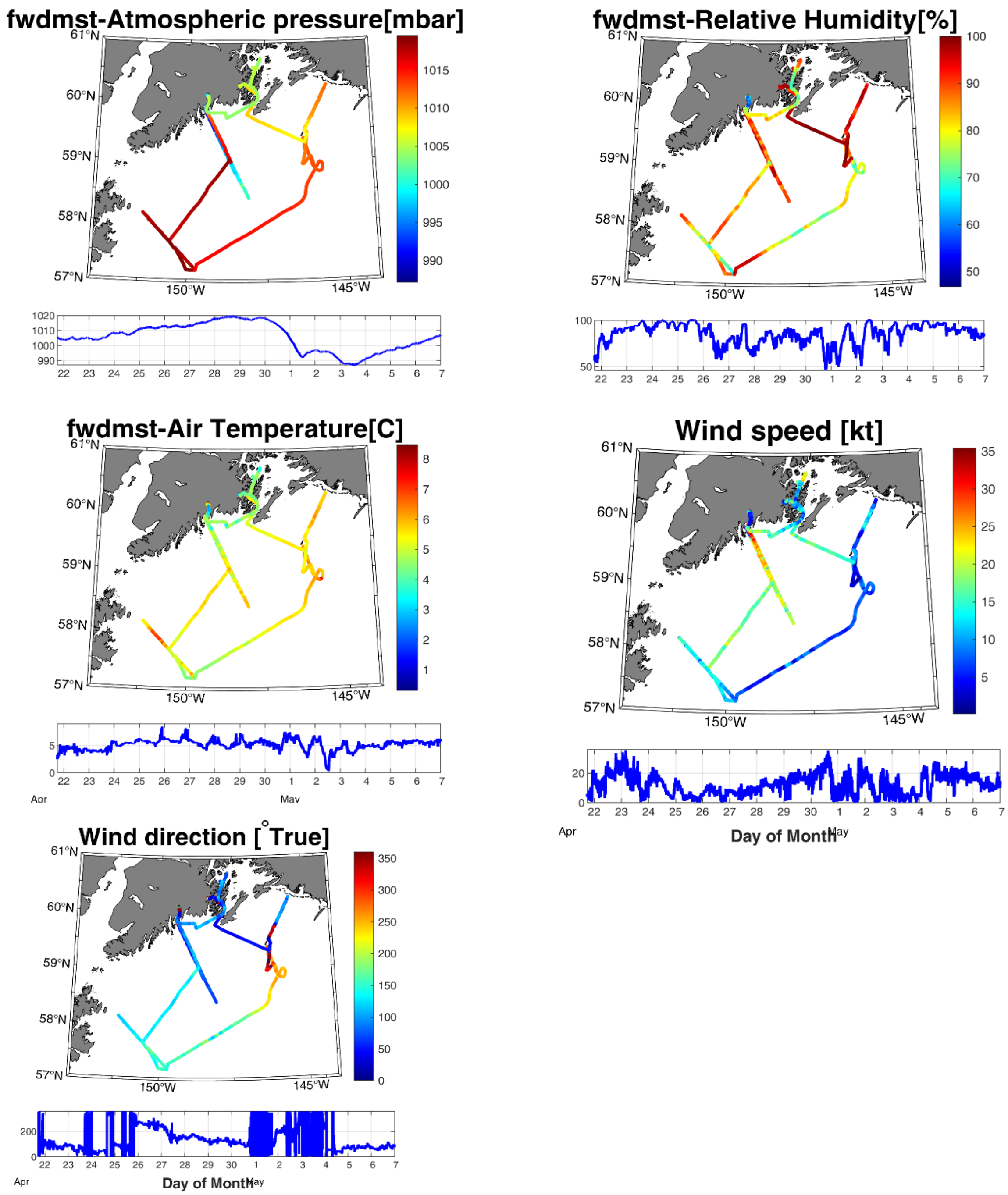


Figure 4: Underway atmospheric parameters.

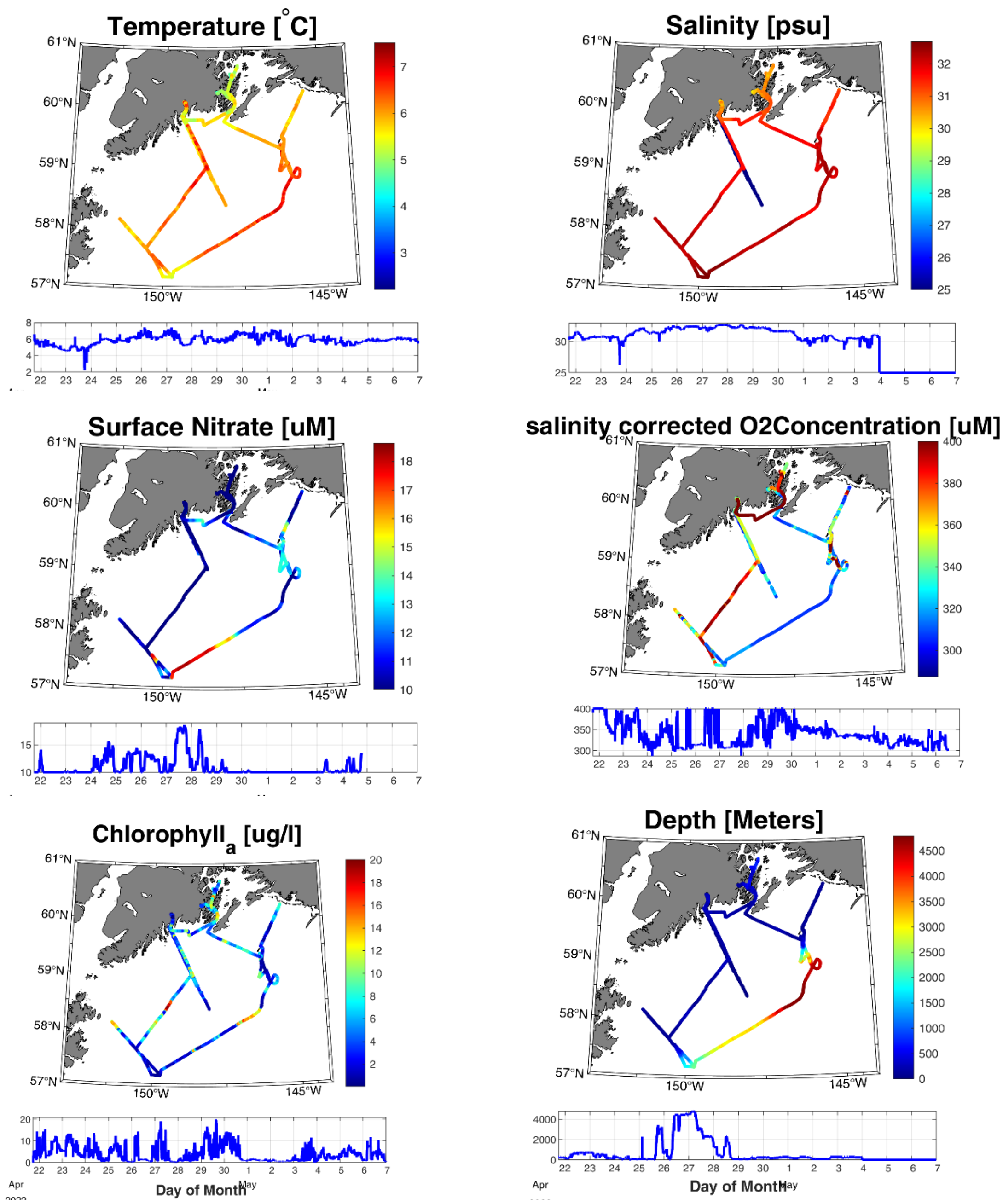


Figure 5: Underway sea surface parameters.

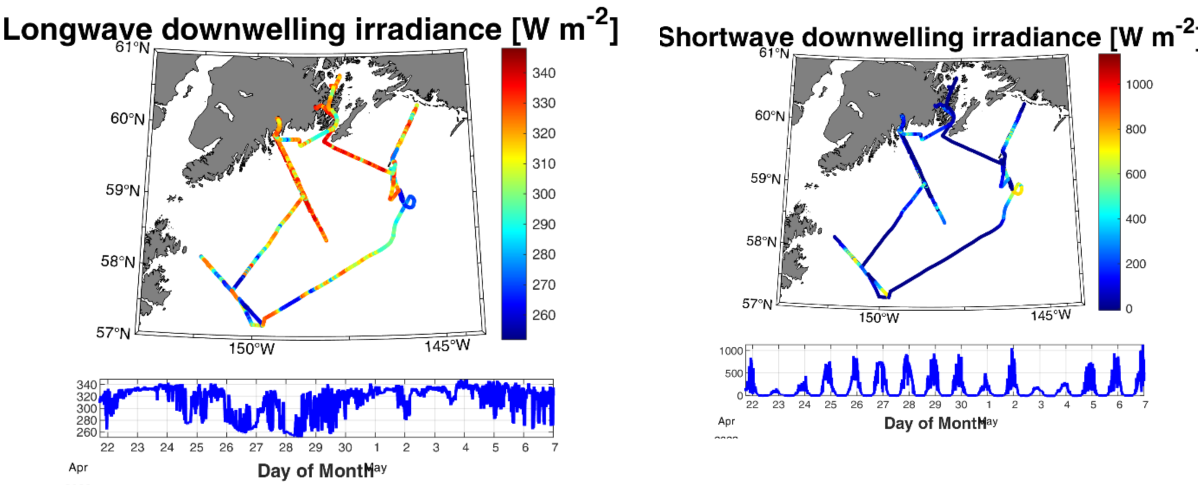


Figure 6: Underway irradiance parameters.

Moorings:

GAK1 Mooring: Oceanographic station GAK1 is the long-term hydrographic profile station at the mouth of Resurrection Bay, sampled nominally monthly since December, 1970. A mooring has been deployed at GAK1 since 1998, with 6-7 temperature/conductivity/pressure dataloggers located between 250 and 20 m depths. We recovered the 2017-2018 GAK1 mooring on this cruise. Data was recovered from all instruments (Figure 7).

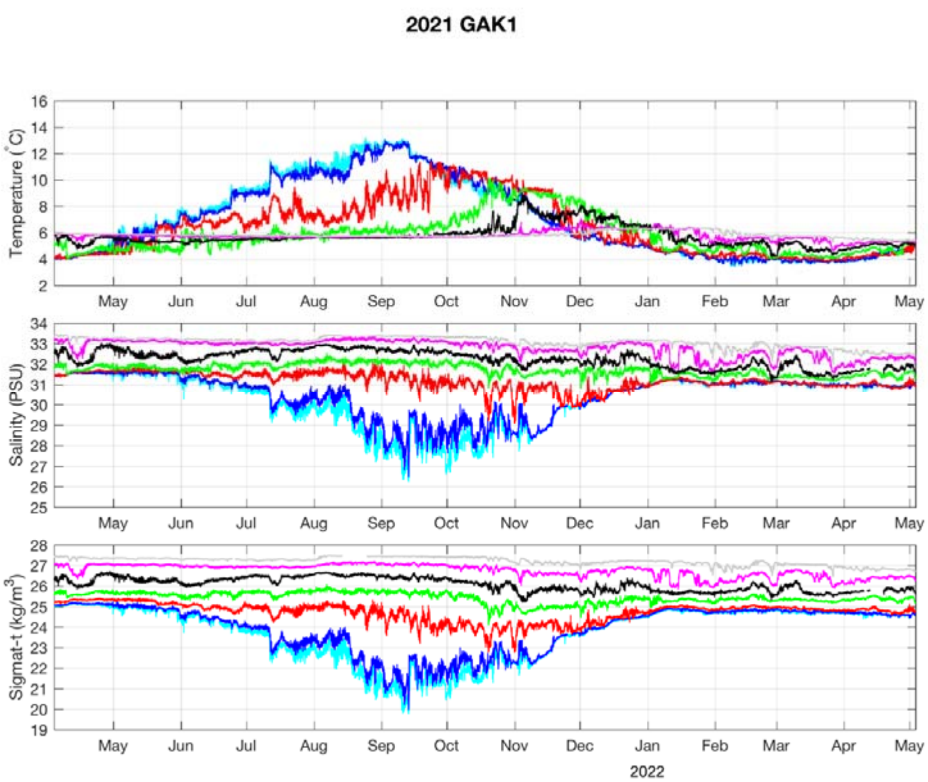


Figure 7. 2021-2022 GAK1 mooring temperature, salinity and density data from the recovered GAK1 mooring. Initial data de-spiking and cleanup has been applied. Colors denote instrument records from deployment depths near 250, 200, 150, 100, 60, 30 and 20 m below the surface.

GEO Moorings:
The GEO mooring cluster was first deployed in 2019. Normal turn-around is now scheduled on the spring LTER cruise and in 2022 we intended to deploy GEO1 (profiler), GEO2 (biophysical and biogeochemical) and GEO3 (surface buoy) and recover moorings GEO1 and GEO2. Recovery narratives are provided below. The ITP profiler was lost from GEO1 and the top instrument frame and associated instruments were lost from GEO2 due to corrosion of the frame. Subsequent investigation showed that incompatible stainless steel metals led to the corrosion. The frame-attached instruments will be replaced by UAF insurance. Following deployment, it was determined that the GEO3 surface buoy was not properly transmitting. We revisited the mooring site and found that the Globeacon unit had sheared off of the mooring mast in the large storm immediately following deployment. The mooring was recovered without incident and will be refurbished in anticipation of a new deployment in 2023.

Datasets were recovered from the recovered GEO2 mooring AURAL passive acoustic sound recorder, three SBE-37 dataloggers, two ADCP current profilers, the sediment trap, the particle camera, and the AZFP active acoustics datalogger.

On April 29th, 2022 at approximately 19:45 UTC, the GEO2-21 mooring was released and seen at the surface. The Sikuliaq positioned to approach the 3 surface expressions perpendicular to the ship with the top float (the buoy with the most biofouling) closest to the hull. The ship approached slowly, and when the top float was aft of the Baltic room, the buoy was clipped to by the outhaul winch. As the buoy was worked back toward the stern, the line became increasingly taught and the top buoy was no longer moving back but “fixed” just a few feet aft of the embarkation opening. Upon noticing this, it became apparent from the angle of the line coming off of the middle buoy that the line between the two was caught somewhere on the ship. The outhaul line was then wrapped on a cleat to prevent the buoy from drifting away while the center board was pulled in. Once the center board was fully retracted, the angle of the line appeared to be a straight line between the top and middle buoy. The ship then edged forward and the outhaul line was worked back to the stern with the top buoy still connected. The top buoy was hauled on deck using the outhaul winch. The mooring line was then stoppered off at the pear link below the float and transferred to the TSE winch. Immediately after beginning to haul in the mooring with the TSE, it became apparent that the frame below the top float was no longer in line and that the safety line on the frame had prevented the top buoy from being lost. This was also the reason that the line below the top buoy was light enough to get snagged on the centerboard.

GEO1-21 was released at about 22:15 UTC on April 29th, 2022. The top steel float and bottom ADCP float were quickly spotted by the bridge, and an approach was made toward the dirtier steel float. As the ship got next to the buoys, the ADCP buoy was the closer and clipped by the outhaul winch. The outhaul wire was walked to the stern of the ship. Once both buoys were trailing behind the ship, the ADCP buoy was lifted with the outhaul winch out of the water and the 8242XS release 2 meters below was pulled in by hand. The Nilspin wire was stoppered off using the pear link between the ADCP buoy and the wire. The ADCP buoy and release were then disconnected and the Nilspin wire was connected to the working line on the TSE winch. The wire was then wrapped onto the TSE winch, pulling the steel float closer to the boat. Once most of the wire was on the winch and the buoy was closer to the ship it became apparent that the ITP was no longer attached to the winch. The rest of the wire was pulled in until the buoy came out of the water. The A-frame was then brought in to land the final buoy.

The View from Space:

Daily images were processed by Rachel Potter at UAF and provided to field participants throughout the cruise via shore to ship file transfers.

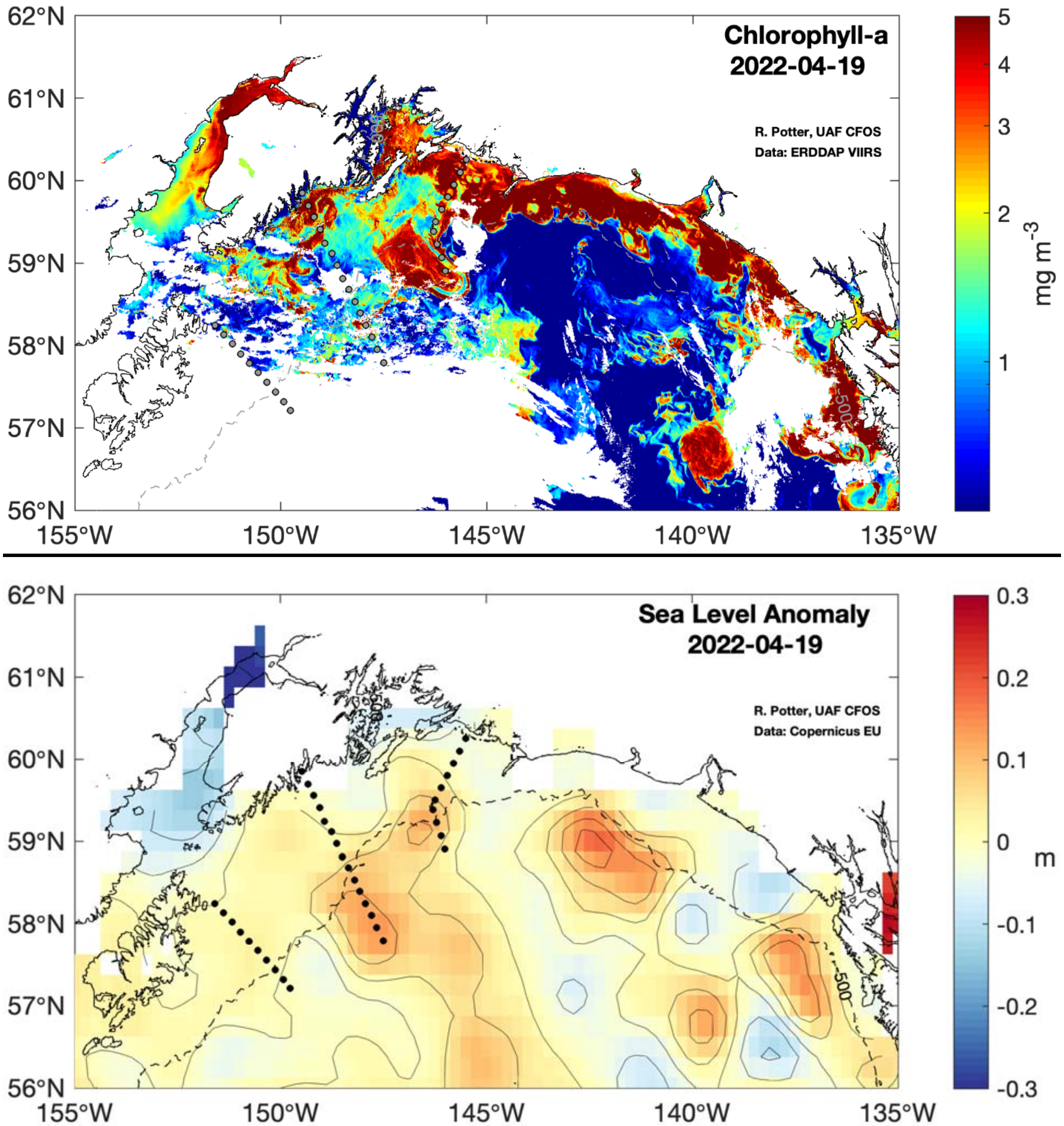


Figure 8. Biomass and sea level anomaly maps for April 19, 2022, the day before the start of the cruise.

Macro- and Micronutrient:

PI: Ana M. Aguilar-Islas
Participants: Ana Aguilar-Islas, Mette Kaufman, Emily Ortega

During this field effort our goal was to determine ambient distribution of dissolved inorganic macronutrients (nitrate, nitrite, ammonium, phosphate and silicic acid) and the micronutrient iron across the three main NGA LTER lines (KOD, GAK, MID) and Prince William Sound. Nutrient distributions in conjunction with hydrography are used to determine resource variability to the phytoplankton community in space and time and to identify the relative importance of various processes in supplying nutrients to surface waters. A secondary aim was to continue training a PhD student in field-related work and experimental design.

Table 1. Samples collected for Nutrient Analysis
Intensive stations are in bold. Additional samples collected from primary production (PP) casts and surface transects are under “OTHER”

STATION	# samples	STATION	# samples	STATION	# samples
RES 2.5	13	MID1	3	KOD2	9
GAK1	13	**MID2**	8	KOD3	7
GAK2	11	MID3	8	KOD4	7
GAK3	11	MID4	8	**KOD5**	8
GAK4	11	**MID5**	8	KOD6	8
GAK5	11	MID6	4	KOD7	11
GAK6	10	MID7	7	KOD8	15
GAK7	12	MID8	14	KOD9	16
GAK8	13	MID9	16	**KOD10**	16
GAK9	13	**MID10**	16		
GAK10	15			GEO Mooring	12
GAK11	15	**PWS2**	14		
GAK12	15	PWS3	14	OTHER	# samples
GAK13	16	PWS1	13	TM Fish	1
GAK14	15	KIP2	14	PP casts	55
GAK15	16	IB0	11		
		IB1	10		
		IB2	10	**TOTAL**	**553**

Sample collection and processing for macronutrient analysis:
Filtered seawater samples were collected from 44 vertical profiles (see Table 1) from surface to 1500 m using the ship’s CTD rosette bottles. Samples were filtered through 0.45 um cellulose acetate filter disks using a syringe, and were frozen (-80 ^{o}C) following collection. Samples were also obtained from primary production casts (55) and surface water from the trace metal surface sampler (1). Kaufman was responsible for CTD macronutrient sampling with some help from Emily Ortega and Josianne Haag. In total 553 samples were collected for nutrient analysis.

Sample collection for iron analysis:
a) Seawater samples were collected from 16 vertical profiles (see Table 2) from 15 -1000 m using a trace metal clean (TMC) rosette made of powder coated aluminum and loaded with Teflon-coated Niskin bottles with external springs. A dedicated winch with 5/16" Amsteel line and a TMC block mounted on the starboard crane were used to deploy/recover the

TMC rosette. The winch was borrowed from the UNOLS East Coast winch pool. All participants were involved in deck operations, with assistance from crew and marine technician.
b) Surface seawater samples were collected underway while arriving (or departing) the stations where TMC casts took place. These samples are used to complete vertical profiles. Surface seawater samples were also collected during transit between the MID and KOD lines. These samples were obtained from a custom-made surface sampler (FeFish) (Figure 9) deployed from the starboard crane, and kept at a distance between 3-5 m from the hull while being towed at ~3 knots. Water was pumped with the use of an air actuated diaphragm pump that delivered the sample into "the bubble" (Figure 9) through Teflon-lined polyethylene tubing. Ortega, Kaufmann and Aguilar-Islas were involved in deck operations, with assistance from the crew and marine technician.

Table 2. Samples for iron parameters
DFe = dissolved iron (< 0.2 um), SFe = soluble Fe (< 0.02 um), TDFe = total dissolvable iron (unfiltered), PFe = particulate iron (> 0.2 um), Ligands = Iron-binding organic ligands (< 0.2 um).

STATION	DFe	SFe	TDFe	Ligands	PFe
GAK1	10	0	10	9	3
GAK3	10	0	10	0	0
GAK5	10	0	10	0	3
GAK7	10	0	10	0	0
GAK9	10	0	10	0	0
GAK13	13	0	13	0	0
GAK15	13	0	13	12	0
MID10	13	0	13	0	0
MID8	7	0	7	0	0
MID5	7	0	7	0	0
MID2	7	0	7	0	0
PWS2	13	0	13	0	0
KOD2	7	0	7	0	0
KOD5	7	0	7	0	11
KOD8	7	0	7	0	0
KOD10	13	0	13	0	0
TOTAL	**157**	**0**	**157**	**21**	**17**
TRANSECT	**DFe**	**SFe**	**TDFe**	**Ligands**	**PFe**
MID→KOD	2	0	2	0	0
TOTAL	**2**	**0**	**2**	**21**	**0**
GRAND TOTAL	**159**	**0**	**159**	**21**	**17**

Sample processing for iron analysis:
A positive-pressure, plastic enclosure supplied with HEPA filtered air (the "bubble") was constructed in the analytical lab to house the Niskin bottles, IronFish sampling spigots and filtration rigs. Immediately after collection Niskin bottles were transferred to the bubble for subsampling. Filtered (through 0.2 um Acropak capsules) subsamples for dissolved Fe analysis were processed from all casts at all depths, and from all IronFish samples. Filtered subsamples for the analysis of iron-binding organic ligands, unfiltered samples for total dissolvable iron analysis, and filters for particulate iron analysis were obtained from a subset of samples (see

Table 2). Samples were filtered through 0.2 um polycarbonate filter discs (Nuclepore) using trace metal clean techniques. Ortega and Aguilar-Islas was responsible for subsampling and filtration. Time consuming ultrafiltration for soluble iron was not carried out during this cruise. In total there were 159 DFe samples, 159 TDFe samples, 21 Ligand samples, and 17 particulate samples collected and processed during the cruise.

Figure 9. Top: The FeFish being deployed along the GAK Line. **Bottom:** Dilution experiment flow-through system and sample collection.

Particle Dissolution Experiments:
Ortega and Aguilar-Islas carried out experiments to determine rates of dissolution of metals from particulate material derived from the NGA. These experiments were carried out in a secondary bubble enclosure with HEPA filtration in the ship's walk-in refrigerator (Figure 9). Typical spring (5.5°C) and summer surface temperatures (15°C) were used to compare seasonal dissolution rates of previously collected particulate samples from KOD5 (bottom boundary layer) and the Copper River Plume region (surface) over a 24-hour period. Filtered HNLC water (50 L) was collected near KOD10 for use in these experiments. The experimental setup (Figure 11) consisted of a custom-designed, inline flow-through manifold with four

leaching chambers connected to the seawater reservoir and post-leaching filtration units. The HNLC water was pumped through the flow-through manifold using a peristaltic pump fitted with pre-cleaned Tygon tubing. Leachate samples for DFe analysis were collected for each of the treatment replicates at seven time-steps (56 samples), and subsamples for Fe-binding ligand analysis were collected as pooled replicates for each particle type and for the initial carboy (12 samples). Filter blanks were also collected at the start of each temperature treatment.

General Notes
We had a successful cruise and were able to accomplish all the programmed sampling for macro-nutrients and iron parameters. We were also able to complete two dissolution experiments. The spring bloom was underway and the presence of eddies at the margin made it challenging to find and collect truly HNLC water.

The warehouse was easy to access before and after the cruise, and the SMC personnel were helpful during loading and offloading. The marine technicians provided excellent support throughout the cruise. The crew was always helpful responding promptly to requests in a happy and professional manner. We experienced no issues with ship's facilities needed for macro- and micronutrient work. Laboratory spaces were adequate, the ship's deck gear, -80 oC freezer and walk-in refrigerator were in good working condition. Internet access was excellent. The quality of the food was excellent. Living quarters were in good condition, as were the linens provided.

Carbonate Chemistry:

PI: Claudine Hauri
Participants: Addie Norgaard

Pre-filtered dissolved inorganic carbon, total alkalinity and pH samples were taken at specific stations along the Seward, Kodiak, and Middleton Lines, and in Prince William Sound. Samples were filtered with a 0.45 micron membrane filter using a peristaltic pump to remove particulate inorganic carbon. **[Except for Kodiak stations because there was such a large bloom that it was impossible to filter].** Triplicates were taken at GAK1, GAK3, GAK5, GAK9, KOD2, KOD3, KOD5, IB1, PWS1, PWS2, PWS3, and GEO. In total 265 samples were collected.

Table 3: Carbonate Chemistry Samples

Station	Number of samples	Station	Number of samples	Station	Number of samples
GAK1	15	PWS1	15	MID1	3
GAK2	10	PWS2	16	MID2	8
GAK3	12	PWS3	18	MID3	6
GAK4	10	IB0	10		
GAK5	11	IB1	12	KOD2	14
GAK6	9	IB2	9	KOD3	9
GAK7	11			KOD4	7
GAK9	13	RES2.5	13	KOD5	10
GAK13	2	GEO	10		
GAK15	13				
Total number of samples				**265**	

Biogeochemistry and particle cycling:

PI: Andrew McDonnell.
Participant: Thomas Kelly

Optical Instruments
Two rosette-mounted optical instruments were used during the cruise and deployed for every cast: the underwater vision profiler (Hydroptic UVP5; sn009) and the laser *in situ* scatterometer and transmissometer (Sequoia LISST-DEEP; sn4041). Both instruments measure particle abundance and size spectra during the downcast. The UVP5 and LISST-DEEP were used on all casts with the UVP5 assessing particles between ~250 – 2500 µm while the LISST-DEEP quantifies particles into 36 size classes between 2 – 500 µm.

Surface Tethered Sediment Trap
Five (ST1-5) deployments of the surface-tethered sediment trap arrays were completed. Deployments lasted for approximately 24 hours and were conducted as cruise logistics allowed (stations: PWS2, MID7i, MID9, KOD10, and GAK12) with the goal of collecting sinking organic matter. Each array was outfitted with 1-2 cross-frames placed (1) near the base of the euphotic zone at ~40 m, and (2) 120 m (when water depth permitted). Four collection tubes per depth allowed for sub-sampling of sinking matter for pigments (*Chl-a*, phaeopigments; n = 36; HPLC; n=6) and carbon and nitrogen abundance and isotopic composition (POC, PON, PIC; n = 27). All deployments were successful, and all gear was recovered intact.

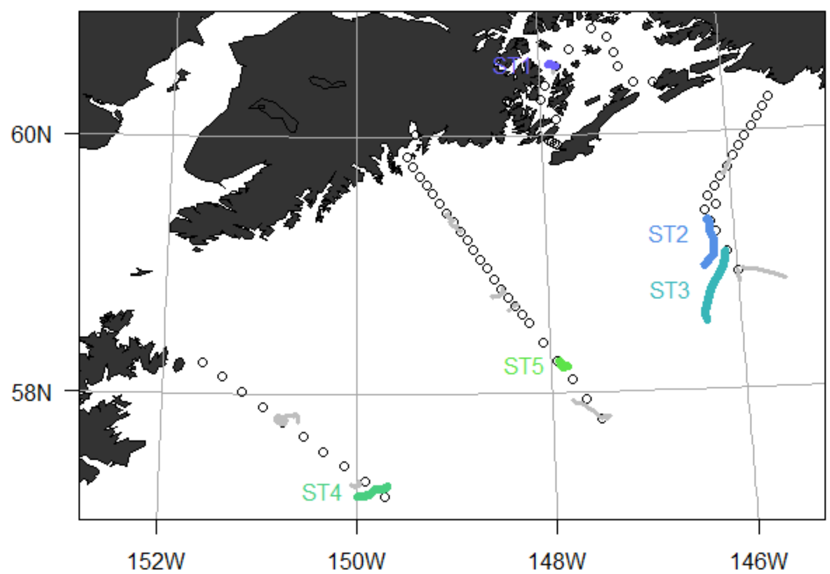


Figure 10. Map of sediment trap drift tracks. Each deployment is color-coded. NGA LTER stations are shown along with previous sediment trap deployments (grey). Note ST1 location in Prince William Sound.

Moored Instrumentation:
The GEO mooring sediment trap (Hydrobios) was successfully recovered (2021-2022) with samples stored at UAF for processing. Timings for the bottle rotation were synchronized with sediment trap deployed in the Bering and Chuchki Sea with sample collections switching on the 1st and 15th of each month. The 2021-2022 marine snow camera system was also successfully recovered. Deployment of the biogeochemical mooring was aborted due to failure of the aquamonitor frame during last year's deployment and subsequent loss of the instrument.

Sediment trap and marine snow camera are planned to be deployed on the next NGA LTER cruise.

Underway Instrumentation:
Three instruments were plumbed into the Sikuliaq's uncontaminated seawater system: (1) spectrophotometer (AC-s sn338), (2) particle backscatter (BB3 sn6077), and (3) a fast repetition rate fluorometer (FRRf sn12-8679-004). The AC-s and BB3 were plumbed in series with an automated valve that switched from raw seawater (100 minutes) to filtered seawater (1 micron prefilter; 0.2 micron final filter; 20 minutes). The filtered seawater provided a blank for the BB3 backscatter instrument and a dissolved sample for the spectrophotometer. In addition, three freshwater blanks were collected during the cruise to monitor biofouling. The FRRf was setup in automated mode and collected a new sample from the seawater inlet every ~30 minutes. The sample was dark acclimated for 15 minutes prior to collection of the fluorescent light curve. All instruments were setup continuously during the voyage, with the ACs and BB3 successfully collecting data throughout. The FRRf periodically stopped collecting data necessitating a clearing of the internal memory (lost entire MID line) but otherwise worked as adequately (n=200 FLCs).

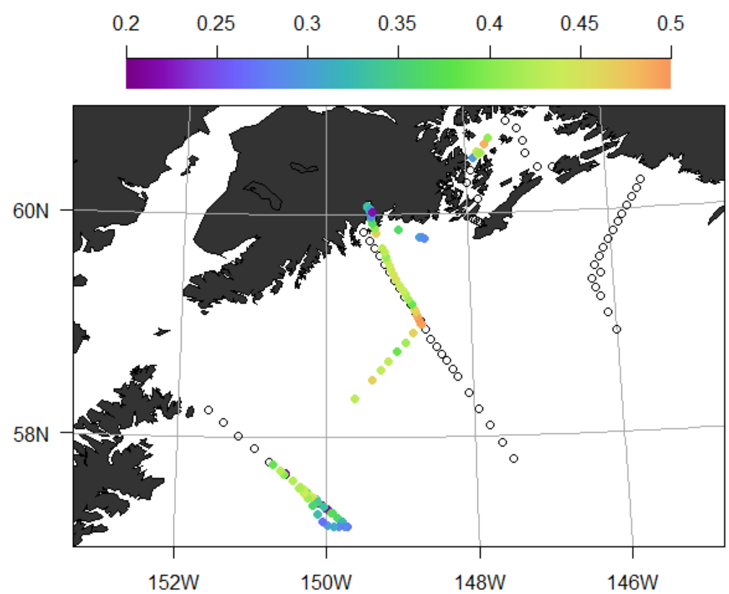


Figure 11. F_v/F_m measurements taken during the cruise. Lower values indicate reduced photophysiological health (inc. micronutrient limitation or photo-oxidative stress).

Dissolved Oxygen
Dissolved oxygen samples (n = 55) were collected at 12 stations from across the NGA LTER study site to provide calibration values of the dissolved oxygen sensor on the CTD rosette. Titrations were performed via automated amperometric titration (Langdon Industries sn58) at sea. No samples were taken prior to April 26th 2022 due to malfunctions of the titrator, which were resolved through a firmware update provided by the manufacturer. Replicates taken at GAK10 oxygen minimum (n = 6 @ 14 uM) demonstrated a relative worse-case variability of 1.1%.

Table 4. Preliminary dissolved oxygen data. Standards (not shown) were consistent with ~1.1% relative uncertainty observed at GAK10 oxygen minimum, whereas replicates often indicate << 1% relative uncertainty in waters with higher oxygen concentrations.

Stn	Cast	Niskin	Depth	$[O_2]$ (uM)	Stn	Cast	Niskin	Depth	$[O_2]$ (uM)
GAK1	48	1	225	200.2	GEO	43	3	200	92.5
GAK1	48	1	225	200.3	GEO	43	4	150	238.0
GAK1	48	1	225	200.9	GEO	43	5	125	254.5
GAK1	48	1	225	*212.5*					
GAK1	48	22	2	361.7	KOD10	33	4	750	62.4
GAK1	48	22	2	360.2	KOD10	33	8	150	23.0
GAK1	48	22	2	360.2	KOD9	34	10	100	157.7
GAK1	48	UW	5	361.5	KOD9	34	10	100	159.4
GAK1	48	UW	5	361.0					
GAK10	58	2	1000	15.9	MID10	30	3	1000	17.8
GAK10	58	2	1000	15.7	MID10	30	3	1000	17.4
GAK10	58	2	1000	15.9	MID10	30	3	1000	16.4
GAK10	58	2	1000	15.9	MID10	30	3	1000	16.3
GAK10	58	2	1000	15.7	MID5	17	1	90	305.1
GAK10	58	2	1000	15.5	MID5	17	15	0	327.7
GAK10	58	2	1000	*16.6*	MID5	17	15	0	325.8
GAK10	58	2	1000	15.5	MID5	17	15	0	327.0
GAK10	58	6	500	33.0	MID5	17	15	0	326.3
GAK10	58	6	500	32.6	MID9	26	3	1000	15.5
GAK10	58	6	500	32.9	MID9	26	3	1000	15.5
GAK2	48	12	50	334.5	MID9	26	3	1000	16.4
GAK2	48	14	40	337.3	MID9	26	3	1000	16.0
GAK2	48	18	20	323.6	MID9	26	3	1000	16.2
GAK5	51	1	40	336.3	MID9	26	22	0	329.5
GAK5	51	1	40	340.6					
GAK5	51	1	40	336.7	PWS2	3	2	720	153.4
GAK8	55	2	281	70.5					
GAK8	55	6	125	180.2					

Radium and Radon:

PI: Will Burt
Participants: Josianne Haag

A total of 40 short-lived radium (Ra) samples, 223Ra and 224Ra, were taken using the ship's continuous flowing non-toxic seawater intake from 6 m depth. The ship's intake water passed directly through MnO2-impregnated fibers (< 2 L min-1) for extraction of Ra isotopes. The total collected volume was calculated using the flow rate and filter time. A deep sample was collected from 5 m above the North Albatross Bank (KOD 5) using sixteen 12 L Niskin bottles. The water was first transferred to a large plastic drum before being slowly filtered. A sample of Ra scavenged to sinking particles was collected by the deployment a sediment trap to 100 m for 24 hours near Middleton Island (MID 7) by Dr. Thomas Kelly. The resulting 326 mL sample was added to a cartridge filled with 25 g of fiber and allowed to sit for 15 min before processing. The fibers were all rinsed with DI water and dried by hand wringing. All samples were initially counted within 2 days of collection on a RaDeCC system and recounted at the University of Alaska Fairbanks 21 days later, to correct for the ^{228}Th supported ^{224}Ra (counting still in progress at UAF).

Preliminary results:
The dominant transport mechanism of surface seawater at the outflow of the greatest point source in the NGA, the Copper River, is onshore advection. The plot of 224Ra and 223Ra with distance from the coast shows an exponentially decreasing distribution (Figure 14) with R^2 = 0.951 and R^2 = 0.783, respectively. The resulting eddy diffusion coefficient (5.68 x 10-7 m2 s-1) is negligible compared to the onshore advective velocity (6.62 x 10-4 cm s-1). This suggests that the outflow of the Copper River is constricted to the coast, therefore forcing onshore advection of surface water.

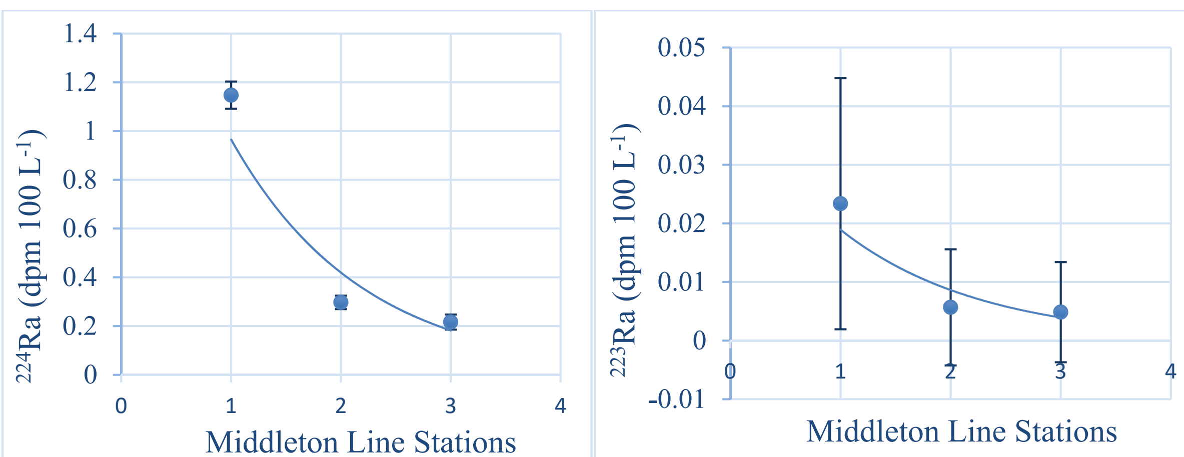


Figure 12. Radon isotope values along the MID Line

Phytoplankton and Microzooplankton:

PI: Suzanne Strom
Participants: Suzanne Strom, Kerri Fredrickson, Kathryn Williams

Rate and State Measurements:
All three of the standard LTER transect lines (KOD, GAK, MID) were sampled in their entirety (with the exception of station KOD-1), as well as 7 stations in Prince William Sound. Ten intensive stations were sampled spanning the PWS-to-offshore gradient (gray shaded rows in sampling table). Limitations due to weather days led to a few modifications relative to our normal sampling scheme. GAK-1 was sampled twice: on 5/1/22 we did a single cast in heavy seas and conducted a 24-h primary productivity incubation; as additional measurements only chl-a and macronutrient sampling were done at the 6 light depths. On 5/3/22 GAK-1 was sampled again with the full suite of 'intensive station' measurements, including a second productivity incubation. Intensive stations MID-2 and GAK-15 were not sampled for primary productivity, but all other 'intensive station' measurements were made. As a partial substitution, GAK-13 was sampled as an intensive station with the full suite of measurements plus a primary productivity incubation.

New funding from the North Pacific Research Board allowed for closer examination of the picophytoplankton (<3 µm) size class during this cruise. This was accomplished by adding additional chl-a size fractionation, conducting duplicate primary productivity experiments at each intensive station, and adding flow cytometry and microscopy sampling for characterization of the pico- and nanoplankton communities. In addition, the upper water column at all GAK stations was sampled for photosynthetic efficiency (Fv/Fm) using a Walz Water PAM fluorometer.

<u>Phytoplankton biomass and production:</u> Phytoplankton biomass was characterized by size-fractionated (>20 µm, <20 µm) chlorophyll at all non-intermediate shelf stations, all Prince William Sound stations, at RES 2.5, and at the GEO mooring site. GAK-1 was sampled twice. At most stations, additional sampling was conducted at 2-3 depths to determine the fraction of chl-a in the <3 µm size fraction. Samples were analyzed fluorimetrically on board. Primary production estimates were made at most intensive stations (see above) using the 13-C method and 24-h deck incubations. Six 'light depths' were sampled per station based on the attenuation coefficient as estimated from the CTD PAR profile. Chlorophyll (GFF only) and nutrient samples were also taken from each light depth during experiment set-up. All primary productivity incubations were conducted in duplicate to allow estimation of productivity in the picophytoplankton (<3 µm) size fraction. Each of the 6 bottles from the duplicate incubation were filtered through 20 µm Nitex and a 3 µm polycarbonate filter before collection of the <3 µm size fraction on a glass fiber filter.

<u>Community characterization</u>: Samples were fixed in acid Lugol's for standard microzooplankton biomass and composition estimates; these were taken from 10 m only at most stations and from 4 depths at intensive stations. Where 10m Lugol's samples were taken, samples were also fixed in borate-buffered formalin for diatom characterization. Samples for epifluorescence microscopy were fixed in glutaraldehyde, DAPI-stained, and made into slides for biomass and composition of nano- and picoplankton; paraformaldehyde-fixed samples were also collected at many stations for automated assessment of the nano- and picoplankton communities. Samples for HPLC analysis of phytoplankton pigments (chemotaxonomy) were taken from 10 m at all intensive stations and additionally at most odd-numbered stations. Also at intensive stations, samples were taken from 10 m (in duplicate) for molecular (18S rRNA) characterization of the protist community by the Rynearson laboratory at URI.

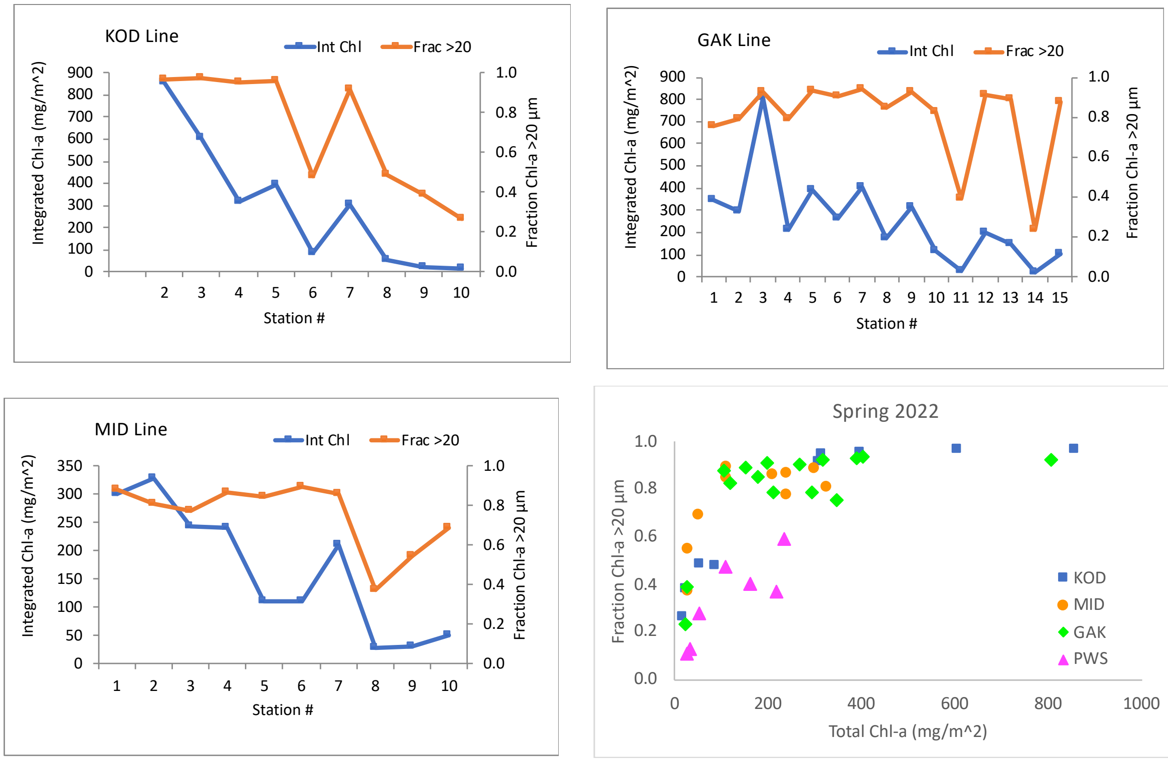


Figure 13. Integrated chl-a biomass (blue lines, mg m^{-2}, integrated to 75, 100, or 150 m depending on station) and fraction of total chl-a in the >20 µm size class (orange lines) for stations on the KOD, MID and GAK lines during late April – early May 2022. Station KOD-1 was not sampled. Lower right plot shows fraction of chl-a in large cells versus total integrated chl-a for all stations.

<u>Organic carbon characterization:</u> Samples for DOC analysis were filtered and frozen at all intensive stations as well as additional stations on the MID and KOD line (total profiles =14); depths sampled were mainly 150 m and above except in the deep intensive casts, and corresponded to nutrient sampling depths (8-11 depths per profile). At intensive stations only, 4 depths were sampled for POC and PIC (total profiles = 11).

Preliminary observations:

Remote sensing of ocean color and direct measurement of water column chlorophyll revealed another high-biomass spring bloom dominated by diatoms. Chlorophyll concentrations did not quite reach the high levels seen in spring 2021 but elevated concentrations of 10 – 20 µg Chl-a L^{-1} were seen in surface waters at the inner stations of all 3 sampling lines. A striking feature, likely the result of the intense storm winds experienced multiple times during the cruise, was apparent subduction of high chl-a water masses below the surface layer at a number of stations. On occasion (e.g. GAK-1 and 2) we had to sample to 150 m depth to capture all chl-a in the water column. Large (>20 µm) phytoplankton dominated the community at all high chl-a stations except in Prince William Sound, a ‘classic’ NGA spring bloom situation. High chl-a stations contained a mix of mostly chain-forming diatoms, with colonial phytoplankton (*Phaeocystis pouchetti*, *Chaetoceros socialis*) also abundant at some stations and depths.

Table 5. Station sampling effort for Strom component. Intensive stations are shaded in gray; stations sampled for typical 'intensive station' properties except for primary production are (unshaded) in red.

Station	SF Chl	Lugols µzoo	Diatom	Nano/ pico	FC	PAM	HPLC	Euk Mol	DOC	POC/ PIC	13C prod
PWS-3	x										
PWS-2	xx	x	x				x	x	x	x	x
PWS-1	x										
KIP-2	xx						x				
IB-0	x										
IB-1	x										
IB-2	x										
MID-6	x	x	x								
MID-5	xx	x	x	x	x		x	x	x	x	x
MID-4	xx	x	x								
MID-3	xx	x	x	x	x		x				
MID-2	xx	x	x	x	x		x	x	x	x	
MID-1	x								x		
MID-9	xx	x	x	x	x		x				
MID-8	x										
MID-7	xx			x	x		x		x		
MID-10	xx	x	x	x	x		x	x	x	x	x
KOD-10	xx	x	x	x	x		x	x	x	x	x
KOD-9	x				x						
KOD-8	xx			x	x		x				
KOD-7	xx	x	x	x	x		x				
KOD-6	x				x						
KOD-5	xx	x	x	x	x		x	x	x	x	x
KOD-4	x				x						
KOD-3	xx			x	x		x				
KOD-2	x								x		
GEO	x										
RES-2.5	x										
GAK-1	x										x
GAK-1	xx	x	x	x	x	x	x	x	x	x	x
GAK-2	x			x	x	x					
GAK-3	xx	x	x	x	x	x	x				
GAK-4	x				x	x					
GAK-5	xx	x	x	x	x	x	x	x	x	x	x
GAK-6	xx			x	x	x					
GAK-7	xx	x	x	x	x	x	x				
GAK-8	xx				x	x					
GAK-9	xx	x	x	x	x	x	x	x	x	x	x
GAK-10	xx			x	x	x					
GAK-11	xx	x	x	x	x	x	x				
GAK-12	xx				x	x					
GAK-13	xx	x	x	x	x	x	x	x	x	x	x
GAK-14	xx				x	x					
GAK-15	xx	x	x	x	x	x	x	x	x	x	
Totals:	**44**	**19**	**19**	**22**	**29**	**15**	**21**	**11**	**14**	**11**	**10**

Table Key:

SF Chl: size-fractionated chlorophyll-a; water sample filtered in series through a 20 µm pre-size filter followed by a glass fiber filter (effective pore size 0.7 µm). For stations marked 'xx', additional size fractionation was done at 2-3 depths to determine the picophytoplankton (<3 µm) size fraction.

Lugol's µzoo: water sample preserved in acid Lugol's iodine solution (final concentration 5%) for microscopy analysis of size and composition of ciliate and dinoflagellate microzooplankton (cells ≥15 µm). Samples collected from 10 m except at intensive stations, where a depth profile (10, 20, 30, 50 m) was collected.

Diatom: water sample preserved in borate-buffered formalin (final concentration 2%) for microscopy analysis of diatom community. Sample collected from 10 m.

Nano/Pico: water samples fixed in glutaraldehyde (final concentration 0.5%), filtered onto a 0.8 µm polycarbonate filter, slide mounted and frozen for later analysis. 1-2 depths sampled per station, always including 10 m.

FC: Flow cytometer samples preserved with paraformaldehyde, flash frozen in liquid nitrogen and then stored frozen for analysis. 2-4 depths sampled per station, always including 10 m.

PAM: Water samples dark-acclimated 20 min then analyzed with Walz Water PAM (pulse amplitude modulated) fluorometer for determination of photosynthetic efficiency Fv/Fm. Four depths per station sampled (0, 10, 20, 30 m).

HPLC: water sample filtered (glass fiber, 0.7 µm) and frozen in liquid N2 for HPLC analysis of phytoplankton pigments (chemotaxonomy). All samples from 10 m. Samples for HPLC pigment analysis were also obtained from several sediment trap deployments.

Euk Mol: water sample filtered (0.2 µm), placed into 0.8 ml Zymo DNA/RNA shield, and frozen (-80°C) for molecular analysis of eukaryotic microbial community composition. All samples from 10 m, in duplicate.

DOC: water sample filtered directly from Niskin through in-line pre-combusted glass fiber filter and filtrate stored frozen for analysis of dissolved organic carbon concentration.

POC/PIC: Paired samples from a single Niskin filtered through pre-combusted glass fiber filters and filters stored frozen for analysis of particulate organic and particulate inorganic carbon. Filtered volume was increased on this cruise to 2.3 L per sample for all but high chlorophyll depths/stations.

Prod: Water column primary productivity measured via 24-h incubation of samples from 6 different depths with 13C-labeled sodium bicarbonate. For this cruise, all primary productivity assays were conducted in duplicate. The first set of 6 bottles was filtered directly onto a GFF filter. The second set of 6 bottles was filtered through 20 µm Nitex mesh then through a 3 µm, 47 mm polycarbonate filter before capture on a GFF for determination of primary production in the picoplankton size class.

Microbes and Genetics:

PI: Gwenn Hennon
Participants: Gwenn Hennon, Jake Cohen

Sample collection at stations:
At all regular and intensive stations, four depths were sampled for DNA and flow cytometry and at intensive stations we sampled one depth for RNA (Table6). We used a quasi-adaptive sampling scheme for the four depths at which DNA and FCM samples were collected, with two fixed depths and two depths that were chosen based on downcast CTD features. We sampled the surface and 10 m for the fixed depths. We sampled the deep chlorophyll max (DCM) when present or a depth corresponding to the pycnocline if the DCM was absent. The DCM was frequently absent on this cruise due to the relatively deep mixed layer and light limitation experienced by phytoplankton in the spring. For the final depth, we sampled the bottom (~5 m above the seafloor) or oxygen minimum if it did not coincide with the bottom of the profile. Typically, the oxygen minimum of the profile coincided with the bottom depth over the shelf, but was found at approximately 800-1000m for the deeper stations.

Whole water for DNA samples was collected in 10L acid-clean polycarbonate bottles, prefiltered with a 200 μm mesh screen to remove mesozooplankton, filtered on a 0.2 μm sterivex filter, and stored at -80°C. The volumes filtered for each DNA sample were variable according to the biomass present in the water and were recorded for each filter, ranging from 0.5 – 10 L. The samples with the lowest volumes filtered and therefore the samples highest biomass were generally surface and 10m samples in Prince William Sound or the inner shelf region where large blooms of *Thalassiosira sp*. diatoms were observed in net tow and whole water samples. The largest volume samples and therefore the samples with the least biomass were generally from offshore HNLC and deep oxygen deplete waters. Flow cytometry (FCM) samples were collected from the same 10L polycarbonate carboys as the DNA samples, 1mL of whole seawater was removed and fixed with 20 μL of 25% glutaraldehyde and incubated for 10 min in the dark. The FCM samples were then flash frozen in liquid nitrogen and stored at -80 C.

Size-fractionated RNA samples were collected in duplicate at all intensive stations* from 10 m depth from the productivity cast and from approximately 1m depth from the trace metal clean fish when we transited through high nitrate low chlorophyll (HNLC) water. Whole water for RNA samples was collected in duplicate with acid-clean 10 L polycarbonate bottles, prefiltered with a 200 μm mesh screen to remove mesozooplankton. RNA samples were filtered in series on a 5 μm polycarbonate 47mm filter and a 0.2 μm sterivex filter, flash frozen and stored in liquid nitrogen.

**Note:* GAK1 was sampled twice for RNA+FCM once on 5/01/22 and again on 5/03/22, we will plan to process only the 5/03 samples which were taken post-storm, because that cast was paired with the full suite of measurements. Due to time constraints caused by weather delays GAK13 was sampled as an intensive station in place of GAK15.

Table 6: Summary of Genetic and FCM samples.

Station	DNA	FCM	RNA	Station	DNA	FCM	RNA
PWS1	4	4	--	GEO	4	4	--
PWS2	4	4	4	Res2.5	4	4	--
PWS3	4	4	--	GAK1*	4	6	8
IB0.5	4	4	--	GAK2	4	4	--
IB1	4	4	--	GAK3	4	4	--
IB2	4	4	--	GAK4	4	4	--
MID1	3	3	--	GAK5	4	4	4
MID2	4	4	4	GAK6	4	4	--
MID3	4	4	--	GAK7	4	4	--
MID4	4	4	--	GAK8	4	4	--
MID5	4	4	4	GAK9	4	4	4
MID6	4	4	--	GAK10	4	4	--
MID7	4	4	--	GAK11	4	4	--
MID8	4	4	--	GAK12	4	4	--
MID9	4	4	--	GAK13*	4	4	4
MID10	4	4	4	GAK14	4	4	--
KOD2	4	4	--	GAK15	4	4	--
KOD3	4	4	--	HNLC1			
KOD4	4	4	--	(58 26.515', 146 16.661')	--	1	2
KOD5	4	4	4	HNLC2			
KOD6	4	4	--	(57 16.325', 149 50.238')	--	2	4
KOD7	4	4	--				
KOD8	4	4	--				
KOD9	4	4	--				
KOD10	4	4	4				
Totals: DNA 167, FCM 172, RNA 50							

Meso/Macro Zooplankton:

PI: Hopcroft,
Participants: Caitlin Smoot, Emily Stidham, Hannah Kepner, Alex Poje

Zooplankton sampling operations were divided into distinct day and night activities. During daytime, Quadnets/Calvets (Quad frame has 4 nets, 2 of 150 µm mesh and 2 of 53 µm mesh) casts were conducted with the underwire winch on the starboard crane at all stations (except intermediate "i" stations) to 100 m depth, or within 5 m of the bottom at shallower stations. At intensive stations, an additional Quadnet cast was taken, with the 150 µm net preserved in ethanol for molecular studies and the 53µm nets used for live sorting. Quantitative counts of *Neocalanus* species and stages were made at Seward Line and PWS intensive stations from either one or both of the 53µm nets. Additionally, at intensive stations along the Seward Line and at PWS2, a Multinet equipped with 150 µm mesh nets was deployed vertically to 200 m (shelf) with a second cast deployed to 750 m (PWS2) dividing strata at 600, 400, 300, 200,100, 60, 40, and 20 m. A Deep Multinet was also deployed at GAK15 to 1200 m dividing strata at 600, 400, 300, 200,100, 60, 40, and 20 m, while at MID10 and KOD10 the shallower casts were not collected thus dividing strata at 600, 400, 300, and 200 m.

During night-time, a Multinet equipped with 505 µm-mesh nets was towed obliquely to 200 m depth (or 5 m above the bottom) dividing strata at 100, 60, 40, and 20 m. A second collection was made at Intensive stations and preserved in Ethanol for molecular analysis. Bongo nets (60cm) were employed instead the multinet along the Kodiak and Middleton Lines. An SBE 49 "Fastcat" CTD sampling at 16 Hz was attached to the Bongo Nets (deployed off the side arm crane or stern) and used to collected pressure data to gauge the depth. One net from each Bongo deployment, and the drogue net from the Multinet, were sent to NOAA Eco-FOCI for larval fish analysis.

The ISIIS-DPI was deployed along the Seward Line from GAK1-GAK6i, and during weather days in Res.Bay to develop more experience in flight characteristics. All instruments and imaging systems worked as planned although SWL tension on the optical cable remained a significant operational concern.

Overall, *Neocalanus* abundances appeared to be above average at the Seward Line intensive station (~58 *N. flemingeri*, ~40 *N. plumchrus*, ~2 *N. cristatus* per cubic meter). Development seemed somewhat delayed compared to recent years with most *N. flemingeri* at Stage CV while *N. plumchrus* were split between stages CIII and CIV.

Table 7. At-sea counts of *Neocalanus* species from live-sort Quadnets. Note that PWS2 was sampled over a week earlier than other stations

N. flemingeri			*N. plumchrus*			*N. cristatus*		
3	4	5	3	4	5	3	4	5
18.9	55.4	21.1	0.0	0.0	0.0	0.0	0.0	0.2
2.6	39.1	35.3	20.3	15.6	1.8	0.0	1.5	0.0
1.0	21.0	61.7	11.7	21.9	2.5	0.0	0.8	0.6
0.1	6.0	17.3	22.2	21.1	1.7	0.4	0.6	0.8
3.6	12.0	32.4	20.7	17.3	2.0	1.1	2.0	0.7
58.1			**39.7**			**2.1**		

Table 8. Sampling effort for Zooplankton. Intensive stations highlighted. *Samples taken for bulk genetics, sorting or imaging.

Station	Calvet-Quad	Vert. Multinet	Multinet Tow	Bongo
RES2.5	x			
GAK1	X*	x	x	
GAK2	x		x	
GAK3	x		x	
GAK4	x		x	
GAK5	X*	x	x	
GAK6	x		x	
GAK7	x		x	
GAK8	x		x	
GAK9	X*	x	x	
GAK10	x		x	
GAK11	x		x	
GAK12	x		x	
GAK13	x		x	
GAK14	x		x	
GAK15	x	X*	x	
MS2	x			
KIP2	x		x	
PWS1	x		x	
PWS2	X*	X*	X	
PWS3	x		x	
IB0.5	x			
IB1	x			
IB2	x			
KOD1				
KOD2	x			X
KOD3	x			X
KOD4	x			X
KOD5	X*			X
KOD6	x			X
KOD7	x			X
KOD8	x			X
KOD9	x			X
KOD10	X*	x		X
MID1				
MID2	X*			X
MID3	x			X
MID4	x			X
MID5	X*			X
MID6	x			X
MID7	x			X
MID8	x			X
MID9	x			X
MID10	X*	x		X
TOTAL	**41**	**7**	**19**	**18**

Marine bird and marine mammal surveys (USFWS)

PI: Elizabeth Labunski and Robert Kaler
Participant: Dan Cushing, Pole Star Ecological Research LLC, onboard observer and report author

Background:
We conducted marine bird and marine mammal surveys in the Northern Gulf of Alaska (NGA), April 21 to May 7, 2022, aboard the 80-m R/V *Sikuliaq*, as a component of the NGA Long-term Ecological Research / Seward Line (NGA-LTER) cruise lead by chief scientist Ana Aguilar-Islas of the University of Alaska Fairbanks. The seabird component is primarily funded by the North Pacific Research Board (Project L37-01A) and the Exxon Valdez Trustee Council (Project 20120114-M). Station-based sampling was conducted along the Seward, Middleton, and Kodiak Lines, and in Prince William Sound (PWS). Seabird and marine mammal surveys were conducted when the vessel was underway, including transits between sampling stations and sampling lines.

Methods:
Observer D. Cushing conducted visual surveys during daylight hours while the vessel was underway. Surveys were conducted from the bridge, using a modified line-transect protocol. The observer searched an area within a 300m, 90° arc from the bow to the beam, using hand-held 10x binoculars when necessary. Observations were recorded using four distance bins: 0–50m, 51–100m, 101–200m, and 201–300m. Observations of rare birds or large flocks, or marine mammals observed outside of the sampling window were recorded as “off-transect”. Observations were recorded directly into a laptop computer using software Dlogv3 (R.G. Ford Consulting, Portland, OR) which logged the geographic coordinates of each sighting, as well as the track line and environmental conditions (Beaufort Sea state, weather, glare, ice coverage) at 20 sec intervals. Data were processed by subdividing survey transects into 3-km segments to calculate density (birds km^{-2}) for each taxon in each transect segment.

Preliminary Results
We conducted a total of 1411 linear km of surveys during the April–May 2022 cruise (Figure 14). On-transect, we observed a total of 3009 individuals of 34 species of birds, with an additional 20 species observed off-transect (Table 9). Averaged across all 3-km transect segments, the mean density of total birds (all bird species combined) was 7.6 birds km^{-2}.

Of the three cross-shelf lines sampled during the April–May 2022 cruise, the lowest overall density of birds occurred on the Kodiak Line, and the highest along the Seward Line (Figure 15 Left), although abundance was patchy. Compared to other spring surveys of Seward Line from GAK1–GAK13 during 2007–2021 (the longest available time-series), the average density of total birds was 5.7 birds km^{-2}, which was the third lowest of 14 spring surveys. The average density of total alcids (murres, puffins, murrelets, auklets; 1.1 birds km^{-2}) was the second lowest observed, and the three most recent surveys (2019, 2021, 2022) compose the three lowest years. Like total alcids, the average density of total larids (gulls and terns; 0.8 birds km^{-2}) was the second lowest since 2007, and the most recent three surveys were the three lowest in the time-series. Average density of total tubenoses (albatrosses, storm-petrels, fulmars, shearwaters; 2.7 birds km^{-2}) was the fourth lowest since 2007. In contrast to these taxonomic groups, average density of total phalaropes (1.0 birds km^{-2}) was the third highest of the 14 spring Seward Line surveys.

Red-necked phalaropes were the most abundant avian species observed on transect (28.9% of total; Table 9). They occurred in flocks of up to 250 birds, foraging along fronts in Resurrection Bay and over the inner shelf along the Seward Line (Figure 15, right). Flocks of red phalaropes (3.0% of total) occurred farther offshore, primarily over the outer continental shelf (Figure 15, right). Phalaropes are shorebirds that feed while swimming, and at sea they feed on zooplankton captured near the water surface, often at fronts. The April–May period coincides with their seasonal migration, with hundreds of thousands moving through the northern Gulf of Alaska region.

The second most abundant bird was the short-tailed shearwater (13.1% of total). While most observations were of single birds or small groups, flocks of up to 150 occurred on the offshore end of the Seward Line (Figure 16, left). Sooty shearwaters were also observed during the cruise (4.2% of total; Figure 16, left). The distributions of the two species differed, with short-tailed shearwaters predominating on the continental shelf along the Seward Line and to the northeast of Portlock Bank, while short-tailed shearwaters predominated near and offshore of the shelf-break, and on the entirety of the Kodiak Line.

Fork-tailed storm-petrel composed 11.3% of sightings. Storm-petrels were widely distributed, with most observations of individuals and small flocks, with the largest aggregations occurring near and beyond the shelf-break (Figure 16, right). Common murres composed 8.4% of sightings. Murres were most abundant over the inner shelf along the Seward Line, and also occurred on the shelf north of Middleton Island, and over Albatross Bank on the Kodiak Line (Figure 17, left). Black-legged kittiwakes composed 8.1% of sightings. Kittiwakes were widely distributed, with aggregations in a variety of habitat types (Figure 17, right). Kittiwakes were observed flying offshore from Middleton Island in the evening and towards the island in the morning, indicating nocturnal foraging over pelagic waters. Glaucous-winged gulls composed 6.0% of sightings. Their highest numbers were observed near Resurrection Bay, and also over the shelf north of Middleton Island (Figure 18, left).

While albatrosses and murrelets each composed relatively low proportions of total avian sightings, both groups are of conservation concern. Black-footed albatrosses composed 1.8% of sightings. Their highest numbers occurred near the shelf-break along the Seward and Middleton lines (Figure 18, right). Laysan albatross were also most frequently observed near the shelf-break. A single juvenile short-tailed albatross was observed along the Seward Line. Murrelet species composed 1.7% of sightings. Marbled murrelets were distributed over the continental shelf along all three lines, as well as in PWS and Resurrection Bay (Figure 19, left). No Kittlitz's murrelets were observed. Ancient murrelets occurred over the middle shelf along the Seward Line.

Ducks, geese, loons, and cranes were observed migrating over marine waters during the cruise. While most waterfowl were observed near the coast, Canada geese, northern pintail, green-winged teal, American wigeon, and northern shoveler were all observed offshore of the shelf-break. While most flocks of migrating sandhill cranes occurred in PWS, one flock was seen near Middleton Island.

Two dead birds were encountered during the cruise. A dead bald eagle was observed by crew at the GAK1 mooring site, and a dead northern shoveler occurred between GAK2 and GAK3. Both were seen on May 3, shortly after two major storms. The crew reported that during following night an unidentified bird (possibly a phalarope) hit the deck lights and was temporarily stunned before flying away.

Table 9. Birds observed during the April-May 2022 NGA-LTER cruise. Numbers include on-transect observations only. Species only observed off-transect during surveys or while on station are indicated by an asterisk.

Common name	Scientific name	Number	% of total
Greater white-fronted goose	*Anser albifrons*	25	0.8%
Brant	*Branta bernicla*	2	0.1%
Canada goose	*Branta canadensis*	*	*
Northern shoveler	*Spatula clypeata*	*	*
American wigeon	*Mareca americana*	*	*
Mallard	*Anas platythynchos*	*	*
Northern pintail	*Anas acuta*	40	1.3%
Green-winged teal	*Anas crecca*	2	0.1%
Lesser scaup	*Aythya affinis*	*	*
Harlequin duck	*Histrionicus histrionicus*	*	*
Surf scoter	*Melanitta perspicillata*	18	0.6%
White-winged scoter	*Melanitta fusca*	2	0.1%
Black scoter	*Melanitta americana*	*	*
Long-tailed duck	*Clangula hyemalis*	*	*
Sandhill crane	*Antigone canadensis*	*	*
Black oystercatcher	*Haematopus bachmani*	*	*
Black-bellied plover	*Pluvialis squatarola*	*	*
Unidentified dowitcher	*Limnodromus* spp.	*	*
Red-necked phalarope	*Phalaropus lobatus*	870	28.9%
Red phalarope	*Phalaropus fulicaria*	90	3.0%
Pomarine jaeger	*Stercorarius pomarinus*	*	*
Common murre	*Uria aalge*	254	8.4%
Thick-billed murre	*Uria lomvia*	4	0.1%
Unidentified murre	*Uria* spp.	7	0.2%
Pigeon guillemot	*Cepphus columba*	3	0.1%
Marbled murrelet	*Brachyramphus marmoratus*	36	1.2%
Marbled or Kittlitz's murrelet	*Brachyramphus* spp.	3	0.1%
Ancient murrelet	*Synthliboramphus antiquus*	12	0.4%
Parakeet auklet	*Aethia psittacula*	1	< 0.1%
Rhinoceros auklet	*Cerorhinca monocerata*	31	1.0%
Horned puffin	*Fratercula corniculata*	1	0.0%
Tufted puffin	*Fratercula cirrhata*	108	3.6%
Black-legged kittiwake	*Rissa tridactyla*	244	8.1%
Sabine's gull	*Xema sabini*	2	0.1%
Short-billed gull	*Larus brachyrhynchus*	6	0.2%
Herring gull	*Larus argentatus*	13	0.4%
Glaucous-winged gull	*Larus glaucescens*	182	6.0%
Unidentified gull	*Larus* spp.	6	0.2%
Arctic tern	*Sterna paradisaea*	12	0.4%
Pacific loon	*Gavia pacifica*	17	0.6%

Common name	Scientific name	Number	% of total
Common loon	*Gavia immer*	*	*
Black-footed albatross	*Phoebastria nigripes*	53	1.8%
Laysan albatross	*Phoebastria immutabilis*	2	0.1%
Short-tailed albatross	*Phoebastria albatrus*	*	*
Fork-tailed storm-petrel	*Hydrobates furcatus*	339	11.3%
Leach's storm-petrel	*Oceanodroma leucorhoa*	1	< 0.1%
Northern fulmar	*Fulmarus glacialis*	44	1.5%
Short-tailed shearwater	*Ardenna tenuirostris*	394	13.1%
Sooty shearwater	*Ardenna grisea*	126	4.2%
Sooty or short-tailed shearwater	*Ardenna tenuirostris or grisea*	4	0.1%
Red-faced cormorant	*Phalacrocorax urile*	2	0.1%
Pelagic cormorant	*Phalacrocorax pelagicus*	30	1.0%
Double-crested cormorant	*Phalacrocorax auritus*	23	0.8%
Bald eagle	*Haliaeetus leucocephalus*	*	*
Peregrine falcon	*Falco oeregrinus*	*	*
Black-billed magpie	*Pica hudsonia*	*	*
American crow	*Corvus brachyrhynchos*	*	*
Common raven	*Corvus corax*	*	*
Total		3009	100.0%

We observed a total of 10 species of marine mammal (Table 10), with 45 individuals on-transect and 173 off-transect. The most abundant toothed whale (odontocete) species was the Dall’s porpoise, which were abundant in Resurrection Bay (Figure 19, right). Killer whales were observed in PWS and near Portlock Bank. Two sperm whales were observed over the continental slope south of Middleton Island. A group of four Baird’s beaked whales occurred over the slope near the Kodiak Line (Figures 19, 20). The most abundant baleen whale (mysticete) species was the fin whale (Table 10); their highest concentrations occurred along the edges of Albatross Bank, northeast of Portlock Bank, and in offshore waters on the Kodiak and Seward Lines (Figure 21, left). Humpback whales were observed in PWS and Resurrection Bay. Harbor Seals were the most abundant pinniped; most were hauled out on glacial ice in PWS (Figure 21, right). Steller sea lions were seen in PWS, and three northern fur seals were observed, two over the continental shelf and one in oceanic waters. Sea otters were observed in PWS and Resurrection Bay.

We recorded a total of 48 pieces of non-organic marine debris (on- and off-transect), most of which were > 25 km from the coastline (Figure 22). Of these marine debris items, 25 (52%) were identified as polystyrene foam (“styrofoam”; Table 11), with an encounter rate of one piece of polystyrene foam every 56 linear km. For reference, the number of polystyrene foam items recorded during this cruise was greater than the number that were recorded during all 2018–2021 NGA-LTER cruises combined (11 cruises, 17 polystyrene foam items, 11% of total marine debris), with an overall encounter rate of one polystyrene foam item every 909 linear km. The mates aboard Sikuliaq reported that during their transit from Oregon to Alaska prior to the NGA-LTER cruise they observed polystyrene foam debris “all the way to Newport”.

Table 10. Marine mammals observed during the April-May 2022 NGA-LTER cruise.

Common name	Scientific name	Number on-transect	Number off-transect
Fin whale	*Balaenoptera physalus*	2	19
Humpback whale	*Megaptera novaeangliae*	1	3
Sperm whale	*Physeter macrocephalus*	0	2
Baird's beaked whale	*Berardius bairdii*	4	0
Killer whale	*Orcinus orca*	6	22
Unidentified whale	*Cetacea* spp.	1	22
Dall's porpoise	*Phocoenoides dalli*	24	55
Northern fur seal	*Callorhinus ursinus*	2	1
Steller sea lion	*Eumetopias jubatus*	0	8
Harbor seal	*Phoca vitulina*	0	35
Sea otter	*Enhydra lutris*	5	6
Total		**45**	**173**

Table 11. Marine debris observed during the April-May 2022 NGA-LTER cruise.

Type	Number	% of total
Plastic	5	10.4%
Polystyrene foam	25	52.1%
Other foam	4	8.3%
Buoy or net float	7	14.6%
Unidentified	7	14.6%
Total	**48**	**100.0%**

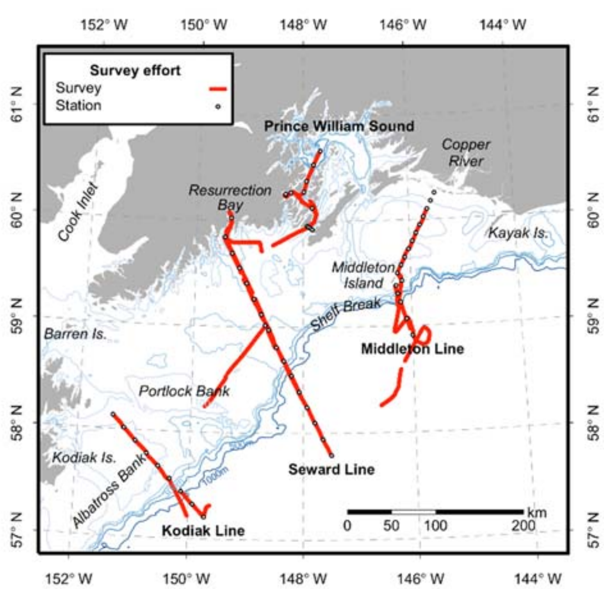


Figure 14. Location of seabird and marine mammal surveys (red).

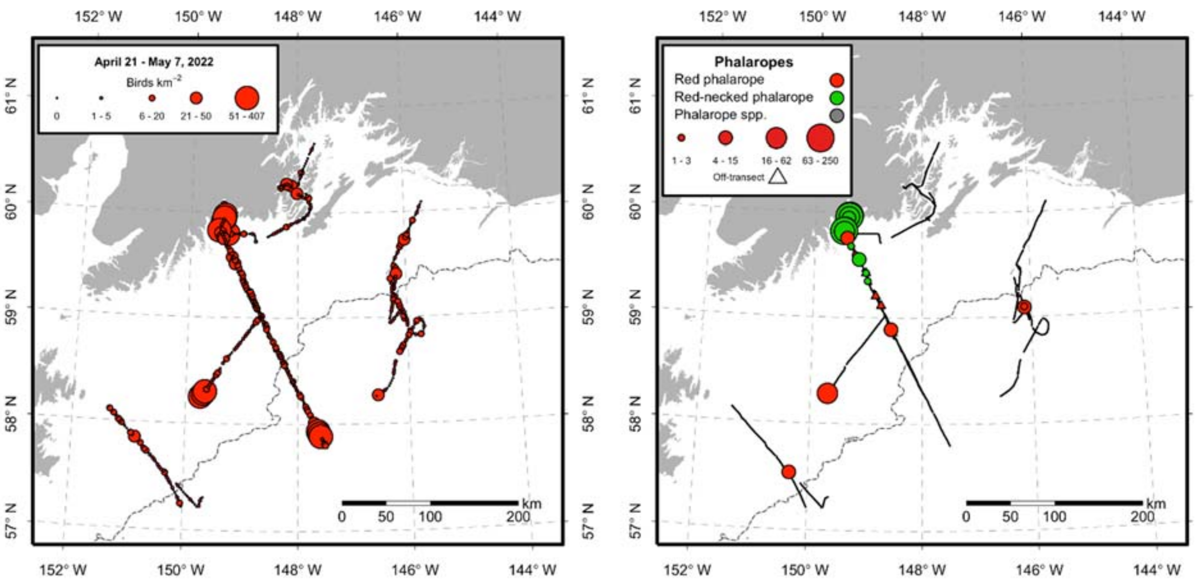


Figure 15. Left: Densities (birds km^{-2}) of total seabirds (all species combined). **Right:** Phalaropes

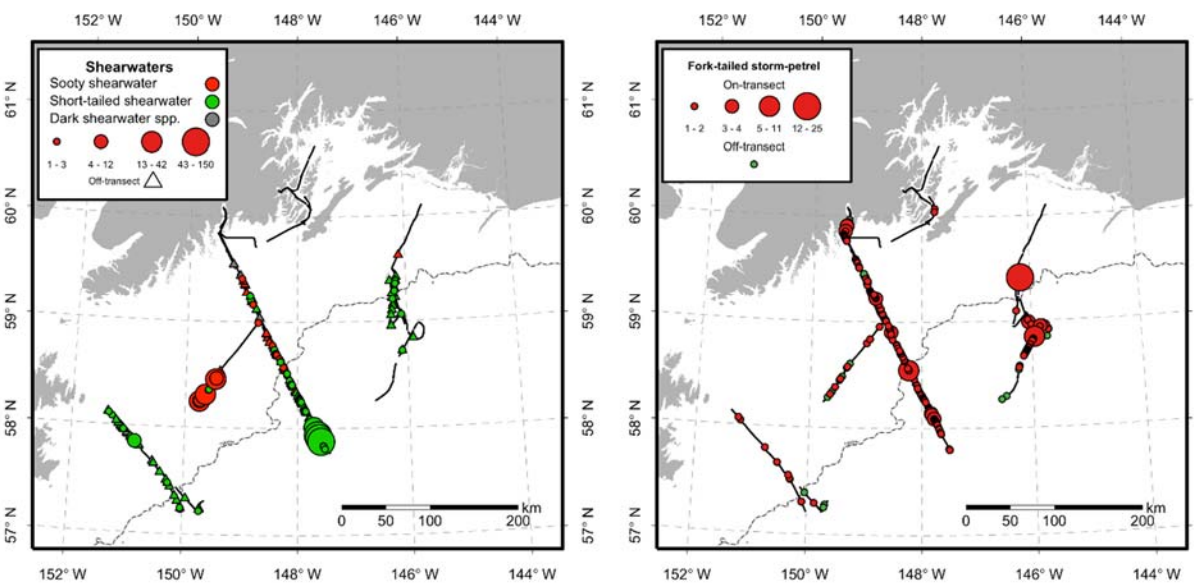


Figure 16. Left: Shearwaters. **Right.** Fork-tailed storm-petrel.

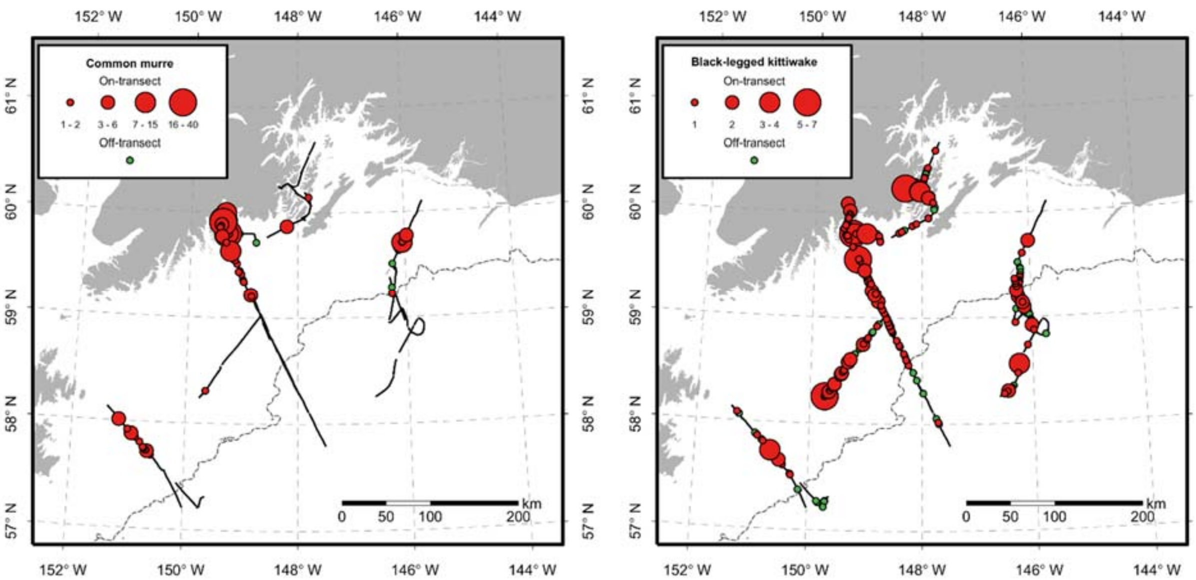


Figure 17. Left: Common murre. **Right:** Black-legged kittiwake.

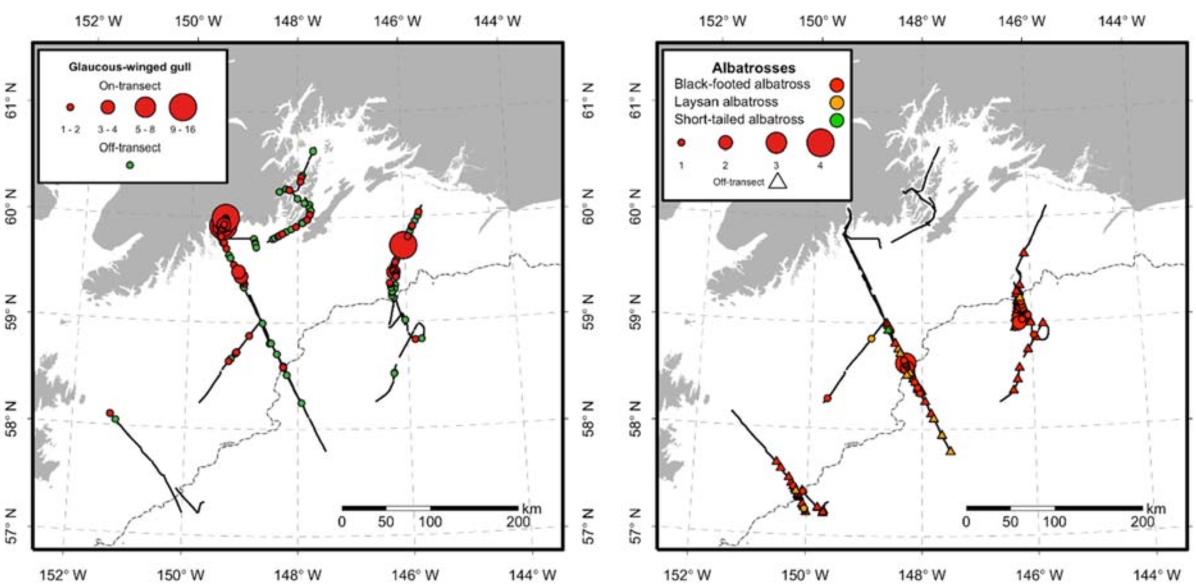


Figure 18. Left: Glaucous-winged gull. **Right:** Albatrosses.

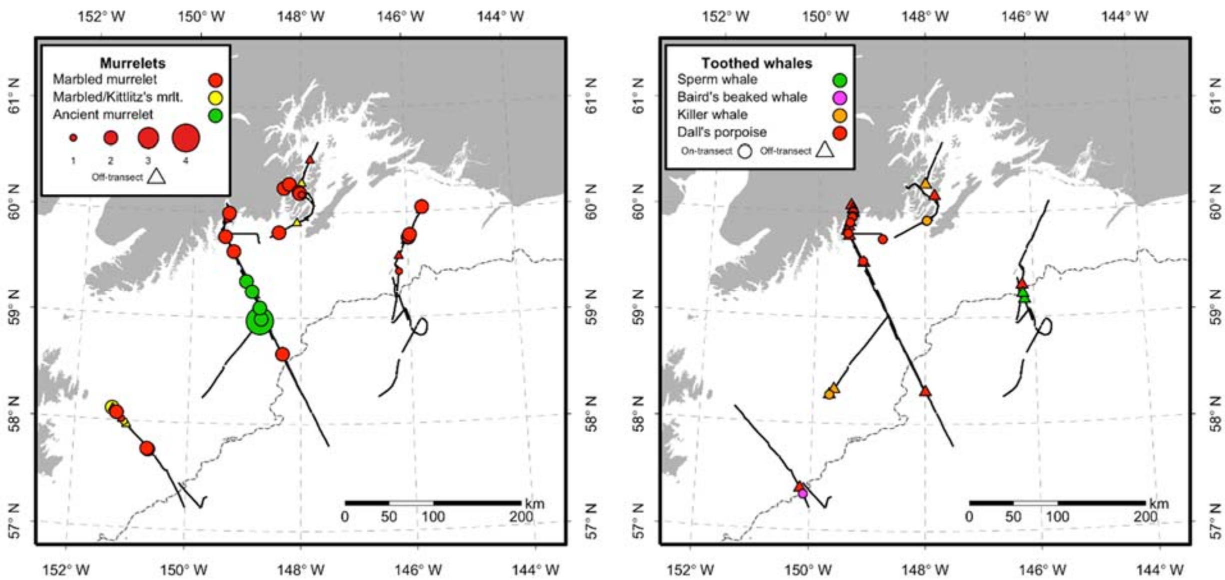
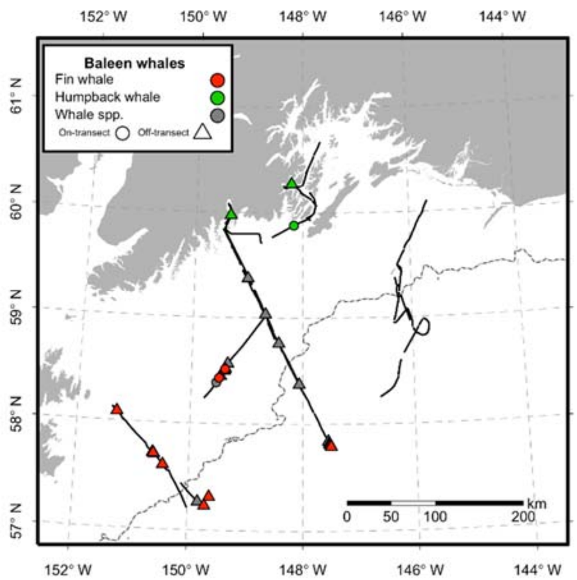


Figure 19. Left: Murrelets. **Right:** Toothed whales.

Figure 20. Baird's beaked whales.



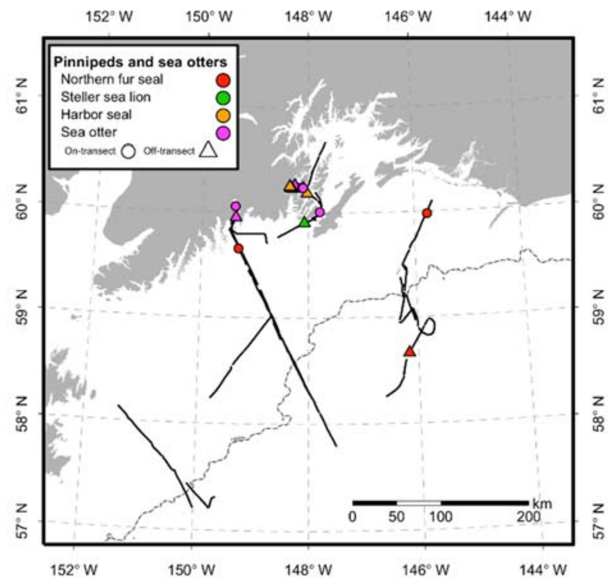


Figure 21. Left: Baleen whales. **Right:** Pinnipeds and sea otters.

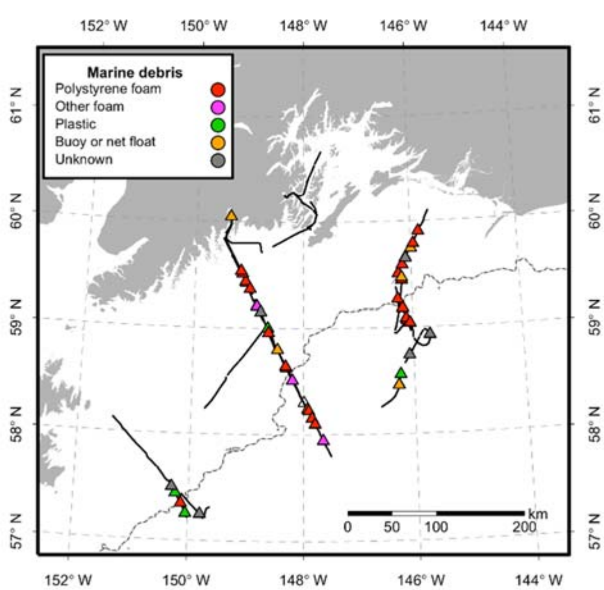


Figure 22. Marine debris.

Appendix. STANDARD STATIONS (intensive stations highlighted)

Latitude N (degrees, minutes)		Longitude W (degrees, minutes)		Station Name	Depth
		Resurrection Bay Station			
60	1.5	149	21.5	RES2.5	298
		Seward Line			
59	50.7	149	28	GAK1	269
59	46	149	23.8	GAK1I	
59	41.5	149	19.6	GAK2	228
59	37.6	149	15.5	GAK2I	
59	33.2	149	11.3	GAK3	213
59	28.9	149	7.1	GAK3I	
59	24.5	149	2.9	GAK4	201
59	20.1	148	58.7	GAK4I	
59	15.7	148	54.5	GAK5	167
59	11.4	148	50.3	GAK5I	
59	7	148	46.2	GAK6	151
59	2.7	148	42	GAK6I	
58	58.3	148	37.8	GAK7	243
58	52.9	148	33.6	GAK7I	
58	48.5	148	29.4	GAK8	288
58	44.6	148	25.2	GAK8I	
58	40.8	148	21	GAK9	276
58	36.7	148	16.7	GAK9I	
58	32.5	148	12.7	GAK10	1459
58	23.3	148	4.3	GAK11	1410
58	14.6	147	56	GAK12	2134
58	5.9	147	47.6	GAK13	2058
57	*56.6*	*147*	*39*	*GAK14*	*3518*
57	*47.5*	*147*	*30*	*GAK15*	*4543*
		Prince William Sound Stations			
60	7.5	147	50	KIP0	
60	16.7	147	59.2	KIP2	588
60	22.78	147	56.17	PWS1	248
60	32.1	147	48.2	PWS2	798
60	40	147	40	PWS3	742
60	49..25	147	24	PWSA	472
60	45	147	14	PWSB	
60	38.1	147	10	PWSC	245
60	31.5	147	7.6	PWSD	
60	24.3	147	58.3	PWSE	291
60	24	146	45	PWSF	
		Columbia Glacier			
61	7.4	147	3.8	CG0	
60	59.5	147	4.2	CG1	192
60	57.6	147	5.9	CG2	
		Icy Bay			
60	16.3	148	21.7	IB0	
60	15.5	148	20.1	IB1	172
60	16.3	148	14	IB2	157
		Montague Strait Line			
59	57.257	147	55.602	MS1	
59	56.6	147	53.7	MS2	194
59	55.9	147	51.4	MS3	169
59	55.2	147	49.7	MS4	119

Latitude N (degrees, minutes)		Longitude W (degrees, minutes)		Station Name	Depth
Kodiak Line					
58	14.7	151	35.4	KOD1	71
58	7.8	151	23.07	KOD2	127
58	0.9	151	10.74	KOD3	84
57	54	150	58.17	KOD4	78
57	47.1	150	45.6	KOD5	87
57	40.26	150	32.97	KOD6	102
57	33.42	150	20.34	KOD7	178
57	26.37	150	7.95	KOD8	708
57	19.32	149	55.56	KOD9	1310
57	12.27	149	43.17	KOD10	2503
Cape Suckling Line					
59	56.35	143	53.5	CS1	63
59	53.85	143	53.5	CS1.25	85
59	51.35	143	53.5	CS1i	104
59	48.85	143	53.5	CS1.75	116
59	46.35	143	53.5	CS2	124
59	41.35	143	53.5	CS2i	134
59	36.35	143	53.5	CS3	193
59	31.35	143	53.5	CS3i	1316
59	26.35	143	53.5	CS4	2010
59	16.35	143	53.5	CS5	2810
Middleton Island Line					
60	15	145	30	MID1	35
60	10.5	145	34.5	MID1i	100
60	6	145	39	MID2	116
60	1.5	145	43.5	MID2i	98
59	57	145	48	MID3	87
59	52.5	145	52.5	MID3i	100
59	48	145	57	MID4	90
59	43.5	146	1.5	MID4i	72
59	39	146	6	MID5	97
59	34.5	146	10.5	MID5i	114
59	30	146	15	MID6	41
59	25.7	146	10	MID6i	65
59	23	146	18	MID7	65
59	18.267	146	15	MID7i	420
59	13.534	146	12	MID8	611
59	4.067	146	6	MID9	2900
58	54.6	146	0	MID10	4444

Event	Instrument	Action	Station	Cast	GPS_Time	Local Time	Latitude	Longitude	Seafloor	Author	Comment
1	Sediment Trap	abort	PWS2		4/22/2022 7:45	4/21/2022 23:45	60.55023	-147.845		tKelly1	TSG not working. Aborted deployment.
2	multinet	recover	PWS2	1	4/22/2022 8:06	4/22/2022 0:06	60.54642	-147.838	728	cGreto1	Bad deployment. Net not flying right.
3	multinet	deploy	PWS2	1	4/22/2022 8:07	4/22/2022 0:07	60.546	-147.837	728	cSmoot1	MOLECULAR
4	multinet	deploy	PWS2	1	4/22/2022 8:10	4/22/2022 0:10	60.54494	-147.835	728	cSmoot1	MOLECULAR RELAUNCHED
5	multinet	maxDepth	PWS2	1	4/22/2022 8:43	4/22/2022 0:43	60.53343	-147.809	728	cSmoot1	MAX DEPTH
6	multinet	recover	PWS2	1	4/22/2022 8:50	4/22/2022 0:50	60.53207	-147.802	732	cSmoot1	
7	multinet	deploy	PWS2	2	4/22/2022 9:16	4/22/2022 1:16	60.53364	-147.771	690	cSmoot1	
8	multinet	maxDepth	PWS2	2	4/22/2022 9:25	4/22/2022 1:25	60.53416	-147.782	712	cSmoot1	
9	multinet	recover	PWS2	2	4/22/2022 9:54	4/22/2022 1:54	60.53558	-147.822	725	cSmoot1	
10	multinet	maxDepth	PWS2	3	4/22/2022 10:54	4/22/2022 2:54	60.52525	-147.818	698	cSmoot1	
11	multinet	deploy	PWS2	3	4/22/2022 11:08	4/22/2022 3:08	60.53016	-147.809	576	cSmoot1	DEEP TOW
12	multinet	recover	PWS2	3	4/22/2022 11:52	4/22/2022 3:52	60.5511	-147.789	698	cSmoot1	
13	multinet	deploy	PWS3	4	4/22/2022 12:47	4/22/2022 4:47	60.66087	-147.672	725	cSmoot1	
14	multinet	maxDepth	PWS3	4	4/22/2022 13:00	4/22/2022 5:00	60.66989	-147.67	752	cSmoot1	
15	multinet	recover	PWS3	4	4/22/2022 13:32	4/22/2022 5:32	60.69018	-147.667	735	cSmoot1	
16	Ra Pump	deploy	PWS03		4/22/2022 14:25	4/22/2022 6:25	60.66678	-147.667		JHaag	
17	Ra Pump	recover	PWS03		4/22/2022 14:32	4/22/2022 6:32	60.66679	-147.667		JHaag	
19	CalVet net	recover	PWS3	1	4/22/2022 16:55	4/22/2022 8:55	60.66728	-147.667	719	rHopcroft1	
20	CTD911	deploy	PWS3	1	4/22/2022 17:11	4/22/2022 9:11	60.66677	-147.667	704	iReister1	
21	CalVet net	deploy	PWS3	1	4/22/2022 17:22	4/22/2022 9:22	60.66679	-147.667	719	cSmoot1	
22	CTD911	recover	PWS3	1	4/22/2022 18:15	4/22/2022 10:15	60.66669	-147.667	717	iReister1	
23	IronFish	deploy			4/22/2022 19:09	4/22/2022 11:09	60.55121	-147.789		aAguilarIslas1	
24	IronFish	recover	PWS2		4/22/2022 19:35	4/22/2022 11:35	60.5349	-147.803		aAguilarIslas1	
25	CTD911	deploy	PWS2	2	4/22/2022 20:02	4/22/2022 12:02	60.53479	-147.803	728	pShipton1	
26	CTD911	recover	PWS2	2	4/22/2022 20:36	4/22/2022 12:36	60.53479	-147.803	728	iReister1	
27	Sediment Trap	deploy	PWS2		4/22/2022 21:11	4/22/2022 13:11	60.53616	-147.801		tKelly1	
28	multinet	deploy	PWS2	01S	4/22/2022 21:24	4/22/2022 13:24	60.53614	-147.801	726	rHopcroft1	
29	multinet	recover	PWS2	01S	4/22/2022 23:24	4/22/2022 15:24	60.53613	-147.801	726	rHopcroft1	
30	multinet	deploy	PWS2	1D	4/22/2022 23:26	4/22/2022 15:26	60.53615	-147.801	726	rHopcroft1	deep
31	multinet	recover	PWS2	1D	4/22/2022 23:58	4/22/2022 15:58	60.53614	-147.801	726	rHopcroft1	stopped at 290m for 2 minutes
32	CTD911	deploy	PWS2	3	4/23/2022 0:04	4/22/2022 16:04	60.53613	-147.801	725	iReister1	
33	CTD911	recover	PWS2	3	4/23/2022 1:08	4/22/2022 17:08	60.53613	-147.8	725	iReister1	
34	CalVet net	deploy	PWS2	1D	4/23/2022 1:22	4/22/2022 17:22	60.53614	-147.801	726	rHopcroft1	

35	CalVet net	recover	PWS2	2	4/23/2022 1:27	4/22/2022 17:27	60.53613	-147.801	726	rHopcroft1	
36	TM CTD	deploy	PWS2	TM1	4/23/2022 1:54	4/22/2022 17:54	60.53612	-147.801		aAguilarIslas1	bottle 10
37	CalVet net	deploy	PWS2	2A	4/23/2022 3:01	4/22/2022 19:01	60.53614	-147.801	726	rHopcroft1	
38	CalVet net	recover	PWS2	2A	4/23/2022 3:07	4/22/2022 19:07	60.53614	-147.8	726	rHopcroft1	
39	TM CTD	abort	PWS2	TM1	4/23/2022 3:11	4/22/2022 19:11	60.53614	-147.801		aAguilarIslas1	
40	CalVet net	deploy	PWS1	3	4/23/2022 4:29	4/22/2022 20:29	60.37975	-147.937	350	rHopcroft1	
41	CalVet net	recover	PWS1	3	4/23/2022 4:35	4/22/2022 20:35	60.37974	-147.937	350	rHopcroft1	
42	CTD911	deploy	PWS1	4	4/23/2022 4:39	4/22/2022 20:39	60.37973	-147.937	356	iReister1	
43	CTD911	recover	PWS1	4	4/23/2022 5:33	4/22/2022 21:33	60.37973	-147.937	356	iReister1	
44	CalVet net	deploy	KIP02	4	4/23/2022 6:40	4/22/2022 22:40	60.27784	-147.987	582	cSmoot1	
45	CalVet net	deploy	KIP02	4	4/23/2022 6:40	4/22/2022 22:40	60.27784	-147.987	582	cSmoot1	
46	CalVet net	deploy	KIP02	4A	4/23/2022 6:41	4/22/2022 22:41	60.27784	-147.987	582	cSmoot1	for Lauren
47	CalVet net	recover	KIP02	4A	4/23/2022 6:46	4/22/2022 22:46	60.27784	-147.987	582	cSmoot1	
48	CTD911	deploy	KIP02	5	4/23/2022 6:53	4/22/2022 22:53	60.27784	-147.987	582	iReister1	
49	CTD911	recover	KIP02	5	4/23/2022 7:48	4/22/2022 23:48	60.27785	-147.987	582	iReister1	
50	multinet	deploy	KIP02	5	4/23/2022 8:16	4/23/2022 0:16	60.26612	-147.993	588	cSmoot1	
51	multinet	maxDepth	KIP02	5	4/23/2022 8:26	4/23/2022 0:26	60.27216	-147.989	588	cSmoot1	
54	multinet	recover	KIP02	5	4/23/2022 8:59	4/23/2022 0:59	60.29059	-147.982	588	cSmoot1	
56	multinet	deploy	PWS01	6	4/23/2022 9:36	4/23/2022 1:36	60.36814	-147.942	273	cSmoot1	
57	multinet	maxDepth	PWS01	6	4/23/2022 9:47	4/23/2022 1:47	60.37444	-147.938	342	cSmoot1	
58	multinet	recover	PWS01	6	4/23/2022 10:15	4/23/2022 2:15	60.3926	-147.931		cSmoot1	
61	Sediment Trap	recover			4/23/2022 13:45	4/23/2022 5:45	60.55524	-147.906		tKelly1	
73	CalVet net	deploy	IB0.5	5	4/23/2022 18:36	4/23/2022 10:36	60.25047	-148.353	183	rHopcroft1	
74	CalVet net	recover	IB0.5	5	4/23/2022 18:41	4/23/2022 10:41	60.25047	-148.353	183	rHopcroft1	
76	CTD911	deploy	IB0.5	6	4/23/2022 18:59	4/23/2022 10:59	60.25034	-148.353	184	pShipton1	
77	CTD911	recover	IB0.5	6	4/23/2022 19:30	4/23/2022 11:30	60.25029	-148.353	184	pShipton1	
78	CalVet net	deploy	IB1	6	4/23/2022 19:58	4/23/2022 11:58	60.24163	-148.335	149	rHopcroft1	
79	CalVet net	recover	IB1	6	4/23/2022 20:04	4/23/2022 12:04	60.24163	-148.335	149	rHopcroft1	
80	CTD911	deploy	IB1	7	4/23/2022 20:18	4/23/2022 12:18	60.24164	-148.335	148	iReister1	
81	CTD911	recover	IB1	7	4/23/2022 20:57	4/23/2022 12:57	60.24163	-148.335	148	iReister1	
82	CalVet net	deploy	IB2	7	4/23/2022 21:47	4/23/2022 13:47	60.27153	-148.234	155	rHopcroft1	
83	CalVet net	recover	IB2	7	4/23/2022 21:53	4/23/2022 13:53	60.27153	-148.234	155	rHopcroft1	
84	CTD911	deploy	IB2	8	4/23/2022 22:02	4/23/2022 14:02	60.27153	-148.234	154	pShipton1	
85	CTD911	recover	IB2	8	4/23/2022 22:30	4/23/2022 14:30	60.27153	-148.234	154	pShipton1	

86	CTD911	deploy	KIP0	9	4/24/2022 0:48	4/23/2022 16:48	60.12505	-147.834	291	pShipton1	
87	CTD911	recover	KIP0	9	4/24/2022 1:04	4/23/2022 17:04	60.12505	-147.834	291	pShipton1	DRY CTD
88	CTD911	deploy	MS1	10	4/24/2022 3:49	4/23/2022 19:49	59.95408	-147.927	168	iReister1	
89	CTD911	recover	MS1	10	4/24/2022 4:08	4/23/2022 20:08	59.95408	-147.927	168	iReister1	
90	CalVet net	deploy	MS2	8	4/24/2022 4:30	4/23/2022 20:30	59.94274	-147.895	193	rHopcroft1	
91	CalVet net	recover	MS2	8	4/24/2022 4:36	4/23/2022 20:36	59.94273	-147.895	193	rHopcroft1	
92	CTD911	deploy	MS3	11	4/24/2022 4:59	4/23/2022 20:59	59.93149	-147.858	185	iReister1	
					4/24/2022 5:20						ctd TOUCHED DOWN. 7 METERS OF CABLE SPOOLED OUT. SENSO
93	CTD911	recover	MS3	11		4/23/2022 21:20	59.93148	-147.858	185	iReister1	DETAILS
94	CalVet net	deploy	MS2	8A	4/24/2022 6:04	4/23/2022 22:04	59.93899	-147.896	194	cSmoot1	FOR L BLOCK
95	CalVet net	recover	MS2	8A	4/24/2022 6:04	4/23/2022 22:04	59.93849	-147.896	194	cSmoot1	
98	CTD911	deploy	MID6i	13	4/24/2022 14:19	4/24/2022 6:19	59.42906	-146.167	60	pShipton1	
99	CTD911	recover	MID6i	13	4/24/2022 14:25	4/24/2022 6:25	59.42904	-146.167	60	pShipton1	
100	CalVet net	deploy	MID06	9	4/24/2022 15:12	4/24/2022 7:12	59.5005	-146.25	37	cSmoot1	
101	CalVet net	recover	MID06	9	4/24/2022 15:14	4/24/2022 7:14	59.50049	-146.25	37	cSmoot1	
102	CTD911	deploy	Mid6	14	4/24/2022 15:23	4/24/2022 7:23	59.50049	-146.25	36	pShipton1	
103	CTD911	recover	Mid6	14	4/24/2022 15:34	4/24/2022 7:34	59.50048	-146.25	36	pShipton1	
104	CTD911	deploy	MS5i	15	4/24/2022 16:20	4/24/2022 8:20	59.57492	-146.177	114	iReister1	
105	CTD911	recover	MS5i	15	4/24/2022 16:36	4/24/2022 8:36	59.57559	-146.179	114	iReister1	
106	IronFish	deploy	MID5		4/24/2022 17:14	4/24/2022 9:14	59.63405	-146.115		aAguilarIslas1	
107	IronFish	recover	MID5		4/24/2022 17:34	4/24/2022 9:34	59.6448	-146.105		aAguilarIslas1	
108	CTD911	deploy	Mid5	16	4/24/2022 17:42	4/24/2022 9:42	59.64414	-146.105	95	iReister1	
109	CTD911	recover	Mid5	16	4/24/2022 18:13	4/24/2022 10:13	59.64426	-146.105	95	iReister1	
110	CalVet net	deploy	MID5	10	4/24/2022 18:17	4/24/2022 10:17	59.64434	-146.105	95	rHopcroft1	
111	CalVet net	recover	MID5	10	4/24/2022 18:23	4/24/2022 10:23	59.64441	-146.105	96	rHopcroft1	92M
112	CalVet net	deploy	MID5	10A	4/24/2022 18:35	4/24/2022 10:35	59.64451	-146.105	96	rHopcroft1	LIVE
113	CalVet net	recover	MID5	10A	4/24/2022 18:40	4/24/2022 10:40	59.64456	-146.105	96	rHopcroft1	
114	TM CTD	deploy	MID5		4/24/2022 19:00	4/24/2022 11:00	59.64435	-146.105		aAguilarIslas1	
115	CTD911	deploy	Mid5	17	4/24/2022 19:17	4/24/2022 11:17	59.64415	-146.105	97	iReister1	
116	TM CTD	abort	MID5		4/24/2022 19:33	4/24/2022 11:33	59.6441	-146.105		aAguilarIslas1	
117	CTD911	recover	Mid5	17	4/24/2022 19:45	4/24/2022 11:45	59.64405	-146.105	97	iReister1	
118	TM CTD	deploy	MID5	TM3	4/24/2022 19:55	4/24/2022 11:55	59.64384	-146.105		aAguilarIslas1	
119	TM CTD	abort	MID5	TM3	4/24/2022 20:05	4/24/2022 12:05	59.64361	-146.107		aAguilarIslas1	
120	TM CTD	deploy	MID5	TM4	4/24/2022 20:51	4/24/2022 12:51	59.65157	-146.103		cGreto1	

121	TM CTD	abort	MID5	TM4	4/24/2022 20:51	4/24/2022 12:51	59.65187	-146.103		cGreto1	
122	CTD911	deploy	Mid4i	18	4/24/2022 21:42	4/24/2022 13:42	59.72475	-146.026	72	pShipton1	DRY CTD
123	CTD911	recover	Mid5i	18	4/24/2022 21:51	4/24/2022 13:51	59.72484	-146.026	72	pShipton1	
124	CalVet net	deploy	MID4	11	4/24/2022 22:44	4/24/2022 14:44	59.80028	-145.95	90	rHopcroft1	85M
125	CalVet net	recover	MID4	11	4/24/2022 22:49	4/24/2022 14:49	59.80069	-145.949	90	rHopcroft1	
126	CTD911	deploy	Mid4	19	4/24/2022 22:54	4/24/2022 14:54	59.80102	-145.948	90	iReister1	
127	CTD911	recover	Mid4	19	4/24/2022 23:23	4/24/2022 15:23	59.80217	-145.946	90	iReister1	
128	CTD911	deploy	MID3I	20	4/25/2022 0:09	4/24/2022 16:09	59.87558	-145.875	100	pShipton1	
129	CTD911	recover	MID3I	20	4/25/2022 0:18	4/24/2022 16:18	59.87558	-145.875	100	pShipton1	
130	CalVet net	deploy	MID3	12	4/25/2022 1:00	4/24/2022 17:00	59.95052	-145.802	86	rHopcroft1	
131	CalVet net	recover	MID3	12	4/25/2022 1:05	4/24/2022 17:05	59.95079	-145.803	86	rHopcroft1	80M
133	CTD911	deploy	MID3	21	4/25/2022 1:25	4/24/2022 17:25	59.95094	-145.803	87	pShipton1	
134	CTD911	recover	MID3	21	4/25/2022 1:45	4/24/2022 17:45	59.95093	-145.803	87	pShipton1	
135	CTD911	deploy	Mid2i	22	4/25/2022 2:32	4/24/2022 18:32	60.02452	-145.726	95	iReister1	MULTIBEAM INOPERABLE, USING EK-80
137	CTD911	recover	Mid2i	22	4/25/2022 2:48	4/24/2022 18:48	60.02542	-145.724	95	iReister1	
139	CalVet net	deploy	MID2	13	4/25/2022 3:32	4/24/2022 19:32	60.09958	-145.652	120	rHopcroft1	
140	CalVet net	recover	MID2	13	4/25/2022 3:38	4/24/2022 19:38	60.0996	-145.652	120	rHopcroft1	
141	CalVet net	deploy	MID2	13A	4/25/2022 3:51	4/24/2022 19:51	60.0996	-145.652	120	rHopcroft1	
142	CalVet net	recover	MID2	13A	4/25/2022 3:57	4/24/2022 19:57	60.09961	-145.652	120	rHopcroft1	
143	CTD911	deploy	Mid2	23	4/25/2022 4:02	4/24/2022 20:02	60.09961	-145.652	118	iReister1	
144	CTD911	recover	Mid2	23	4/25/2022 4:33	4/24/2022 20:33	60.09962	-145.652	118	iReister1	
145	TM CTD	deploy	MID2	TM5	4/25/2022 4:45	4/24/2022 20:45	60.09962	-145.652	118	aAguilarIslas1	
146	TM CTD	recover	MID2	TM5	4/25/2022 5:09	4/24/2022 21:09	60.09981	-145.652	118	aAguilarIslas1	
147	IronFish	deploy	MID2		4/25/2022 5:10	4/24/2022 21:10	60.10048	-145.652		aAguilarIslas1	
148	IronFish	deploy	MID2		4/25/2022 5:11	4/24/2022 21:11	60.1005	-145.652		aAguilarIslas1	
149	IronFish	recover	MID2		4/25/2022 5:37	4/24/2022 21:37	60.12265	-145.633		aAguilarIslas1	
150	CTD911	deploy	Mid1i	25	4/25/2022 6:09	4/24/2022 22:09	60.17474	-145.575	99	iReister1	
151	CTD911	recover	Mid1i	25	4/25/2022 6:23	4/24/2022 22:23	60.17474	-145.575	99	iReister1	
152	CTD911	deploy	Mid1	25	4/25/2022 7:11	4/24/2022 23:11	60.24937	-145.5	20	iReister1	
153	CTD911	recover	Mid1	25	4/25/2022 7:24	4/24/2022 23:24	60.24936	-145.5	20	iReister1	
154	Bongo Net	deploy	MID2	1	4/25/2022 8:34	4/25/2022 0:34	60.10477	-145.647	121	cSmoot1	
155	Bongo Net	maxDepth	MID2	1	4/25/2022 8:39	4/25/2022 0:39	60.10256	-145.649	120	cSmoot1	MAX DEPTH
156	Bongo Net	recover	MID2	1	4/25/2022 8:46	4/25/2022 0:46	60.09952	-145.652	121	cSmoot1	
157	Bongo Net	deploy	MID3	2	4/25/2022 9:54	4/25/2022 1:54	59.95295	-145.794	87	cSmoot1	

158	Bongo Net	maxDepth	MID3	2	4/25/2022 9:57	4/25/2022 1:57	59.95123	-145.795	87	cSmoot1	
159	Bongo Net	recover	MID3	2	4/25/2022 10:01	4/25/2022 2:01	59.94924	-145.796	87	cSmoot1	
160	Bongo Net	deploy	MID4	3	4/25/2022 11:07	4/25/2022 3:07	59.80433	-145.946	95	cSmoot1	
161	Bongo Net	maxDepth	MID4	3	4/25/2022 11:11	4/25/2022 3:11	59.80266	-145.947	95	cSmoot1	
162	Bongo Net	recover	MID4	3	4/25/2022 11:16	4/25/2022 3:16	59.80058	-145.949	91	cSmoot1	
163	Bongo Net	deploy	MID5	4	4/25/2022 12:28	4/25/2022 4:28	59.65165	-146.106	95	cSmoot1	
164	Bongo Net	maxDepth	MID5	4	4/25/2022 12:31	4/25/2022 4:31	59.65102	-146.106	95	cSmoot1	
165	Bongo Net	recover	MID5	4	4/25/2022 12:34	4/25/2022 4:34	59.65016	-146.105	95	cSmoot1	
166	TM CTD	deploy	MID5	TM6	4/25/2022 12:48	4/25/2022 4:48	59.64997	-146.1		aAguilarIslas1	
167	TM CTD	recover	MID5	TM6	4/25/2022 13:01	4/25/2022 5:01	59.6505	-146.103		aAguilarIslas1	
168	Bongo Net	deploy	MID6	5	4/25/2022 14:11	4/25/2022 6:11	59.5	-146.25	35	cSmoot1	DOUBLE OBLIQUE
169	Bongo Net	maxDepth	MID6	5	4/25/2022 14:14	4/25/2022 6:14	59.49951	-146.249	35	cSmoot1	MAX DEPTH
170	Bongo Net	recover	MID6	5	4/25/2022 14:15	4/25/2022 6:15	59.49942	-146.249	35	cSmoot1	
171	Sediment Trap	recover			4/25/2022 17:54	4/25/2022 9:54	58.95188	-146.346		tKelly1	
172	Sediment Trap	deploy	MID9		4/25/2022 19:15	4/25/2022 11:15	59.06497	-146.102		tKelly1	
175	CalVet net	deploy	MID9	14	4/25/2022 19:39	4/25/2022 11:39	59.0686	-146.1	3066	rHopcroft1	
176	CalVet net	recover	MID9	14	4/25/2022 19:45	4/25/2022 11:45	59.06681	-146.101	3066	rHopcroft1	
177	CTD911	deploy	Mid9	26	4/25/2022 20:05	4/25/2022 12:05	59.07057	-146.096	3066	pShipton1	
178	CTD911	recover	Mid9	26	4/25/2022 21:46	4/25/2022 13:46	59.05544	-146.102	3066	pShipton1	
179	IronFish	deploy	MID8		4/25/2022 22:54	4/25/2022 14:54	59.20766	-146.193		aAguilarIslas1	
180	IronFish	recover	MID8		4/25/2022 23:16	4/25/2022 15:16	59.2199	-146.201		aAguilarIslas1	
183	CalVet net	recover	MID8	15	4/25/2022 23:37	4/25/2022 15:37	59.22319	-146.203	645	rHopcroft1	hit bottom but samples good
184	CTD911	deploy	Mid8	27	4/25/2022 23:48	4/25/2022 15:48	59.22455	-146.201	647	iReister1	
185	CTD911	recover	Mid8	27	4/26/2022 0:49	4/25/2022 16:49	59.21087	-146.222	647	iReister1	
186	TM CTD	deploy	MID8	TM7	4/26/2022 1:17	4/25/2022 17:17	59.20572	-146.23		aAguilarIslas1	
187	TM CTD	recover	MID8	TM7	4/26/2022 2:33	4/25/2022 18:33	59.19026	-146.262		aAguilarIslas1	
189	CTD911	deploy	Mid7i	28	4/26/2022 3:36	4/25/2022 19:36	59.30795	-146.25	421	iReister1	
190	CTD911	recover	Mid7i	28	4/26/2022 4:04	4/25/2022 20:04	59.3056	-146.262	412	iReister1	
191	CalVet net	deploy	MID7	16	4/26/2022 4:42	4/25/2022 20:42	59.37582	-146.297	60	rHopcroft1	
192	CalVet net	recover	MID7	16	4/26/2022 4:46	4/25/2022 20:46	59.37571	-146.298	60	rHopcroft1	
193	CTD911	deploy	Mid7	29	4/26/2022 4:54	4/25/2022 20:54	59.37498	-146.299	60	iReister1	
194	CTD911	recover	Mid7	29	4/26/2022 5:29	4/25/2022 21:29	59.37201	-146.303	60	iReister1	seasave bugged out on the way up and fell apart. hex feed may h
195	CTD911	deploy	Mid7	29	4/26/2022 5:39	4/25/2022 21:39	59.37166	-146.302	60	iReister1	redeploying CTD after software crash to obtain 2 surface bottles.
196	CTD911	recover	Mid7	29	4/26/2022 5:46	4/25/2022 21:46	59.37147	-146.303	60	iReister1	

197	Bongo Net	deploy	MID7	6	4/26/2022 6:01	4/25/2022 22:01	59.37402	-146.301	68	cSmoot1	
198	Bongo Net	maxDepth	MID7	6	4/26/2022 6:03	4/25/2022 22:03	59.37464	-146.3	68	cSmoot1	
199	Bongo Net	recover	MID7	6	4/26/2022 6:06	4/25/2022 22:06	59.37528	-146.298	68	cSmoot1	
200	Bongo Net	deploy	MID8	7	4/26/2022 7:15	4/25/2022 23:15	59.22835	-146.205	536	cSmoot1	
201	Bongo Net	maxDepth	MID8	7	4/26/2022 7:25	4/25/2022 23:25	59.22398	-146.202	637	cSmoot1	
202	Bongo Net	recover	MID8	7	4/26/2022 7:37	4/25/2022 23:37	59.2187	-146.196	791	cSmoot1	
203	Bongo Net	deploy	MID9	8	4/26/2022 8:42	4/26/2022 0:42	59.07107	-146.109	2679	cSmoot1	
206	Bongo Net	maxDepth	MID9	8	4/26/2022 8:55	4/26/2022 0:55	59.06563	-146.098	2875	cSmoot1	
207	Bongo Net	recover	MID9	8	4/26/2022 9:07	4/26/2022 1:07	59.06167	-146.088	2875	cSmoot1	
208	Bongo Net	deploy	MID10	9	4/26/2022 10:13	4/26/2022 2:13	58.91745	-146.004	4426	cSmoot1	
209	Bongo Net	maxDepth	MID10	9	4/26/2022 10:25	4/26/2022 2:25	58.91119	-145.999	4426	cSmoot1	
210	Bongo Net	recover	MID10	9	4/26/2022 10:37	4/26/2022 2:37	58.90429	-145.996	4443	cSmoot1	
212	multinet	deploy	MID10	2D	4/26/2022 11:40	4/26/2022 3:40	58.90989	-146	4445	cSmoot1	VERT 150
213	multinet	recover	MID10	2D	4/26/2022 13:04	4/26/2022 5:04	58.90989	-146	4445	cSmoot1	
214	CTD911	deploy	MID10	30	4/26/2022 16:05	4/26/2022 8:05	58.90969	-146.001	4444	pShipton1	
215	CTD911	other	Mid10	30	4/26/2022 16:33	4/26/2022 8:33	58.90969	-146.001	4440	pShipton1	CTD stopped archiving at 1498 m
216	CTD911	deploy	MID10	30UC	4/26/2022 16:37	4/26/2022 8:37	58.90969	-146.001	4440	pShipton1	upcast of 030 to fire bottles
217	CTD911	recover	MID10	30UC	4/26/2022 17:35	4/26/2022 9:35	58.90969	-146.001	4440	pShipton1	
218	TM CTD	deploy	MID10	TM8	4/26/2022 17:47	4/26/2022 9:47	58.90997	-146		aAguilarIslas1	
219	TM CTD	recover	MID10	TM8	4/26/2022 19:00	4/26/2022 11:00	58.90997	-146		aAguilarIslas1	
220	CalVet net	deploy	MID10	17	4/26/2022 19:10	4/26/2022 11:10	58.90997	-146	4445	rHopcroft1	
221	CalVet net	recover	MID10	17	4/26/2022 19:15	4/26/2022 11:15	58.90997	-146	4445	rHopcroft1	
222	CalVet net	deploy	MID10	17A	4/26/2022 19:30	4/26/2022 11:30	58.90997	-146	4445	rHopcroft1	
223	CalVet net	recover	MID10	17A	4/26/2022 19:35	4/26/2022 11:35	58.90998	-146	4445	rHopcroft1	
224	CTD911	deploy	MID10	31	4/26/2022 19:49	4/26/2022 11:49	58.90998	-146	4445	iReister1	
225	CTD911	recover	MID10	31	4/26/2022 20:20	4/26/2022 12:20	58.90998	-146	4445	iReister1	
226	IronFish	deploy	MID10		4/26/2022 20:28	4/26/2022 12:28	58.90902	-145.998		aAguilarIslas1	
227	IronFish	recover			4/26/2022 23:46	4/26/2022 15:46	58.9792	-145.801		aAguilarIslas1	
228	Sediment Trap	recover			4/27/2022 3:20	4/26/2022 19:20	58.44431	-146.28		tKelly1	
229	IronFish	deploy			4/27/2022 3:28	4/26/2022 19:28	58.44027	-146.278		aAguilarIslas1	
230	IronFish	recover			4/27/2022 6:12	4/26/2022 22:12	58.18693	-146.872		aAguilarIslas1	
232	Sediment Trap	deploy	KOD10		4/27/2022 15:03	4/27/2022 7:03	57.29101	-149.684		tKelly1	
233	IronFish	deploy			4/27/2022 15:37	4/27/2022 7:37	57.21365	-149.716		aAguilarIslas1	
234	IronFish	deploy	KOD10		4/27/2022 15:38	4/27/2022 7:38	57.21342	-149.716		aAguilarIslas1	

235	IronFish	recover	KOD10		4/27/2022 15:59	4/27/2022 7:59	57.19749	-149.724		aAguilarIslas1	
236	multinet	deploy	KOD10	3D	4/27/2022 16:22	4/27/2022 8:22	57.20443	-149.719	2524	rHopcroft1	
237	multinet	recover	KOD10	3D	4/27/2022 17:40	4/27/2022 9:40	57.20442	-149.719	2524.4	rHopcroft1	deep
238	CTD911	deploy	KOD10	32	4/27/2022 17:52	4/27/2022 9:52	57.2043	-149.72	2524	iReister1	
239	CTD911	recover	KOD10	32	4/27/2022 18:23	4/27/2022 10:23	57.20431	-149.72	2524	iReister1	
240	CalVet net	deploy	KOD10	18	4/27/2022 18:33	4/27/2022 10:33	57.20431	-149.72	2525	rHopcroft1	
241	CalVet net	recover	KOD10	18	4/27/2022 18:39	4/27/2022 10:39	57.2042	-149.72	2525	rHopcroft1	
242	CalVet net	deploy	KOD10	18a	4/27/2022 18:51	4/27/2022 10:51	57.20404	-149.721	2525	rHopcroft1	
243	CalVet net	recover	KOD10	18A	4/27/2022 18:56	4/27/2022 10:56	57.20315	-149.722	2525	rHopcroft1	LIVE
244	TM CTD	deploy	KOD10	9	4/27/2022 19:12	4/27/2022 11:12	57.20189	-149.725		aAguilarIslas1	
245	TM CTD	recover	KOD10	9	4/27/2022 20:25	4/27/2022 12:25	57.19408	-149.748		aAguilarIslas1	
246	CTD911	deploy	KOD10	33	4/27/2022 20:45	4/27/2022 12:45	57.20469	-149.721	2360	iReister1	
247	CTD911	recover	KOD10	33	4/27/2022 22:18	4/27/2022 14:18	57.20299	-149.74	2515	iReister1	
248	IronFish	deploy	KOD10	9	4/28/2022 0:01	4/27/2022 16:01	57.27459	-149.842		aAguilarIslas1	
249	IronFish	recover	KOD10		4/28/2022 0:02	4/27/2022 16:02	57.27516	-149.843		aAguilarIslas1	
250	CalVet net	deploy	KOD9	19	4/28/2022 0:32	4/27/2022 16:32	57.32243	-149.927	1308	rHopcroft1	
251	CalVet net	recover	KOD9	19	4/28/2022 0:38	4/27/2022 16:38	57.32276	-149.928	1308	rHopcroft1	
252	CTD911	deploy	KOD09	34	4/28/2022 0:52	4/27/2022 16:52	57.32309	-149.928	1017	iReister1	
254	IronFish	deploy	KOD8		4/28/2022 3:35	4/27/2022 19:35	57.43299	-150.122		aAguilarIslas1	
255	IronFish	recover	KOD8		4/28/2022 3:52	4/27/2022 19:52	57.43914	-150.132		aAguilarIslas1	
256	CalVet net	deploy	KOD8	20	4/28/2022 3:57	4/27/2022 19:57	57.43895	-150.132	711	rHopcroft1	
257	CalVet net	recover	KOD8	20	4/28/2022 4:04	4/27/2022 20:04	57.43633	-150.131	711	rHopcroft1	
258	CTD911	deploy	KOD8	35	4/28/2022 4:31	4/27/2022 20:31	57.4445	-150.134	709	pShipton1	
259	CTD911	recover	KOD8	35	4/28/2022 5:35	4/27/2022 21:35	57.43657	-150.142	684	pShipton1	this cast includes 035 035a and 035b see log sheet for details
260	TM CTD	deploy	KOD8	10	4/28/2022 5:54	4/27/2022 21:54	57.43942	-150.132		aAguilarIslas1	
261	TM CTD	recover	KOD8	10	4/28/2022 6:46	4/27/2022 22:46	57.43915	-150.148		aAguilarIslas1	
262	Bongo Net	deploy	KOD7	10	4/28/2022 8:00	4/28/2022 0:00	57.56167	-150.346	170	cSmoot1	
263	Bongo Net	maxDepth	KOD7	10	4/28/2022 8:08	4/28/2022 0:08	57.55994	-150.344	174	cSmoot1	
264	Bongo Net	recover	KOD7	10	4/28/2022 8:17	4/28/2022 0:17	57.55781	-150.341	178	cSmoot1	
265	Bongo Net	deploy	KOD8	11	4/28/2022 9:24	4/28/2022 1:24	57.44335	-150.14	566	cSmoot1	
266	Bongo Net	maxDepth	KOD8	11	4/28/2022 9:33	4/28/2022 1:33	57.44153	-150.139	695	cSmoot1	
269	Bongo Net	recover	KOD8	11	4/28/2022 9:41	4/28/2022 1:41	57.44046	-150.136	695	cSmoot1	
271	Bongo Net	deploy	KOD9	12	4/28/2022 10:50	4/28/2022 2:50	57.32356	-149.929	1349	cSmoot1	
272	Bongo Net	maxDepth	KOD9	12	4/28/2022 11:01	4/28/2022 3:01	57.32127	-149.925	1310	cSmoot1	

273	Bongo Net	recover	KOD9	12	4/28/2022 11:10	4/28/2022 3:10	57.31848	-149.922	1306	cSmoot1	
274	Bongo Net	deploy	KOD10	13	4/28/2022 12:15	4/28/2022 4:15	57.20743	-149.722	2473	cSmoot1	
275	Bongo Net	maxDepth	KOD10	13	4/28/2022 12:24	4/28/2022 4:24	57.20462	-149.719	2473	cSmoot1	
276	Bongo Net	recover	KOD10	13	4/28/2022 12:34	4/28/2022 4:34	57.20141	-149.717	2533	cSmoot1	
277	Sediment Trap	recover			4/28/2022 14:30	4/28/2022 6:30	57.21103	-150.011		tKelly1	
278	CalVet net	deploy	KOD7	21	4/28/2022 16:56	4/28/2022 8:56	57.55579	-150.341	180	rHopcroft1	
279	CalVet net	abort	KOD7	21	4/28/2022 17:00	4/28/2022 9:00	57.5547	-150.342	180	rHopcroft1	
280	CalVet net	deploy	KOD7	21	4/28/2022 17:10	4/28/2022 9:10	57.55416	-150.344	180	rHopcroft1	RECAST
281	CalVet net	recover	KOD7	21	4/28/2022 17:16	4/28/2022 9:16	57.55329	-150.346	180	rHopcroft1	
282	CTD911	deploy	KOD7	36	4/28/2022 17:24	4/28/2022 9:24	57.5525	-150.349	177	iReister1	
283	CTD911	recover	KOD7	36	4/28/2022 17:55	4/28/2022 9:55	57.54991	-150.359	177	iReister1	0.6 MILES OFF STATION
284	CalVet net	deploy	KOD6	22	4/28/2022 19:01	4/28/2022 11:01	57.67554	-150.544	101	rHopcroft1	
285	CalVet net	recover	KOD6	22	4/28/2022 19:09	4/28/2022 11:09	57.67603	-150.547	101	rHopcroft1	
286	CTD911	deploy	KOD6	37	4/28/2022 19:17	4/28/2022 11:17	57.67067	-150.548	101	iReister1	
287	CTD911	recover	KOD6	37	4/28/2022 19:45	4/28/2022 11:45	57.67538	-150.56	101	iReister1	
288	IronFish	deploy	KOD5		4/28/2022 20:43	4/28/2022 12:43	57.77945	-150.751		aAguilarIslas1	
289	IronFish	recover	KOD5		4/28/2022 21:01	4/28/2022 13:01	57.79334	-150.771		aAguilarIslas1	
290	CTD911	deploy	KOD5	38	4/28/2022 21:22	4/28/2022 13:22	57.78647	-150.761	89	iReister1	PROD
291	CTD911	recover	KOD5	38	4/28/2022 21:53	4/28/2022 13:53	57.7907	-150.763	89	iReister1	
292	CalVet net	deploy	KOD5	23	4/28/2022 22:14	4/28/2022 14:14	57.7851	-150.758	89	rHopcroft1	
293	CalVet net	recover	KOD5	23	4/28/2022 22:18	4/28/2022 14:18	57.78581	-150.757	88	rHopcroft1	81M 0NLY
294	CalVet net	deploy	KOD5	23A	4/28/2022 22:32	4/28/2022 14:32	57.78601	-150.759	88	rHopcroft1	LIVE
295	CalVet net	recover	KOD5	23A	4/28/2022 22:36	4/28/2022 14:36	57.78685	-150.758	88	rHopcroft1	84M
296	CTD911	deploy	KOD5	39	4/28/2022 23:38	4/28/2022 15:38	57.78615	-150.754	89	iReister1	
297	TM CTD	deploy	KOD5	11	4/28/2022 23:45	4/28/2022 15:45	57.78642	-150.752		aAguilarIslas1	
298	TM CTD	recover	KOD5	11	4/28/2022 23:46	4/28/2022 15:46	57.78644	-150.751		aAguilarIslas1	
299	CTD911	recover	KOD5	39	4/29/2022 0:08	4/28/2022 16:08	57.787	-150.744	89	iReister1	
300	CalVet net	deploy	KOD4	24	4/29/2022 1:20	4/28/2022 17:20	57.89961	-150.968	75	rHopcroft1	
301	CalVet net	recover	KOD4	24	4/29/2022 1:24	4/28/2022 17:24	57.89913	-150.967	75	rHopcroft1	
302	CTD911	deploy	KOD4	40	4/29/2022 1:39	4/28/2022 17:39	57.89874	-150.967	75	iReister1	
303	CTD911	recover	KOD4	40	4/29/2022 2:02	4/28/2022 18:02	57.89507	-150.962	75	iReister1	
304	CalVet net	deploy	KOD3	25	4/29/2022 3:16	4/28/2022 19:16	58.01779	-151.187	80	rHopcroft1	
305	CalVet net	recover	KOD3	25	4/29/2022 3:20	4/28/2022 19:20	58.01723	-151.187	80	rHopcroft1	75M
306	CTD911	deploy	KOD3	41	4/29/2022 3:25	4/28/2022 19:25	58.01693	-151.19	80	iReister1	

307	CTD911	recover	KOD3	41	4/29/2022 3:48	4/28/2022 19:48	58.01407	-151.191	80	iReister1	
308	CalVet net	deploy	KOD2	26	4/29/2022 4:54	4/28/2022 20:54	58.13143	-151.384	124	rHopcroft1	
309	CalVet net	recover	KOD2	26	4/29/2022 5:01	4/28/2022 21:01	58.13223	-151.387	124	rHopcroft1	
310	CTD911	deploy	KOD2	42	4/29/2022 5:07	4/28/2022 21:07	58.13294	-151.388	124	iReister1	
312	CTD911	recover	KOD2	42	4/29/2022 5:41	4/28/2022 21:41	58.13566	-151.39	125	iReister1	
313	Bongo Net	deploy	KOD2	14	4/29/2022 5:49	4/28/2022 21:49	58.13626	-151.39	131	cSmoot1	
314	Bongo Net	maxDepth	KOD2	14	4/29/2022 5:54	4/28/2022 21:54	58.13515	-151.387	130	cSmoot1	
315	Bongo Net	recover	KOD2	14	4/29/2022 6:00	4/28/2022 22:00	58.13401	-151.384	129	cSmoot1	
316	Bongo Net	deploy	KOD3	15	4/29/2022 7:12	4/28/2022 23:12	58.0169	-151.182	82	cSmoot1	
317	Bongo Net	maxDepth	KOD3	15	4/29/2022 7:15	4/28/2022 23:15	58.01827	-151.18	82	cSmoot1	
318	Bongo Net	recover	KOD3	15	4/29/2022 7:19	4/28/2022 23:19	58.02058	-151.181	82	cSmoot1	
319	Bongo Net	deploy	KOD4	16	4/29/2022 8:32	4/29/2022 0:32	57.90217	-150.97	80	cSmoot1	
320	Bongo Net	maxDepth	KOD4	16	4/29/2022 8:34	4/29/2022 0:34	57.90199	-150.97	78	cSmoot1	
321	Bongo Net	recover	KOD4	16	4/29/2022 8:37	4/29/2022 0:37	57.90183	-150.97	78	cSmoot1	
323	Bongo Net	deploy	KOD5	17	4/29/2022 9:38	4/29/2022 1:38	57.78766	-150.763	89	cSmoot1	
324	Bongo Net	maxDepth	KOD5	17	4/29/2022 9:41	4/29/2022 1:41	57.78719	-150.761	89	cSmoot1	
325	Bongo Net	maxDepth	KOD5	17	4/29/2022 9:44	4/29/2022 1:44	57.78654	-150.76	89	cSmoot1	
326	Bongo Net	deploy	KOD6	18	4/29/2022 10:44	4/29/2022 2:44	57.67313	-150.552	99	cSmoot1	
327	Bongo Net	maxDepth	KOD6	18	4/29/2022 10:48	4/29/2022 2:48	57.67253	-150.549	99	cSmoot1	
328	Bongo Net	recover	KOD6	18	4/29/2022 10:52	4/29/2022 2:52	57.67177	-150.545	102	cSmoot1	
329	CTD911	deploy	GEO	43	4/29/2022 19:32	4/29/2022 11:32	59.01227	-148.691	235	iReister1	
330	CTD911	recover	GEO	43	4/29/2022 20:13	4/29/2022 12:13	59.01226	-148.691	235	iReister1	
337	Mooring	deploy	GEO1-22		4/29/2022 23:43	4/29/2022 15:43	59.0164	-148.699	230	pShipton1	
340	Mooring	deploy	GEO3-22		4/30/2022 3:57	4/29/2022 19:57	59.01123	-148.683	230	pShipton1	
341	ISIISDPI	deploy					4/29/2022 20:36	242	rHopcroft1		
342	ISIISDPI	recover			4/30/2022 7:12	4/29/2022 23:12	59.12375	-148.759	242	rHopcroft1	recover due to loss of elevator control
343	ISIISDPI	deploy			4/30/2022 7:26	4/29/2022 23:26	59.12821	-148.764	147	rHopcroft1	redeploy after fixing cables
345	ISIISDPI	recover			4/30/2022 18:18	4/30/2022 10:18	59.96204	-149.375	200	rHopcroft1	laTE BY 5
346	CTD911	deploy	RES2.5	44	4/30/2022 19:18	4/30/2022 11:18	60.01884	-149.358	292	iReister1	
347	CTD911	recover	RES2.5	44	4/30/2022 20:07	4/30/2022 12:07	60.01883	-149.358	292	iReister1	
348	CalVet net	deploy	Res2,5	27	4/30/2022 20:13	4/30/2022 12:13	60.01883	-149.358	293	rHopcroft1	

349	CalVet net	recover	Res2,5	27	4/30/2022 20:18	4/30/2022 12:18	60.01883	-149.358	293	rHopcroft1	
350	CalVet net	deploy	Res2,5	27A	4/30/2022 20:30	4/30/2022 12:30	60.01882	-149.358	293	rHopcroft1	
351	CalVet net	recover	Res2,5	27A	4/30/2022 20:36	4/30/2022 12:36	60.01882	-149.358	293	rHopcroft1	
361	CTD911	deploy	Gak1	45	5/1/2022 19:10	5/1/2022 11:10	59.84434	-149.474	268	iReister1	
362	CTD911	recover	Gak1	45	5/1/2022 19:44	5/1/2022 11:44	59.84345	-149.476	268	iReister1	
367	ISIISDPI	deploy			5/3/2022 4:39	5/2/2022 20:39	60.02076	-149.357	199	rHopcroft1	
370	ISIISDPI	recover			5/3/2022 11:45	5/3/2022 3:45	60.00592	-149.356	295	cSmoot1	
377	CTD911	deploy	Gak1	46	5/3/2022 18:11	5/3/2022 10:11	59.84508	-149.468	267	iReister1	prod
378	CTD911	recover	Gak1	46	5/3/2022 18:53	5/3/2022 10:53	59.84508	-149.468	267	iReister1	
379	CalVet net	deploy	GAK01	28	5/3/2022 18:55	5/3/2022 10:55	59.84507	-149.468	268	rHopcroft1	
380	CalVet net	recover	GAK01	28	5/3/2022 19:00	5/3/2022 11:00	59.84508	-149.468	268	rHopcroft1	
381	CalVet net	deploy	GAK01	28A	5/3/2022 19:15	5/3/2022 11:15	59.84508	-149.468	268	rHopcroft1	
382	CalVet net	recover	GAK01	28A	5/3/2022 19:21	5/3/2022 11:21	59.84508	-149.468	268	rHopcroft1	live
383	TM CTD	deploy	GAK01	TM12	5/3/2022 19:38	5/3/2022 11:38	59.84508	-149.468		aAguilarIslas1	
384	TM CTD	recover	GAK01	TM12	5/3/2022 20:08	5/3/2022 12:08	59.84508	-149.468		aAguilarIslas1	
385	CTD911	deploy	Gak1	47	5/3/2022 20:15	5/3/2022 12:15	59.84509	-149.468	268	iReister1	
386	CTD911	recover	Gak1	47	5/3/2022 21:00	5/3/2022 13:00	59.84508	-149.468	268	iReister1	
387	multinet	recover	Gak1	4	5/3/2022 21:13	5/3/2022 13:13	59.84508	-149.468	268	iReister1	VERT 150
388	multinet	recover	Gak1	4	5/3/2022 21:27	5/3/2022 13:27	59.84507	-149.468	268	rHopcroft1	
391	IronFish	deploy	GAK01		5/3/2022 22:05	5/3/2022 14:05	59.83625	-149.445		aAguilarIslas1	
392	IronFish	recover	GAK01		5/3/2022 22:13	5/3/2022 14:13	59.83891	-149.459		aAguilarIslas1	
395	Mooring	deploy	Gak1		5/4/2022 1:04	5/3/2022 17:04	59.85009	-149.501	268	pShipton1	Gak1 mooring deployment
397	CalVet net	deploy	GAK02	29	5/4/2022 2:28	5/3/2022 18:28	59.68971	-149.33	268	rHopcroft1	
398	CalVet net	recover	GAK02	29	5/4/2022 2:34	5/3/2022 18:34	59.68911	-149.332	268	rHopcroft1	
399	CTD911	deploy	GAK2	48	5/4/2022 2:41	5/3/2022 18:41	59.68812	-149.333	229	iReister1	
400	CTD911	recover	GAK2	48	5/4/2022 3:19	5/3/2022 19:19	59.68467	-149.34	229	iReister1	
401	CalVet net	deploy	GAK02	30	5/4/2022 4:52	5/3/2022 20:52	59.5523	-149.187	211	rHopcroft1	
402	CalVet net	recover	GAK03	30	5/4/2022 4:58	5/3/2022 20:58	59.55082	-149.187	211	rHopcroft1	
403	CTD911	deploy	GAK3	49	5/4/2022 5:00	5/3/2022 21:00	59.55035	-149.187	212	iReister1	
404	CTD911	recover	GAK3	49	5/4/2022 5:45	5/3/2022 21:45	59.53991	-149.185	212	iReister1	
405	TM CTD	deploy	GAK03	TM13	5/4/2022 5:57	5/3/2022 21:57	59.53693	-149.184		aAguilarIslas1	
406	TM CTD	recover	GAK03	TM13	5/4/2022 6:20	5/3/2022 22:20	59.53253	-149.186		aAguilarIslas1	
407	multinet	deploy	GAK1	7	5/4/2022 8:28	5/4/2022 0:28	59.83669	-149.461	270	cSmoot1	
408	multinet	maxDepth	GAK1	7	5/4/2022 8:37	5/4/2022 0:37	59.84061	-149.464	270	cSmoot1	

409	multinet	recover	GAK1	7	5/4/2022 9:04	5/4/2022 1:04	59.85375	-149.476	270	cSmoot1	
410	multinet	recover	GAK1	8	5/4/2022 9:21	5/4/2022 1:21	59.85372	-149.474	268	cSmoot1	
411	multinet	maxDepth	GAK1	8	5/4/2022 9:31	5/4/2022 1:31	59.84878	-149.469	268	cSmoot1	
412	multinet	recover	GAK1	8	5/4/2022 9:58	5/4/2022 1:58	59.83432	-149.458	270	cSmoot1	
413	multinet	deploy	GAK2	9	5/4/2022 10:53	5/4/2022 2:53	59.70303	-149.336	234	cSmoot1	
414	multinet	maxDepth	GAK2	9	5/4/2022 11:05	5/4/2022 3:05	59.69529	-149.329	234	cSmoot1	
415	multinet	maxDepth	GAK2	9	5/4/2022 11:35	5/4/2022 3:35	59.67474	-149.312	225	cSmoot1	
416	multinet	deploy	GAK3	10	5/4/2022 12:24	5/4/2022 4:24	59.56177	-149.2	215	cSmoot1	
417	multinet	maxDepth	GAK3	10	5/4/2022 12:38	5/4/2022 4:38	59.55219	-149.191	215	cSmoot1	
418	multinet	recover	GAK3	10	5/4/2022 13:08	5/4/2022 5:08	59.53283	-149.172	213	cSmoot1	
419	multinet	deploy	GAK4	11	5/4/2022 13:59	5/4/2022 5:59	59.41882	-149.054	200	cSmoot1	
420	multinet	maxDepth	GAK4	11	5/4/2022 14:08	5/4/2022 6:08	59.41182	-149.047	200	cSmoot1	
421	multinet	recover	GAK4	11	5/4/2022 14:36	5/4/2022 6:36	59.3913	-149.022	200	cSmoot1	
422	CalVet net	deploy	GAK04	31	5/4/2022 16:03	5/4/2022 8:03	59.4073	-149.05	199	rHopcroft1	
423	CalVet net	recover	GAK04	31	5/4/2022 16:09	5/4/2022 8:09	59.40705	-149.049	199	rHopcroft1	
424	CTD911	deploy	Gak4	50	5/4/2022 16:19	5/4/2022 8:19	59.4069	-149.048	199	iReister1	
425	CTD911	recover	Gak4	50	5/4/2022 17:02	5/4/2022 9:02	59.40477	-149.042	199	iReister1	
426	IronFish	deploy	GAK05		5/4/2022 18:11	5/4/2022 10:11	59.2547	-148.919		aAguilarIslas1	
427	IronFish	recover	GAK05		5/4/2022 18:20	5/4/2022 10:20	59.25889	-148.914	167	aAguilarIslas1	
429	CalVet net	deploy	GAK05	32	5/4/2022 18:31	5/4/2022 10:31	59.26195	-148.911	167	rHopcroft1	
430	CalVet net	recover	GAK05	32	5/4/2022 18:36	5/4/2022 10:36	59.26187	-148.91	167	rHopcroft1	
431	CalVet net	deploy	GAK05	32A	5/4/2022 18:48	5/4/2022 10:48	59.26136	-148.909	167	rHopcroft1	live
432	CalVet net	recover	GAK05	32A	5/4/2022 18:53	5/4/2022 10:53	59.26126	-148.909	167	rHopcroft1	
433	CTD911	deploy	GAK5	51	5/4/2022 19:03	5/4/2022 11:03	59.26098	-148.908	166	pShipton1	
434	CTD911	recover	GAK5	51	5/4/2022 19:36	5/4/2022 11:36	59.26094	-148.908	166	pShipton1	
435	TM CTD	deploy	GAK05	14	5/4/2022 19:49	5/4/2022 11:49	59.26117	-148.909		aAguilarIslas1	
436	TM CTD	recover	GAK05	14	5/4/2022 20:18	5/4/2022 12:18	59.2617	-148.91		aAguilarIslas1	
437	multinet	deploy	GAK5	5	5/4/2022 21:03	5/4/2022 13:03	59.26121	-148.91	167	rHopcroft1	VERT 150
438	multinet	recover	GAK5	5	5/4/2022 21:17	5/4/2022 13:17	59.26118	-148.91	167	rHopcroft1	
439	CTD911	deploy	GAK5	52	5/4/2022 21:25	5/4/2022 13:25	59.26128	-148.91	167	iReister1	
440	CTD911	recover	GAK5	52	5/4/2022 22:05	5/4/2022 14:05	59.26196	-148.911	167	iReister1	
441	CalVet net	deploy	GAK05	33	5/4/2022 23:34	5/4/2022 15:34	59.11836	-148.776	151	rHopcroft1	
442	CalVet net	recover	GAK06	33	5/4/2022 23:39	5/4/2022 15:39	59.11925	-148.777	151	rHopcroft1	
443	CTD911	deploy	GAK6	53	5/4/2022 23:41	5/4/2022 15:41	59.1195	-148.778	150	iReister1	

444	CTD911	recover	GAK6	53	5/5/2022 0:17	5/4/2022 16:17	59.12466	-148.785	150	iReister1	
445	IronFish	deploy	GAK07		5/5/2022 1:24	5/4/2022 17:24	58.98168	-148.636		aAguilarIslas1	
446	IronFish	recover	GAK07		5/5/2022 1:41	5/4/2022 17:41	58.97177	-148.629		aAguilarIslas1	
447	CTD911	deploy	GAK7	54	5/5/2022 1:51	5/4/2022 17:51	58.97311	-148.632	240	pShipton1	
448	CTD911	recover	GAK5	54	5/5/2022 2:26	5/4/2022 18:26	58.97614	-148.638	241	pShipton1	
449	CalVet net	deploy	GAK07	34	5/5/2022 2:29	5/4/2022 18:29	58.97643	-148.638	241	rHopcroft1	
450	CalVet net	recover	GAK07	34	5/5/2022 2:35	5/4/2022 18:35	58.97705	-148.64	241	rHopcroft1	
451	TM CTD	deploy	GAK07	15	5/5/2022 3:09	5/4/2022 19:09	58.97253	-148.629		aAguilarIslas1	
452	TM CTD	recover	GAK07	15	5/5/2022 3:42	5/4/2022 19:42	58.97878	-148.63		aAguilarIslas1	
453	multinet	deploy	GAK5	12	5/5/2022 6:08	5/4/2022 22:08	59.25727	-148.924	173	cSmoot1	
454	multinet	maxDepth	GAK5	12	5/5/2022 6:16	5/4/2022 22:16	59.25943	-148.916	169	cSmoot1	
455	multinet	recover	GAK5	12	5/5/2022 6:43	5/4/2022 22:43	59.26641	-148.89	168	cSmoot1	
456	multinet	deploy	GAK5	13	5/5/2022 6:59	5/4/2022 22:59	59.26568	-148.893	164	cSmoot1	molecular
457	multinet	maxDepth	GAK5	13	5/5/2022 7:07	5/4/2022 23:07	59.26375	-148.901	164	cSmoot1	
458	multinet	recover	GAK5	13	5/5/2022 7:33	5/4/2022 23:33	59.25704	-148.927	166	cSmoot1	
459	multinet	deploy	GAK6	14	5/5/2022 8:41	5/5/2022 0:41	59.11217	-148.791	146	cSmoot1	
460	multinet	maxDepth	GAK6	14	5/5/2022 8:46	5/5/2022 0:46	59.11337	-148.788	146	cSmoot1	
461	multinet	recover	GAK6	14	5/5/2022 9:10	5/5/2022 1:10	59.11724	-148.769	146	cSmoot1	
462	multinet	deploy	GAK7	15	5/5/2022 10:13	5/5/2022 2:13	58.96837	-148.653	248	cSmoot1	
463	multinet	maxDepth	GAK7	15	5/5/2022 10:21	5/5/2022 2:21	58.96976	-148.649	248	cSmoot1	
464	multinet	recover	GAK7	15	5/5/2022 10:45	5/5/2022 2:45	58.97283	-148.637	245	cSmoot1	
465	multinet	deploy	GAK8	16	5/5/2022 11:57	5/5/2022 3:57	58.80368	-148.502	291	cSmoot1	
466	multinet	abort	GAK8	16	5/5/2022 12:05	5/5/2022 4:05	58.80632	-148.497	291	cSmoot1	FLOWMETER ERROR
467	multinet	deploy	GAK8	16	5/5/2022 12:15	5/5/2022 4:15	58.80717	-148.499	291	cSmoot1	
468	multinet	maxDepth	GAK8	16	5/5/2022 12:24	5/5/2022 4:24	58.80896	-148.492	298	cSmoot1	
469	multinet	recover	GAK8	16	5/5/2022 12:50	5/5/2022 4:50	58.81248	-148.467	291	cSmoot1	
470	CalVet net	deploy	GAK08	35	5/5/2022 15:55	5/5/2022 7:55	58.80809	-148.49	290	rHopcroft1	
471	CalVet net	recover	GAK08	35	5/5/2022 16:01	5/5/2022 8:01	58.80867	-148.49	290	rHopcroft1	
472	CTD911	deploy	GAK8	54	5/5/2022 16:06	5/5/2022 8:06	58.809	-148.49	290	iReister1	
473	CTD911	recover	GAK8	54	5/5/2022 16:52	5/5/2022 8:52	58.81258	-148.484	290	iReister1	
474	IronFish	deploy	GAK09		5/5/2022 17:53	5/5/2022 9:53	58.6745	-148.366		aAguilarIslas1	
475	IronFish	recover	GAK09		5/5/2022 18:10	5/5/2022 10:10	58.68254	-148.343		aAguilarIslas1	
476	multinet	deploy	GAK9	6	5/5/2022 18:24	5/5/2022 10:24	58.68027	-148.353	276	rHopcroft1	150 vert
477	multinet	recover	GAK9	6	5/5/2022 18:44	5/5/2022 10:44	58.68041	-148.353	276	rHopcroft1	

478	CTD911	deploy	GAK9	56	5/5/2022 18:50	5/5/2022 10:50	58.68067	-148.353	276	iReister1	PROD
480	CTD911	recover	GAK9	56	5/5/2022 19:33	5/5/2022 11:33	58.6814	-148.354	276	iReister1	PROD
481	TM CTD	deploy	GAK09	TM16	5/5/2022 19:43	5/5/2022 11:43	58.68206	-148.354		aAguilarIslas1	
482	TM CTD	recover	GAK09	TM16	5/5/2022 20:16	5/5/2022 12:16	58.68167	-148.354		aAguilarIslas1	
483	CalVet net	deploy	GAK09	36	5/5/2022 20:24	5/5/2022 12:24	58.68132	-148.354	276	rHopcroft1	
484	CalVet net	recover	GAK09	36	5/5/2022 20:30	5/5/2022 12:30	58.68106	-148.353	276	rHopcroft1	
485	CalVet net	deploy	GAK09	36A	5/5/2022 20:42	5/5/2022 12:42	58.68062	-148.353	276	rHopcroft1	live
486	CalVet net	recover	GAK09	36A	5/5/2022 20:48	5/5/2022 12:48	58.68036	-148.353	276	rHopcroft1	
487	CTD911	deploy	GAK9	57	5/5/2022 20:49	5/5/2022 12:49	58.68031	-148.353	276	iReister1	
488	CTD911	recover	GAK9	57	5/5/2022 21:40	5/5/2022 13:40	58.6803	-148.353	276	iReister1	
489	TM CTD	deploy	GAK09	TM17	5/5/2022 21:44	5/5/2022 13:44	58.6803	-148.353		aAguilarIslas1	2nd cast at GAK9 - bottles misfired at wrong depths on cast 1
490	TM CTD	recover	GAK09	TM17	5/5/2022 22:12	5/5/2022 14:12	58.68031	-148.353		aAguilarIslas1	
492	CalVet net	deploy	GAK10	37	5/5/2022 23:38	5/5/2022 15:38	58.53938	-148.213	1456	rHopcroft1	
493	CalVet net	recover	GAK10	37	5/5/2022 23:44	5/5/2022 15:44	58.53826	-148.216	1456	rHopcroft1	
494	CTD911	deploy	GAK10	58	5/6/2022 0:01	5/5/2022 16:01	58.54238	-148.203	1491	iReister1	
495	CTD911	other	GAK10	58	5/6/2022 0:52	5/5/2022 16:52	58.54081	-148.211	1491	iReister1	Seasavecrashed
496	CTD911	recover	GAK10	58	5/6/2022 1:36	5/5/2022 17:36	58.5113	-148.184	1491	iReister1	
497	CalVet net	deploy	GAK11	38	5/6/2022 2:29	5/5/2022 18:29	58.38882	-148.074	1410	rHopcroft1	
498	CalVet net	recover	GAK11	38	5/6/2022 2:35	5/5/2022 18:35	58.38871	-148.076	1410	rHopcroft1	
499	CTD911	deploy	GAK11	59	5/6/2022 2:41	5/5/2022 18:41	58.38874	-148.078	1408	pShipton1	
501	CTD911	recover	GAK11	59	5/6/2022 3:43	5/5/2022 19:43	58.38346	-148.086	1406	pShipton1	
502	CalVet net	deploy	GAK12	39	5/6/2022 4:49	5/5/2022 20:49	58.24332	-147.935	2163	rHopcroft1	
503	CalVet net	recover	GAK12	39	5/6/2022 4:55	5/5/2022 20:55	58.24334	-147.935	2163	rHopcroft1	
504	CTD911	deploy	GAK12	60	5/6/2022 5:02	5/5/2022 21:02	58.24334	-147.935	2162	pShipton1	
505	CTD911	recover	GAk12	60	5/6/2022 6:05	5/5/2022 22:05	58.24333	-147.935	2162	pShipton1	
506	Sediment Trap	deploy	GAK12		5/6/2022 6:29	5/5/2022 22:29	58.24583	-147.928		tKelly1	
507	multinet	deploy	GAK12	17	5/6/2022 6:55	5/5/2022 22:55	58.23962	-147.952	2171	cSmoot1	
508	multinet	maxDepth	GAK12	17	5/6/2022 7:06	5/5/2022 23:06	58.24237	-147.94	2112	cSmoot1	
509	multinet	recover	GAK12	17	5/6/2022 7:35	5/5/2022 23:35	58.25183	-147.91	2112	cSmoot1	
511	multinet	deploy	GAK11	18	5/6/2022 8:40	5/6/2022 0:40	58.38261	-148.086	1403	cSmoot1	
512	multinet	maxDepth	GAK11	18	5/6/2022 8:51	5/6/2022 0:51	58.38598	-148.077	1407	cSmoot1	
513	multinet	recover	GAK11	18	5/6/2022 9:24	5/6/2022 1:24	58.39535	-148.053	1407	cSmoot1	
514	multinet	deploy	GAK10	19	5/6/2022 10:26	5/6/2022 2:26	58.53082	-148.214	1480	cSmoot1	
515	multinet	maxDepth	GAK10	19	5/6/2022 10:34	5/6/2022 2:34	58.53345	-148.214	1478	cSmoot1	

516	multinet	recover	GAK10	19	5/6/2022 11:00	5/6/2022 3:00	58.54325	-148.211	1499	cSmoot1	
517	multinet	deploy	GAK9	20	5/6/2022 11:56	5/6/2022 3:56	58.6724	-148.35	277	cSmoot1	
518	multinet	maxDepth	GAK9	20	5/6/2022 12:05	5/6/2022 4:05	58.67769	-148.351	277	cSmoot1	
520	multinet	recover	GAK9	20	5/6/2022 12:32	5/6/2022 4:32	58.69168	-148.348	282	cSmoot1	
521	multinet	deploy	GAK9	21	5/6/2022 12:44	5/6/2022 4:44	58.69106	-148.351	283	cSmoot1	molecular
522	multinet	maxDepth	GAK9	21	5/6/2022 12:54	5/6/2022 4:54	58.68611	-148.352	281	cSmoot1	
523	multinet	recover	GAK9	21	5/6/2022 13:20	5/6/2022 5:20	58.67328	-148.348	283	cSmoot1	
525	IronFish	recover	GAK13		5/6/2022 17:01	5/6/2022 9:01	58.09536	-147.793		aAguilarIslas1	
526	CTD911	deploy	GAK13	61	5/6/2022 17:05	5/6/2022 9:05	58.09537	-147.793	2068	iReister1	
528	CTD911	recover	GAK13	61	5/6/2022 17:44	5/6/2022 9:44	58.09679	-147.793	2068	iReister1	
529	CalVet net	deploy	GAK13	40	5/6/2022 17:48	5/6/2022 9:48	58.09693	-147.794	2063	rHopcroft1	
530	CalVet net	recover	GAK13	40	5/6/2022 18:06	5/6/2022 10:06	58.09771	-147.795	2063	rHopcroft1	
531	CalVet net	deploy	GAK13	40A	5/6/2022 18:07	5/6/2022 10:07	58.09773	-147.795	2063	rHopcroft1	
532	CalVet net	recover	GAK13	40A	5/6/2022 18:12	5/6/2022 10:12	58.09797	-147.795	2063	rHopcroft1	live
533	TM CTD	deploy	GAK13	TM18	5/6/2022 18:30	5/6/2022 10:30	58.09914	-147.795		aAguilarIslas1	
534	TM CTD	recover	GAK13	TM18	5/6/2022 19:33	5/6/2022 11:33	58.1002	-147.795		aAguilarIslas1	
535	CTD911	deploy	GAK13	62	5/6/2022 19:41	5/6/2022 11:41	58.1003	-147.795	2062	pShipton1	
536	CTD911	recover	GAK13	62	5/6/2022 20:51	5/6/2022 12:51	58.10029	-147.795	2062	pShipton1	
537	CalVet net	deploy	GAK14	41	5/6/2022 22:10	5/6/2022 14:10	57.94431	-147.651	3040	rHopcroft1	
538	CalVet net	recover	GAK14	41	5/6/2022 22:16	5/6/2022 14:16	57.945	-147.654	3040	rHopcroft1	
539	CTD911	deploy	GAK14	63	5/6/2022 22:19	5/6/2022 14:19	57.94523	-147.655	3006	iReister1	
540	CTD911	recover	GAK14	63	5/6/2022 23:00	5/6/2022 15:00	57.94667	-147.657	3006	iReister1	Seasave crashed at 500m on upcast
541	CTD911	deploy	GAK14	063A	5/6/2022 23:02	5/6/2022 15:02	57.9467	-147.657	2963	pShipton1	restart of 063 upcast to complete bottle firing
542	CTD911	recover	GAK14	063A	5/6/2022 23:38	5/6/2022 15:38	57.94813	-147.657	2927	pShipton1	end of 063 and 063A cast
543	IronFish	deploy	GAK15		5/7/2022 0:48	5/6/2022 16:48	57.7952	-147.508		aAguilarIslas1	
544	IronFish	recover	GAK15		5/7/2022 1:00	5/6/2022 17:00	57.79038	-147.496		aAguilarIslas1	
545	CalVet net	deploy	GAK15	42A	5/7/2022 1:05	5/6/2022 17:05	57.79035	-147.496	4607	rHopcroft1	live
546	CalVet net	recover	GAK15	42A	5/7/2022 1:11	5/6/2022 17:11	57.79033	-147.499	4607	rHopcroft1	
547	CalVet net	deploy	GAK15	42	5/7/2022 1:25	5/6/2022 17:25	57.79063	-147.503	4607	rHopcroft1	NOT LIVE
548	CalVet net	recover	GAK15	42	5/7/2022 1:31	5/6/2022 17:31	57.79073	-147.504	4607	rHopcroft1	
549	CTD911	deploy	GAK15	64	5/7/2022 1:38	5/6/2022 17:38	57.79077	-147.505	4433	pShipton1	
550	CTD911	recover	GAK15	64	5/7/2022 2:43	5/6/2022 18:43	57.79055	-147.513	4211	pShipton1	
551	TM CTD	deploy	GAK15	TM19	5/7/2022 3:04	5/6/2022 19:04	57.79324	-147.503		aAguilarIslas1	
552	TM CTD	recover	GAK15	TM19	5/7/2022 4:03	5/6/2022 20:03	57.79716	-147.519		aAguilarIslas1	

553	multinet	deploy	GAK15	7S	5/7/2022 4:23	5/6/2022 20:23	57.79261	-147.501	4516	cSmoot1	VERTICAL 150
554	multinet	recover	GAK15	7S	5/7/2022 4:38	5/6/2022 20:38	57.79434	-147.508	4516	cSmoot1	
555	multinet	deploy	GAK15	7D	5/7/2022 4:56	5/6/2022 20:56	57.79591	-147.512	4116	cSmoot1	
556	multinet	recover	GAK15	7D	5/7/2022 6:15	5/6/2022 22:15	57.80177	-147.53	4128	cSmoot1	
558	multinet	deploy	GAK15	22	5/7/2022 6:51	5/6/2022 22:51	57.79577	-147.515	4099	cSmoot1	
559	multinet	maxDepth	GAK15	22	5/7/2022 7:01	5/6/2022 23:01	57.79442	-147.51	4112	cSmoot1	
560	multinet	recover	GAK15	22	5/7/2022 7:28	5/6/2022 23:28	57.78953	-147.491	4112	cSmoot1	
561	multinet	deploy	GAK15	23	5/7/2022 7:48	5/6/2022 23:48	57.79515	-147.512	4112	cSmoot1	
562	multinet	abort	GAK15	23	5/7/2022 7:58	5/6/2022 23:58	57.79456	-147.512	4112	cSmoot1	FLOWMETER ERROR NO SAMPLES
563	multinet	deploy	GAK14	24	5/7/2022 8:52	5/7/2022 0:52	57.93611	-147.644	3361	cSmoot1	
564	multinet	maxDepth	GAK14	24	5/7/2022 9:05	5/7/2022 1:05	57.94589	-147.653	3238	cSmoot1	
565	multinet	recover	GAK14	24	5/7/2022 9:38	5/7/2022 1:38	57.97153	-147.675	2783	cSmoot1	
566	multinet	deploy	GAK13	25	5/7/2022 10:24	5/7/2022 2:24	58.0901	-147.787	2069	cSmoot1	
567	multinet	deploy	GAK13	25	5/7/2022 10:34	5/7/2022 2:34	58.09539	-147.791	2071	cSmoot1	
568	multinet	recover	GAK13	25	5/7/2022 11:02	5/7/2022 3:02	58.10932	-147.805	2067	cSmoot1	
569	Sediment Trap	recover			5/7/2022 12:00	5/7/2022 4:00	58.19696	-147.82		tKelly1	Grapple gun 0; Harry 1