NGA-LTER

Northern Gulf of Alaska Long-Term Ecological Research

Cruise Report June/July 2021

Cruise ID: SKQ2021-10S

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 fourth 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 24th year and 10th summer cruise for the Seward Line in the NGA, including Prince William Sound (PWS), and the 50th year of observations at GAK1.

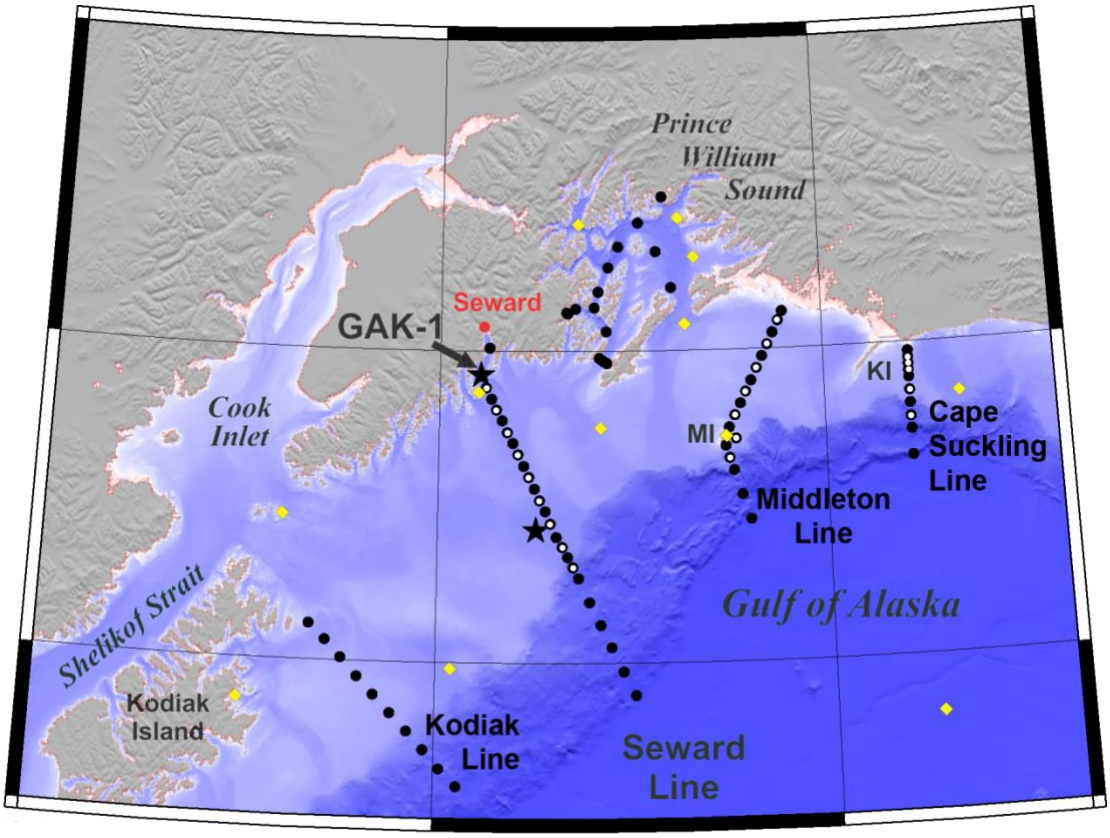


Figure 1. The LTER sampling stations. CTD casts without water sampling as open symbols. Yellow diamonds represent locations of meteorological data from NOAA buoys or ground stations. Star shows position of LTER mooring. Cape Suckling is low priority.

Scientific Personnel:

1	Russ Hopcroft (LTER Lead PI)	Zooplankton (days), UAF, Chief Scientist
2	Caitlin Smoot	Zooplankton, UAF, Night Watch Lead Scientist
3	Pete Shipton	Physics (Moorings/CTD), UAF
4	Ana Aguilar-Islas	Chemistry (Nutrients, Iron), UAF
5	Emily Ortega	Chemistry (Nutrients, Iron), UAF
6	Kerri Fredrickson	Phytoplankton/Microzooplankton, WWU
7	Megan O'Hare	Phytoplankton/Microzooplankton, WWU
8	Annie Kandel	Phytoplankton/Microzooplankton, UAF-WWU
9	Tom Kelly	Flux/Sediment Traps, UAF
10	Ben Lowin	Plankton/Optics, Gases, UAF
11	Delaney Coleman	Zooplankton (nights), UAF
12	Emily Stidham	Zooplankton (nights), UAF
13	Bette Smith	Zooplankton (nights), UAF
14	Dan Cushing	Seabirds/Mammals, US Fish & Wildlife Service
15	Jake Cohen	Phytoplankton/Genetics, UAF
16	Megan Brauner	Phytoplankton/Genetics, UAF
17	Michele Hoffman-Trotter	Media, Microcosm Film
18	Alex Rose	Media, Microcosm Film
19	Alex Promnitz	Chemistry (Nutrients, Iron), UAF
20	Feyne Elmore	Undergraduate, (independent study) UAF
21	Charles Cousin (1st 2 days only)	Bellamare LLC – ISIIS/DPI
22	Cedric Guigand (1st 2 days only)	Bellamare LLC – ISIIS/DPI
23	Seth Danielson (1st 2 days only)	Physics (Moorings/CTD), UAF
24	Jennifer Questel (1st 2 days only)	Zooplankton, UAF

SKQ2021-10S was conducted during the time of the COVID19 global pandemic. Mitigation measures were taken to reduce the risk of disease transmission following UNOLS' recommendations.

Cruise Overview:

ISIIS-DPI sea Trials: This cruise began the first day an half conducting sea-trials of the new ISIIS-DPI towed imaging system. Multiple deployments were made inside Resurrection Bay, then the training team discharged before beginning a transect of the entire Seward Line. An additional deployment also occurred along the inner section of the Middleton Line.

Station Transects: Most of the cruise was dedicated to transect station work, split as roughly 3 days on the Kodiak Line, 3 on the Middleton Island Line, 2 in Prince William Sound, and 5 on the Seward line. As per standard design while occupying our transect lines, operations were generally divided into distinct day and night tasks, thus requiring each station to be occupied twice. This structure requires some back-tracking but avoids each discipline needing to supply 2 shifts of scientists and ensures all organisms – especially larger diel-migrating zooplankton – are captured with minimal time-of-day bias. During each morning we typically occupied an established "intensive" station for experimental work. Intensive stations involve a greater number and range of collections than other stations occupied that day. Stations profiles were supplemented by underway measurements. The Fe-Fish was not deployed in between stations, instead it was used to collect surface samples while arriving to/departing from a station, affording time for more trace-metal casts. Bird and mammal observations were conducted continuously during daylight hours while the ship was underway.

Sediment Traps: This cruise involved the deployment of drifting sediment traps with subsequent-day recovery, on the Kodiak, Seward, and Middleton lines. The reoccupation of stations as characteristic of our normal sampling design greatly facilitated the integration of sediment traps into the cruise logistics.

Moorings: This cruise recovered the Gulf of Alaska Ecosystem Observatory (GEO) mooring GEO2 and redeployed GEO2 and GEO3.

Media: We were accompanied this cruise by 2 media specialist who collected video footage to be use for this summer's NGA site review by NSF as well as for future E&O content and activities.

Daily summary

June 24 – Most of science party arrived and stayed on Sikuliaq overnight. Media team and zooplankton team have arrived even earlier to prep for cruise.

June 25 – Mobilization begins at 8am with positioning of larger gear. Most gear was loaded and largely setup by end of day. The Trace Metal lab bubble was already setup from the prior cruise, resulting in significant time saving. A trip to Anchorage was required to pick up a camera frame for the mooring and a Bellamare team member.

June 26 – Mob Day 2. Setup is largely completed by midday. First in water test of ISIIS-DPI is completed without issues.

June 27 – Day 1 – Sikuliaq was underway at ~07:30. The ISIIS-DPI first deployment occurs at 08:20 and recovered at ~11:00 after completing several test undulations. While making adjustments to it, a large benthic camera tripod was deployed in Sunny Cover at ~11:50 for testing. The ISIIS-DPI was redeployed at ~14:15 for additional testing and recovered after 2 hrs for further hardware and software adjustments. During that time we completed two Calvet and a CTD at Res2.5 (~16:40-18:30) as well as GAK1 (20:00-21:00). The conductivity cell on the 9/11 CTD was changed overnight due to a large offset between the two cells.

June 28 – Day 2 – The ISIIS-DPI was deployed at ~noon and recovered shortly thereafter due to a camera issue, after removing the camera it was redeployed for final testing at 18:20-19:20. Cousin, Guigand, Questel and Danielson were transferred to *Nanuq* via the *Sikuliaq*'s FRB, with Elmore embarking. The ISIIS-DPI was then redeployed near GAK1 at 20:20 and we headed south toward the GEO mooring at 5 knots with vehicle depth being controlled by paying wire in and out because the vehicle lacked adequate lift and flight control surfaces.

June 29 – Day 3 – The ISIIS-DPI was pulled near GAK6i at ~08:30. A calibration CTD cast was conducted near GEO ~9:30, then mooring recovery and deployments proceeded from 11:00-19:00 with a trace metal CTD inserted at ~13:00 (for collecting water to be used in experiments). The ISIIS-DPI was redeployed near GAK6i at ~20:30 and we headed toward GAK15.

June 30 – Day 4 – The DPI was recovered early in the vicinity of GAK13 at ~9:00 due to issues with the winch's level-wind. Recovery corresponded with an unexpected engine malfunction and power loss by Sikuliaq, but the DPI was still recovered without incident. We remained on station several hours while the situation was assessed before getting underway. The formal daywork began with a deployment of a drifting sediment trap near Intensive Station GAK15 at

~13:00 followed by the Production CTD at 14:00 (to 600m to collect LISST data). Two Calvets, the TM CTD rosette, the regular CTD cast, and a pair of deep and shallow tandem vertical multinet were ultimately completed by 22:15. A short deployment of the iron-fish occurred before Methot nets began at nearly midnight. Methots and towed Multinets were run heading north that ended at GAK13 at ~600, with a Multinet repeated for genetics at GAK15 from 8:00 to 8:30 (A second towed Multinet for genetic sampling occurred at all intensive stations).

July 1 – Day 5 – Daywork began at 09:30 with recovery of the floating Sediment trap at GAK15, then we collected Calvets and deployed CTDs beginning at GAK14 and heading north ending at GAK12 at ~21:00. An extra TM CTD was inserted while at GAK13. Nights worked Methot's and towed Multinets from GAK12 to GAK9 ending at ~07:30. A drifting sediment trap was deployed at ~05:00 prior to starting nets at this final station.

July 2 – Day 6 – The day began with Intensive station GAK9 at ~8:00 with the regular CTD, followed by the vertical Multinet, the iron-fish, two Calvets, the TM CTD rosette, and the production CTD cast, ending that station at ~16:00. We headed south to conduct Calvets and CTDs at GAK10 and 11, followed by a TM CTD at GAK11 that ended at 20:00. We headed back north recovering the Drifting trap near GAK9 at 23:00, then began night work at GAK8 near midnight working Methots and towed Multinets northward to GAK5 with the second cast ending there at 08:15.

July 3 – Day 7 – Daywork at Intensive station GAK5 began with the iron-fish at ~08:30, followed by a production cast, two Calvets, a TM CTD rosette, the vertical Multinet, the regular CTD and a drifting trap, all ending by ~12:15. We worked southward with CTDs and Calvets to GAK 8 ending at 19:00, while having inserted an extra TM CTD at GAK7. We transited to GAK4 to begin night work there at 23:00 and worked northward with Methots and towed Multinets that ended at GAK1 at 07:00

July 4 – Day 8 – We began Intensive Station GAK1 at 07:00 with the iron-fish, a vertical Multinet, the production CTD, a TM CTD, two Calvets, the standard CTD, and an additional water collection cast ending the station at ~10:40. We worked CTDs and Calvets southward ending at GAK4 at 19:30, also having conducted CTDs at all the "I" station plus an extra TM CTD at GAK3. He headed to GAK5 to recover the drifting trap at 20:30, then headed to KOD10.

July 5 – Day 9 – The day work began at Intensive Station KOD10 with the iron-fish at 08:30, followed by the production CTD, two Calvets, the TM CTD and the regular CTD, wrapping up sampling at ~14:00. We worked north with Calvets and CTDs (including an extra TM CTD at KOD8) ending at KOD7 at 22:00. Night work began at KOD7 at ~22:00 working Bongos and Methots out to KOD10, which was completed at ~04:15, and then sampled both gears at KOD6 ending at 09:00.

July 6 – Day 10 – We began day sampling with a Calvet and CTD at 09:30 for station KOD6, then moved to Intensive station KOD5, beginning with the iron-fish at ~11:00, followed by deployment of a drifting trap, the production CTD, 2 Calvets, the TM CTD and the regular CTD, ending station activities by ~13:45. We worked northward with Calvets and CTDs, including an extra TM CTD at KOD2, ending the day activities at KOD1 at 21:30. Night work began there immediately, working Bongos and Methots south to KOD5 ending at 04:45, then recovered the drifting trap at ~7:00.

July 7 – Day 11 – The day was spent transiting to the Middleton Line. Night work began at MID7 at 22:30 and worked Bongos and Methots out to MID10 until 05:00, then undertook a deep multinet (for live sorting) that ended at 07:30.

July 8 – Day 12 – The day work began at Intensive station MID10 with the iron-fish 07:30, followed by the regular CTD, two Calvets, the TM CTD, and the production CTD, all ending at ~12:15. We worked northward with Calvets and CTDs completing the CTD at MID6i at ~21:45, and including a TM CTD at MID8. Night work began at MID6 at 22:30 working Bongos and Methots northward to finish MID1 at ~07:40, including the deployment of a drifting trap near MID5 at 01:00.

July 9 – Day 13 – The day work began at 08:00 for MID1 with a CTD, then we moved to Intensive station MID2, starting with a Prod cast at 10:30, followed by two Calvets, the TM CTD and the main CTD, ending at ~13:00. We worked southward with Calvets and CTDs ending at MID 6 at 21:30. The Night team deployed the ISIIS-DPI at 22:30 near MID5i and towed it at 5 knots to ~MID1i, recovering it at ~06:00.

July 10 – Day 14 – The day work began with Transit to MID5 and recovery of the drifting trap at 08:30. Intensive Station MID5 began with the iron-fish at ~10:20, followed by the Production cast, two Calvets, the TM CTD, and the main CTD, ending at ~13:00. We headed for northern Prince William Sound, and conducted a Calvet and CTD between 20:15 and 21:30. Night work began sampling immediately, working towed Multinets and Methots to PWS1, ending at 04:20, then returned to PWS2 for daywork.

July 11 – Day 15 – The day began at Intensive Station PWS2 around 05:40 with a set of deep and shallow vertical multinets, followed by an additional deep multinet for live sorting that was completed by 08:00. We continued with the standard CTD, two Calvets, the TM CTD, the Production CTD, and the iron-fish that completed the station at ~11:40, we worked southward with Calvets and CTDs into Icy Bay, completing the last station at ~21:00. Night work began at KIP2 ~22:00, completing the final Multinets and Methot at ~2300. The four Montague Strait stations were sampled by the CTD (no water samples) between 01:45 and 04:00 on the way out of PWS.

July 12 – Day 16 – We conducted a CTD (no water collection) at GAK1 at ~10:00, retrieved the camera frame in Sunny Cove at ~XX, then conducted the final Calvet and CTD at Res2.5 at 12:30-13:30 and reached the dock at ~14:00 to conclude the cruise. Demobilization began with larger equipment, leaving the majority of palettes to offload the following morning.

July 13 – Demobilization, and staging of materials into the warehouse, continued. Vehicles were loaded and all underway for Fairbanks (or ANC) by ~13:00.

General Comment: *The entire shelf was cool compared to other recent summers, and there remained notable amounts of phytoplankton in the water. Although the ISIIS-DPI has a number of issues for Bellamare to resolve, its imaging systems worked well and yielded usable data. LISST data is absent from casts in excess of 600m because the deep-rated model was still unavailable for this cruise.*

Physics Report:

PI: Seth Danielson, Participant: Pete Shipton

On SKQ202110S we conducted 72 CTD casts for water column hydrography using a 24 place rosette with 10-liter Niskin bottles. Bottles were tripped on 57 of these 72 casts. For normal operations, bottles were made at standard depth 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, a WetLabs C-Star transmissometer, a Biospherical PAR sensor, and a Tritech altimeter. One channel was assigned to a self-logging Sequoia 200x 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 (Kodiak, Middleton and Seward lines; Figures 1 and 2) plus stations in Western Prince William Sound.

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. Other underway data collected include the ship’s operational data, meteorological data, and ocean surface data. Operational data of ship’s equipment (e.g., navigation and winch payout and tensions) were also logged. Navigation data parameters include GMT date time, latitude,

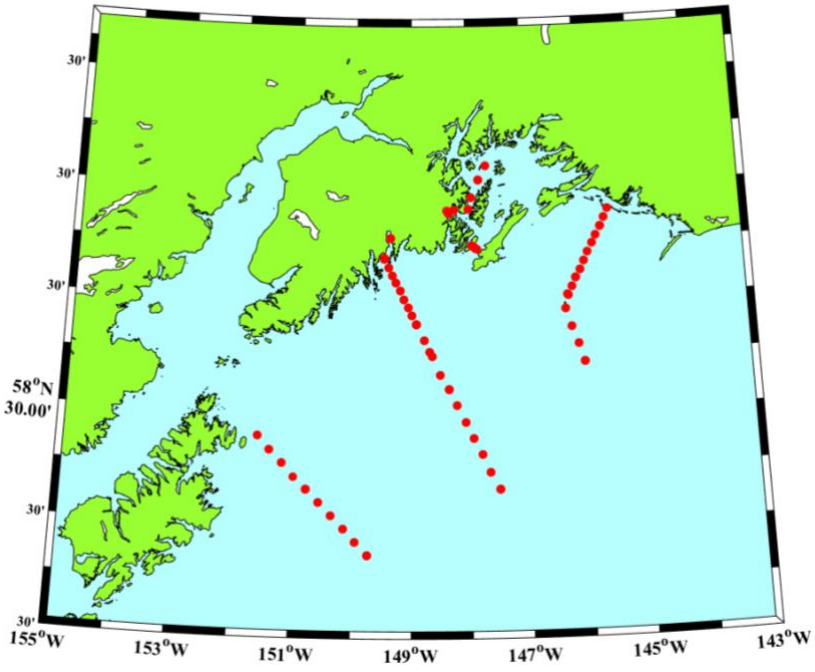


Figure 2. SKQ2021-10S CTD Stations

longitude and water depth. Atmospheric data parameters measured by the ship's underway system included atmospheric pressure, wind speed/direction, air temperature, humidity, CO_2, shortwave downwelling irradiance, longwave downwelling irradiance, and PAR. Surface seawater underway data samples included temperature, salinity, chlorophyll-a fluorescence, partial pressure of CO_2, 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.

There was a pronounced east-west gradient in SST, with temperature warmest over the inner Middleton Line, and coolest over the Albatross Bank on the Kodiak Line. A large eddy sat offshore between the Seward and Kodiak lines. Weather was fair throughout the cruise. The near-surface stratification was thermally dominated, with a pycnocline near 10-25 across most of the Seward and Middleton Line, but weak stratification over Albatross Bank. The CTD showed a subsurface chlorophyll a fluorescence maximum at most stations, and a relatively enhanced signal near the upper slope, and a stronger signal over Albatross Bank.

Unfortunately, Sikuliaq's data logging system was hung up from 7/9/2021 5:29 to 7/11/2021 3:51. The server crashed and all of the LDS sensor data was lost during that timeframe.

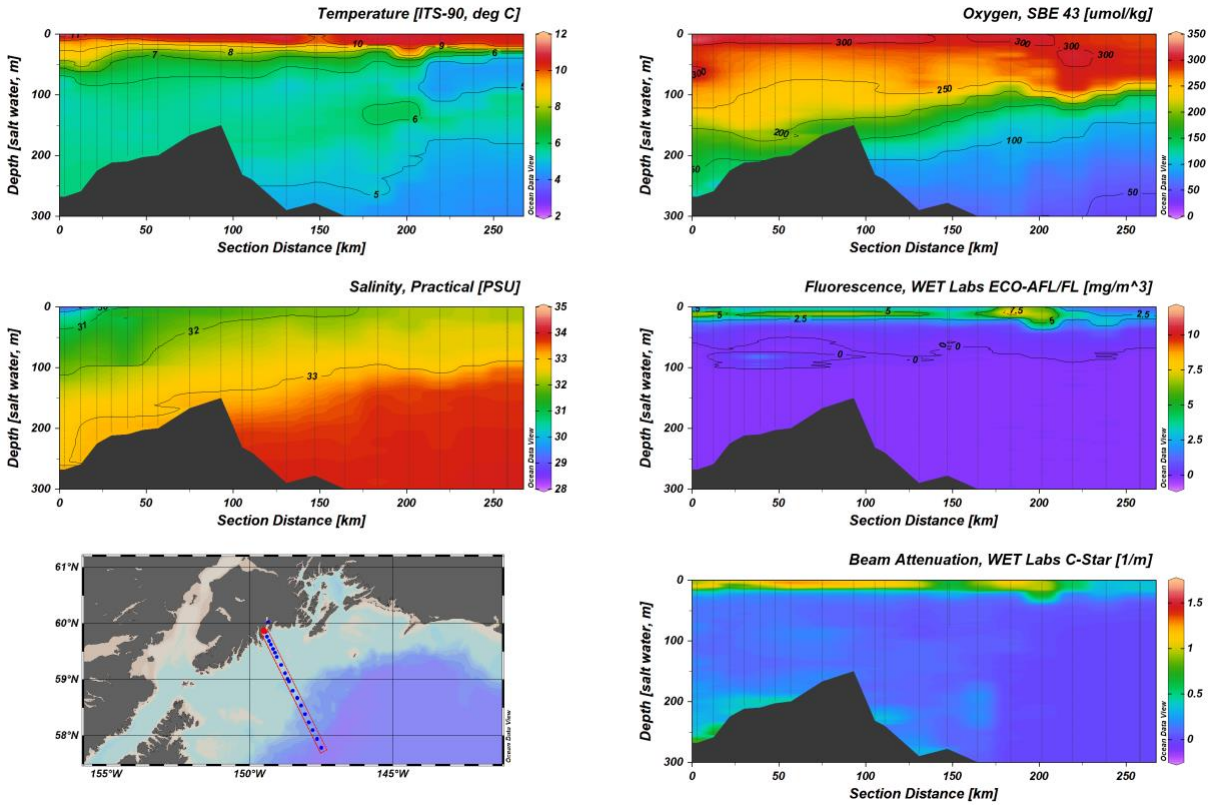


Fig. 3 Seward Line transect physical hydrography from SKQ2021-10S.

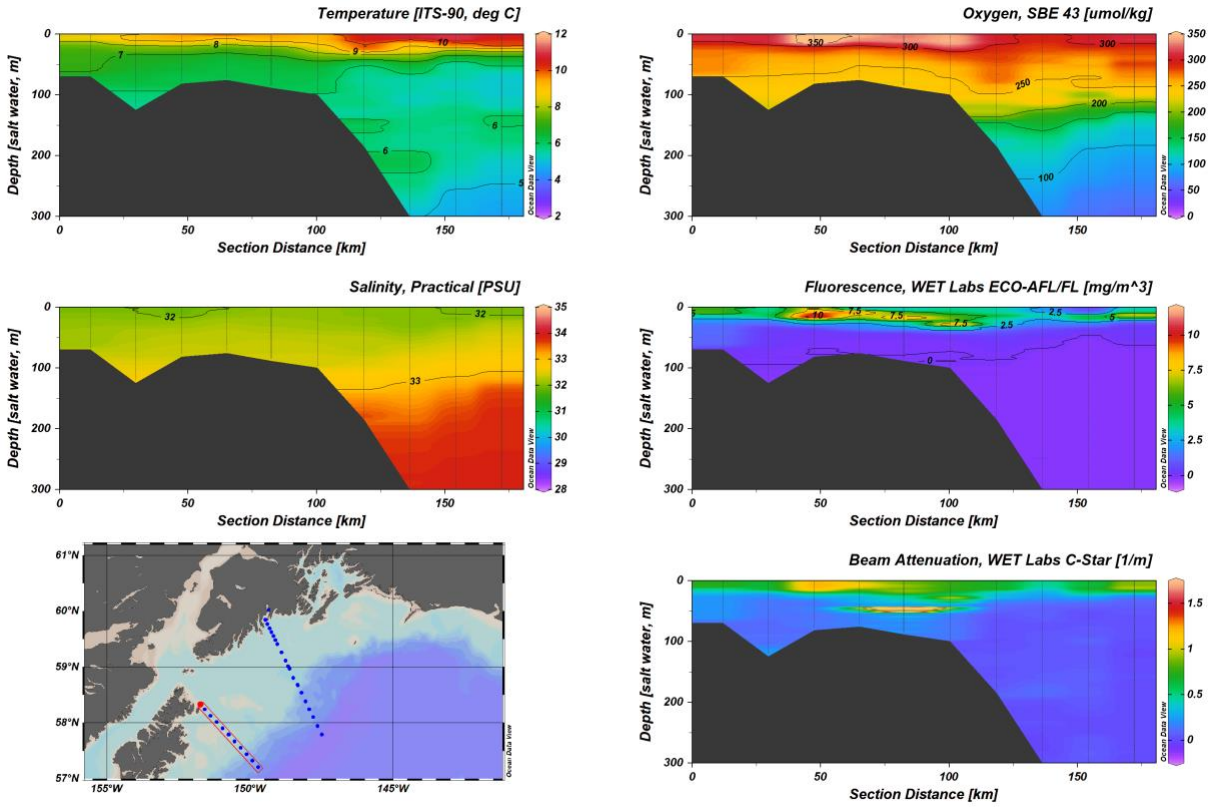


Fig. 4 Kodiak Line transect physical hydrography from SKQ2021-10S.

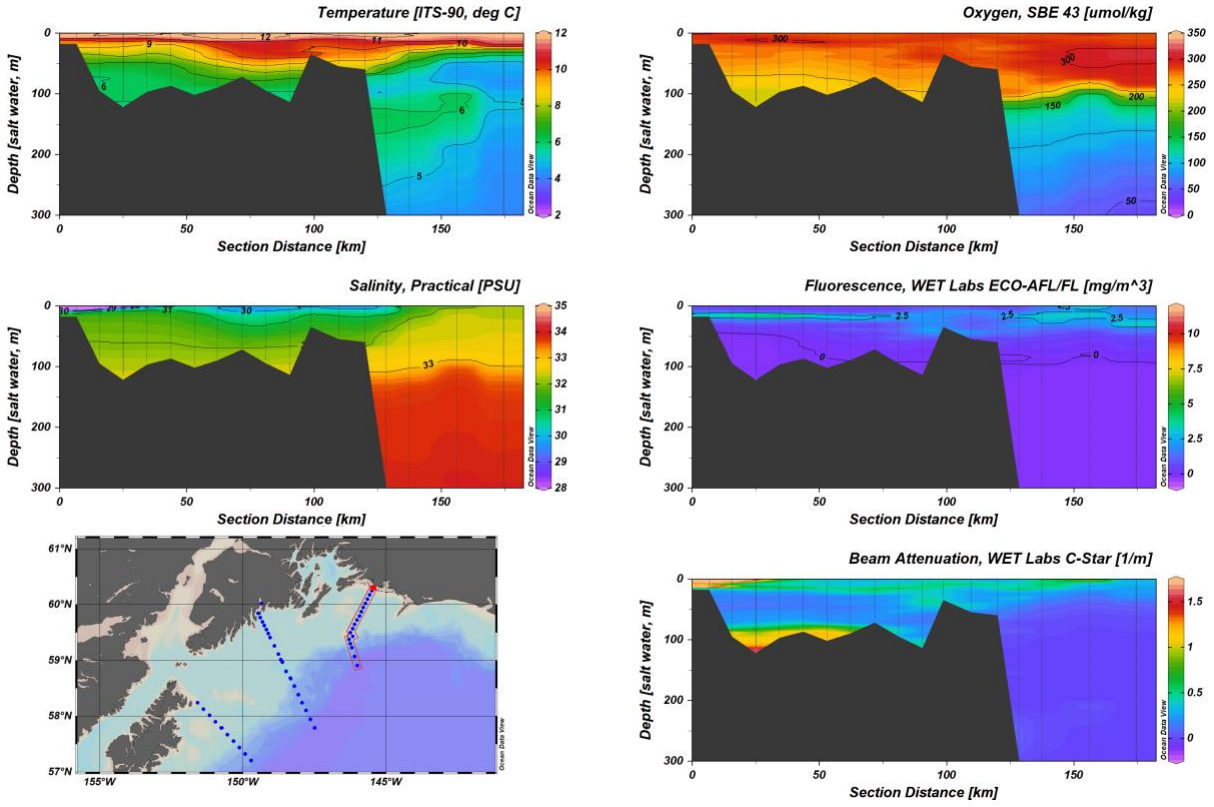
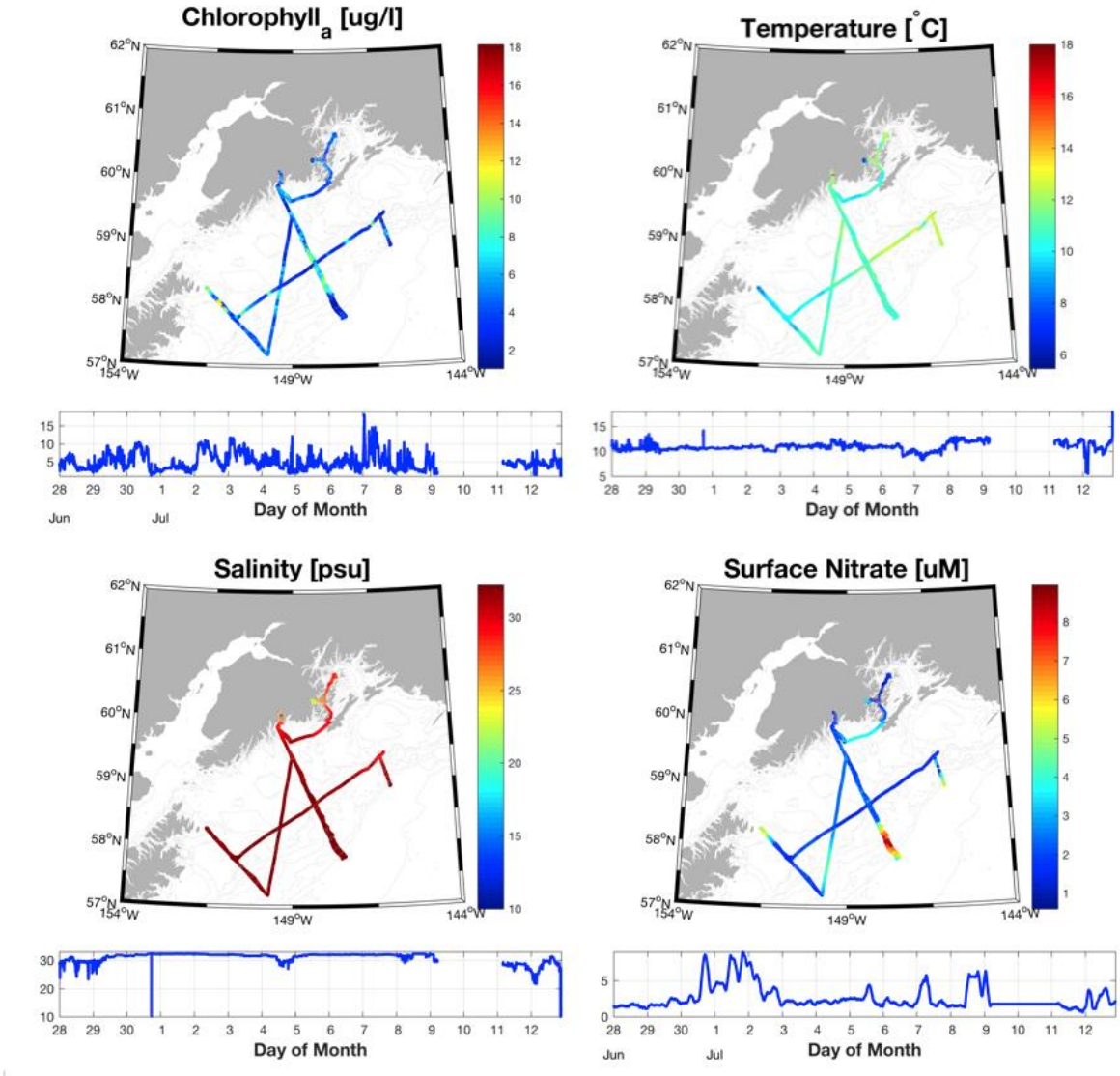
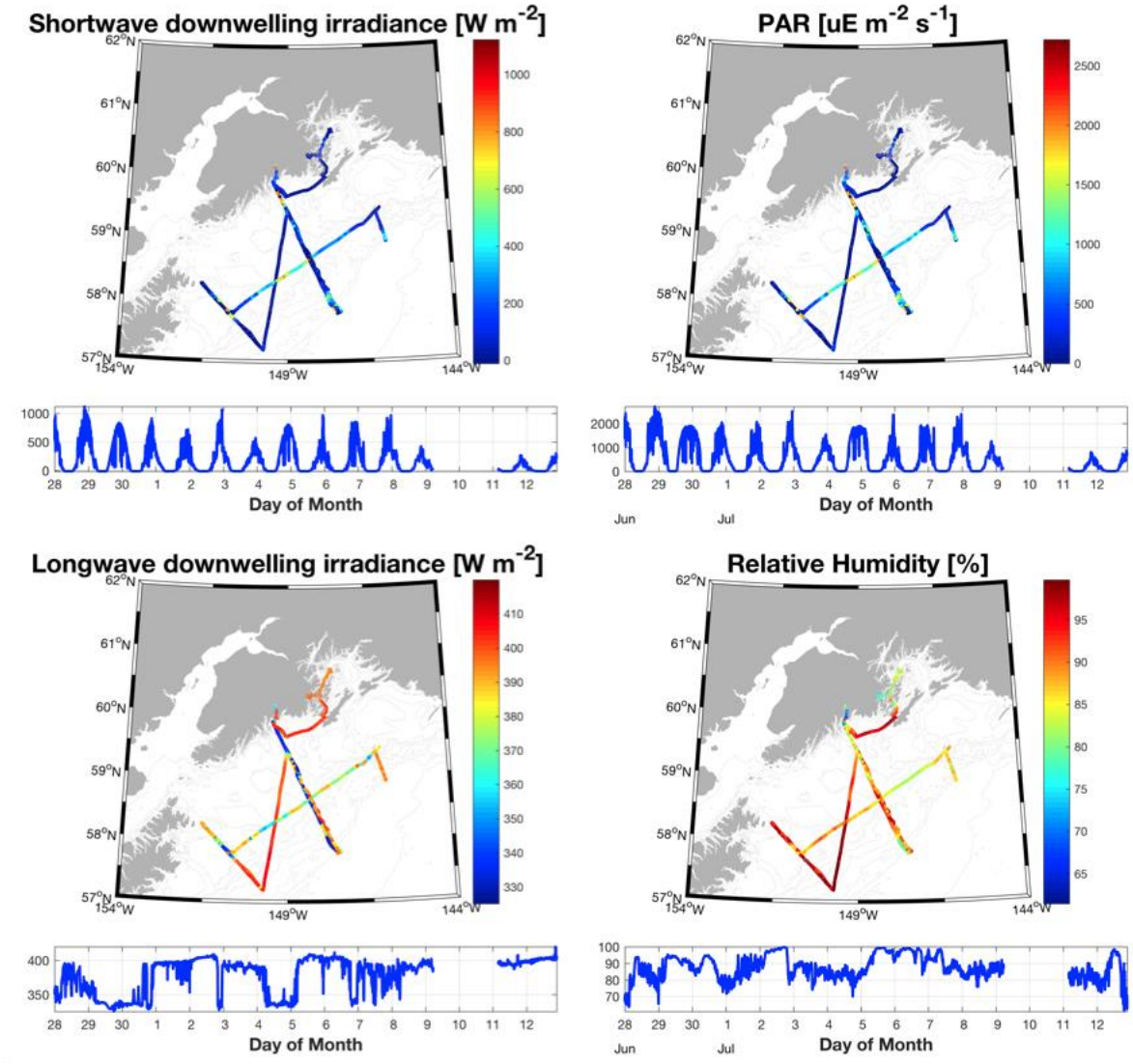


Fig. 5 Middleton Line transect physical hydrography from SKQ2021-10S.

Underway Sensor Data:




Shortwave downwelling irradiance [W m-2]
PAR [uE m-2 s-1]
Longwave downwelling irradiance [W m-2]
Relative Humidity [%]
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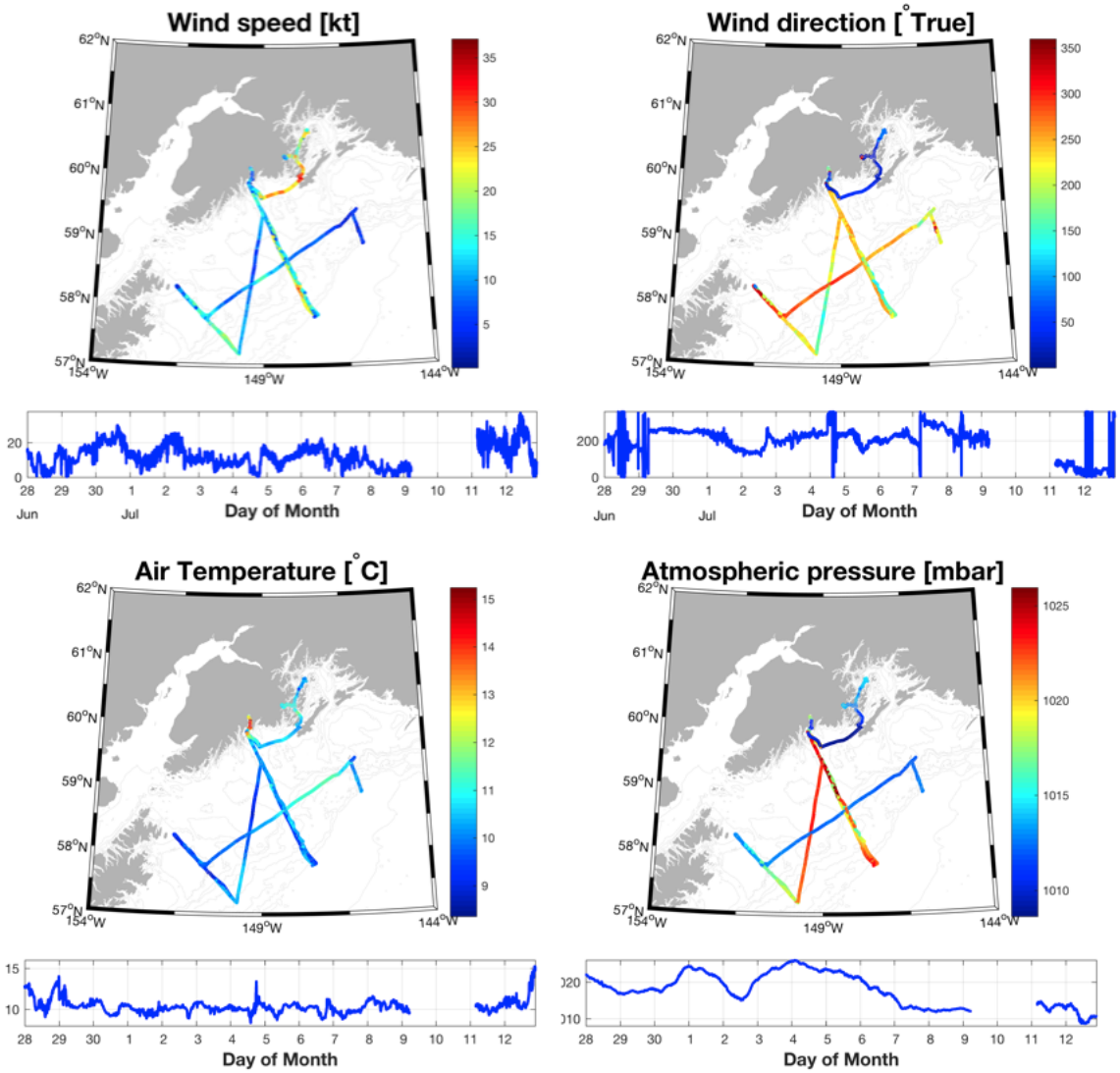
59°N
58°N
57°N
154°W
149°W
144°W
Day of Month
Jun
Jul


Wind speed [kt]
Wind direction [°True]
Air Temperature [°C]
Atmospheric pressure [mbar]
62°N
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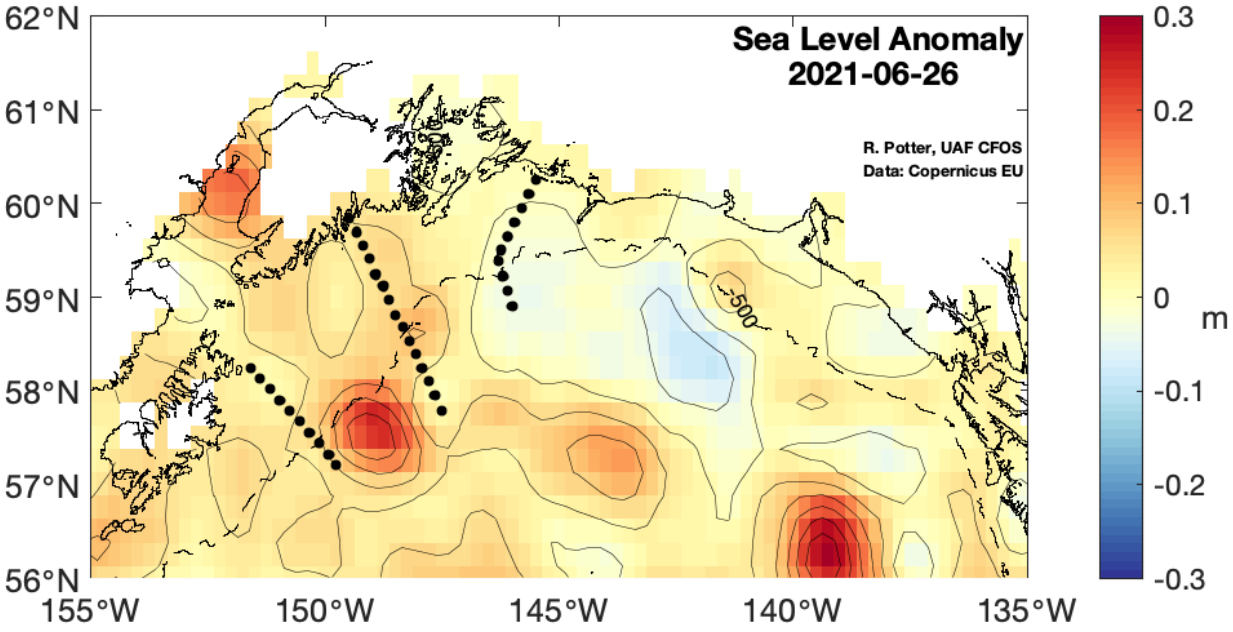
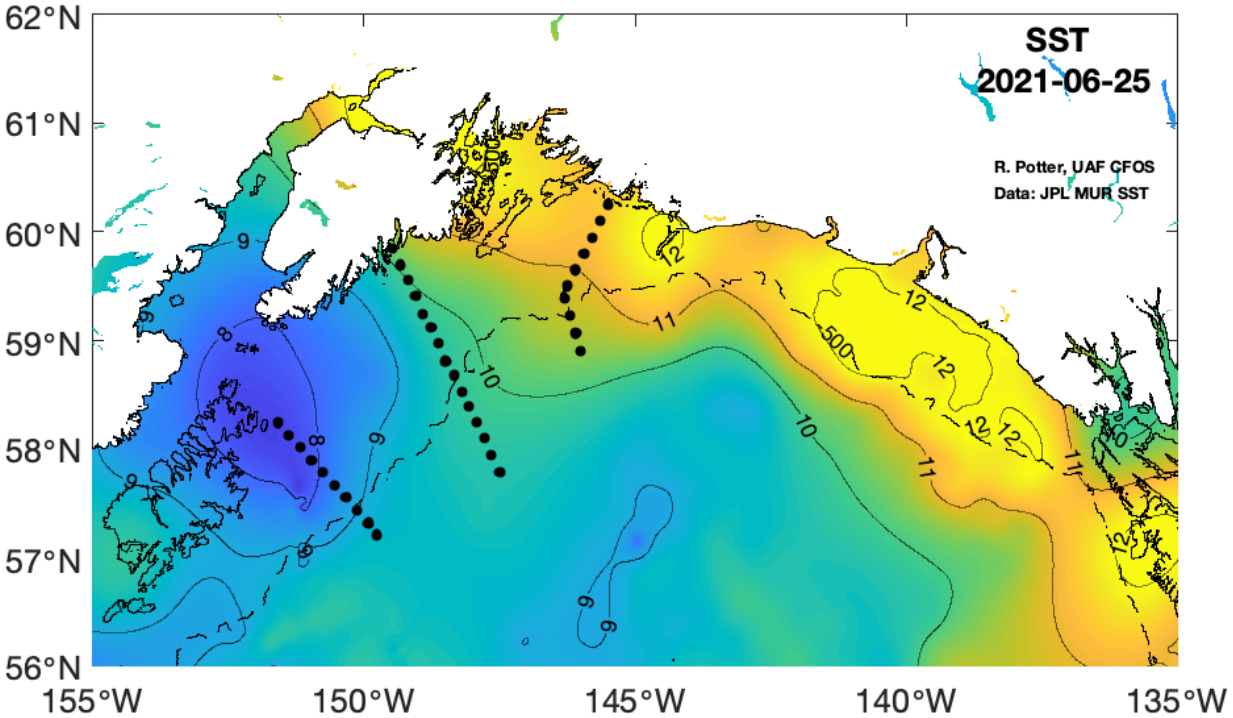
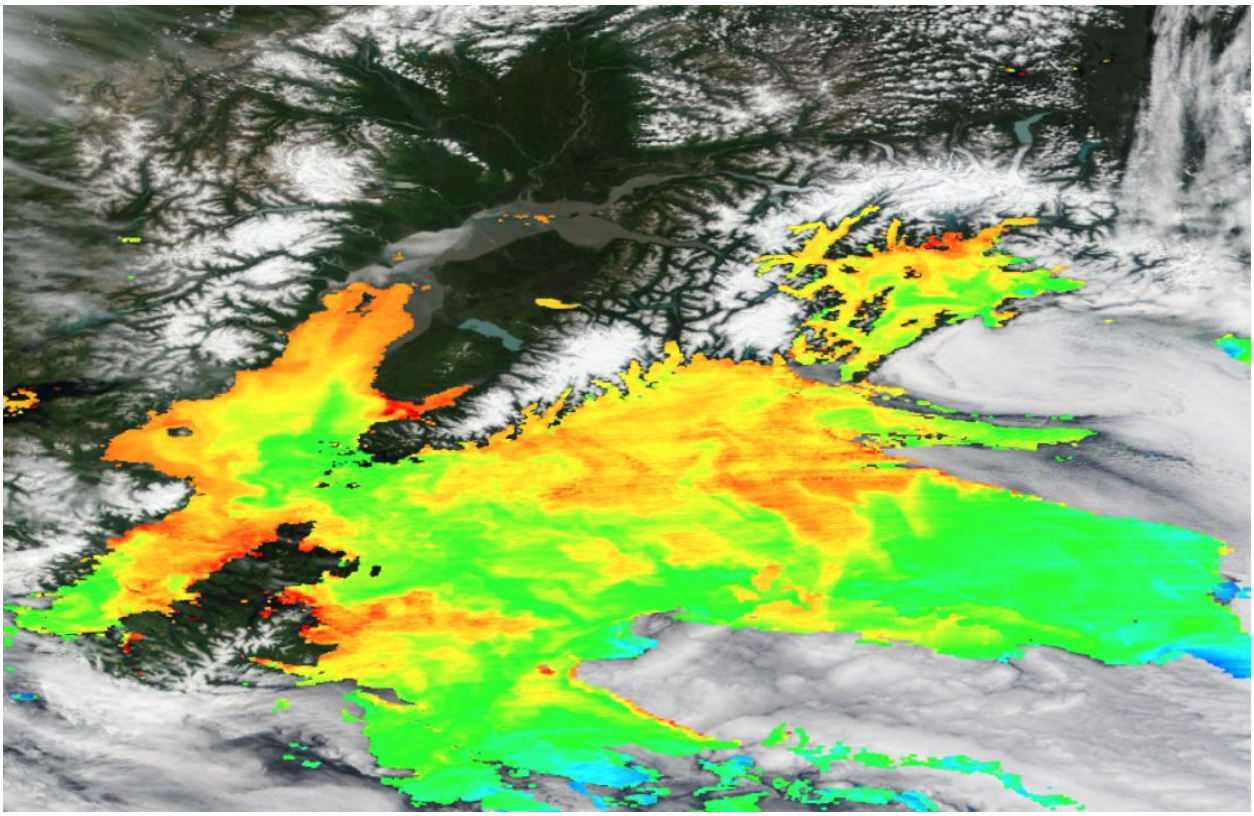
Day of Month

The View from Space:





30 June 2021: (Chlorophyll a ocean color)



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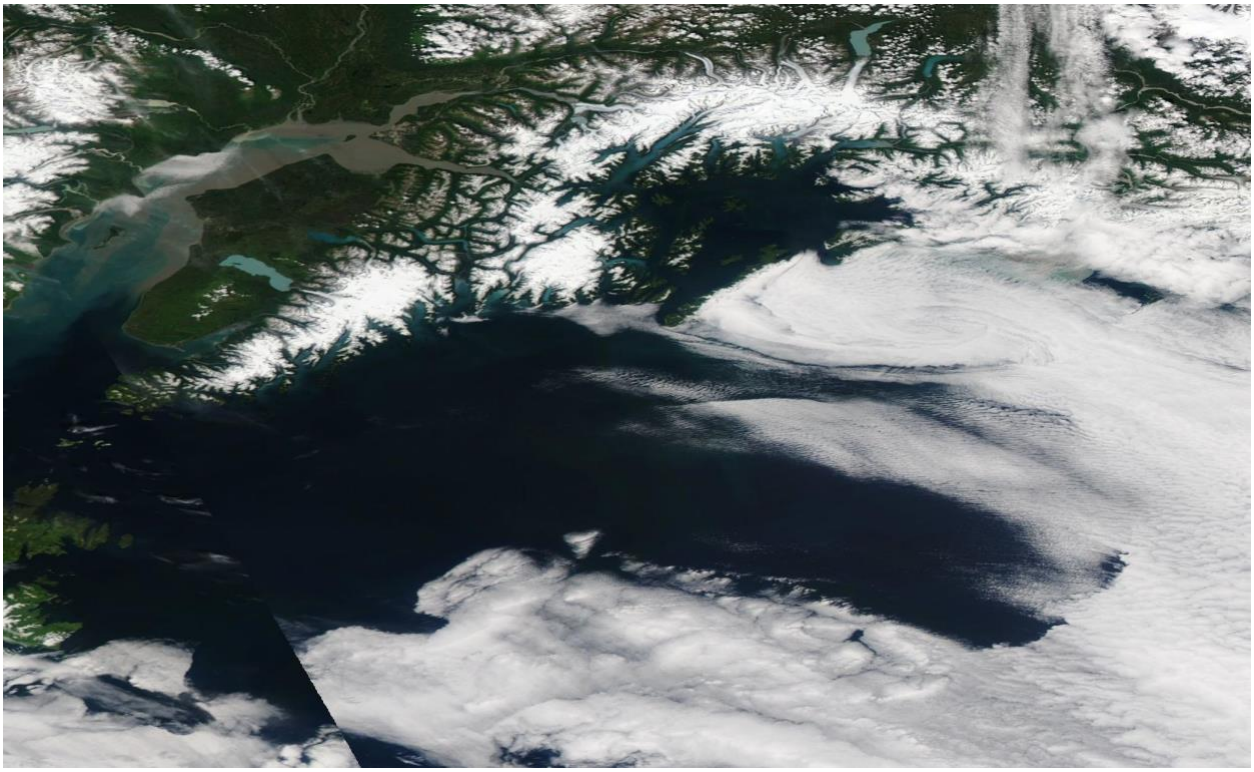

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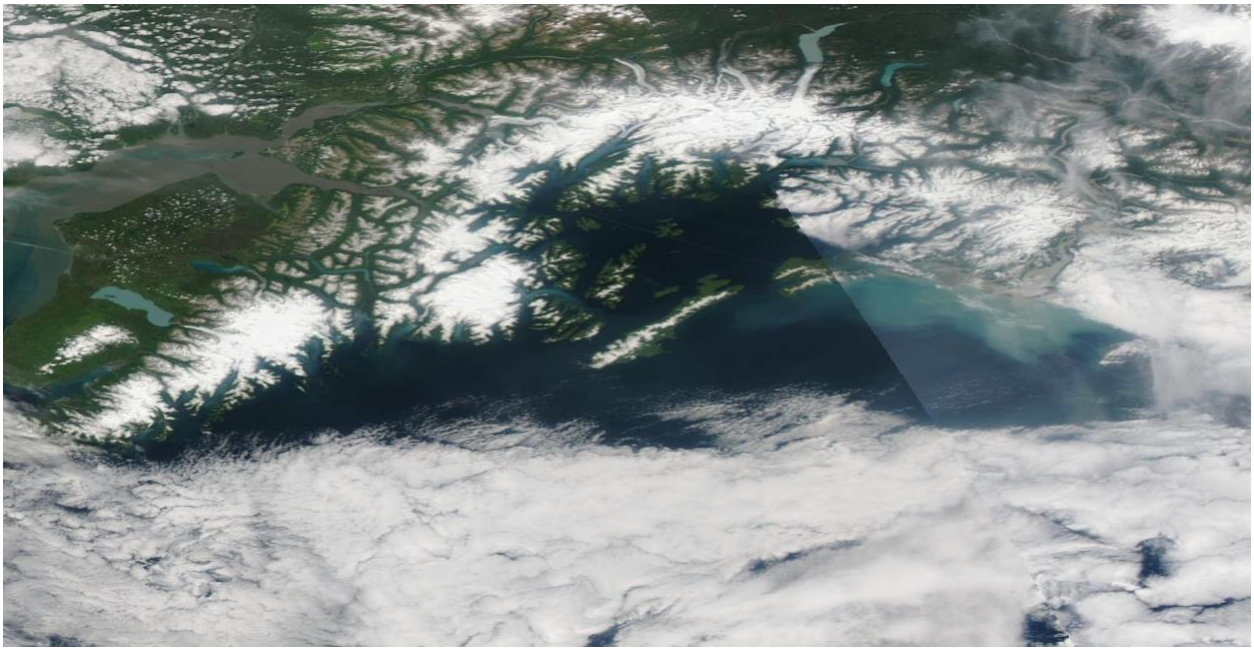
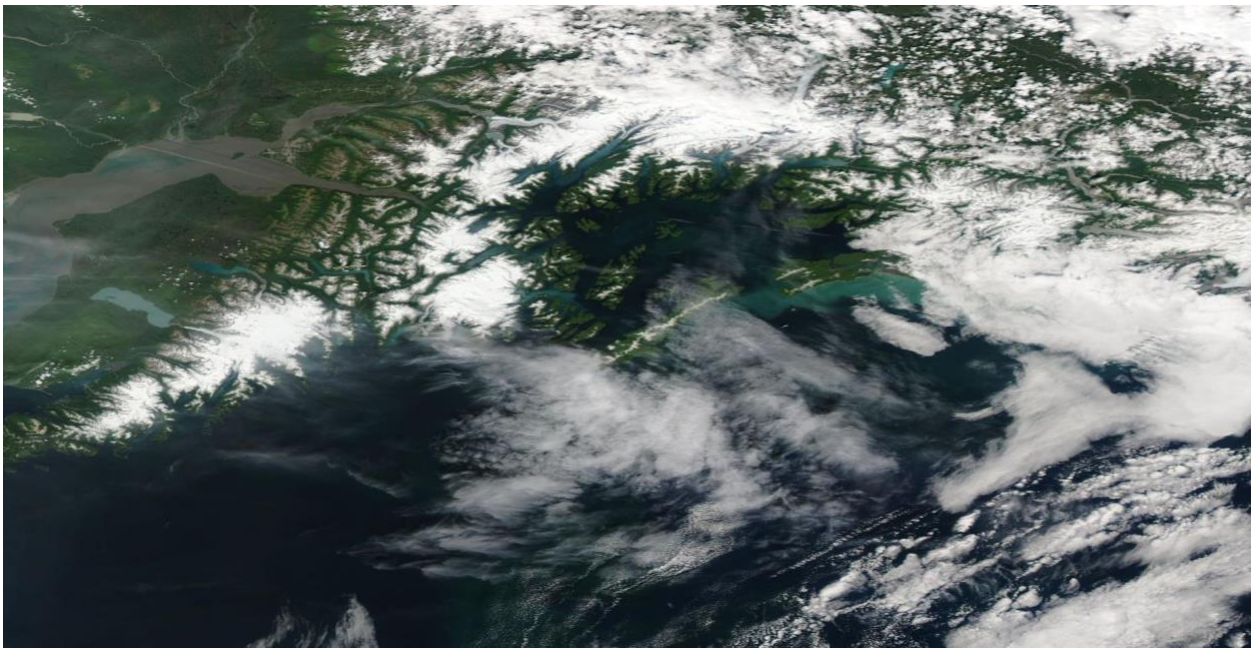


15 July 2021:



Moorings:

In comparing the actual (GPS from the surface float) location of the 2019 GEO1 and GEO3 moorings versus the target locations, we found that each of these moorings (each with 4300 lb anchors) experienced a lay-back of about 21 meters from the anchor drop site. Hence, for the 2021 deployment of GEO3 we drove past the target location by 20 meters before dropping the anchor. Moorings GEO1 and GEO2 were successfully recovered (GEO3 was recovered in May). We also deployed – as a test – a bottom-landing tripod on which was mounted a time lapse camera system. The test went well and we will relocated the tripod to the Chukchi Sea for the 2021 CEO mooring deployment.

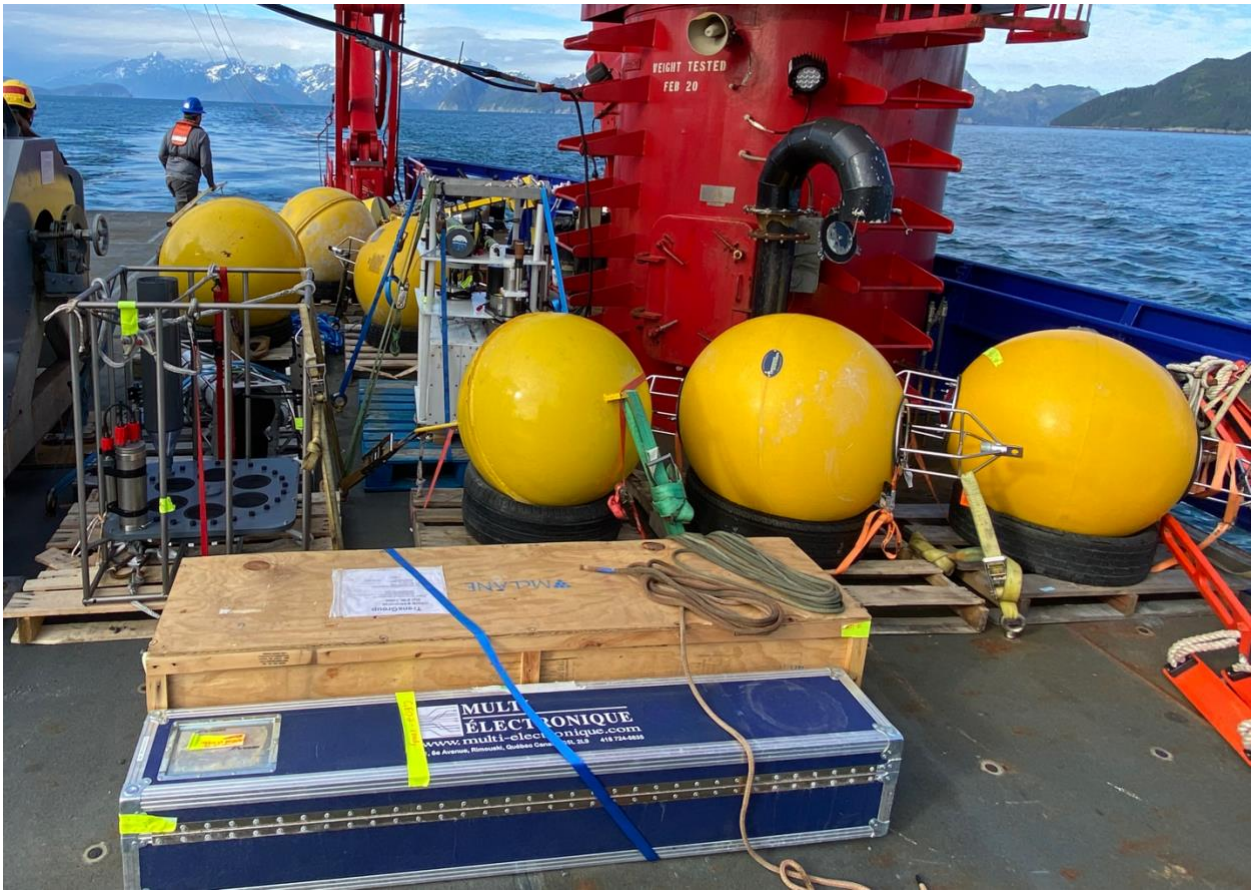
GEO mooring recovery notes:

- The AURAL, AZFP, ADCPs, SeapHOx, Sexton Camera, 2xSoloT and 4x SBE-37 instruments collected what appear at first look to be complete datasets.
- The sediment trap and water samplers both collected their material samples for the deployment year.
- The ITP sampled from May to September and then the battery dies. The instrument is being sent back to the manufacturer for assessment. It appears that it may have lost the motor control board.
- The ITP was damaged on recovery and nearly lost. One of the wire keepers may be been broken upon deployment, and the second one fell off during the recovery operation. We are in consultation with McLane to find a solution to the light nylon bolts that sheared.

GEO-2020 Mooring Deployment Times and Locations

GEO1-21 @ 00:35:59 on 6/30/2021 UTC 59.013442˚ N, 148.690964˚ W
GEO2-21 @ 03:06:08 on 6/30/2021 UTC 59.012454˚ N, 148.687412˚ W
GEO3-21 @ 23:06:58 on 6/29/2021 UTC 59.011011˚ N, 148.684329˚ W

Affixing the mast to the GEO3 real-time data transmission buoy.



Mooring floats and instrumentation.

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Deployment of the CEO tripod (above) and captured photos (below and right).

Macro- and Micronutrient sample collection and processing

PI: Ana M. Aguilar-Islas
Participants: Emily Ortega (UAF graduate student), Alex Promnitz (UAF undergraduate student), Ana Aguilar-Islas

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 train technical staff in field-related work.

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, 13	MID1	3	KOD1	7
GAK1	13, 13	**MID2**	9	KOD2	9
GAK2	12	MID3	8	KOD3	7
GAK3	11	MID4	8	KOD4	7
GAK4	11	**MID5**	8, 8	KOD5	8
GAK5	11	MID6	4	KOD6	8
GAK6	10	MID7	7	KOD7	11
GAK7	12	MID8	14	KOD8	14
GAK8	14	MID9	16	KOD9	16
GAK9	13	**MID10**	16	KOD10	16
GAK10	16				
GAK11	16	**PWS2**	14	GEO Mooring	12
GAK12	16	PWS3	14		
GAK13	16	PWS1	13	OTHER	# samples
GAK14	16	KIP2	14	Transects	1
GAK15	16	IB1	10	PP casts	60
		IB0	13		
		IB2	10	**TOTAL**	**607**

Sample collection and processing for macronutrient analysis:
Filtered seawater samples were collected from 47 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 (by the Strom group) (60). Promnitz was responsible for macronutrient sampling with help from Ortega and Aguilar-Islas. In total 607 samples were collected for nutrient analysis.

Sample collection for iron analysis:
a) Seawater samples were collected from 18 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 West Coast winch pool. All participants were involved in deck operations, with assistance from crew and marine technician. Ortega was responsible for programming the Auto Fire module on the TM CTD, and for operating the winch. There were two TM CTD casts on most days; one at the intensive station of the day, and a second one later in the day. This allowed enough time to subsample the Niskin bottles and to prepare them for the 2nd cast. A miscast at KOD10 was caused by low batteries on the Seacat. The cast was redone after the batteries were changed. The additional vertical profiles will serve to better understand cross-shelf distributions of iron parameters throughout the water column.

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. These samples were obtained from a custom-made surface sampler (FeFish) deployed from the starboard crane, and kept at a distance between 3-5 m from the hull while being towed at 5 knots. Water was pumped with the use of an air actuated diaphragm pump that delivered the sample into "the bubble" through Teflon-lined polyethylene tubing. Ortega and Aguilar-Islas were involved in deck operations, with assistance from the crew and marine technician. The Fe-fish was always deployed/recovered at 2 knots, and sampling took place at 5 knots. The ship slowed down to 2 knots 1 nm away from station to deploy the fish. The ship then sped up to 5 knots. Sampling took place while the ship was ~ 0.5 nm from station. Sampling usually took about 5 minutes. The ship was basically at station by the time it slowed again to 2 knots for recovery. This procedure minimized the need to reposition before other ops could begin.

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 Nisking bottles, IronFish sampling spigots and filtration rigs. Immediately after collection Niskin bottles were transferred to the bubble for subsampling. Filtered (through 0.2 µm 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). Replicates of particulate samples for use in dissolution experiments were obtained from KOD5 (bottom water collected with Niskins) and from MID1 (surface water collected with the Fe-Fish). These samples were filtered through 0.2 um polycarbonate filter discs (Nuclepore) using trace metal clean techniques. Filters and organic iron-binding ligand samples were stored frozen. Ortega and Aguilar-Islas were responsible for subsampling and filtration. In total there were 169 DFe samples, 143 TDFe samples, 32 Ligand samples, and 29 particulate samples taken during the cruise.

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

STATION	DFe	TDFe	Ligands	PFe
GAK1	10	10	4	-
GAK3	10	10	-	-
GAK5	10	10	-	3
GAK7	10	10	-	3
GAK9	10	10	-	-
GAK11	13	13	-	3
GAK13	13	13	6	-
GAK15	13	13	6	-
MID10	13	13	4	-
MID8	13	-	-	-
MID5	7	7	4	1
MID2	7	7	-	-
MID1	-	-	-	(6)
PWS2	-	-	-	7
KOD2	7	7	-	-
KOD5	7	7	2	(6)
KOD8	13	-	-	-
KOD10	13	13	6	-
GRAND TOTAL	169	143	32	29

Particulate samples in parenthesis were taken for experimental work back in the lab.

General Notes

We had a successful cruise and were able to accomplish all the programmed sampling for macro-nutrients and iron parameters. The calm conditions over most of the cruise made on-deck operations run smoothly. Diminishing the amount of Fe-Fish ops, and increasing the number of trace metal casts allowed for day ops to take less time than on other cruises, although this sacrificed the high coverage of surface iron and nutrients obtained during other cruises. Overall, this was a good trade off that could be implemented in future Sikuliaq NGA LTER cruises.

The Seward Marine Center 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. Communication with the bridge via the bosun during fish sampling improved the timing of that operation and eliminated the need to reposition before other ops could begin at a given station. We experienced no issues with ship's facilities needed for macro- and micronutrient work. Laboratory spaces were adequate, the ship's deck gear, -80 ^{o}C 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.

Carbonate Chemistry

PI: Claudine Hauri, Participant: Ben Lowin

A total of 68 samples were taken for the Hauri lab by Thomas Kelly, Fayne Elmore and Lowin. The main pump displayed error 3 during the first sampling set, the secondary pump was used and functioned well as a backup. I suspect that shipping the pump may be causing the problems, but I am not sure. Otherwise, all samples were successfully taken. Filters for the pump were changed nearly every sample as this cut down the sampling time to a reliable 5 min a sample as unposed to up to 10 min when the filter was used 2-3 times before it was changed.

Dissolved Oxygen

Participant: Ben Lowin

A total of 80 samples were taken. During the sampling the reagent pumps needed to be cleaned frequently and were temperamental at best. This temperamental nature has resulted in air injection into some samples, which is **not optimal**. We recommend that the pumps be replaced. The replacements should be able to handle viscous and corrosive substances such as 3*M* Manganese Chloride and 8*M* Sodium Hydroxide/ 4*M* Sodium Iodide. Having reliable and smoothly operating pumps is critical for the quick sample processing needed with gasses.

Particles & Biogeochemisrty

PI: Andrew McDonnell. Participant: Thomas Kelly, UAF

Optical Instruments

Two rosette-mounted optical instruments were used during the cruise: the underwater vision profiler (Hydroptic UVP5; sn009) and the laser in situ scatterometer and transmissometer (Sequoia LISST-200x; sn2167). Both instruments measure particle abundance and size spectra during the downcast. The UVP5 was used on almost all casts (n = 68) and assesses particles between ~250 – 2500 µm while the LISST-200x was used on shallow casts (600m depth rating; n = 46) and quantifies particles into 36 size classes between 1 – 500 µm. Blanks for the LISST-200x (milli-q water) were consistently low and in line with factory calibration values. The LISST-200x was also used onboard the towed DPI instrument during tow-yo transects.

Nitrogen Uptake

Deckboard incubations (500 ml; n = 108) were conducted at 9 intensive stations to quantify nitrate and ammonium uptake rates at 6 depths through the water column. Briefly, Niskin-collected seawater was added to 2 bottles per depth (for ^{15}N-nitrate and ^{15}N-ammonium, respectively). Bottles were spiked with 100 nM (final concentration) of ^{15}N-labeled nitrate or ammonium. Samples were then gently mixed, placed in screened bags to mimic ambient light conditions, secured within a deckboard incubator, and kept at ambient mixed layer temperatures. Nitrate uptake experiments were conducted for 24 hours while ammonium experiments were terminated after 4 hours to minimize the impact of ammonium recycling. Incubations were filtered onto precombusted GF/F filters (Whatman) and stored in labeled cryovials at -80C for further processing back on land.

Additionally, 2 sets of diel ammonium and nitrate uptake experiments (n = 24) were conducted to assess the diel cycle of nutrient uptake by the phytoplankton community in either the mixed layer (10m) or deep chlorophyll maximum (DCM; typically ~30 m). Experiments were

conducted in a manner similar to the standard incubations above but consisting of a series of 4-hour incubations with one additional bottle serving as a 24 hour control.

Surface Tethered Sediment Trap

Five (5) deployments of the surface-tethered sediment trap arrays were completed during SKQ202110S. Deployments lasted for approximately 24 hours (18 – 32 h) and were conducted at a subset of intensive stations (i.e. KOD5, KOD9, MID10, MID5, GAK4, GAK8, and GAK15) with the goal of collecting sinking organic matter. Each array was outfitted with 1-4 cross-frames typically placed (1) near the base of the euphotic zone at ~30 m, (2) 70 m, (3) 110 m, and 180 m (when water depth permitted). Four collection tubes per depth allowed for sub-sampling of sinking matter for pigments (Chl-a, phaeopigments; n = 44), carbon and nitrogen abundance and isotopic composition (POC, PON, PIC; n = 39), biogenic silica abundance (bSi; n = 13), non-contamination prone trace elemental analysis (e.g. P; n = 15), and genetic analysis (n = 13).

Intrinsic Sinking Rates

The intrinsic sinking rates of nano- and microplankton was assessed using SETCOLs (Bienfang, 1981; 4" diameter x 24" tall). Each SETCOL contained approximately 3L of Niskin-collected seawater from either the surface mixed layer (~3m) or the deep chlorophyll maximum (DCM; typically ~30 m). Chlorophyll a (Chl-a) and flow cytometry (FCM) samples were taken to establish the initial concentrations of pigments and nano- and microplankton in the SETCOLs. At various time points, samples for FCM were collected from up to 5 apertures on the sides of each SETCOL: top, 75%, middle, 25%, and bottom. Occasional sampling for Chl-a was also conducted but was restricted to fewer timepoints due to volume requirements. FCM samples were poisoned (glutaraldehyde), flash-frozen in liquid N_2, and then stored at -80°C. Chl-a samples were immediately filtered and processed according to standard acidification protocols (Strickland and Parsons, 1972) and measured at sea on a calibrated 10AU Fluorometer (Turner Designs). Three experiments were conducted on board and will be used to design future process studies investigating taxa and size-specific relationships to sinking velocities within the NGA.

Moored Instrumentation

Two moored instruments were deployed at the GEO mooring site with the explicit purpose of providing data on marine particle dynamics within the northern Gulf of Alaska. The in situ marine snow camera system (Sexton Systems) is a downward facing camera system with dual strobe lights, which capture photographs of particulate matter every 30 minutes. Due to a last-minute change to a titanium frame, the geometry of the camera system had to be condensed and the frame modified to accept the camera system. The focal distance of the camera was reduced to compensate.

The GEO mooring sediment trap (Hydrobios) was successfully recovered (2020-2021) and redeployed (2021-2022). Timings for the bottle rotation were synchronized with sediment trap deployed in the Bering and Chukcki Sea with sample collections switching on the 1st and 15th of each month. Recovered samples were prepared for storage and transport for analysis back in the lab. The 2020-2021 marine snow camera system was also successfully recovered.

Underway optics

PI: Will Burt. Participant Ben Lowin

The underway bio-optics system ran from day two of the cruise (29th June 2021) till the end (13th July 2021). The first days were done in Resurrection Bay, which had a very high sediment load.

This was causing difficulty for the system during filter periods. To prevent excessive wear and tear the system was shut down until we begun to level Resurrection Bay. After the system begun operation it performed poorly. There was constant bubble injection from the ACS and the flow rate during filter periods was very low. At the end of the cruise, I removed a final tube, after the flow meter. This led to the bubbles stopping during filter period. I think this shows that the final tube was causing excessive back pressure. The bubbles from the ACS defiantly caused the blank periods for the BB3 to be less than optimal, however we currently do not use them. During the process of looking into preventing the bubbles, the O-rings were examined, and it was found that they are nicked.

During the cruise HPLC samples were taken during MODIS Aqua and occasionally Terra satellite passes. With this it would be very useful for the R/V Sikuliaq to keep the map server updated with the satellite passes for Chlorophyll and MODIS Daily (true color). This request needs to be made during the planning stage (2-3 months prior) to give the marine techs ample time to implement this request. Additional, samples of POC and PIC were taken to be compared against the Strom labs results. Finally, samples of the underway water were taken and incubated with the Strom lab's growth incubations to determine how comparable the growth estimates made by the system are against the growth rates measured from the CTD.

A mount was 3D printed by Ethan Roth for the 0.2um filter housing. This was very helpful as the previous one was scavenged from available parts during the first construction of the underway system.

Phytoplankton and Microzooplankton

PI: Suzanne Strom
Participants: Kerri Fredrickson, Megan O'Hara, Annie Kandel (WWU)
with assistance from Megan Brauner (UAA)

State Measurements
All three of the standard LTER transect lines (KOD, GAK, MID) were sampled in their entirety, as well as 7 stations in Prince William Sound. Ten intensive stations were sampled spanning the PWS-to-offshore gradient (see red station labels in sampling table).

Phytoplankton biomass and production: Phytoplankton biomass was characterized by size-fractionated chlorophyll at all non-intermediate shelf stations, all Prince William Sound stations, and at the GEO mooring site. GAK-1, MID-5 and RES 2.5 were sampled twice. Samples were analyzed fluorimetrically on board except for the last occupation of RES-2.5, which were frozen for later analysis. Primary production estimates were made at all intensive stations (total = 10) 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. In addition, a seventh bottle was incubated containing water collected from the underway system as fed through the Burt Lab optical set-up. Incubation screening for this bottle was based on the 6 m intake depth for the underway system and the water column light profile as determined at each intensive station. Chlorophyll (GFF only) and nutrient samples were also taken from each light depth during experiment set-up.

Community characterization: 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. Microscopy samples, collected at every station along the GAK line and generally every other station along the MID and KOD lines, were

fixed in glutaraldehyde, DAPI-stained, and made into slides for biomass and composition of nano- and picoplankton with the focus on cryptophytes; paraformaldehyde-fixed samples were collected at nearly every station for flow cytometry (3 depths per station at all stations, O'Hara thesis research). Samples for HPLC analysis of phytoplankton pigments (chemotaxonomy) were taken from all intensive stations; these were from 10 m and generally one other euphotic zone depth (often 0 or 30 m). 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.

Organic carbon characterization: Samples for DOC analysis were filtered and frozen all intensive stations as well as additional stations on the MID and KOD line (total profiles = 13); depths sampled were mainly 150 m and above except in the deep intensive casts, and corresponded to nutrient sampling depths (8-10 depths per profile). At intensive stations only, 4 depths were sampled for POC and PIC (total profiles = 10).

Preliminary observations:

The highest chlorophyll-a concentrations were found along the Kodiak line; values as high as 10 µg/liter were measured at KOD3. Except for KOD 7 and 8, nearly all the biomass was in cells >20 µm at stations along the Kodiak line (Fig. 6). Microscope observation showed pennate diatoms at the end of the line, most likely related to an offshore eddy. Inshore stations were comprised of a diverse assemblage of mainly centric, chain diatoms including *Thalassiosira* and *Chaetoceros* spp.

Summer-like conditions were observed in PWS and along the GAK and MID lines, where most of the chlorophyll biomass was in small cells (Figs 6, 7).

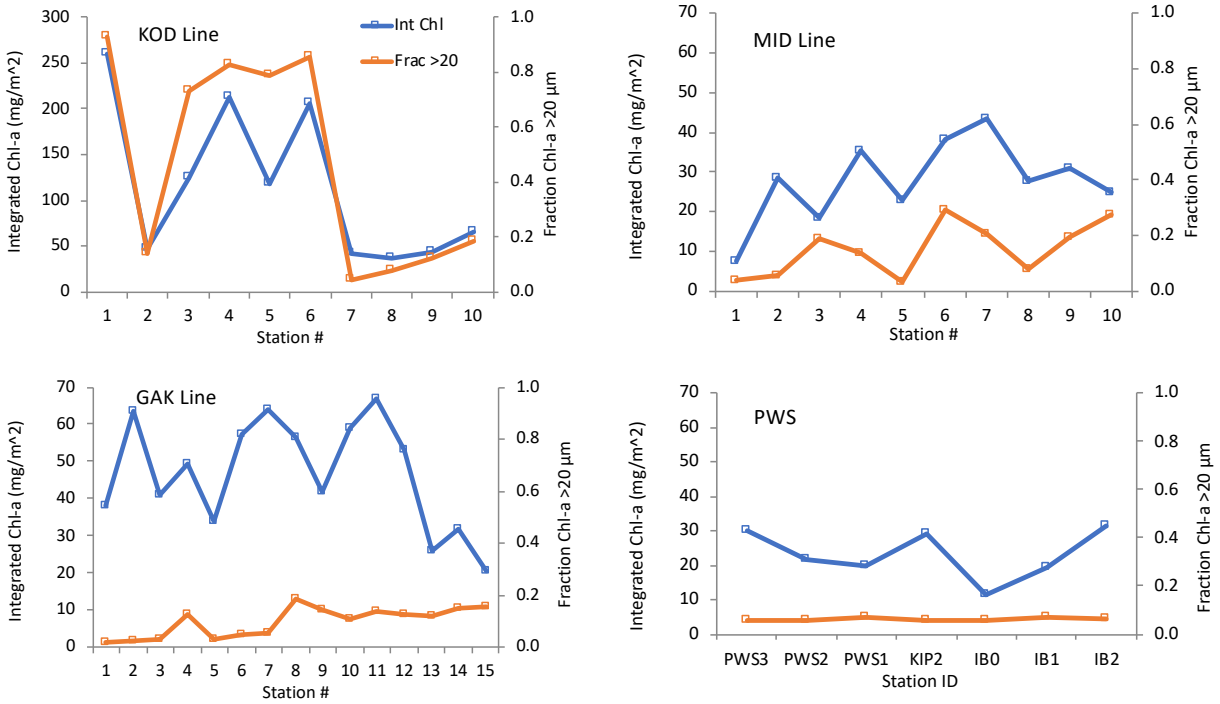

Figure 6. Integrated chlorophyll-a (0-75 m) and fraction of chlorophyll in particles >20 µm along transects during June-July 2021 for the KOD, GAK, MID, and PWS stations. Note different integrated chl-a y axis scale for the KOD line.

Table 3. Sampling effort for Strom component, by station. Intensive stations are highlighted

Station	SF Chl	Lugols µzoo	Diatom	Nano/ pico	FC	HPLC	Euk Mol	DOC	POC/ PIC	13C prod
RES2.5-	x			x	x					
GAK1-A	x				x					
GEO	x									
GAK15	x	x	x	x	x	x	x	x	x	x
GAK14	x	x		x	x					
GAK13	x	x	x	x	x					
GAK12	x	x		x	x					
GAK9	x	x	x	x	x	x	x	x	x	x
GAK10	x	x		x	x					
GAK11	x	x	x	x	x					
GAK5	x	x	x	x	x	x	x	x	x	x
GAK6	x	x		x	x					
GAK7	x	x	x	x	x					
GAK8	x	x		x	x					
GAK1-B	x	x	x	x	x	x	x	x	x	x
GAK2	x	x		x	x					
GAK3	x	x	x	x	x					
GAK4	x	x		x	x					
KOD10	x	x	x	x	x	x	x	x	x	x
KOD9	x				x					
KOD8	x			x	x					
KOD7	x	x	x		x					
KOD6	x			x	x					
KOD5	x	x	x	x	x	x	x	x	x	x
KOD4	x				x					
KOD3	x	x	x	x	x					
KOD2	x				x					
KOD1	x	x	x	x	x			x		
MID10	x	x	x	x	x	x	x	x	x	x
MID9	x	x	x		x					
MID8	x			x	x					
MID7	x	x	x	x	x			x		
MID6	x	x	x		x					
MID1	x				x			x		
MID2	x	x	x	x	x	x	x	x	x	x
MID3	x	x	x		x					
MID4	x	x	x	x	x					
MID5-A	x				x					
MID6	x	x	x	x	x					
MID5-B	x	x	x	x		x	x	x	x	x
PWS3	x				x					
PWS2	x	x	x	x	x	x	x	x	x	x
PWS1	x									
KIP2	x									
IB1	x				x					
IB2, IB0	x									
RES2.5	x									
Totals:	**48**	**31**	**23**	**39**	**40**	**10**	**10**	**13**	**10**	**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)

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).

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. Three depths sampled (0 and 10m, chl max or 30 m).

FC: Flow cytometer samples preserved with paraformaldehyde, flash frozen in liquid nitrogen and then stored frozen for analysis. Three depths sampled (0 and 10m, chl max).

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.

HPLC: water sample filtered (glass fiber, 0.7 µm) and frozen in liquid N2 for HPLC analysis of phytoplankton pigments (chemotaxonomy).

Euk Mol: water sample filtered (0.2 µm) and frozen in liquid N2 for molecular analysis of eukaryotic microbial community composition.

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 different depths with 13C-labeled sodium bicarbonate.

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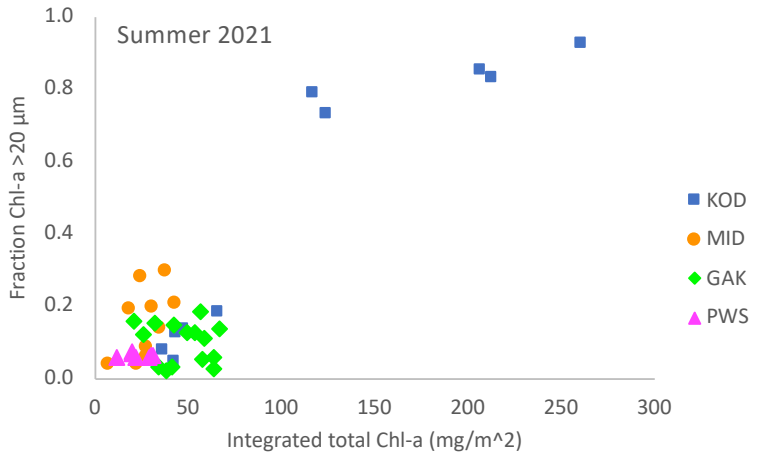

Fig. 7 Total integrated (0-75 m) chl-a versus fraction of chl-a in large (>20 µm) cells during summer 2021 NGA cruise during spring 2021 NGA cruise.

Phytoplankton

PI: Hennon, Participant: Jake Cohen

On the summer NGA LTER cruise, our lab conducted sampling for both DNA and flow cytometry analysis in order to better understand phytoplankton community structure in the Gulf of Alaska. At each station sampled, water samples were taken at the surface, 10 meters, the deep chlorophyll max, and the bottom. One milliliter of seawater was taken from each container and fixed with glutaraldehyde for flow cytometry. This will allow for counts of small cells in the water column to be conducted, with samples gated for picoeukaryotes, nanoeukaryotes, heterotrophic bacteria, *Synechococcus* and cryptophytes. Each water sample was also run through a .22 micron Sterivex filter in order for DNA analysis to be conducted. Each Sterivex filter had between one and five liters of water run through it. All DNA obtained will be extracted, PCR amplified for both 16S and 18S, and sequenced at the CORE lab at UAF. In total, 172 samples were collected over the course of the summer cruise. This data, combined with that collected on other years, will allow for a better understanding of how phytoplankton community structure responds to environmental variables, especially marine heat waves.

Additionally, 48 IV bags were recovered from the water sampler attached to the GEO mooring. These bags took phytoplankton samples over the course of the year and were poisoned with mercuric chloride and formalin. Mercuric chloride bags will be analyzed for nutrients and DNA, while formalin bags will be analyzed for small cell count via flow cytometry. The analysis of bags from the GEO mooring will allow for temporal resolution of phytoplankton and nutrient data in the Gulf of Alaska, providing a window into conditions between the three annual cruises.

Meso/Macro Zooplankton

PI: Hopcroft, Participants: Caitlin Smoot, Delaney Coleman, Emily Stidham, Bette Smith
Bellamare reps: Charles Cousin, Cedric Guigand

ISIIS-DPI: The first two days of shakedown with the DPI uncovered several design issues that need to be resolved, most importantly adequate lift, and strong enough elevators. Ultimately, this required the ROTV depth was changed largely by paying wire in and out to tow-yo it. We were able to complete 3 deployments, with 2 of the 3 cameras collecting data: GAK1-6i, GAK6i-13 and MID5i-1i. The system was pulled at GAK13 due to winch issues. We had issues on 2 of the 3 transects with the CTD clogging during deployment, suggesting this should be run with dual CTDs, and possibly intake shrouds, to maintain these fundamental measurements. The flow meter also did not appear to generate usable data. Data from other sensors and instruments is still to be evaluated. The acoustic system could not be tested because transducers were not shipped to UAF.

Nets: The 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. 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 Tandem Multinet was also deployed at GAK15 to 2000 m, dividing strata at 1200, 600, 400, 200,100, 60, 40, and 20 m. A Deep Multinet (but no shallow partner) was also deployed at KOD10 for sorting.

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 along the Seward Line and within PWS. A second collection was made at Intensive stations and preserved in Ethanol for molecular analysis. Finally, 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) and used to collected pressure data to gauge the depth. One net from each Bongo deployment, and the drogue net from the Multinet, were also preserved in Ethanol. A Methot net was collected at all night stations an live sorted for jellyfish

Observations: Overall, few *Neocalanus plumchrus* and *N. cristatus* were still present in surface waters, but the majority of all three species were found at depth. The surface community was dominated by *Pseudocalanus* and *Calanus* as is typical for summer. Surprisingly large numbers of *N. plumchrus* occurred at several offshore stations. Portions of the outer Seward Line, and the shelf stations on the Kodiak Line, were unusually thick with large phytoplankton for summer.

Table 4. Sampling effort for Zooplankton. Intensive stations highlighted. *samples taken for bulk genetics, sorting or imaging.

Station	Calvet-Quad	Multi Vert.	Multi Tow	Bongo		Station	Calvet-Quad	Multi Vert.	Multi Tow	Bongo
RES2.5	x					KOD1	X*			X
GAK1	X*	x	X*			KOD2	x			X
GAK2	x		x			KOD3	x			X
GAK3	x		x			KOD4	x			X
GAK4	x		x			KOD5	X*			X
GAK5	X*	x	X*			KOD6	x			X
GAK6	x		x			KOD7	x			X
GAK7	x		x			KOD8	x			X
GAK8	x		x			KOD9	x			X
GAK9	X*	x	X*			KOD10	X*			X
GAK10	x		x			MID1	x			X
GAK11	x		x			MID2	X*			X
GAK12	x		x			MID3	x			X
GAK13	x		x			MID4	x			X
GAK14	x		x			MID5	X*			X
GAK15	X*	X*	X*			MID6	x			X
MS2	x					MID7	x			X
KIP2	x		x			MID8	x			X
PWS1	x		x			MID9	x			X
PWS2	X*	X*	X			MID10	X*			X
PWS3	x		x			**TOTAL**	**44**	**4**	**19**	**10**
IB0	x									
IB1	X*									
IB2	x									

PI: Petra H. Lenz & Russ Hopcroft. **Participant:** (Hopcroft)

Project Goals: *Neocalanus* emergence from diapause, *Neocalanus* preparation for diapause (NSF project - UHM & UAF; PIs: Lenz, Hopcroft, and Hartline) – transcriptional profiling of individuals in the genus *Neocalanus* in the adult stage. 2020 marks the 7th year of spring collection of *Neocalanus flemingeri* from our PWS2 station.

Research Activities:

- Live Quad nets samples at intensive Stations were sorted for *Neocalanu*s (up to 60 individuals for each species and stage), and then imaged for determination of lipid sac volume. Along the Seward Line, samples from the vertical multinets in the 100-200m layer were also examined for *Neocalanus*, and notable numbers of *N flemingeri* females and N.plumchrus C5 were found in this strata.
- The Deep collections taken with vertical Multinet at GAK15 and PWS2 had all deeper strata sorted and imaged for *Neocalanus*.
- No animals were sorted for transcriptomics, in part because of their low numbers and excessive lags in sorting them.

Marine bird and marine mammal surveys (USFWS)

PI: Dr. Kathy Kuletz, USFWS. Participant: Dan Cushing,

Background

We conducted marine bird and marine mammal surveys in the Northern Gulf of Alaska (NGA), June 27 – July 12, 2021, aboard the 80-m R/V *Sikuliaq*, as a component of the NGA Long-term Ecological Research (NGA-LTER) cruise. The seabird and mammal surveys were supported by a grant from UAF. 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 300-m, 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. Environmental conditions were generally fair during this cruise; poor observation conditions due to high sea state occurred during ~ 5% of survey transects, while fog was relatively rare and restricted visibility on < 1% of transects. 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 1418 linear km of surveys during the June-July 2021 cruise (Figure 8). On-transect, we observed a total of 3814 individuals of 32 species of birds, with an additional 9 species observed off-transect during surveys or while at stations (Table 5). Averaged across all

3-km transect segments, the mean density (all bird species combined) was 10.6 birds km^{-2}. In general, abundance of birds was patchy. On the inner shelf, abundance was low in many locations but forage flocks occurred in Resurrection Bay and Hinchinbrook Entrance, where strong fronts occurred at the transition between the open Gulf of Alaska and PWS (Figure 9). In addition, concentrations of birds and whales occurred in the channel between Albatross Bank and the Kodiak Archipelago. Over the middle and outer shelf, birds were relatively abundant over the outer edge of Albatross Bank, and in Stephensen Trough, located between Albatross Bank and Portlock Bank. On the shelf north of Middleton Island, aggregations of birds (primarily kittiwakes, storm-petrels, and shearwaters) and humpback whales foraged on schooling fish. Abundance of birds was low offshore of the shelf-break. No dead marine birds or marine mammals were observed during the cruise.

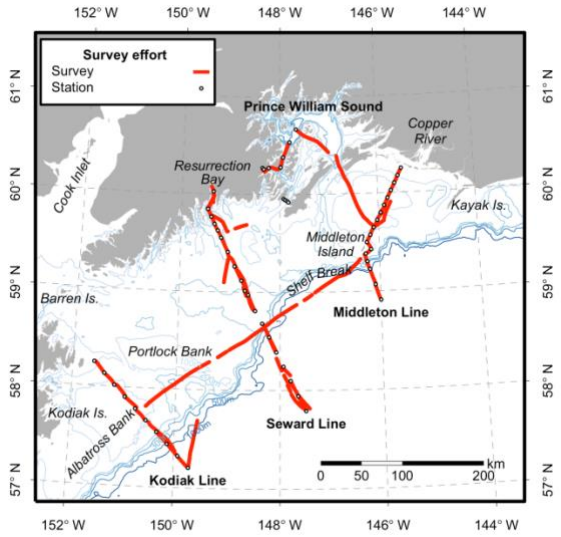

Figure 8. Location of seabird and marine mammal surveys (red lines).

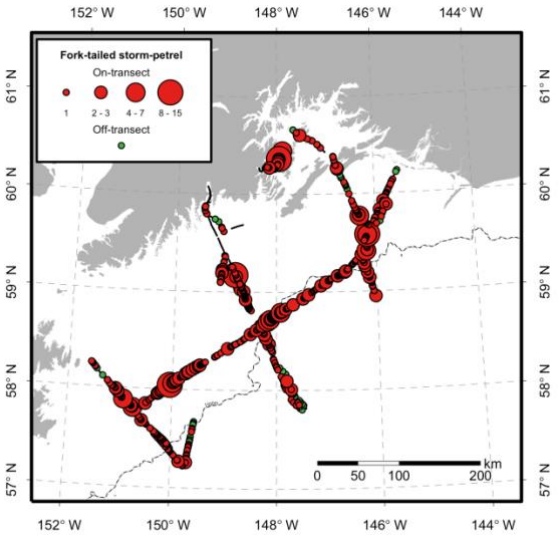

Figure 9. Densities (birds km^{-2}) of total seabirds (all species combined).

The most abundant avian species during the cruise was the fork-tailed storm-petrel (29% of total bird observations; Table 5). Fork-tailed storm-petrels were widely distributed, and often concentrated over bathymetric features such as troughs, banks, and the shelf-break (Figure 10). While abundance of fork-tailed storm-petrels was lowest on the inner shelf, flocks did occur in Knight Island Passage in PWS.

The second most abundant species of seabird was the northern fulmar (21% of total birds). Fulmars were widely distributed, with the exception of lower-salinity waters of the Alaska Coastal Current and PWS (Figure 11). Fulmars were generally most abundant near the shelf-break and in Stephenson Trough.

The third most abundant species was the tufted puffin (14% of total birds). The highest concentrations of tufted puffins occurred over the outer continental shelf, including offshore slopes of Albatross Bank, over Stephenson Trough, and near Middleton Island, which hosts nesting colonies (Figure 12). Flocks were also observed near small colonies on the Smith Islands in PWS.

Short-tailed shearwaters made up 10% of seabird observations and were most abundant over the middle and outer shelf (Figure 13). Few short-tailed shearwaters occurred in the relatively fresh waters of the inner shelf along the Middleton and Seward Lines and in PWS, and abundance was low offshore of the shelf-break. Short-tailed shearwaters were most abundant in

the southwestern portion of the study area, near the Kodiak Line. The highest concentrations were observed between Albatross Bank and the Kodiak Archipelago, where surface water temperatures were relatively low. However, we did not observe flocks of thousands of short-tailed shearwaters, such as occurred near Albatross Bank during the summer 2018 and 2019 LTER cruises. Sooty shearwaters were much less abundant than short-tailed shearwaters during this summer 2021 cruise (Table 5).

Glaucous-winged gulls composed 8% of seabird observations and were most abundant in the northeastern portion of the study area, in the vicinity of the Middleton Line and in Resurrection Bay (Figure 14). Glaucous-winged gulls were absent along the Kodiak Line, and few gulls were observed offshore of the shelf-break.

Common murres made up 5% of total seabird observations. The highest concentrations of murres occurred over the inner shelf along the Seward Line, in Resurrection Bay, and in Hinchinbrook Entrance (Figure 15), where murres aggregated at fronts.

Several other notable observations occurred during the cruise. The eastern edge of an anticyclonic eddy overlapped the outer stations of the Kodiak Line, and Leach's storm-petrels were relatively abundant in this area (Figure 16). Least auklets, which have not been observed during prior summer LTER NGA cruises, occurred near the Kodiak Line (Figure 17). A Manx shearwater occurred over the outer shelf on the Kodiak Line (Figures 13, 18). Historically an Atlantic species, observations of Manx shearwaters in the North Pacific began in the 1970s and have increased in frequency in recent decades, suggesting colonization of the Pacific basin; however, breeding in the Pacific remains unconfirmed. We also observed Manx shearwaters during September 2019 and July 2020 NGA LTER cruises.

A hybrid black-footed x Laysan albatross with a red alphanumeric auxiliary leg band was photographed at stations GAK9 and GAK10, (Figure 19). Colleagues at the Papahānaumokuākea Marine National Monument reported that this albatross was banded as a nestling on Jan 3, 2020 at Sand Island, Midway Atoll. Critically Endangered short-tailed albatrosses were observed in the outer portion of the Seward Line all had stage-1 juvenile plumage. At station GAK10 all three species of North Pacific albatrosses, as well as the hybrid, were present concurrently.

We observed 10 species of marine mammal (Table 6), with 34 individuals on transect and 230 off transect. The most abundant toothed whale (odontocete) species was the Dall's porpoise, which was widely distributed (Figure 20). Killer whales occurred over the shelf, including a group of six with a calf, observed on the Seward Line and a group of two near Portlock Bank. Two sperm whales were observed over the continental slope. The most abundant baleen whale (mysticete) species was the fin whale. The highest concentrations of fin whales occurred along the edges of Albatross Bank, and offshore of the shelf-break near the Seward and Middleton lines (Figure 21). Humpback whales occurred in and near Resurrection Bay along the Seward Line, near Marmot Island along the Kodiak Line, and north of Middleton Island. A common minke whale was observed in Hinchinbrook Entrance. Harbor Seals were the most abundant pinniped observed, totalling 135 in Icy Bay in PWS; most were hauled out on glacial ice (Figure 22). Northern fur seals were widely distributed over the shelf and slope, and Steller sea lions were observed near Middleton Island and in PWS. Sea otters were observed in PWS.

Table 5. Marine birds observed during the July 2020 NGA-LTER cruise. Numbers include on-transect observations only. Species only observed off-transect are indicated by an asterisk.

Common name	Scientific name	Number	% total
White-winged scoter	*Melanitta fusca*	*	0.0%
Northern pintail	*Anas acuta*	*	0.0%
Black oystercatcher	*Haematopus bachmani*	*	0.0%
Black turnstone	*Arenaria melanocephala*	8	0.2%
Greater yellowlegs	*Tringa melanoleuca*	*	0.0%
Red-necked phalarope	*Phalaropus lobatus*	17	0.4%
Pomarine jaeger	*Stercorarius pomarinus*	*	0.0%
Parasitic jaeger	*Stercorarius parasiticus*	1	< 0.1%
Long-tailed jaeger	*Stercorarius longicaudus*	1	< 0.1%
Common murre	*Uria aalge*	204	5.3%
Thick-billed murre	*Uria lomvia*	3	0.1%
Unidentified murre	*Uria* spp.	2	0.1%
Pigeon guillemot	*Cepphus columba*	2	0.1%
Marbled murrelet	*Brachyramphus marmoratus*	4	0.1%
Kittlitz's murrelet	*Brachyramphus brevirostris*	1	< 0.1%
Marbled or Kittlitz's murrelet	*Brachyramphus* spp.	1	< 0.1%
Ancient murrelet	*Synthliboramphus antiquus*	86	2.3%
Cassin's auklet	*Ptychoramphus aleuticus*	9	0.2%
Parakeet auklet	*Aethia psittacula*	10	0.3%
Least auklet	*Aethia pusilla*	17	0.4%
Rhinoceros auklet	*Cerorhinca monocerata*	16	0.4%
Horned puffin	*Fratercula corniculata*	30	0.8%
Tufted puffin	*Fratercula cirrhata*	522	13.7%
Black-legged kittiwake	*Rissa tridactyla*	119	3.1%
Sabine's gull	*Xema sabini*	*	0.0%
Mew gull	*Larus canus*	1	< 0.1%
Herring gull	*Larus argentatus*	7	0.2%
Glaucous-winged gull	*Larus glaucescens*	294	7.7%
Unidentified gull	*Larus spp.*	3	0.1%
Arctic tern	*Sterna paradisaea*	2	0.1%
Pacific loon	*Gavia pacifica*	*	0.0%
Laysan albatoss	*Phoebastria immutabilis*	1	< 0.1%
Black-footed albatross	*Phoebastria nigripes*	92	2.4%
Laysan x black-footed albatross hybrid	*Phoebastria immutabilis* x *nigripes*	*	0.0%
Short-tailed albatross	*Phoebastria albatrus*	*	0.0%
Fork-tailed storm-petrel	*Hydrobates furcatus*	1114	29.2%
Leach's storm-petrel	*Hydrobates leucorhous*	39	1.0%
Northern fulmar	*Fulmarus glacialis*	788	20.7%
Short-tailed shearwater	*Ardenna tenuirostris*	361	9.5%
Sooty shearwater	*Ardenna grisea*	24	0.6%
Unidentified dark shearwater	*Ardenna* spp.	23	0.6%
Manx shearwater	*Puffinus puffinus*	1	< 0.1%
Red-faced cormorant	*Phalacrocorax urile*	2	0.1%
Pelagic cormorant	*Phalacrocorax pelagicus*	1	< 0.1%
Pelagic or red-faced cormorant	*Phalacocorax urile* or *pelagicus*	1	< 0.1%
Double-crested cormorant	*Phalacrocorax auritus*	7	0.2%
Bald eagle	*Haliaeetus leucocephalus*	*	0.0%
Total		**3814**	**100.0%**

Table 6. Marine mammal species observed during the April-May 2021 NGA-LTER cruise.

Common name	Scientific name	On-transect	Off-transect
Fin whale	*Balaenoptera physalus*	2	21
Common minke whale	*Balaenoptera acutorostrata*	0	1
Humpback whale	*Megaptera novaeangliae*	3	8
Sperm whale	*Physter macrocephalus*	0	2
Killer whale	*Orcinus orca*	1	7
Unidentified whale	*Cetacea* spp.	0	12
Dall's porpoise	*Phocoenoides dalli*	19	30
Unidentified porpoise	*Phocoenoides* spp.	1	3
Northern fur seal	*Callorhinus ursinus*	5	2
Steller sea lion	*Eumetopias jubatus*	1	5
Harbor seal	*Phoca vitulina*	1	136
Sea otter	*Enhydra lutris*	1	3
Total		**34**	**230**

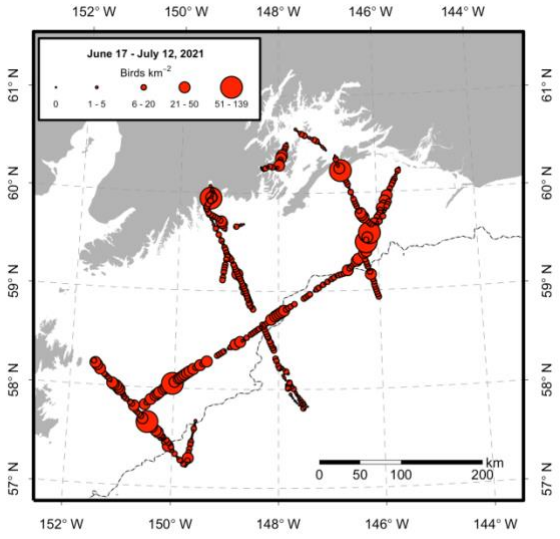

Figure 10. Fork-tailed storm-petrel distrib

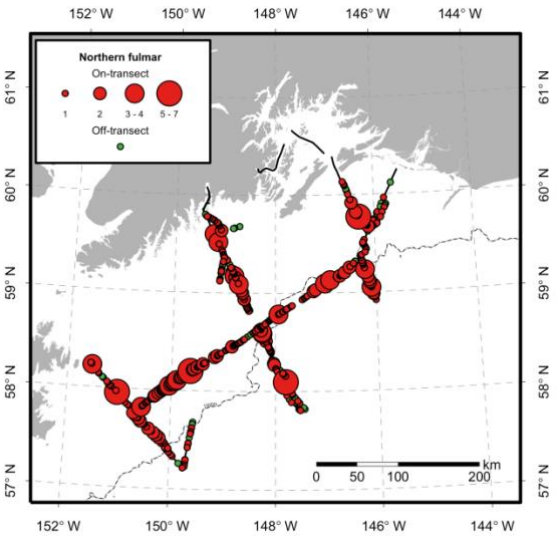

Figure 11. Northern fulmar distribution.

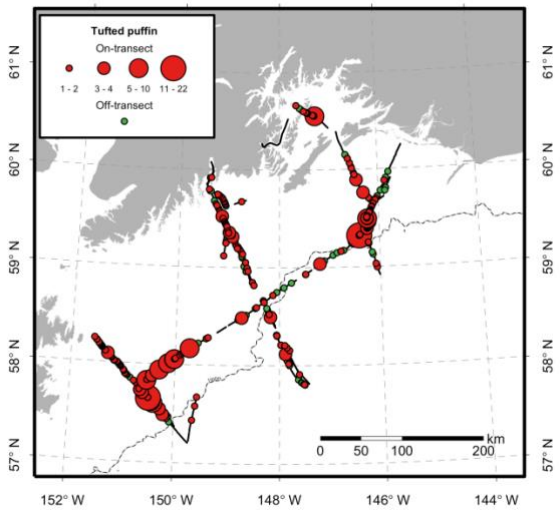

Figure 12. Tufted puffin distribution

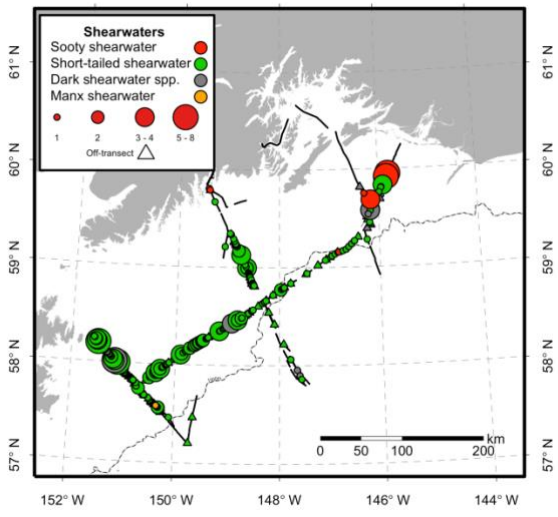

Figure 13. Shearwater distribution

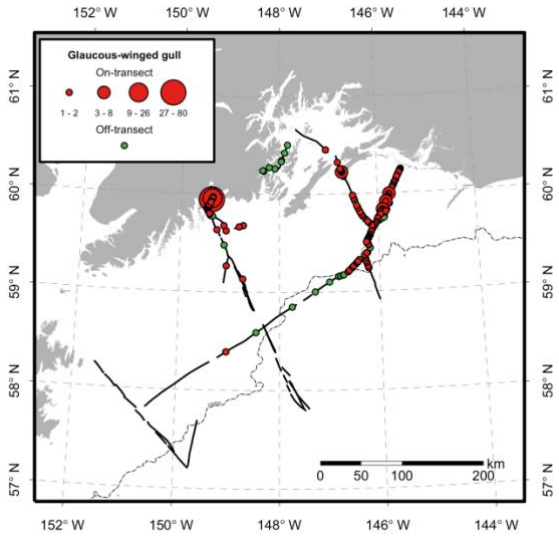

Figure 14. Glaucous-winged gull

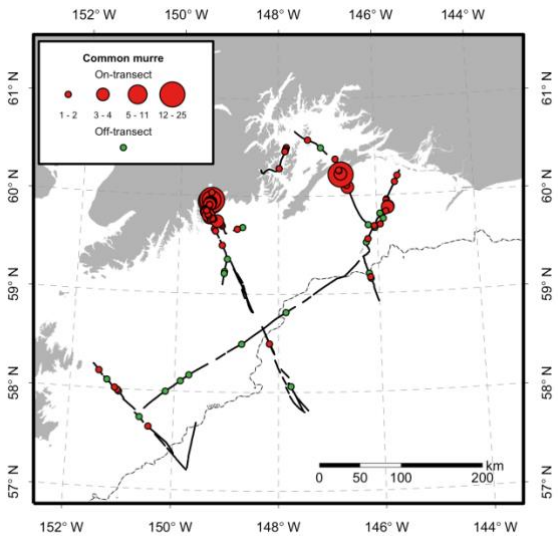

Figure 15. Common murre distribution

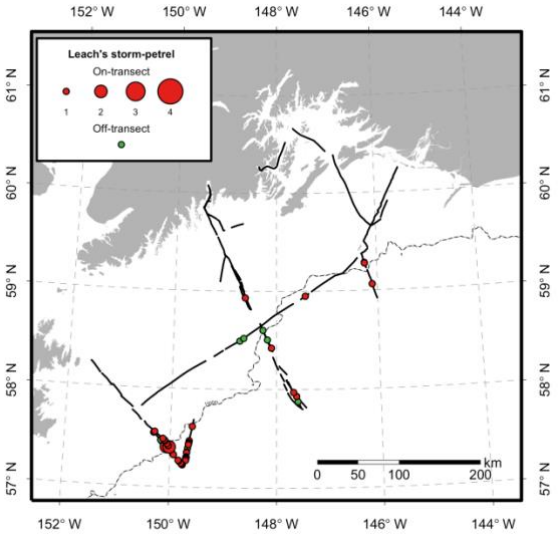

Figure 16. Leach's storm-petrel distribution.

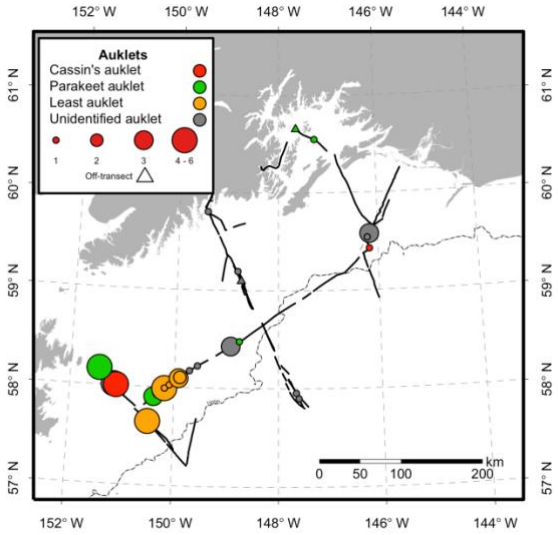

Figure 17. Auklet distribution.

Figure 18. Manx shearwater (photo by D. Cushing)

Figure 19. Black-footed x Laysan albatross hybrid with alphanumeric auxiliary leg band (photo by D. Cushing). The bird was banded at Midway Atoll as a chick in 2020.

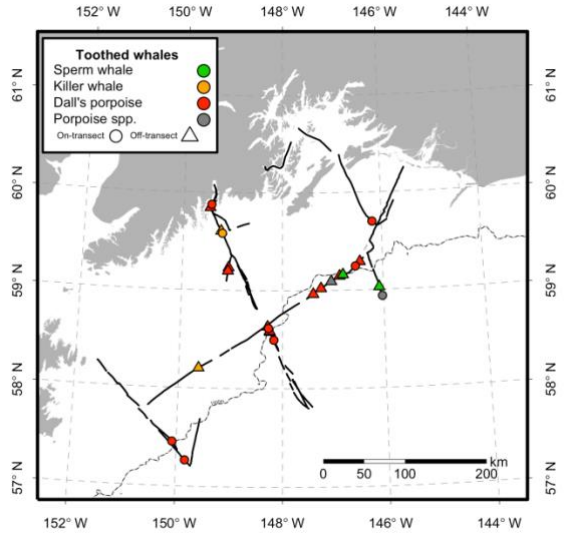

Figure 20. Toothed whale distribution.

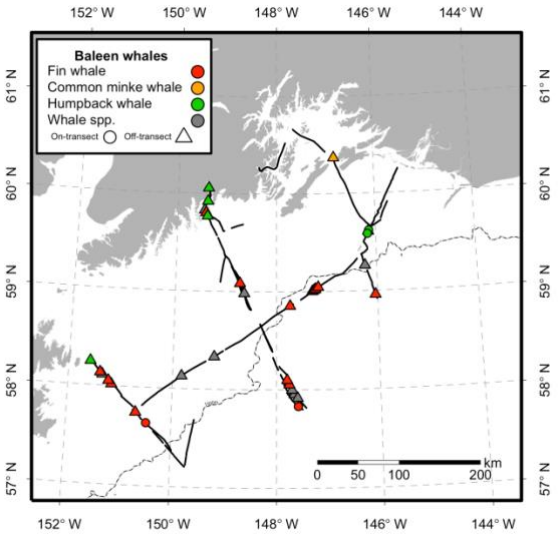

Figure 21. Baleen whale distribution.

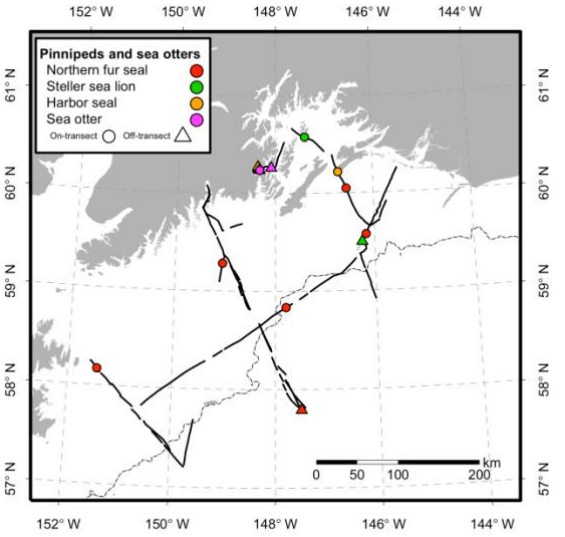

Figure 22. Distribution of pinnipeds and sea

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

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
6/27/2021 15:26:13	6/27/2021 7:26:13	Ship	startCruise	NaN	NaN	NaN	60.09288	-149.431		eRoth1	
6/27/2021 16:21:59	6/27/2021 8:21:59	ISIIS-DPI	deploy	NaN	RES bay	NaN	60.0913	-149.427		rHopcroft1	
6/27/2021 16:47:40	6/27/2021 8:47:40	PCO2	start	NaN	NaN	NaN	60.07329	-149.397		bMcKiernan1	
6/27/2021 16:48:49	6/27/2021 8:48:49	UNCSW	start	NaN	NaN	NaN	60.0719	-149.396		bMcKiernan1	
6/27/2021 16:49:09	6/27/2021 8:49:09	EM302	start	NaN	NaN	NaN	60.0715	-149.396		bMcKiernan1	
6/27/2021 17:55:59	6/27/2021 9:55:59	ISSIS Wall mount	start	NaN	NaN	NaN	59.9865	-149.359		bMcKiernan1	Started flow for Wall mount ISSIIS
6/27/2021 18:54:35	6/27/2021 10:54:35	ISIIS-DPI	recover		Res Bay	1	59.91804	-149.4		rHopcroft1	It worked
6/27/2021 19:47:59	6/27/2021 11:47:59	Mooring	deploy	NaN	CEOT	NaN	59.9133	-149.353	47	sDanielson1	CEO Tripod camera test
6/27/2021 19:52:07	6/27/2021 11:52:07	centerBoard	deploy	NaN	NaN	NaN	59.9133	-149.353		bMcKiernan1	Center board deployed
6/27/2021 19:54:20	6/27/2021 11:54:20	ADCP WH300	start	NaN	NaN	NaN	59.9133	-149.353		bMcKiernan1	WH300 recording
6/27/2021 22:13:07	6/27/2021 14:13:07	ISIIS-DPI	deploy	NaN	RES Bay	2	59.92242	-149.377		rHopcroft1	Removed camera housing prior to this deployment
		ISIIS-DPI	recover		RES Bay					rHopcroft1	
6/28/2021 0:43:12	6/27/2021 16:43:12	CalVet net	deploy	NaN	RES2.5	1	60.02584	-149.358	295	rHopcroft1	
6/28/2021 0:47:59	6/27/2021 16:47:59	CalVet net	recover	NaN	RES2.5	1	60.02578	-149.358	295	rHopcroft1	
6/28/2021 1:24:59	6/27/2021 17:24:59	CTD911	deploy	Seward	RES2.5	1	60.02523	-149.357	294	sDanielson1	
6/28/2021 2:04:41	6/27/2021 18:04:41	CTD911	recover	Seward	RES2.5	1	60.02496	-149.358	294	sDanielson1	
6/28/2021 2:24:30	6/27/2021 18:24:30	CalVet net	deploy	NaN	RES2.5	1A	60.02537	-149.357	294	rHopcroft1	For live photos
6/28/2021 2:30:01	6/27/2021 18:30:01	CalVet net	recover	NaN	RES2.5	1A	60.02597	-149.357	294	rHopcroft1	
6/28/2021 4:03:59	6/27/2021 20:03:59	CalVet net	deploy	NaN	GAK1	2	59.84548	-149.466	268	rHopcroft1	
6/28/2021 4:08:59	6/27/2021 20:08:59	CalVet net	recover	NaN	GAK1	2	59.84549	-149.466	268	rHopcroft1	
6/28/2021 4:24:14	6/27/2021 20:24:14	CTD911	deploy	Seward	GAK1	2	59.84543	-149.466	268	sDanielson1	
6/28/2021 4:58:36	6/27/2021 20:58:36	CTD911	recover	Seward	GAK1	2	59.84554	-149.466	268	sDanielson1	Conductivity Cells had offset of 0.06-0.07
6/28/2021 18:01:28	6/28/2021 10:01:28	Incubator SW	start	NaN	NaN	NaN	60.08922	-149.413		bMcKiernan1	Incubator pump online
6/28/2021 18:38:35	6/28/2021 10:38:35	CTD911	other	NaN	NaN	NaN	60.0894	-149.415		bMcKiernan1	Installed new conductivity sensor on Primary input, Installed S
6/28/2021 20:22:00	6/28/2021 12:22:00	ISIIS-DPI	deploy	NaN	ResBay	NaN	60.08578	-149.416		rHopcroft1	
6/28/2021 20:48:17	6/28/2021 12:48:17	ISIIS-DPI	recover	NaN	ResBay	NaN	60.06075	-149.386		rHopcroft1	
6/29/2021 2:11:24	6/28/2021 18:11:24	EK80	start	NaN	NaN	NaN	59.92367	-149.401		eRoth1	
6/29/2021 2:19:28	6/28/2021 18:19:28	ISIIS-DPI	deploy	NaN	ResBay	NaN	59.92309	-149.401	259	rHopcroft1	
6/29/2021 3:11:27	6/28/2021 19:11:27	ISIIS-DPI	recover	NaN	ResBay	NaN	59.85953	-149.462	259	rHopcroft1	
6/29/2021 4:17:40	6/28/2021 20:17:40	UNCSW	service	NaN	NaN	NaN	59.85821	-149.422		bMcKiernan1	Swapped strainer filter
6/29/2021 4:23:53	6/28/2021 20:23:53	ISIIS-DPI	deploy	GAK	GAK01	NaN	59.859	-149.425	259	rHopcroft1	
6/29/2021 16:23:37	6/29/2021 8:23:37	ISIIS-DPI	recover	GAK	GAK06i	NaN	59.03623	-148.665	217	rHopcroft1	
6/29/2021 17:36:23	6/29/2021 9:36:23	CTD911	deploy	Seward	GEO cal	3	59.01524	-148.679	232	sDanielson1	GEO Calibration

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
6/29/2021 18:01:51	6/29/2021 10:01:51	CTD911	recover	Seward	GEO cal	3	59.01467	-148.677	232	sDanielson1	GEO Calibration
6/29/2021 18:59:46	6/29/2021 10:59:46	Mooring	recover	NaN	GEO1-20	NaN	59.00681	-148.693		pShipton1	
6/29/2021 20:30:01	6/29/2021 12:30:01	Mooring	recover	NaN	GEO2-20	NaN	59.00496	-148.711		pShipton1	
6/29/2021 21:07:01	6/29/2021 13:07:01	Trace Metal Cast	deploy	GAK	GEO	TM01	59.00791	-148.712	232	aAguilarIslas1	
6/29/2021 21:28:01	6/29/2021 13:28:01	Trace Metal Cast	recover	GAK	GEO	TM01	59.00638	-148.713	232	aAguilarIslas1	
6/29/2021 23:07:01	6/29/2021 15:07:01	Mooring	deploy	NaN	GEO3-21	NaN	59.01101	-148.684		pShipton1	
6/30/2021 0:36:01	6/29/2021 16:36:01	Mooring	deploy	NaN	GEO1-21	NaN	59.01355	-148.691		pShipton1	
6/30/2021 3:06:01	6/29/2021 19:06:01	Mooring	deploy	NaN	GEO2-21	NaN	59.01245	-148.687		pShipton1	
6/30/2021 4:26:38	6/29/2021 20:26:38	ISIIS-DPI	deploy	NaN	GAK06i	2	59.05422	-148.706		rHopcroft1	
6/30/2021 5:10:27	6/29/2021 21:10:27	UNCSW	service	NaN	NaN	NaN	59.01024	-148.703		bMcKiernan1	Swapped filter
6/30/2021 10:51:00	6/30/2021 2:51:00	EM302	stop	NaN	NaN	NaN	58.54864	-148.277		bMcKiernan1	Stopped logging once over the shelf in 1000 meters of water.
6/30/2021 17:02:00	6/30/2021 9:02:00	ISIIS-DPI	recover	GAK	GAK13		58.07333	-147.848		rHopcroft1	recovered coincident with loss of ship's power
6/30/2021 21:05:01	6/30/2021 13:05:01	Neutrally Buoyant Sediment Trap	deploy	GAK	GAK15		57.78822	-147.508	4435	tKelly1	4 depths
6/30/2021 21:51:01	6/30/2021 13:51:01	CTD911	deploy	Seward	GAK15 prod	4	57.7915	-147.5	4490	sDanielson1	
6/30/2021 22:47:31	6/30/2021 14:47:31	CTD911	recover	Seward	GAK15 prod	4	57.79195	-147.5	4490	sDanielson1	
6/30/2021 23:05:57	6/30/2021 15:05:57	CalVet net	deploy	GAK	GAK15	3	57.79189	-147.5	4520	rHopcroft1	
6/30/2021 23:11:45	6/30/2021 15:11:45	CalVet net	recover	GAK	GAK15	3	57.79184	-147.5	4520	rHopcroft1	
6/30/2021 23:25:21	6/30/2021 15:25:21	CalVet net	deploy	GAK	GAK15	3A	57.79175	-147.5	4520	rHopcroft1	
6/30/2021 23:31:03	6/30/2021 15:31:03	CalVet net	recover	GAK	GAK15	3A	57.79174	-147.5	4520	rHopcroft1	
6/30/2021 23:53:01	6/30/2021 15:53:01	Trace Metal Cast	deploy	GAK	GAK15	TM02	57.79178	-147.5		anOther	
7/1/2021 0:57:26	6/30/2021 16:57:26	Trace Metal Cast	recover	GAK	GAK15	TM02	57.78958	-147.497		aAguilarIslas1	
7/1/2021 1:12:01	6/30/2021 17:12:01	CTD911	deploy	Seward	GAK15	5	57.78917	-147.496	4607	sDanielson1	
7/1/2021 2:42:01	6/30/2021 18:42:01	CTD911	recover	Seward	GAK15	5	57.78653	-147.489	4607	sDanielson1	
7/1/2021 3:55:08	6/30/2021 19:55:08	multinet	deploy	NaN	gak15	1S	57.79148	-147.499	4520	rHopcroft1	vertical shallow
7/1/2021 4:06:14	6/30/2021 20:06:14	UNCSW	service	NaN	NaN	NaN	57.79067	-147.499		bMcKiernan1	Swapped strainer
7/1/2021 4:10:40	6/30/2021 20:10:40	multinet	recover	NaN	gak15	1S	57.79037	-147.498	4520	rHopcroft1	
7/1/2021 4:45:52	6/30/2021 20:45:52	multinet	deploy	NaN	gak15	1D	57.79104	-147.498	4058	rHopcroft1	deep vertical
7/1/2021 6:11:38	6/30/2021 22:11:38	multinet	recover	NaN	gak15	1D	57.79217	-147.497	4058	rHopcroft1	
7/1/2021 6:45:18	6/30/2021 22:45:18	IronFish	deploy	GAK	GAK15	NaN	57.79214	-147.497		aAguilarIslas1	
7/1/2021 7:04:14	6/30/2021 23:04:14	IronFish	recover	GAK	GAK15	NaN	57.77867	-147.528		aAguilarIslas1	
7/1/2021 7:40:37	6/30/2021 23:40:37	Methot Net	deploy	GAK	GAK15	1	57.77915	-147.526	4058	cSmoot1	
7/1/2021 8:03:53	7/1/2021 0:03:53	Methot Net	recover	GAK	GAK15	1	57.78488	-147.511	4058	cSmoot1	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author		Comment
7/1/2021 8:26:00	7/1/2021 0:26:00	multinet	deploy	GAK	gak15	1	57.78918	-147.503	4470	cSmoot1	mnt1	
7/1/2021 9:01:28	7/1/2021 1:01:28	multinet	recover	GAK	gak15	1	57.8059	-147.49	4447	cSmoot1		
7/1/2021 10:23:01	7/1/2021 2:23:01	Methot Net	deploy	GAK	gak14	2	57.93975	-147.644	2848	cSmoot1		
7/1/2021 10:43:01	7/1/2021 2:43:01	Methot Net	recover	GAK	gak14	2	57.9516	-147.658	2848	cSmoot1		
7/1/2021 10:59:46	7/1/2021 2:59:46	multinet	deploy	GAK	gak14	2	57.9522	-147.656	2862	cSmoot1	MNT 2	
7/1/2021 11:38:28	7/1/2021 3:38:28	multinet	recover	GAK	gak14	2	57.93113	-147.638	2862	cSmoot1		
7/1/2021 12:53:02	7/1/2021 4:53:02	Methot Net	deploy	GAK	GAK13	3	58.08803	-147.783	2055	cSmoot1		
7/1/2021 13:14:02	7/1/2021 5:14:02	Methot Net	recover	GAK	GAK13	3	58.10049	-147.795	2056	cSmoot1		
7/1/2021 13:30:54	7/1/2021 5:30:54	multinet	deploy	GAK	gak13	3	58.10466	-147.799	2028	cSmoot1	MNT3	
7/1/2021 14:06:36	7/1/2021 6:06:36	multinet	recover	GAK	gak13	3	58.08438	-147.781	2028	cSmoot1		
7/1/2021 16:00:57	7/1/2021 8:00:57	multinet	deploy	GAK	GAK15	1A	57.81308	-147.525	4261	cSmoot1	MNT1A MOLECULAR	
7/1/2021 16:35:51	7/1/2021 8:35:51	multinet	recover	GAK	GAK15	1A	57.7914	-147.508	4261	cSmoot1		
7/1/2021 17:35:02	7/1/2021 9:35:02	Neutrally Buoyant Sediment Trap	recover	GAK	GAK 15		57.81295	-147.424		tKelly1		
7/1/2021 19:00:30	7/1/2021 11:00:30	CalVet net	deploy	GAK	GAK14	4	57.94369	-147.651	2056	rHopcroft1		
7/1/2021 19:05:57	7/1/2021 11:05:57	CalVet net	recover	GAK	GAK14	4	57.94366	-147.651	3027	rHopcroft1		
7/1/2021 19:21:02	7/1/2021 11:21:02	CTD911	deploy	Seward	GAK14	6	57.94345	-147.653	3040	sDanielson1		
7/1/2021 20:53:05	7/1/2021 12:53:05	CTD911	recover	Seward	GAK14	6	57.94663	-147.653	3007	sDanielson1		
7/1/2021 22:13:02	7/1/2021 14:13:02	CalVet net	deploy	GAK	GAK13	5	58.09861	-147.796	3040	rHopcroft1		
7/1/2021 22:19:02	7/1/2021 14:19:02	CalVet net	recover	GAK	GAK13	5	58.09971	-147.797	3040	rHopcroft1		
7/1/2021 22:45:02	7/1/2021 14:45:02	CTD911	deploy	Seward	GAK13	7	58.10434	-147.801	2051	sDanielson1		
7/2/2021 0:12:27	7/1/2021 16:12:27	CTD911	recover	Seward	GAK13	7	58.12237	-147.816	1945	sDanielson1		
7/2/2021 0:25:59	7/1/2021 16:25:59	Trace Metal Cast	deploy	GAK	GAK13	TM03	58.12522	-147.818		aAguilarIslas1		
7/2/2021 1:24:53	7/1/2021 17:24:53	Trace Metal Cast	recover	GAK	GAK13	TM03	58.13642	-147.828		aAguilarIslas1		
7/2/2021 1:42:05	7/1/2021 17:42:05	IronFish	deploy	GAK	GAK13	NaN	58.13787	-147.828		aAguilarIslas1		
7/2/2021 2:00:07	7/1/2021 18:00:07	IronFish	recover	GAK	GAK13	NaN	58.14877	-147.797		aAguilarIslas1		
7/2/2021 3:03:02	7/1/2021 19:03:02	CalVet net	deploy	GAK	GAK12	6	58.24152	-147.934	2130	rHopcroft1		
7/2/2021 3:08:44	7/1/2021 19:08:44	CalVet net	recover	GAK	GAK12	6	58.24175	-147.936	2130	rHopcroft1		
7/2/2021 3:16:58	7/1/2021 19:16:58	CTD911	deploy	Seward	GAK12	8	58.24183	-147.939	2136	sDanielson1		
7/2/2021 3:55:01	7/1/2021 19:55:01	UNCSW	service	NaN	NaN	NaN	58.24029	-147.952		bMcKiernan1	Swapped strainer	
7/2/2021 4:40:03	7/1/2021 20:40:03	CTD911	recover	Seward	GAK12	8	58.23931	-147.97	2088	sDanielson1		
7/2/2021 4:59:47	7/1/2021 20:59:47	Methot Net	deploy	GAK	GAK12	4	58.24313	-147.978	3067	cSmoot1		
7/2/2021 5:23:02	7/1/2021 21:23:02	Methot Net	recover	GAK	GAK12	4	58.25515	-147.978	3067	cSmoot1		
7/2/2021 6:07:37	7/1/2021 22:07:37	multinet	deploy	gak	GAK12	4	58.24192	-147.932	3068	cSmoot1	MNT4	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
7/2/2021 6:45:10	7/1/2021 22:45:10	multinet	recover	gak	GAK12	4	58.26024	-147.932	2061	cSmoot1	
7/2/2021 8:03:02	7/2/2021 0:03:02	Methot Net	deploy	GAK	GAK11	5	58.37008	-148.064	1417	cSmoot1	
7/2/2021 8:26:02	7/2/2021 0:26:02	Methot Net	recover	GAK	GAK11	5	58.38946	-148.064	1419	cSmoot1	3 MINS LATE
7/2/2021 8:38:28	7/2/2021 0:38:28	multinet	deploy	gak	gak11	5	58.39738	-148.066	1422	cSmoot1	MNT5
7/2/2021 9:22:41	7/2/2021 1:22:41	multinet	recover	gak	gak11	5	58.43244	-148.079	1480	cSmoot1	
7/2/2021 10:14:02	7/2/2021 2:14:02	Methot Net	deploy	GAK	GAK10	6	58.51477	-148.198	1530	cSmoot1	
7/2/2021 10:34:02	7/2/2021 2:34:02	Methot Net	recover	GAK	GAK10	6	58.52685	-148.201	1530	cSmoot1	
7/2/2021 10:48:26	7/2/2021 2:48:26	multinet	deploy	GAK	GAK10	6	58.53525	-148.205	1532	cSmoot1	MNT6
7/2/2021 11:30:02	7/2/2021 3:30:02	multinet	recover	GAK	GAK10	6	58.55869	-148.219	1358	cSmoot1	MNT6
7/2/2021 12:00:37	7/2/2021 4:00:37	EM302	start	NaN	NaN	NaN	58.6187	-148.272		bMcKiernan1	LESS thsn 1000 meters water depth
7/2/2021 12:59:47	7/2/2021 4:59:47	Neutrally Buoyant Sediment Trap	deploy	GAK	GAK9		58.67599	-148.347		tKelly1	
7/2/2021 13:13:02	7/2/2021 5:13:02	Methot Net	deploy	GAK	GAK09	7	58.67226	-148.345	269	cSmoot1	
7/2/2021 13:33:02	7/2/2021 5:33:02	Methot Net	recover	GAK	GAK09	7	58.6623	-148.336	269	cSmoot1	
7/2/2021 13:55:02	7/2/2021 5:55:02	multinet	deploy	GAK	GAK09	7	58.66266	-148.338	269	cSmoot1	MNT7
7/2/2021 14:42:02	7/2/2021 6:42:02	multinet	recover	GAK	GAK09	7	58.69115	-148.368	273	cSmoot1	MNT7
7/2/2021 14:59:09	7/2/2021 6:59:09	multinet	deploy	GAK	GAK09	7A	58.70304	-148.378	279	cSmoot1	MNT7A MOLECULAR
7/2/2021 15:34:35	7/2/2021 7:34:35	multinet	recover	GAK	GAK09	7A	58.68938	-148.357	281	cSmoot1	
7/2/2021 16:05:42	7/2/2021 8:05:42	CTD911	deploy	Seward	GAK9	9	58.68099	-148.35	276	sDanielson1	
7/2/2021 16:42:35	7/2/2021 8:42:35	CTD911	recover	Seward	GAK9	9	58.68115	-148.349	278	sDanielson1	
7/2/2021 16:56:02	7/2/2021 8:56:02	multinet	deploy	Seward	GAK9	2	58.68109	-148.349	278	rHopcroft1	vertical
7/2/2021 17:10:02	7/2/2021 9:10:02	multinet	recover	Seward	GAK9	2	58.68109	-148.35	278	rHopcroft1	
7/2/2021 17:30:14	7/2/2021 9:30:14	IronFish	deploy	GAK	GAK9	NaN	58.67964	-148.35		aAguilarIslas1	
7/2/2021 17:47:11	7/2/2021 9:47:11	IronFish	recover	GAK	GAK9	NaN	58.66213	-148.334		aAguilarIslas1	
7/2/2021 18:14:02	7/2/2021 10:14:02	CalVet net	deploy	Seward	GAK9	7	58.68043	-148.347	278	rHopcroft1	
7/2/2021 18:19:02	7/2/2021 10:19:02	CalVet net	recover	Seward	GAK9	7	58.68065	-148.346	278	rHopcroft1	NETS FOULED - BAD CAST
7/2/2021 18:34:32	7/2/2021 10:34:32	CalVet net	deploy	Seward	GAK9	7	58.67899	-148.35	278	rHopcroft1	REPEAT
7/2/2021 18:40:09	7/2/2021 10:40:09	CalVet net	recover	Seward	GAK9	7	58.67904	-148.35	278	rHopcroft1	
7/2/2021 18:52:02	7/2/2021 10:52:02	CalVet net	deploy	Seward	GAK9	7A	58.6793	-148.35	278	rHopcroft1	
7/2/2021 18:58:00	7/2/2021 10:58:00	CalVet net	recover	Seward	GAK9	7A	58.6793	-148.35	278	rHopcroft1	
7/2/2021 19:14:18	7/2/2021 11:14:18	Trace Metal Cast	deploy	GAK	GAK9	TM04	58.67944	-148.35		aAguilarIslas1	
7/2/2021 19:53:29	7/2/2021 11:53:29	Trace Metal Cast	abort	GAK	GAK9	TM04	58.67761	-148.344		aAguilarIslas1	
7/2/2021 19:54:01	7/2/2021 11:54:01	Trace Metal Cast	deploy	GAK	GAK9	TM05	58.67755	-148.344		aAguilarIslas1	
7/2/2021 20:16:19	7/2/2021 12:16:19	Trace Metal Cast	recover	GAK	GAK9	TM05	58.67555	-148.338		aAguilarIslas1	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author		Comment
7/2/2021 20:26:39	7/2/2021 12:26:39	CTD911	deploy	Seward	GAK9	10	58.67464	-148.335	278	pShipton1	prod	
7/2/2021 20:52:40	7/2/2021 12:52:40	CTD911	recover	Seward	GAK9	10	58.67301	-148.33	278	pShipton1	prod	
7/2/2021 22:04:02	7/2/2021 14:04:02	CalVet net	deploy	Seward	GAK10	8	58.54004	-148.214	1453	rHopcroft1		
7/2/2021 22:09:16	7/2/2021 14:09:16	CalVet net	recover	Seward	GAK10	8	58.54014	-148.213	1453	rHopcroft1		
7/2/2021 22:29:58	7/2/2021 14:29:58	CTD911	deploy	Seward	GAK10	11	58.54069	-148.212	1453	sDanielson1		
7/2/2021 23:54:10	7/2/2021 15:54:10	CTD911	recover	Seward	GAK10	11	58.54167	-148.213	1444	sDanielson1		
7/3/2021 1:03:47	7/2/2021 17:03:47	IronFish	deploy	GAK	GAK11	NaN	58.40328	-148.081		aAguilarIslas1		
7/3/2021 1:14:20	7/2/2021 17:14:20	IronFish	recover	GAK	GAK11	NaN	58.39181	-148.071		aAguilarIslas1		
7/3/2021 1:22:22	7/2/2021 17:22:22	CalVet net	deploy	Seward	GAK11	9	58.3884	-148.069	1453	rHopcroft1		
7/3/2021 1:27:19	7/2/2021 17:27:19	CalVet net	recover	Seward	GAK11	9	58.38837	-148.068	1414	rHopcroft1		
7/3/2021 1:41:01	7/2/2021 17:41:01	CTD911	deploy	Seward	GAK11	12	58.38805	-148.066	1417	sDanielson1		
7/3/2021 3:01:13	7/2/2021 19:01:13	CTD911	recover	Seward	GAK11	12	58.38543	-148.063	1422	sDanielson1		
7/3/2021 3:10:02	7/2/2021 19:10:02	Trace Metal Cast	deploy	GAK	GAK11	TM06	58.38517	-148.063		aAguilarIslas1		
7/3/2021 4:04:02	7/2/2021 20:04:02	Trace Metal Cast	recover	GAK	GAK11	TM06	58.38246	-148.062		aAguilarIslas1		
7/3/2021 4:42:35	7/2/2021 20:42:35	EM302	stop	NaN	NaN	NaN	58.4402	-148.129		bMcKiernan1	stopped logging in deeper water	
7/3/2021 5:41:19	7/2/2021 21:41:19	EM302	start	NaN	NaN	NaN	58.59449	-148.259		bMcKiernan1	less than 1000 meters water depth	
7/3/2021 6:59:47	7/2/2021 22:59:47	Neutrally Buoyant Sediment Trap	recover	GAK	GAK9		58.70865	-148.342		tKelly1		
7/3/2021 7:53:02	7/2/2021 23:53:02	Methot Net	deploy	GAK	GAK08	8	58.787	-148.444	282	cSmoot1		
7/3/2021 8:13:02	7/3/2021 0:13:02	Methot Net	recover	GAK	GAK08	8	58.79122	-148.462	282	cSmoot1		
7/3/2021 8:24:48	7/3/2021 0:24:48	multinet	deploy	GAK	GAK8	MNT8	58.79528	-148.471	282	cSmoot1		
7/3/2021 8:57:34	7/3/2021 0:57:34	multinet	recover	GAK	GAK8	MNT8	58.80525	-148.486	282	cSmoot1		
7/3/2021 9:12:55	7/3/2021 1:12:55	UNCSW	service	NaN	NaN	NaN	58.82295	-148.504		bMcKiernan1	Swapped filters	
7/3/2021 10:09:02	7/3/2021 2:09:02	Methot Net	deploy	GAK	GAK07	9	58.94665	-148.615	253	cSmoot1		
7/3/2021 10:29:41	7/3/2021 2:29:41	Methot Net	recover	GAK	GAK07	9	58.95756	-148.622	253	cSmoot1		
7/3/2021 10:39:14	7/3/2021 2:39:14	multinet	deploy	GAK	GAK07	9	58.96227	-148.626	248	cSmoot1	MNT9	
7/3/2021 11:15:35	7/3/2021 3:15:35	multinet	recover	GAK	GAK07	9	58.97896	-148.637	248	cSmoot1		
7/3/2021 12:13:01	7/3/2021 4:13:01	Methot Net	deploy	GAK	GAK06	10	59.09256	-148.753	167	cSmoot1		
7/3/2021 12:32:57	7/3/2021 4:32:57	Methot Net	recover	GAK	GAK06	10	59.10473	-148.76	167	cSmoot1		
7/3/2021 12:43:02	7/3/2021 4:43:02	multinet	deploy	GAK	GAK06	10	59.11078	-148.765	153	cSmoot1	MNT10	
7/3/2021 13:17:57	7/3/2021 5:17:57	multinet	recover	GAK	GAK06	10	59.13101	-148.784	146	cSmoot1		
7/3/2021 14:05:29	7/3/2021 6:05:29	Methot Net	deploy	GAK	GAK05	11	59.23637	-148.883	157	cSmoot1		
7/3/2021 14:25:09	7/3/2021 6:25:09	Methot Net	recover	GAK	GAK05	11	59.24885	-148.897	157	cSmoot1		
7/3/2021 14:36:47	7/3/2021 6:36:47	multinet	deploy	GAK	GAK05	11	59.25612	-148.905	165	cSmoot1	MNT11	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
7/3/2021 15:14:54	7/3/2021 7:14:54	multinet	recover	GAK	GAK05	11	59.28207	-148.931	168	cSmoot1	
7/3/2021 15:37:39	7/3/2021 7:37:39	multinet	deploy	GAK	GAK05	11A	59.2774	-148.923	175	cSmoot1	MNT11A MOLECULAR
7/3/2021 16:18:02	7/3/2021 8:18:02	multinet	recover	GAK	GAK05	11A	59.26036	-148.902	167	cSmoot1	MNT11A MOLECULAR
7/3/2021 16:30:17	7/3/2021 8:30:17	IronFish	deploy	GAK	GAK5	NaN	59.25571	-148.896		aAguilarIslas1	
7/3/2021 16:43:41	7/3/2021 8:43:41	IronFish	recover	GAK	GAK5	NaN	59.2421	-148.885		aAguilarIslas1	
7/3/2021 17:11:46	7/3/2021 9:11:46	CTD911	deploy	Seward	GAK5 prod	13	59.26276	-148.908	168	sDanielson1	
7/3/2021 17:44:53	7/3/2021 9:44:53	CTD911	recover	Seward	GAK5 prod	13	59.26297	-148.908	168	sDanielson1	
7/3/2021 17:50:41	7/3/2021 9:50:41	CalVet net	deploy	Seward	GAK5	10	59.26291	-148.908	168	rHopcroft1	
7/3/2021 17:56:25	7/3/2021 9:56:25	CalVet net	recover	Seward	GAK5	10	59.26285	-148.907	168	rHopcroft1	
7/3/2021 18:09:14	7/3/2021 10:09:14	CalVet net	deploy	Seward	GAK5	10A	59.26279	-148.907	168	rHopcroft1	
7/3/2021 18:14:05	7/3/2021 10:14:05	CalVet net	recover	Seward	GAK5	10A	59.26277	-148.907	168	rHopcroft1	
7/3/2021 18:29:52	7/3/2021 10:29:52	Trace Metal Cast	deploy	GAK	GAK5	TM07	59.26276	-148.907		aAguilarIslas1	
7/3/2021 18:49:44	7/3/2021 10:49:44	Trace Metal Cast	recover	GAK	GAK5	TM07	59.26264	-148.906		aAguilarIslas1	
7/3/2021 19:01:02	7/3/2021 11:01:02	multinet	deploy	Seward	GAK5	3	59.26255	-148.905	168	rHopcroft1	vertical
7/3/2021 19:12:49	7/3/2021 11:12:49	multinet	recover	Seward	GAK5	3	59.26249	-148.905	167	rHopcroft1	
7/3/2021 19:24:00	7/3/2021 11:24:00	CTD911	deploy	Seward	GAK5	14	59.26242	-148.904	167	sDanielson1	
7/3/2021 19:53:16	7/3/2021 11:53:16	CTD911	recover	Seward	GAK5	14	59.26188	-148.903	167	sDanielson1	
7/3/2021 20:08:02	7/3/2021 12:08:02	Neutrally Buoyant Sediment Trap	deploy	GAK	GAK5		59.26125	-148.902		tKelly1	
7/3/2021 21:20:38	7/3/2021 13:20:38	CalVet net	deploy	Seward	GAK6	11	59.11627	-148.768	150	rHopcroft1	
7/3/2021 21:26:11	7/3/2021 13:26:11	CalVet net	recover	Seward	GAK6	11	59.11627	-148.768	150	rHopcroft1	
7/3/2021 21:43:57	7/3/2021 13:43:57	CTD911	deploy	Seward	GAK6	15	59.11543	-148.766	150	sDanielson1	
7/3/2021 22:12:26	7/3/2021 14:12:26	CTD911	recover	Seward	GAK6	15	59.11378	-148.76	150	sDanielson1	
7/3/2021 23:17:50	7/3/2021 15:17:50	IronFish	deploy	GAK	GAK7	NaN	58.97591	-148.635		aAguilarIslas1	
7/3/2021 23:28:56	7/3/2021 15:28:56	IronFish	recover	GAK	GAK7	NaN	58.9636	-148.624		aAguilarIslas1	
7/3/2021 23:42:02	7/3/2021 15:42:02	CalVet net	deploy	Seward	GAK7	12	58.97175	-148.632	241	rHopcroft1	
7/3/2021 23:47:02	7/3/2021 15:47:02	CalVet net	recover	Seward	GAK7	12	58.97186	-148.632	241	rHopcroft1	
7/3/2021 23:55:02	7/3/2021 15:55:02	CTD911	deploy	Seward	GAK7	16	58.97201	-148.631	240	sDanielson1	
7/4/2021 0:27:02	7/3/2021 16:27:02	CTD911	recover	Seward	GAK7	16	58.97207	-148.632	240	sDanielson1	
7/4/2021 1:00:33	7/3/2021 17:00:33	Trace Metal Cast	deploy	GAK	GAK7	TM08	58.97163	-148.631		aAguilarIslas1	
7/4/2021 1:00:45	7/3/2021 17:00:45	Trace Metal Cast	recover	GAK	GAK7	TM08	58.97153	-148.631		aAguilarIslas1	
7/4/2021 2:12:59	7/3/2021 18:12:59	CalVet net	deploy	Seward	GAK8	13	58.80762	-148.499	290	rHopcroft1	
7/4/2021 2:18:56	7/3/2021 18:18:56	CalVet net	recover	Seward	GAK8	13	58.80741	-148.5	290	rHopcroft1	
7/4/2021 2:26:04	7/3/2021 18:26:04	CTD911	deploy	Seward	GAK8	17	58.8072	-148.5	290	sDanielson1	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
7/4/2021 3:03:37	7/3/2021 19:03:37	CTD911	recover	Seward	GAK8	17	58.80657	-148.503	290	sDanielson1	
7/4/2021 6:57:02	7/3/2021 22:57:02	Methot Net	deploy	GAK	GAK04	12	59.38622	-149.039	201	cSmoot1	
7/4/2021 7:17:28	7/3/2021 23:17:28	Methot Net	recover	GAK	GAK04	12	59.40197	-149.039	201	cSmoot1	
7/4/2021 7:26:02	7/3/2021 23:26:02	multinet	deploy	GAK	GAK04	12	59.40875	-149.039	199	cSmoot1	MNT12
7/4/2021 8:01:56	7/4/2021 0:01:56	multinet	recover	GAK	GAK04	12	59.42689	-149.046	197	cSmoot1	MNT12
7/4/2021 8:43:23	7/4/2021 0:43:23	UNCSW	service	NaN	NaN	NaN	59.50388	-149.144		bMcKiernan1	Swapped strainer
7/4/2021 8:57:45	7/4/2021 0:57:45	Methot Net	deploy	GAK	GAK03	13	59.52828	-149.168	211	cSmoot1	
7/4/2021 9:17:40	7/4/2021 1:17:40	Methot Net	recover	GAK	GAK03	13	59.54242	-149.178	212	cSmoot1	
7/4/2021 9:32:14	7/4/2021 1:32:14	multinet	deploy	GAK	GAK03	13	59.55085	-149.184	212	cSmoot1	MNT13
7/4/2021 10:15:11	7/4/2021 2:15:11	multinet	recover	GAK	GAK03	13	59.57521	-149.208	212	cSmoot1	
7/4/2021 11:04:17	7/4/2021 3:04:17	Methot Net	deploy	GAK	GAK02	14	59.67061	-149.308	217	cSmoot1	
7/4/2021 11:14:19	7/4/2021 3:14:19	Methot Net	recover	GAK	GAK02	14	59.67668	-149.315	217	cSmoot1	
7/4/2021 11:23:05	7/4/2021 3:23:05	multinet	deploy	GAK	GAK02	14	59.68187	-149.32	219	cSmoot1	MNT14
7/4/2021 12:01:10	7/4/2021 4:01:10	multinet	recover	GAK	GAK02	14	59.70095	-149.337	224	cSmoot1	
7/4/2021 12:53:18	7/4/2021 4:53:18	Methot Net	deploy	GAK	GAK01	15	59.81299	-149.443	276	cSmoot1	
7/4/2021 13:13:18	7/4/2021 5:13:18	Methot Net	recover	GAK	GAK01	15	59.82553	-149.451	276	cSmoot1	
7/4/2021 13:24:06	7/4/2021 5:24:06	multinet	deploy	GAK	GAK01	15	59.83145	-149.456	274	cSmoot1	MNT15
7/4/2021 14:01:43	7/4/2021 6:01:43	multinet	recover	GAK	GAK01	15	59.84937	-149.472	270	cSmoot1	
7/4/2021 14:15:49	7/4/2021 6:15:49	multinet	deploy	GAK	GAK01	15A	59.85746	-149.477	266	cSmoot1	MNT15A MOLECULAR
7/4/2021 14:55:27	7/4/2021 6:55:27	multinet	recover	GAK	GAK01	15A	59.83766	-149.462	266	cSmoot1	
7/4/2021 15:05:29	7/4/2021 7:05:29	IronFish	deploy	GAK	GAK1	NaN	59.83777	-149.463		aAguilarIslas1	
7/4/2021 15:19:51	7/4/2021 7:19:51	IronFish	recover	GAK	GAK1	NaN	59.85348	-149.476		aAguilarIslas1	
7/4/2021 15:39:02	7/4/2021 7:39:02	multinet	deploy	GAK	GAK01	4S	59.84552	-149.466	266	cSmoot1	vertical
7/4/2021 15:54:14	7/4/2021 7:54:14	multinet	recover	GAK	GAK01	4S	59.84547	-149.466	266	cSmoot1	
7/4/2021 16:21:54	7/4/2021 8:21:54	CTD911	deploy	Seward	GAK1	18	59.84546	-149.466	268	sDanielson1	
7/4/2021 16:46:27	7/4/2021 8:46:27	CTD911	recover	Seward	GAK1	18	59.84535	-149.467	268	sDanielson1	
7/4/2021 16:55:10	7/4/2021 8:55:10	Trace Metal Cast	deploy	GAK	GAK1	TM09	59.84528	-149.467		aAguilarIslas1	
7/4/2021 17:17:33	7/4/2021 9:17:33	Trace Metal Cast	recover	GAK	GAK1	TM09	59.84511	-149.468		aAguilarIslas1	
7/4/2021 17:28:00	7/4/2021 9:28:00	CalVet net	deploy	GAK	GAK01	14	59.84507	-149.469	266	rHopcroft1	
7/4/2021 17:32:40	7/4/2021 9:32:40	CalVet net	recover	GAK	GAK01	14	59.84505	-149.469	266	rHopcroft1	
7/4/2021 17:45:49	7/4/2021 9:45:49	CalVet net	deploy	GAK	GAK01	14A	59.84495	-149.469	266	rHopcroft1	
7/4/2021 17:50:59	7/4/2021 9:50:59	CalVet net	recover	GAK	GAK01	14A	59.84493	-149.469	266	rHopcroft1	
7/4/2021 18:06:18	7/4/2021 10:06:18	CTD911	deploy	Seward	GAK1	19	59.84482	-149.47	268	sDanielson1	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
7/4/2021 18:40:47	7/4/2021 10:40:47	CTD911	recover	Seward	GAK1	19	59.84462	-149.471	270	sDanielson1	
7/4/2021 19:38:34	7/4/2021 11:38:34	CTD911	deploy	Seward	GAK1i	20	59.76773	-149.395	259	sDanielson1	
7/4/2021 19:53:16	7/4/2021 11:53:16	CTD911	recover	Seward	Gak1i	20	59.76788	-149.392	259	sDanielson1	3 bottom bottles for deep water
7/4/2021 20:37:25	7/4/2021 12:37:25	CalVet net	deploy	GAK	GAK02	15	59.69147	-149.327	225	rHopcroft1	
7/4/2021 20:42:05	7/4/2021 12:42:05	CalVet net	recover	GAK	GAK02	15	59.69138	-149.327	225	rHopcroft1	
7/4/2021 21:07:23	7/4/2021 13:07:23	CTD911	deploy	Seward	GAK2	21	59.69135	-149.327	225	sDanielson1	
7/4/2021 21:43:46	7/4/2021 13:43:46	CTD911	recover	Seward	GAK2	21	59.69143	-149.327	225	sDanielson1	
7/4/2021 22:32:05	7/4/2021 14:32:05	CTD911	deploy	Seward	GAK2i	22	59.62667	-149.258	212	sDanielson1	
7/4/2021 22:48:40	7/4/2021 14:48:40	CTD911	recover	Seward	GAK2i	22	59.62665	-149.258	212	sDanielson1	
7/4/2021 23:21:20	7/4/2021 15:21:20	IronFish	deploy	GAK	GAK3	NaN	59.56913	-149.2		aAguilarIslas1	
7/4/2021 23:21:29	7/4/2021 15:21:29	IronFish	deploy	GAK	GAK3	NaN	59.56907	-149.2		aAguilarIslas1	
7/4/2021 23:30:44	7/4/2021 15:30:44	IronFish	recover	GAK	GAK3	NaN	59.55915	-149.192		aAguilarIslas1	
7/4/2021 23:42:35	7/4/2021 15:42:35	CalVet net	deploy	GAK	GAK03	16	59.55293	-149.184	211	rHopcroft1	
7/4/2021 23:47:50	7/4/2021 15:47:50	CalVet net	recover	GAK	GAK03	16	59.55256	-149.182	211	rHopcroft1	
7/5/2021 0:00:59	7/4/2021 16:00:59	CTD911	deploy	Seward	GAK3	23	59.55212	-149.181	211	sDanielson1	
7/5/2021 0:30:08	7/4/2021 16:30:08	CTD911	recover	Seward	Gak3	23	59.55098	-149.179	210	sDanielson1	
7/5/2021 0:38:02	7/4/2021 16:38:02	Trace Metal Cast	deploy	GAK	GAK3	TM10	59.55057	-149.178		aAguilarIslas1	
7/5/2021 0:56:02	7/4/2021 16:56:02	Trace Metal Cast	recover	GAK	GAK3	TM10	59.55046	-149.178		aAguilarIslas1	
7/5/2021 1:44:19	7/4/2021 17:44:19	CTD911	deploy	Seward	GAK3i	24	59.482	-149.119	203	sDanielson1	
7/5/2021 1:52:51	7/4/2021 17:52:51	CTD911	recover	Seward	GAK3i	24	59.48176	-149.118	204	sDanielson1	
7/5/2021 2:34:24	7/4/2021 18:34:24	CalVet net	deploy	GAK	GAK04	17	59.40805	-149.052	200	rHopcroft1	
7/5/2021 2:40:02	7/4/2021 18:40:02	CalVet net	recover	GAK	GAK04	17	59.40798	-149.052	200	rHopcroft1	nets fouled - need to recast
7/5/2021 2:49:29	7/4/2021 18:49:29	CTD911	deploy	Seward	GAK4	25	59.40857	-149.052	200	sDanielson1	
7/5/2021 3:20:06	7/4/2021 19:20:06	CTD911	recover	Seward	GAK4	25	59.40858	-149.052	200	sDanielson1	
7/5/2021 3:22:53	7/4/2021 19:22:53	CalVet net	deploy	GAK	GAK04	17	59.40858	-149.051	200	rHopcroft1	REPEAT
7/5/2021 3:28:11	7/4/2021 19:28:11	CalVet net	recover	GAK	GAK04	17	59.40855	-149.052	200	rHopcroft1	
7/5/2021 4:30:02	7/4/2021 20:30:02	Neutrally Buoyant Sediment Trap	recover	GAK	GAK5		59.34125	-149.032		tKelly1	
7/5/2021 6:49:01	7/4/2021 22:49:01	UNCSW	service	NaN	NaN	NaN	58.9502	-149.165		bMcKiernan1	swapped filter
7/5/2021 14:12:54	7/5/2021 6:12:54	EM302	stop	NaN	NaN	NaN	57.61983	-149.591		bMcKiernan1	stopped logging once over mapped area, will return recording
7/5/2021 14:38:40	7/5/2021 6:38:40	EM302	start	NaN	NaN	NaN	57.54567	-149.617		bMcKiernan1	Started logging once back over missing mapserver areas
7/5/2021 15:07:34	7/5/2021 7:07:34	EM302	stop	NaN	NaN	NaN	57.46249	-149.646		bMcKiernan1	Stopped logging once in surveyed areas
7/5/2021 16:32:31	7/5/2021 8:32:31	IronFish	deploy	KOD	KOD10	NaN	57.2224	-149.715		aAguilarIslas1	
7/5/2021 16:46:43	7/5/2021 8:46:43	IronFish	recover	KOD	KOD10	NaN	57.206	-149.72		aAguilarIslas1	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
7/5/2021 16:58:36	7/5/2021 8:58:36	CTD911	deploy	Kodiak	KOD10	26	57.20542	-149.72	2519	sDanielson1	
7/5/2021 17:37:03	7/5/2021 9:37:03	CTD911	recover	Kodiak	KOD10	26	57.20553	-149.719	2520	sDanielson1	
7/5/2021 17:43:30	7/5/2021 9:43:30	CalVet net	deploy	KOD	KOD10	18	57.2054	-149.719	2520	rHopcroft1	
7/5/2021 17:49:19	7/5/2021 9:49:19	CalVet net	recover	KOD	KOD10	18	57.20541	-149.719	2520	rHopcroft1	
7/5/2021 18:02:53	7/5/2021 10:02:53	CalVet net	deploy	KOD	KOD10	18A	57.20531	-149.719	2520	rHopcroft1	GENETICS
7/5/2021 18:08:09	7/5/2021 10:08:09	CalVet net	recover	KOD	KOD10	18A	57.20506	-149.721	2520	rHopcroft1	
7/5/2021 18:28:39	7/5/2021 10:28:39	Trace Metal Cast	deploy	KOD	KOD10	TM11	57.2049	-149.722		aAguilarIslas1	
7/5/2021 19:30:31	7/5/2021 11:30:31	CTD911	deploy	Kodiak	KOD10	27	57.20425	-149.726	2493	sDanielson1	
7/5/2021 21:00:00	7/5/2021 13:00:00	CTD911	recover	Kodiak	KOD10	27	57.20471	-149.725	2495	sDanielson1	
7/5/2021 21:31:39	7/5/2021 13:31:39	Trace Metal Cast	abort	KOD	KOD10	TM11	57.20539	-149.722		aAguilarIslas1	
7/5/2021 21:32:05	7/5/2021 13:32:05	Trace Metal Cast	deploy	KOD	KOD10	TM12	57.2054	-149.722		aAguilarIslas1	
7/5/2021 22:05:15	7/5/2021 14:05:15	Trace Metal Cast	recover	KOD	KOD10	TM12	57.20542	-149.721		aAguilarIslas1	
7/5/2021 23:04:17	7/5/2021 15:04:17	CalVet net	deploy	KOD	KOD9	19	57.32143	-149.928	1307	rHopcroft1	
7/5/2021 23:09:53	7/5/2021 15:09:53	CalVet net	recover	KOD	KOD9	19	57.32145	-149.928	1307	rHopcroft1	
7/5/2021 23:22:19	7/5/2021 15:22:19	CTD911	deploy	Kodiak	KOD9	28	57.32156	-149.927	1308	sDanielson1	
7/6/2021 0:40:01	7/5/2021 16:40:01	CTD911	recover	Kodiak	KOD9	28	57.32203	-149.926	1308	sDanielson1	
7/6/2021 1:40:15	7/5/2021 17:40:15	IronFish	deploy	KOD	KOD8	NaN	57.42705	-150.109		aAguilarIslas1	
7/6/2021 1:51:28	7/5/2021 17:51:28	IronFish	recover	KOD	KOD8	NaN	57.43793	-150.13		aAguilarIslas1	
7/6/2021 1:58:41	7/5/2021 17:58:41	CalVet net	deploy	KOD	KOD8	20	57.43992	-150.133	711	rHopcroft1	
7/6/2021 2:04:09	7/5/2021 18:04:09	CalVet net	recover	KOD	KOD8	20	57.43998	-150.131	711	rHopcroft1	
7/6/2021 2:12:31	7/5/2021 18:12:31	CTD911	deploy	Kodiak	KOD8	29	57.44003	-150.129	715	sDanielson1	
7/6/2021 2:59:03	7/5/2021 18:59:03	Trace Metal Cast	deploy	KOD	KOD8	TM13	57.4402	-150.125		aAguilarIslas1	
7/6/2021 3:06:50	7/5/2021 19:06:50	CTD911	recover	Kodiak	KOD8	29	57.44041	-150.126	735	sDanielson1	
7/6/2021 3:59:33	7/5/2021 19:59:33	Trace Metal Cast	recover	KOD	KOD8	TM13	57.44056	-150.128		aAguilarIslas1	
7/6/2021 3:59:48	7/5/2021 19:59:48	UNCSW	service	NaN	NaN	NaN	57.44056	-150.128		bMcKiernan1	swapped filter
7/6/2021 5:07:11	7/5/2021 21:07:11	CalVet net	deploy	KOD	KOD7	21	57.55563	-150.337	184	rHopcroft1	
7/6/2021 5:12:41	7/5/2021 21:12:41	CalVet net	recover	KOD	KOD7	21	57.55552	-150.337	184	rHopcroft1	
7/6/2021 5:20:14	7/5/2021 21:20:14	CTD911	deploy	Kodiak	KOD7	30	57.55544	-150.336	185	sDanielson1	
7/6/2021 5:50:12	7/5/2021 21:50:12	CTD911	recover	Kodiak	KOD7	30	57.55599	-150.336	185	sDanielson1	
7/6/2021 6:05:02	7/5/2021 22:05:02	Bongo Net	deploy	KOD	KOD07	1	57.55809	-150.339	185	cSmoot1	BON01
7/6/2021 6:10:17	7/5/2021 22:10:17	Bongo Net	maxDepth	KOD	KOD07	1	57.55811	-150.342	185	cSmoot1	
7/6/2021 6:16:11	7/5/2021 22:16:11	Bongo Net	recover	KOD	KOD07	1	57.55825	-150.345	177	cSmoot1	
7/6/2021 6:28:03	7/5/2021 22:28:03	Methot Net	deploy	KOD	KOD07	16	57.5585	-150.344	174	cSmoot1	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
7/6/2021 6:48:11	7/5/2021 22:48:11	Methot Net	recover	KOD	KOD07	16	57.55037	-150.319	174	cSmoot1	
7/6/2021 7:41:16	7/5/2021 23:41:16	Methot Net	deploy	KOD	KOD08	17	57.45849	-150.168	574	cSmoot1	
7/6/2021 8:01:25	7/6/2021 0:01:25	Methot Net	recover	KOD	KOD08	17	57.45103	-150.151	661	cSmoot1	
7/6/2021 8:14:03	7/6/2021 0:14:03	Bongo Net	deploy	KOD	KOD08	2	57.44644	-150.142	672	cSmoot1	BON02
7/6/2021 8:23:33	7/6/2021 0:23:33	Bongo Net	maxDepth	KOD	KOD08	2	57.44476	-150.137	672	cSmoot1	
7/6/2021 8:33:50	7/6/2021 0:33:50	Bongo Net	recover	KOD	KOD08	2	57.44218	-150.132	672	cSmoot1	
7/6/2021 9:07:04	7/6/2021 1:07:04	EM302	stop	NaN	NaN	NaN	57.39073	-150.041		bMcKiernan1	stopped logging over previous mapped areas and over 1000 r
7/6/2021 9:36:03	7/6/2021 1:36:03	Methot Net	deploy	KOD	KOD09	18	57.34052	-149.96	1327	cSmoot1	
7/6/2021 9:56:03	7/6/2021 1:56:03	Methot Net	recover	KOD	KOD09	18	57.33128	-149.95	1325	cSmoot1	
7/6/2021 10:08:57	7/6/2021 2:08:57	Bongo Net	deploy	KOD	KOD09	3	57.3253	-149.94	1327	cSmoot1	BON03
7/6/2021 10:17:50	7/6/2021 2:17:50	Bongo Net	maxDepth	KOD	KOD09	3	57.32401	-149.938	1320	cSmoot1	
7/6/2021 10:27:03	7/6/2021 2:27:03	Bongo Net	recover	KOD	KOD09	3	57.32249	-149.935	1320	cSmoot1	
7/6/2021 11:32:03	7/6/2021 3:32:03	Methot Net	deploy	KOD	KOD10	19	57.22229	-149.749	2383	cSmoot1	
7/6/2021 11:57:03	7/6/2021 3:57:03	Methot Net	recover	KOD	KOD10	19	57.21073	-149.731	2382	cSmoot1	
7/6/2021 12:01:25	7/6/2021 4:01:25	Bongo Net	deploy	KOD	KOD10	4	57.20929	-149.728	2398	cSmoot1	BON04
7/6/2021 12:08:41	7/6/2021 4:08:41	Bongo Net	maxDepth	KOD	KOD10	4	57.20795	-149.725	2398	cSmoot1	
7/6/2021 12:16:30	7/6/2021 4:16:30	Bongo Net	recover	KOD	KOD10	4	57.20592	-149.722	2398	cSmoot1	
7/6/2021 16:08:24	7/6/2021 8:08:24	Methot Net	deploy	KOD	KOD06	20	57.65882	-150.507	98	cSmoot1	
7/6/2021 16:28:23	7/6/2021 8:28:23	Methot Net	recover	KOD	KOD06	20	57.66494	-150.536	92	cSmoot1	
7/6/2021 16:38:59	7/6/2021 8:38:59	Bongo Net	deploy	KOD	KOD06	5	57.66755	-150.544	99	cSmoot1	BON05
7/6/2021 16:40:59	7/6/2021 8:40:59	Bongo Net	abort	KOD	KOD06	5	57.66809	-150.546	99	cSmoot1	
7/6/2021 16:53:12	7/6/2021 8:53:12	Bongo Net	deploy	KOD	KOD06	5	57.66854	-150.551	99	cSmoot1	BON05 RECAST
7/6/2021 16:56:31	7/6/2021 8:56:31	Bongo Net	maxDepth	KOD	KOD06	5	57.66717	-150.552	99	cSmoot1	
7/6/2021 17:02:21	7/6/2021 9:02:21	Bongo Net	recover	KOD	KOD06	5	57.66448	-150.554	99	cSmoot1	
7/6/2021 17:33:55	7/6/2021 9:33:55	CTD911	deploy	Kodiak	KOD6	31	57.67131	-150.551	100	sDanielson1	
7/6/2021 17:55:33	7/6/2021 9:55:33	CTD911	recover	Kodiak	KOD6	31	57.67169	-150.554	100	sDanielson1	
7/6/2021 18:02:03	7/6/2021 10:02:03	CalVet net	deploy	KOD	KOD6	22	57.67182	-150.555	100	rHopcroft1	
7/6/2021 18:07:07	7/6/2021 10:07:07	CalVet net	recover	KOD	KOD6	22	57.67183	-150.555	100	rHopcroft1	
7/6/2021 19:07:40	7/6/2021 11:07:40	IronFish	deploy	KOD	KOD5	NaN	57.77106	-150.743		aAguilarIslas1	
7/6/2021 19:07:43	7/6/2021 11:07:43	IronFish	deploy	KOD	KOD5	NaN	57.77108	-150.743		aAguilarIslas1	
7/6/2021 19:19:50	7/6/2021 11:19:50	IronFish	recover	KOD	KOD5	NaN	57.78301	-150.761		aAguilarIslas1	
7/6/2021 19:30:03	7/6/2021 11:30:03	Neutrally Buoyant Sediment Trap	deploy	KOD	KOD5		57.78702	-150.763		tKelly1	
7/6/2021 19:46:40	7/6/2021 11:46:40	CTD911	deploy	Kodiak	KOD5	32	57.79058	-150.76	88	sDanielson1	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
7/6/2021 20:11:31	7/6/2021 12:11:31	CTD911	recover	Kodiak	KOD5	32	57.79075	-150.759	88	sDanielson1	
7/6/2021 20:14:53	7/6/2021 12:14:53	CalVet net	deploy	KOD	KOD5	23	57.79079	-150.759	89	rHopcroft1	
7/6/2021 20:19:44	7/6/2021 12:19:44	CalVet net	recover	KOD	KOD5	23	57.79089	-150.758	89	rHopcroft1	
7/6/2021 20:37:12	7/6/2021 12:37:12	CalVet net	deploy	KOD	KOD5	23A	57.79119	-150.755	89	rHopcroft1	GENETICS
7/6/2021 20:42:05	7/6/2021 12:42:05	CalVet net	recover	KOD	KOD5	23A	57.79138	-150.754	89	rHopcroft1	
7/6/2021 20:57:47	7/6/2021 12:57:47	Trace Metal Cast	deploy	KOD	KOD5	TM14	57.79207	-150.748		aAguilarIslas1	
7/6/2021 21:10:39	7/6/2021 13:10:39	Trace Metal Cast	recover	KOD	KOD5	TM14	57.79262	-150.744		aAguilarIslas1	
7/6/2021 21:20:48	7/6/2021 13:20:48	CTD911	deploy	Kodiak	KOD5	33	57.79319	-150.739	89	sDanielson1	
7/6/2021 21:43:00	7/6/2021 13:43:00	CTD911	recover	Kodiak	KOD5	33	57.79448	-150.729	87	sDanielson1	
7/6/2021 22:51:41	7/6/2021 14:51:41	CalVet net	deploy	KOD	KOD4	24	57.9004	-150.969	76	rHopcroft1	
7/6/2021 22:55:51	7/6/2021 14:55:51	CalVet net	recover	KOD	KOD4	24	57.90037	-150.967	76	rHopcroft1	
7/6/2021 23:06:31	7/6/2021 15:06:31	CTD911	deploy	Kodiak	KOD4	34	57.89986	-150.962	76	sDanielson1	
7/6/2021 23:25:33	7/6/2021 15:25:33	CTD911	recover	Kodiak	KOD4	34	57.89881	-150.952	77	sDanielson1	
7/7/2021 0:46:03	7/6/2021 16:46:03	CalVet net	deploy	KOD	KOD3	25	58.0153	-151.178	81	rHopcroft1	
7/7/2021 0:50:38	7/6/2021 16:50:38	CalVet net	recover	KOD	KOD3	25	58.01529	-151.175	81	rHopcroft1	78M
7/7/2021 0:58:17	7/6/2021 16:58:17	CTD911	deploy	Kodiak	KOD3	35	58.0153	-151.169	82	sDanielson1	
7/7/2021 1:16:03	7/6/2021 17:16:03	CTD911	recover	Kodiak	KOD3	35	58.01531	-151.161	82	sDanielson1	
7/7/2021 2:26:18	7/6/2021 18:26:18	IronFish	deploy	KOD	KOD2	NaN	58.11903	-151.361		aAguilarIslas1	
7/7/2021 2:37:04	7/6/2021 18:37:04	IronFish	recover	KOD	KOD2	NaN	58.12676	-151.376		aAguilarIslas1	
7/7/2021 2:49:46	7/6/2021 18:49:46	CalVet net	deploy	KOD	KOD2	26	58.1289	-151.385	124	rHopcroft1	
7/7/2021 2:55:23	7/6/2021 18:55:23	CalVet net	recover	KOD	KOD2	26	58.12874	-151.384	125	rHopcroft1	
7/7/2021 3:05:52	7/6/2021 19:05:52	CTD911	deploy	Kodiak	KOD2	36	58.12875	-151.383	125	sDanielson1	
7/7/2021 3:27:09	7/6/2021 19:27:09	CTD911	recover	Kodiak	KOD2	36	58.12878	-151.382	125	sDanielson1	
7/7/2021 3:35:58	7/6/2021 19:35:58	Trace Metal Cast	deploy	KOD	KOD2	TM15	58.12879	-151.382		aAguilarIslas1	
7/7/2021 3:53:42	7/6/2021 19:53:42	Trace Metal Cast	recover	KOD	KOD2	TM15	58.1288	-151.381		aAguilarIslas1	
7/7/2021 4:19:44	7/6/2021 20:19:44	UNCSW	service	NaN	NaN	NaN	58.17264	-151.449		bMcKiernan1	swapped strainer
7/7/2021 5:02:03	7/6/2021 21:02:03	CalVet net	deploy	KOD	KOD1	27	58.24372	-151.59	70	rHopcroft1	
7/7/2021 5:06:03	7/6/2021 21:06:03	CalVet net	recover	KOD	KOD1	27	58.24357	-151.591	71	rHopcroft1	
7/7/2021 5:17:03	7/6/2021 21:17:03	CTD911	deploy	Kodiak	KOD1	37	58.24362	-151.59	71	sDanielson1	
7/7/2021 5:33:03	7/6/2021 21:33:03	CTD911	recover	Kodiak	KOD1	37	58.24357	-151.591	71	sDanielson1	
7/7/2021 5:40:45	7/6/2021 21:40:45	Bongo Net	deploy	KOD	KOD01	6	58.24286	-151.59	71	cSmoot1	BON06
7/7/2021 5:42:59	7/6/2021 21:42:59	Bongo Net	maxDepth	KOD	KOD01	6	58.24191	-151.59	71	cSmoot1	
7/7/2021 5:47:14	7/6/2021 21:47:14	Bongo Net	recover	KOD	KOD01	6	58.24062	-151.589	71	cSmoot1	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
7/7/2021 5:58:31	7/6/2021 21:58:31	Methot Net	deploy	KOD	KOD01	21	58.23662	-151.587	70	cSmoot1	
7/7/2021 6:18:41	7/6/2021 22:18:41	Methot Net	recover	KOD	KOD01	21	58.22642	-151.578	70	cSmoot1	
7/7/2021 7:12:04	7/6/2021 23:12:04	Methot Net	deploy	KOD	KOD02	22	58.14401	-151.419	157	cSmoot1	
7/7/2021 7:32:03	7/6/2021 23:32:03	Methot Net	recover	KOD	KOD02	22	58.13439	-151.399	157	cSmoot1	
7/7/2021 7:42:37	7/6/2021 23:42:37	Bongo Net	deploy	KOD	KOD02	7	58.13118	-151.389	128	cSmoot1	BON07
7/7/2021 7:49:22	7/6/2021 23:49:22	Bongo Net	maxDepth	KOD	KOD02	7	58.12977	-151.385	127	cSmoot1	
7/7/2021 7:57:46	7/6/2021 23:57:46	Bongo Net	recover	KOD	KOD02	7	58.12806	-151.38	126	cSmoot1	
7/7/2021 8:58:24	7/7/2021 0:58:24	Methot Net	deploy	KOD	KOD03	23	58.02975	-151.215	90	cSmoot1	
7/7/2021 9:18:11	7/7/2021 1:18:11	Methot Net	recover	KOD	KOD03	23	58.01845	-151.195	90	cSmoot1	
7/7/2021 9:27:25	7/7/2021 1:27:25	Bongo Net	deploy	KOD	KOD03	8	58.01477	-151.187	82	cSmoot1	BON08
7/7/2021 9:30:39	7/7/2021 1:30:39	Bongo Net	maxDepth	KOD	KOD03	8	58.01349	-151.185	82	cSmoot1	
7/7/2021 9:35:16	7/7/2021 1:35:16	Bongo Net	recover	KOD	KOD03	8	58.0115	-151.181	82	cSmoot1	
7/7/2021 10:32:11	7/7/2021 2:32:11	Methot Net	deploy	KOD	KOD04	24	57.91441	-151.003	80	cSmoot1	
7/7/2021 10:51:36	7/7/2021 2:51:36	Methot Net	recover	KOD	KOD04	24	57.90559	-150.98	80	cSmoot1	
7/7/2021 11:02:07	7/7/2021 3:02:07	Bongo Net	deploy	KOD	KOD04	9	57.9012	-150.97	77	cSmoot1	BON09
7/7/2021 11:05:05	7/7/2021 3:05:05	Bongo Net	maxDepth	KOD	KOD04	9	57.90001	-150.968	77	cSmoot1	
7/7/2021 11:09:04	7/7/2021 3:09:04	Bongo Net	recover	KOD	KOD04	9	57.89846	-150.966	77	cSmoot1	
7/7/2021 12:07:03	7/7/2021 4:07:03	Methot Net	deploy	KOD	KOD05	25	57.80239	-150.789	82	cSmoot1	
7/7/2021 12:26:55	7/7/2021 4:26:55	Methot Net	recover	KOD	KOD05	25	57.79079	-150.77	82	cSmoot1	
7/7/2021 12:38:52	7/7/2021 4:38:52	Bongo Net	deploy	KOD	KOD05	10	57.78526	-150.76	87	cSmoot1	BON10
7/7/2021 12:41:40	7/7/2021 4:41:40	Bongo Net	maxDepth	KOD	KOD05	10	57.78402	-150.758	87	cSmoot1	
7/7/2021 12:44:31	7/7/2021 4:44:31	Bongo Net	recover	KOD	KOD05	10	57.78265	-150.756	87	cSmoot1	
7/7/2021 15:05:04	7/7/2021 7:05:04	Neutrally Buoyant Sediment Trap	recover	KOD	KOD5		57.77791	-150.617		tKelly1	
7/8/2021 4:01:21	7/7/2021 20:01:21	UNCSW	service	NaN	NaN	NaN	59.11556	-146.96		bMcKiernan1	swapped strainer
7/8/2021 4:55:00	7/7/2021 20:55:00	EM302	stop	NaN	NaN	NaN	59.18198	-146.673		bMcKiernan1	EM202 crashed required a rebooting
7/8/2021 4:59:16	7/7/2021 20:59:16	EM302	start	NaN	NaN	NaN	59.19057	-146.655		bMcKiernan1	back online logging
7/8/2021 6:30:02	7/7/2021 22:30:02	Methot Net	deploy	MID	MID07	26	59.35837	-146.334	84	cSmoot1	
7/8/2021 6:49:55	7/7/2021 22:49:55	Methot Net	recover	MID	MID07	26	59.36392	-146.325	84	cSmoot1	
7/8/2021 7:11:04	7/7/2021 23:11:04	Bongo Net	deploy	MID	MID07	11	59.37158	-146.308	68	cSmoot1	BON11
7/8/2021 7:15:49	7/7/2021 23:15:49	Bongo Net	maxDepth	MID	MID07	11	59.37213	-146.307	67	cSmoot1	
7/8/2021 7:22:52	7/7/2021 23:22:52	Bongo Net	recover	MID	MID07	11	59.37301	-146.306	67	cSmoot1	
7/8/2021 8:26:04	7/8/2021 0:26:04	Methot Net	deploy	MID	MID08	27	59.24591	-146.223	410	cSmoot1	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
7/8/2021 8:46:32	7/8/2021 0:46:32	Methot Net	recover	MID	MID08	27	59.23537	-146.208	410	cSmoot1	
7/8/2021 8:57:12	7/8/2021 0:57:12	Bongo Net	deploy	MID	MID08	12	59.23173	-146.204	571	cSmoot1	BON12
7/8/2021 9:04:23	7/8/2021 1:04:23	Bongo Net	maxDepth	MID	MID08	12	59.22987	-146.2	571	cSmoot1	
7/8/2021 9:13:24	7/8/2021 1:13:24	Bongo Net	recover	MID	MID08	12	59.2274	-146.196	571	cSmoot1	
7/8/2021 9:38:15	7/8/2021 1:38:15	EM302	stop	NaN	NaN	NaN	59.18299	-146.176		bMcKiernan1	Secured logging over 1000 meters water depth.
7/8/2021 10:16:04	7/8/2021 2:16:04	Methot Net	deploy	MID	MID09	28	59.08485	-146.133	2506	cSmoot1	
7/8/2021 10:36:04	7/8/2021 2:36:04	Methot Net	recover	MID	MID09	28	59.07381	-146.12	2506	cSmoot1	
7/8/2021 10:44:18	7/8/2021 2:44:18	Bongo Net	deploy	MID	MID09	13	59.07076	-146.116	2595	cSmoot1	BON13
7/8/2021 10:52:24	7/8/2021 2:52:24	Bongo Net	maxDepth	MID	MID09	13	59.06829	-146.112	2595	cSmoot1	
7/8/2021 11:08:32	7/8/2021 3:08:32	Bongo Net	recover	MID	MID09	13	59.06368	-146.103	2595	cSmoot1	
7/8/2021 11:50:06	7/8/2021 3:50:06	CTD911	other	NaN	NaN	NaN	58.97119	-146.052		bMcKiernan1	REMOVED LIST unit form CTD with a max of 600 meters dep
7/8/2021 12:09:04	7/8/2021 4:09:04	Methot Net	deploy	MID	MID10	29	58.93039	-146.03	4400	cSmoot1	
7/8/2021 12:29:04	7/8/2021 4:29:04	Methot Net	recover	MID	MID10	29	58.92125	-146.017	4400	cSmoot1	
7/8/2021 12:38:52	7/8/2021 4:38:52	Bongo Net	deploy	MID	MID10	14	58.91843	-146.013	4379	cSmoot1	BON14
7/8/2021 12:45:36	7/8/2021 4:45:36	Bongo Net	maxDepth	MID	MID10	14	58.917	-146.01	4379	cSmoot1	
7/8/2021 12:57:11	7/8/2021 4:57:11	Bongo Net	recover	MID	MID10	14	58.91449	-146.005	4379	cSmoot1	
7/8/2021 13:19:49	7/8/2021 5:19:49	multinet	deploy	MID	MID10	5	58.90986	-146	4445	cSmoot1	MNV5 MOLECULAR SORTING
7/8/2021 15:25:45	7/8/2021 7:25:45	multinet	recover	MID	MID10	5	58.9098	-146	4445	cSmoot1	
7/8/2021 15:33:29	7/8/2021 7:33:29	IronFish	deploy	MID	MID10	NaN	58.90949	-146.001		aAguilarIslas1	
7/8/2021 15:46:10	7/8/2021 7:46:10	IronFish	recover	MID	MID10	NaN	58.89738	-146.02		aAguilarIslas1	
7/8/2021 16:18:38	7/8/2021 8:18:38	CTD911	deploy	Middleton	MID10	38	58.90982	-146.001	4444	sDanielson1	
7/8/2021 17:42:04	7/8/2021 9:42:04	CTD911	recover	Middleton	MID10	38	58.90994	-146	4445	sDanielson1	
7/8/2021 17:52:25	7/8/2021 9:52:25	CalVet net	deploy	MID	MID10	28	58.90981	-146	4445	rHopcroft1	
7/8/2021 17:57:58	7/8/2021 9:57:58	CalVet net	recover	MID	MID10	28	58.90981	-146	4445	rHopcroft1	
7/8/2021 18:12:00	7/8/2021 10:12:00	CalVet net	deploy	MID	MID10	28A	58.90969	-146	4445	rHopcroft1	
7/8/2021 18:17:22	7/8/2021 10:17:22	CalVet net	recover	MID	MID10	28A	58.90954	-146	4445	rHopcroft1	
7/8/2021 18:38:54	7/8/2021 10:38:54	Trace Metal Cast	deploy	MID	MID10	TM16	58.90987	-146		aAguilarIslas1	
7/8/2021 18:38:57	7/8/2021 10:38:57	Trace Metal Cast	deploy	MID	MID10	TM16	58.90987	-146		aAguilarIslas1	
7/8/2021 19:29:15	7/8/2021 11:29:15	Trace Metal Cast	recover	MID	MID10	TM16	58.91133	-146.003		aAguilarIslas1	
7/8/2021 19:37:30	7/8/2021 11:37:30	CTD911	deploy	Middleton	MID10 prod	39	58.91106	-146.002	4443	sDanielson1	
7/8/2021 20:16:35	7/8/2021 12:16:35	CTD911	recover	Middleton	MID10 prod	39	58.91112	-146.003	4444	sDanielson1	
7/8/2021 21:22:04	7/8/2021 13:22:04	CalVet net	deploy	MID	MID9	29	59.06757	-146.1	2971	rHopcroft1	
7/8/2021 21:27:26	7/8/2021 13:27:26	CalVet net	recover	MID	MID9	29	59.06756	-146.1	2971	rHopcroft1	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
7/8/2021 21:42:10	7/8/2021 13:42:10	CTD911	deploy	Middleton	MID9	40	59.06756	-146.1	2966	sDanielson1	
7/8/2021 23:08:03	7/8/2021 15:08:03	CTD911	recover	Middleton	MID9	40	59.06762	-146.089	3150	sDanielson1	
7/9/2021 0:09:39	7/8/2021 16:09:39	IronFish	deploy	MID	MID08	NaN	59.20994	-146.194		aAguilarIslas1	
7/9/2021 0:22:37	7/8/2021 16:22:37	IronFish	recover	MID	MID08	NaN	59.22674	-146.201		aAguilarIslas1	
7/9/2021 0:31:09	7/8/2021 16:31:09	CalVet net	deploy	MID	MID8	30	59.22903	-146.202	584	rHopcroft1	
7/9/2021 0:36:47	7/8/2021 16:36:47	CalVet net	recover	MID	MID8	30	59.22814	-146.202	584	rHopcroft1	
7/9/2021 0:45:39	7/8/2021 16:45:39	CTD911	deploy	Middleton	MID8	41	59.22725	-146.201	610	sDanielson1	
7/9/2021 1:36:00	7/8/2021 17:36:00	CTD911	recover	Middleton	MID8	41	59.22658	-146.201	637	sDanielson1	
7/9/2021 1:48:13	7/8/2021 17:48:13	Trace Metal Cast	deploy	MID	MID8	TM17	59.22659	-146.201		aAguilarIslas1	
7/9/2021 2:26:09	7/8/2021 18:26:09	Trace Metal Cast	recover	MID	MID8	TM17	59.22659	-146.201		aAguilarIslas1	
7/9/2021 3:10:41	7/8/2021 19:10:41	CTD911	deploy	Middleton	MID7i	42	59.30303	-146.254	431	sDanielson1	
7/9/2021 3:31:26	7/8/2021 19:31:26	CTD911	recover	Middleton	MID7i	42	59.30126	-146.26	420	sDanielson1	
7/9/2021 4:11:58	7/8/2021 20:11:58	CalVet net	deploy	MID	MID7	31	59.37733	-146.294	68	rHopcroft1	
7/9/2021 4:15:22	7/8/2021 20:15:22	CalVet net	recover	MID	MID7	31	59.37722	-146.296	68	rHopcroft1	
7/9/2021 4:26:07	7/8/2021 20:26:07	CTD911	deploy	Middleton	MID7	43	59.37465	-146.3	57	sDanielson1	
7/9/2021 4:42:14	7/8/2021 20:42:14	CTD911	recover	Middleton	MID7	43	59.37184	-146.311	60	sDanielson1	
7/9/2021 5:35:56	7/8/2021 21:35:56	CTD911	deploy	Middleton	MID6i	44	59.43247	-146.17	55	sDanielson1	
7/9/2021 5:42:34	7/8/2021 21:42:34	CTD911	recover	Middleton	MID6i	44	59.43442	-146.172	54	sDanielson1	
7/9/2021 6:25:31	7/8/2021 22:25:31	Methot Net	deploy	MID	MID06	30	59.5094	-146.26	36	cSmoot1	
7/9/2021 6:45:25	7/8/2021 22:45:25	Methot Net	recover	MID	MID06	30	59.50783	-146.249	36	cSmoot1	
7/9/2021 7:00:32	7/8/2021 23:00:32	Bongo Net	deploy	MID	MID06	15	59.50223	-146.249	41	cSmoot1	BON15
7/9/2021 7:02:28	7/8/2021 23:02:28	Bongo Net	maxDepth	MID	MID06	15	59.50222	-146.249	41	cSmoot1	
7/9/2021 7:08:26	7/8/2021 23:08:26	Bongo Net	maxDepth	MID	MID06	15	59.50223	-146.248	41	cSmoot1	DOUBLE OBLIQUE
7/9/2021 7:11:47	7/8/2021 23:11:47	Bongo Net	recover	MID	MID06	15	59.50224	-146.247	41	cSmoot1	
7/9/2021 7:19:23	7/8/2021 23:19:23	UNCSW	service	NaN	NaN	NaN	59.50208	-146.245		bMcKiernan1	Swapped filter
7/9/2021 8:07:37	7/9/2021 0:07:37	Methot Net	deploy	MID	MID05	31	59.62456	-146.143	106	cSmoot1	
7/9/2021 8:27:36	7/9/2021 0:27:36	Methot Net	recover	MID	MID05	31	59.63964	-146.123	106	cSmoot1	
7/9/2021 8:34:05	7/9/2021 0:34:05	Bongo Net	deploy	MID	MID05	16	59.64349	-146.118	97	cSmoot1	
7/9/2021 8:39:05	7/9/2021 0:39:05	Bongo Net	maxDepth	MID	MID05	16	59.64612	-146.114	97	cSmoot1	
7/9/2021 8:48:05	7/9/2021 0:48:05	Bongo Net	recover	MID	MID05	16	59.65044	-146.107	97	cSmoot1	
7/9/2021 9:05:05	7/9/2021 1:05:05	Neutrally Buoyant Sediment Trap	deploy	MID	MID5		59.65116	-146.101		tKelly1	
7/9/2021 10:06:56	7/9/2021 2:06:56	Methot Net	deploy	MID	MID04	32	59.77974	-145.968	91	cSmoot1	
7/9/2021 10:26:55	7/9/2021 2:26:55	Methot Net	recover	MID	MID04	32	59.78895	-145.97	91	cSmoot1	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author		Comment
7/9/2021 10:40:25	7/9/2021 2:40:25	Bongo Net	deploy	MID	MID04	17	59.7995	-145.962	83	cSmoot1	BON17	
7/9/2021 10:47:35	7/9/2021 2:47:35	Bongo Net	maxDepth	MID	MID04	17	59.79999	-145.952	83	cSmoot1		
7/9/2021 10:54:51	7/9/2021 2:54:51	Bongo Net	recover	MID	MID04	17	59.8007	-145.942	92	cSmoot1		
7/9/2021 11:57:51	7/9/2021 3:57:51	Methot Net	deploy	MID	MID03	33	59.92704	-145.788	87	cSmoot1		
7/9/2021 12:17:57	7/9/2021 4:17:57	Methot Net	recover	MID	MID03	33	59.93795	-145.797	87	cSmoot1		
7/9/2021 12:25:07	7/9/2021 4:25:07	Bongo Net	deploy	MID	MID03	18	59.94186	-145.799	84	cSmoot1	BON18	
7/9/2021 12:28:29	7/9/2021 4:28:29	Bongo Net	maxDepth	MID	MID03	18	59.94284	-145.8	84	cSmoot1		
7/9/2021 12:35:17	7/9/2021 4:35:17	Bongo Net	recover	MID	MID03	18	59.94509	-145.8	84	cSmoot1		
7/9/2021 13:36:28	7/9/2021 5:36:28	Methot Net	deploy	MID	MID02	34	60.07835	-145.673	101	cSmoot1		
7/9/2021 13:56:28	7/9/2021 5:56:28	Methot Net	recover	MID	MID02	34	60.08947	-145.662	101	cSmoot1		
7/9/2021 14:04:36	7/9/2021 6:04:36	Bongo Net	deploy	MID	MID02	19	60.09369	-145.658	107	cSmoot1	BON19	
7/9/2021 14:10:32	7/9/2021 6:10:32	Bongo Net	maxDepth	MID	MID02	19	60.09552	-145.656	112	cSmoot1		
7/9/2021 14:16:00	7/9/2021 6:16:00	Bongo Net	recover	MID	MID02	19	60.09766	-145.653	119	cSmoot1		
7/9/2021 15:19:17	7/9/2021 7:19:17	Methot Net	deploy	MID	MID01	35	60.22952	-145.524	40	cSmoot1		
7/9/2021 15:39:22	7/9/2021 7:39:22	Methot Net	deploy	MID	MID01	35	60.24261	-145.508	40	cSmoot1		
7/9/2021 16:00:18	7/9/2021 8:00:18	CTD911	deploy	Middleton	MID1	45	60.24861	-145.503	18	sDanielson1		
7/9/2021 16:07:24	7/9/2021 8:07:24	CTD911	recover	Middleton	MID1	45	60.24887	-145.503	18	sDanielson1		
7/9/2021 16:15:35	7/9/2021 8:15:35	IronFish	deploy	MID	MID1	NaN	60.24752	-145.503		aAguilarIslas1		
7/9/2021 17:09:46	7/9/2021 9:09:46	CTD911	deploy	Middleton	MID1i	46	60.17673	-145.576	95	sDanielson1		
7/9/2021 17:18:43	7/9/2021 9:18:43	CTD911	recover	Middleton	MID1i	46	60.17768	-145.577	95	sDanielson1		
7/9/2021 18:16:39	7/9/2021 10:16:39	IronFish	recover	MID	MID1	NaN	60.10204	-145.649		aAguilarIslas1		
7/9/2021 18:36:05	7/9/2021 10:36:05	CTD911	deploy	Middleton	MID2 prod	47	60.10016	-145.653	117	sDanielson1		
7/9/2021 19:01:05	7/9/2021 11:01:05	CTD911	recover	Middleton	MID2 prod	47	60.10064	-145.653	117	sDanielson1		
7/9/2021 19:07:11	7/9/2021 11:07:11	CalVet net	deploy	MID	MID2	32	60.1007	-145.652	117	rHopcroft1		
7/9/2021 19:12:09	7/9/2021 11:12:09	CalVet net	recover	MID	MID2	32	60.10074	-145.652	117	rHopcroft1		
7/9/2021 19:23:53	7/9/2021 11:23:53	CalVet net	deploy	MID	MID2	32A	60.10069	-145.652	117	rHopcroft1		
7/9/2021 19:29:18	7/9/2021 11:29:18	CalVet net	recover	MID	MID2	32A	60.10073	-145.652	117	rHopcroft1		
7/9/2021 20:00:04	7/9/2021 12:00:04	Trace Metal Cast	deploy	MID	MID2	TM18	60.10068	-145.651		aAguilarIslas1		
7/9/2021 20:13:47	7/9/2021 12:13:47	Trace Metal Cast	recover	MID	MID2	TM18	60.10114	-145.65		aAguilarIslas1		
7/9/2021 20:24:55	7/9/2021 12:24:55	CTD911	deploy	Middleton	MID2	48	60.10172	-145.649	118	sDanielson1		
7/9/2021 20:49:55	7/9/2021 12:49:55	CTD911	recover	Middleton	MID2	48	60.10474	-145.643	122	sDanielson1		
7/9/2021 21:43:13	7/9/2021 13:43:13	CTD911	deploy	Middleton	MID2i	49	60.02523	-145.724	97	sDanielson1		
7/9/2021 21:52:23	7/9/2021 13:52:23	CTD911	recover	Middleton	MID2i	49	60.02523	-145.724	100	sDanielson1		

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
7/9/2021 22:34:05	7/9/2021 14:34:05	CalVet net	deploy	MID	MID3	33	59.9496	-145.8	88	rHopcroft1	
7/9/2021 22:39:44	7/9/2021 14:39:44	CalVet net	recover	MID	MID3	33	59.9496	-145.8	88	rHopcroft1	
7/9/2021 22:51:05	7/9/2021 14:51:05	CTD911	deploy	Middleton	MID3	50	59.94959	-145.799	87	sDanielson1	
7/9/2021 23:11:35	7/9/2021 15:11:35	CTD911	recover	Middleton	MID3	50	59.94958	-145.799	87	sDanielson1	
7/9/2021 23:54:01	7/9/2021 15:54:01	CTD911	deploy	Middleton	MID3i	51	59.87369	-145.868	102	sDanielson1	
7/10/2021 0:02:01	7/9/2021 16:02:01	CTD911	recover	Middleton	MID3i	51	59.87323	-145.865	102	sDanielson1	
7/10/2021 0:41:59	7/9/2021 16:41:59	CalVet net	deploy	MID	MID4	34	59.79854	-145.941	89	rHopcroft1	
7/10/2021 0:46:45	7/9/2021 16:46:45	CalVet net	recover	MID	MID4	34	59.79848	-145.939	89	rHopcroft1	
7/10/2021 0:57:05	7/9/2021 16:57:05	CTD911	deploy	Middleton	MID4	52	59.79881	-145.932	90	sDanielson1	
7/10/2021 1:16:36	7/9/2021 17:16:36	CTD911	recover	Middleton	MID4	52	59.79896	-145.925	91	sDanielson1	
7/10/2021 2:03:05	7/9/2021 18:03:05	CTD911	deploy	Middleton	MID4i	53	59.72305	-146.018	72	sDanielson1	
7/10/2021 2:09:46	7/9/2021 18:09:46	CTD911	recover	Middleton	MID4i	53	59.72312	-146.017	72	sDanielson1	
7/10/2021 2:54:04	7/9/2021 18:54:04	CalVet net	deploy	MID	MID5	35	59.6493	-146.101	95	rHopcroft1	
7/10/2021 2:59:30	7/9/2021 18:59:30	CalVet net	recover	MID	MID5	35	59.64937	-146.101	95	rHopcroft1	
7/10/2021 3:11:53	7/9/2021 19:11:53	CTD911	deploy	Middleton	MID5	54	59.64953	-146.101	95	sDanielson1	
7/10/2021 3:33:02	7/9/2021 19:33:02	CTD911	recover	Middleton	MID5	54	59.65066	-146.101	95	sDanielson1	
7/10/2021 4:24:05	7/9/2021 20:24:05	CTD911	deploy	Middleton	MID5i	55	59.57305	-146.171	114	sDanielson1	
7/10/2021 4:34:05	7/9/2021 20:34:05	CTD911	recover	Middleton	MID5i	55	59.57445	-146.173	114	sDanielson1	
7/10/2021 4:50:25	7/9/2021 20:50:25	UNCSW	service	NaN	NaN	NaN	59.55184	-146.198		bMcKiernan1	Swapped filter
7/10/2021 5:18:40	7/9/2021 21:18:40	CalVet net	deploy	MID	MID6	36	59.50023	-146.251	35	rHopcroft1	
7/10/2021 5:20:05	7/9/2021 21:20:05	CalVet net	recover	MID	MID06	36	59.50027	-146.25	35	rHopcroft1	
7/10/2021 5:26:53	7/9/2021 21:26:53	CTD911	deploy	Middleton	MID6	56	59.50037	-146.25	35	sDanielson1	
7/10/2021 5:36:59	7/9/2021 21:36:59	CTD911	recover	Middleton	MID6	56	59.5003	-146.25	35	sDanielson1	
7/10/2021 6:30:05	7/9/2021 22:30:05	ISIIS-DPI	deploy	MID	MID5i	NaN	59.59083	-146.169	110	rHopcroft1	
7/10/2021 14:02:08	7/10/2021 6:02:08	ISIIS-DPI	recover	MID	MID1i.5	NaN	60.16237	-145.586		rHopcroft1	
7/10/2021 16:30:06	7/10/2021 8:30:06	Neutrally Buoyant Sediment Trap	recover	MID	MID5		59.79658	-145.848		tKelly1	
7/10/2021 18:19:38	7/10/2021 10:19:38	IronFish	deploy	MID	MID5	NaN	59.6595	-146.075		aAguilarIslas1	
7/10/2021 18:30:48	7/10/2021 10:30:48	IronFish	recover	MID	MID5	NaN	59.65179	-146.097		aAguilarIslas1	
7/10/2021 18:48:26	7/10/2021 10:48:26	CTD911	deploy	Middleton	MID 5 prod	57	59.65091	-146.1	94	sDanielson1	
7/10/2021 19:10:51	7/10/2021 11:10:51	CTD911	recover	Middleton	MID 5 prod	57	59.65307	-146.1	94	sDanielson1	
7/10/2021 19:17:35	7/10/2021 11:17:35	CalVet net	deploy	MID	MID5	37	59.65314	-146.1	93	rHopcroft1	
7/10/2021 19:22:12	7/10/2021 11:22:12	CalVet net	recover	MID	MID5	37	59.6533	-146.099	93	rHopcroft1	
7/10/2021 19:34:22	7/10/2021 11:34:22	CalVet net	deploy	MID	MID5	37A	59.65275	-146.1	93	rHopcroft1	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
7/10/2021 19:39:27	7/10/2021 11:39:27	CalVet net	recover	MID	MID5	37A	59.65296	-146.099	93	rHopcroft1	
7/10/2021 19:55:53	7/10/2021 11:55:53	Trace Metal Cast	deploy	MID	MID5	TM19	59.65224	-146.1		aAguilarIslas1	
7/10/2021 20:09:24	7/10/2021 12:09:24	Trace Metal Cast	recover	MID	MID5	TM19	59.65564	-146.097		aAguilarIslas1	
7/10/2021 20:29:24	7/10/2021 12:29:24	CTD911	deploy	Middleton	MID5	58	59.66043	-146.093	92	sDanielson1	
7/10/2021 20:50:20	7/10/2021 12:50:20	CTD911	recover	Middleton	MID5	58	59.66494	-146.09	92	sDanielson1	
7/11/2021 4:14:12	7/10/2021 20:14:12	CalVet net	deploy	PWS	PWS3	38	60.66884	-147.667	741	rHopcroft1	
7/11/2021 4:19:42	7/10/2021 20:19:42	CalVet net	recover	PWS	PWS3	38	60.66917	-147.667	741	rHopcroft1	
7/11/2021 4:29:20	7/10/2021 20:29:20	CTD911	deploy	PWS	PWS3	59	60.66995	-147.668	741	sDanielson1	
7/11/2021 5:22:30	7/10/2021 21:22:30	CTD911	recover	PWS	PWS3	59	60.67219	-147.669	741	sDanielson1	
7/11/2021 5:34:40	7/10/2021 21:34:40	Methot Net	deploy	PWS	PWS03	36	60.66957	-147.671	746	cSmoot1	
7/11/2021 5:54:28	7/10/2021 21:54:28	Methot Net	recover	PWS	PWS03	36	60.65735	-147.662	746	cSmoot1	
7/11/2021 6:14:06	7/10/2021 22:14:06	multinet	deploy	PWS	PWS03	16	60.66686	-147.674	744	cSmoot1	MNT16
7/11/2021 6:55:25	7/10/2021 22:55:25	multinet	recover	PWS	PWS03	16	60.67377	-147.625	744	cSmoot1	
7/11/2021 7:59:24	7/10/2021 23:59:24	Methot Net	deploy	PWS	PWS02	37	60.54528	-147.762	687	cSmoot1	
7/11/2021 8:19:19	7/11/2021 0:19:19	Methot Net	recover	PWS	PWS02	37	60.54016	-147.79	687	cSmoot1	
7/11/2021 8:31:57	7/11/2021 0:31:57	multinet	deploy	PWS	PWS02	17	60.53545	-147.804	730	cSmoot1	MNT17
7/11/2021 9:11:33	7/11/2021 1:11:33	multinet	recover	PWS	PWS02	17	60.51589	-147.834	674	cSmoot1	
7/11/2021 9:24:26	7/11/2021 1:24:26	multinet	deploy	PWS	PWS02	17A	60.51494	-147.834	637	cSmoot1	MNT17A MOLECULAR
7/11/2021 9:59:19	7/11/2021 1:59:19	multinet	recover	PWS	PWS02	17A	60.52981	-147.814	722	cSmoot1	
7/11/2021 10:59:38	7/11/2021 2:59:38	multinet	deploy	PWS	PWS01	18	60.39459	-147.911	267	cSmoot1	MNT18
7/11/2021 11:10:34	7/11/2021 3:10:34	UNCSW	service	NaN	NaN	NaN	60.38781	-147.919		bMcKiernan1	swapped filter
7/11/2021 11:46:02	7/11/2021 3:46:02	multinet	recover	PWS	PWS01	18	60.36662	-147.947	267	cSmoot1	
7/11/2021 11:59:34	7/11/2021 3:59:34	Methot Net	deploy	PWS	PWS01	38	60.36724	-147.945	315	cSmoot1	
7/11/2021 12:19:25	7/11/2021 4:19:25	Methot Net	recover	PWS	PWS01	38	60.37806	-147.937	315	cSmoot1	
7/11/2021 13:38:06	7/11/2021 5:38:06	multinet	deploy	PWS	PWS02	6S	60.53426	-147.804	729	cSmoot1	MNV6S
7/11/2021 13:54:06	7/11/2021 5:54:06	multinet	recover	PWS	PWS02	6S	60.53438	-147.804	729	cSmoot1	
7/11/2021 14:08:32	7/11/2021 6:08:32	multinet	deploy	PWS	PWS02	6D	60.53469	-147.803	729	cSmoot1	MNV6D
7/11/2021 14:58:58	7/11/2021 6:58:58	multinet	recover	PWS	PWS02	6D	60.53558	-147.804	729	cSmoot1	
7/11/2021 15:08:06	7/11/2021 7:08:06	multinet	deploy	PWS	PWS02	6D A	60.53549	-147.804	729	cSmoot1	MNV6D A MOLECULAR SORTING
7/11/2021 15:59:36	7/11/2021 7:59:36	multinet	recover	PWS	PWS02	6D A	60.53339	-147.802	729	cSmoot1	
7/11/2021 16:22:00	7/11/2021 8:22:00	CTD911	deploy	PWS	PSW02	60	60.53409	-147.804	730	sDanielson1	
7/11/2021 17:14:22	7/11/2021 9:14:22	CTD911	recover	PWS	PSW02	60	60.53633	-147.808	733	sDanielson1	
7/11/2021 17:17:06	7/11/2021 9:17:06	CalVet net	deploy	PWS	PWS2	39	60.53637	-147.808	732	rHopcroft1	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
7/11/2021 17:23:11	7/11/2021 9:23:11	CalVet net	recover	PWS	PWS2	39	60.53628	-147.808	732	rHopcroft1	
7/11/2021 17:34:01	7/11/2021 9:34:01	CalVet net	deploy	PWS	PWS2	39A	60.5366	-147.809	732	rHopcroft1	
7/11/2021 17:39:45	7/11/2021 9:39:45	CalVet net	recover	PWS	PWS2	39A	60.53671	-147.809	732	rHopcroft1	
7/11/2021 17:55:06	7/11/2021 9:55:06	Trace Metal Cast	deploy	PWS	PWS2	TM20	60.53718	-147.81		aAguilarIslas1	
7/11/2021 18:35:18	7/11/2021 10:35:18	Trace Metal Cast	recover	PWS	PWS2	TM20	60.53752	-147.811		aAguilarIslas1	
7/11/2021 18:42:44	7/11/2021 10:42:44	CTD911	deploy	PWS	PWS02 prod	61	60.53772	-147.812	725	sDanielson1	
7/11/2021 19:22:25	7/11/2021 11:22:25	CTD911	recover	PWS	PWS02 prod	61	60.53871	-147.815	725	sDanielson1	
7/11/2021 19:34:37	7/11/2021 11:34:37	IronFish	deploy	PWS	PWS2	NaN	60.53581	-147.815		aAguilarIslas1	
7/11/2021 19:42:47	7/11/2021 11:42:47	IronFish	recover	PWS	PWS2	NaN	60.52689	-147.819		aAguilarIslas1	
7/11/2021 20:37:06	7/11/2021 12:37:06	CalVet net	deploy	PWS	PWS1	40	60.37998	-147.939	340	rHopcroft1	
7/11/2021 20:43:14	7/11/2021 12:43:14	CalVet net	recover	PWS	PWS1	40	60.37995	-147.938	340	rHopcroft1	
7/11/2021 20:57:47	7/11/2021 12:57:47	CTD911	deploy	PWS	PWS01	62	60.38026	-147.938	344	sDanielson1	
7/11/2021 21:33:54	7/11/2021 13:33:54	CTD911	recover	PWS	PWS01	62	60.38062	-147.94	340	sDanielson1	
7/11/2021 22:26:06	7/11/2021 14:26:06	CalVet net	deploy	PWS	KIP2	41	60.27834	-147.987	582	rHopcroft1	
7/11/2021 22:31:06	7/11/2021 14:31:06	CalVet net	recover	PWS	KIP2	41	60.27842	-147.987	582	rHopcroft1	
7/11/2021 22:43:48	7/11/2021 14:43:48	CTD911	deploy	PWS	KIP2	63	60.27857	-147.988	575	sDanielson1	
7/11/2021 23:31:07	7/11/2021 15:31:07	CTD911	recover	PWS	KIP2	63	60.279	-147.991	545	sDanielson1	
7/12/2021 1:17:06	7/11/2021 17:17:06	CalVet net	deploy	PWS	IB1	42	60.24147	-148.334	157	rHopcroft1	
7/12/2021 1:23:13	7/11/2021 17:23:13	CalVet net	recover	PWS	IB1	42	60.24141	-148.335	157	rHopcroft1	
7/12/2021 1:28:55	7/11/2021 17:28:55	CTD911	deploy	PWS	IB1	64	60.24155	-148.335	157	sDanielson1	
7/12/2021 1:52:12	7/11/2021 17:52:12	CTD911	recover	PWS	IB1	64	60.24185	-148.335	143	sDanielson1	
7/12/2021 2:27:49	7/11/2021 18:27:49	CalVet net	deploy	PWS	IB0	43	60.2719	-148.361	274	rHopcroft1	
7/12/2021 2:33:11	7/11/2021 18:33:11	CalVet net	recover	PWS	IB0	43	60.27191	-148.361	274	rHopcroft1	
7/12/2021 2:43:32	7/11/2021 18:43:32	CTD911	deploy	PWS	IB0	65	60.27191	-148.361	274	sDanielson1	
7/12/2021 3:13:57	7/11/2021 19:13:57	CTD911	recover	PWS	IB0	65	60.2719	-148.361	274	sDanielson1	
7/12/2021 4:22:48	7/11/2021 20:22:48	CalVet net	deploy	PWS	IB2	44	60.27103	-148.233	154	rHopcroft1	
7/12/2021 4:28:13	7/11/2021 20:28:13	CalVet net	recover	PWS	IB2	44	60.27107	-148.233	154	rHopcroft1	
7/12/2021 4:36:15	7/11/2021 20:36:15	CTD911	deploy	PWS	IB02	66	60.27112	-148.233	155	sDanielson1	
7/12/2021 5:02:50	7/11/2021 21:02:50	CTD911	recover	PWS	IB02	66	60.27128	-148.234	155	sDanielson1	
7/12/2021 6:06:07	7/11/2021 22:06:07	Methot Net	deploy	PWS	KIP02	39	60.2552	-147.998	476	cSmoot1	
7/12/2021 6:26:01	7/11/2021 22:26:01	Methot Net	recover	PWS	KIP02	39	60.26518	-147.994	566	cSmoot1	
7/12/2021 6:34:00	7/11/2021 22:34:00	multinet	deploy	PWS	KIP02	19	60.2686	-147.993	584	cSmoot1	MNT19
7/12/2021 7:04:53	7/11/2021 23:04:53	multinet	recover	PWS	KIP02	19	60.28001	-147.983	584	cSmoot1	

GPS_Time	Local Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
7/12/2021 9:43:25	7/12/2021 1:43:25	CTD911	deploy	MS	MS01	67	59.95513	-147.922	175	sDanielson1	
7/12/2021 9:56:29	7/12/2021 1:56:29	CTD911	recover	MS	MS01	67	59.95551	-147.925	170	sDanielson1	
7/12/2021 10:24:32	7/12/2021 2:24:32	CTD911	deploy	MS	MS02	68	59.94433	-147.899	190	sDanielson1	
7/12/2021 10:37:00	7/12/2021 2:37:00	CTD911	recover	MS	MS02	68	59.94464	-147.901	185	sDanielson1	
7/12/2021 11:05:51	7/12/2021 3:05:51	CTD911	deploy	MS	MS03	69	59.93388	-147.861	177	sDanielson1	
7/12/2021 11:18:06	7/12/2021 3:18:06	CTD911	recover	MS	MS03	69	59.93431	-147.863	177	sDanielson1	
7/12/2021 11:44:32	7/12/2021 3:44:32	CTD911	deploy	MS	MS04	70	59.9219	-147.829	120	sDanielson1	
7/12/2021 11:58:59	7/12/2021 3:58:59	CTD911	recover	MS	MS04	70	59.92234	-147.833	122	sDanielson1	
7/12/2021 17:48:50	7/12/2021 9:48:50	CTD911	deploy	Seward	GAK1	71	59.84476	-149.467	268	pShipton1	
7/12/2021 18:02:23	7/12/2021 10:02:23	CTD911	recover	Seward	GAK1	71	59.84472	-149.467	268	sDanielson1	
		Mooring	recover	NaN	CEOT	NaN	59.9133	-149.353	47	sDanielson1	CEO Tripod camera test
7/12/2021 20:34:58	7/12/2021 12:34:58	CalVet net	deploy	GAK	RES2.5	45	60.0254	-149.357	298	rHopcroft1	
7/12/2021 20:40:06	7/12/2021 12:40:06	CalVet net	recover	GAK	RES2.5	45	60.02542	-149.356	293	rHopcroft1	
7/12/2021 20:47:16	7/12/2021 12:47:16	CTD911	deploy	Seward	RES2.5	72	60.02539	-149.356	292	sDanielson1	
7/12/2021 21:20:40	7/12/2021 13:20:40	CTD911	recover	Seward	RES2.5	72	60.02547	-149.357	292	sDanielson1	
7/12/2021 21:28:15	7/12/2021 13:28:15	UNCSW	stop	NaN	NaN	NaN	60.0299	-149.363		bMcKiernan1	Stopped flow and flushed with fresh water
7/12/2021 21:28:58	7/12/2021 13:28:58	PCO2	stop	NaN	NaN	NaN	60.03134	-149.363		bMcKiernan1	end of cruise Stopped samples ran standards fresh water rins
7/12/2021 21:46:47	7/12/2021 13:46:47	Ship	endCruise	NaN	NaN	NaN	60.07816	-149.4		eRoth1	Arrival at Seward Marine Center