NGA-LTER

Northern Gulf of Alaska Long-Term Ecological Research

Cruise Report April/May 2021

Cruise ID: SKQ2021-06S

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

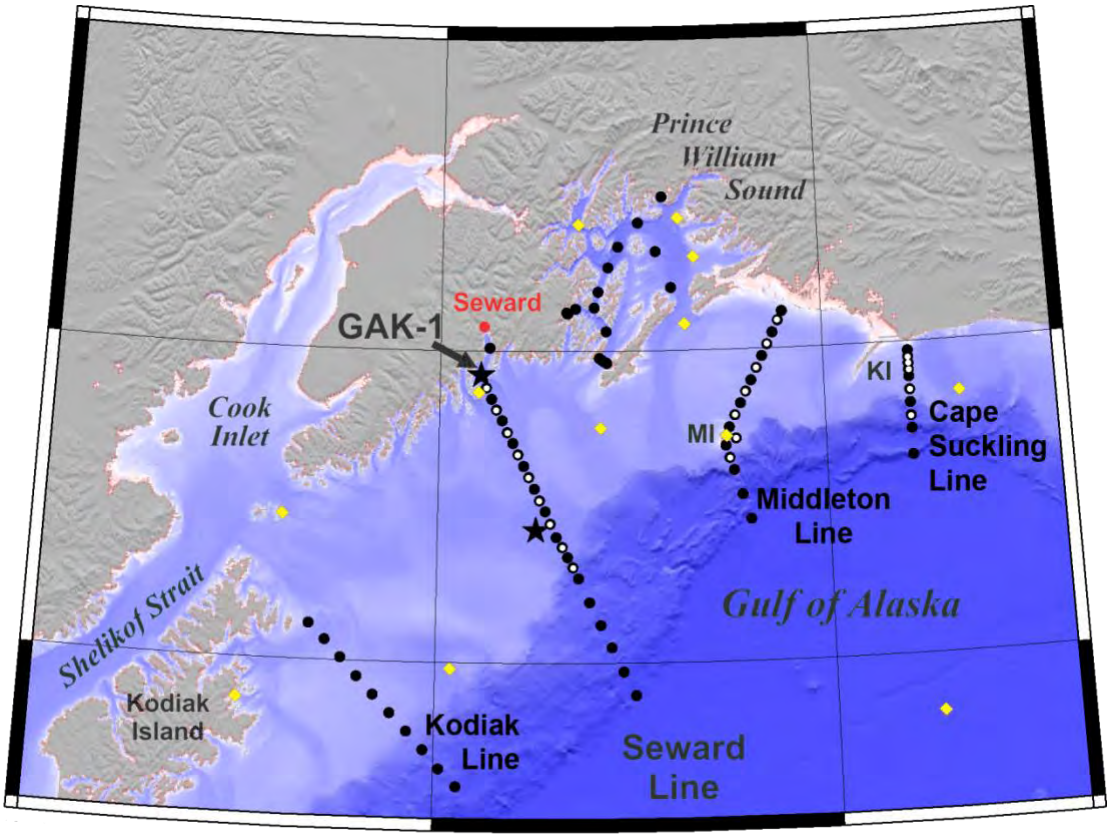


Figure 1. The LTER sampling stations. CTD casts without water sampling as open symbols. Yellow diamonds represent locations of meteorological data from NOAA buoys or ground stations. Star shows position of LTER mooring. Cape Suckling is low priority.

Scientific Personnel:

1	Russ Hopcroft (LTER Lead PI)	Zooplankton (days), UAF, Chief Scientist
2	Jennifer Questel	Zooplankton, UAF, Night Watch Lead Scientist
3	Isaac Reister	Physics (Moorings/CTD/Acrobat), UAF
4	Ana Aguilar-Islas	Chemistry (Nutrients, Iron), UAF
5	Marissa Despins	Chemistry (Nutrients, Iron), Wright State
6	Suzanne Strom	Phytoplankton/Microzooplankton, WWU
7	Megan O'Hare	Phytoplankton/Microzooplakton, WWU
8	Kelly Bright	Phytoplankton/Microzooplakton, 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	Kathy Kuletz	Seabirds/Mammals, US Fish & Wildlife Service
15	Ethan Roth	SKQ Marine technician, Lead
16	Dan Naber	SKQ Marine technician

SKQ2021-06S was conducted during the time of the COVID19 global pandemic. Mitigation measures were taken to reduce the risk of disease transmission, included sailing with a reduced number of scientists.

Cruise Overview:

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. This cruise aligned with a very active spring bloom, as evidenced by both satellite and in situ samples/instruments. 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 also towed between most stations along the transects to collect trace metal/nutrient surface data. 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 of the Gulf of Alaska Ecosystem Observatory (GEO) mooring GEO3 subsurface float and acoustic release.

Daily summary

April 6 – Science party enters 14-day pre-cruise quarantine, with Strom, O'Hara, Bright, Despins isolating in Seward, Kuletz in Anchorage, and all others in Fairbanks. All science party members received one COVID-19 tests as entering quarantine with a second administered ~5 days before boarding the ship. All tests come back negative (the science party was already fully vaccinated).

April 19 – Iron team arrives early to get a jump start on setup.

April 20 – Science team arrives by road from Fairbanks.

April 21 - Day 0 – Setup began after breakfast. This was the first LTER cruise with 2 days reserved for setup and the reduced stress made for a decidedly more comfortable pace. The trace-metal team had already begun setup the prior day, and this helped accelerate the setup process.

April 22 - Day 0 – Setup continued. With trace-metal's head start, everyone was setup by dinner time, and we got underway at ~19:30. A Calvet and CTD were completed at RES2.5 and GAK1, then we transited overnight to the Kodiak Line.

Apr 23 – Day 1 – The day began with a floating Sediment trap deployed at KOD5 at ~14:30, the Iron fish was deployed and we worked northward completing CTDs and Calvets at KOD4-KOD1 ending "day" work at 01:00. The night team worked Bongo nets southward from KOD1 to KOD5 ending at 06:30.

Apr 24 – Day 2 – The day began at Intensive Station KOD5 with a Calvet at 08:45 followed by the Prod Cast, a second Calvet and the main CTD and a Trace metal CTD cast (TMC) that ended at ~12:00. The Sediment Trap was recovered, the Iron fish deployed and we worked southward with CTD and Calvets until 01:00. The Sediment Trap was deployed and the Night team worked Bongo nets from KOD9-KOD7 finishing near dawn (06:00). To ensure correct time for primary production that morning, KOD6 was left unsampled and we transited to KOD10 completing the final Bongo there during daytime at ~10:30.

Apr 25 – Day 3 – The day work began at Intensive Station KOD10 with a prod cast, followed by two Calvets, a standard CTD, and a TMC cast. The Iron fish was deployed for a sample, the sediment tarps retrieved at ~18:00, then we transited overnight to the Middleton Line.

Apr 26 – Day 4 – The day work began at Intensive station MID10 with a Sediment Trap deployment at ~9:00 followed by two Calvets, the Prod cast, the TMC and the main CTD ending at ~1400. The Iron fish was deployed and we worked northward with Calvets and CTDs completing the CTD at MID7 at ~22:30. Night began immediately at MID7and the worked Bongo nets out to MID10 ending at ~04:30. The Sediment trap has drifted significantly eastward and was retrieved at 07:00, then we transited to MID5.

Apr. 27 – Day 5 – The day work began at Intensive station MID5 with a Prod cast at ~12:30, followed by the TMC, by two Calvets, and the main CTD ending at ~15:00. The Iron fish was deployed and we headed northward for a Calvet and CTD at KOD4 then headed south sampling MID4i, MID5i and MID6 completing that station at 21:30. Night sampling began at 22:30 and worked Bongo form MID6 to MID2 ending at ~4:40.

Apr. 28 – Day 6 – The day work began at 07:30 at MID3i with a CTD, at CTD and Calvet at MID3, a CTD at MID2i and finally reaching Intensive station MID2 at 11:30. We completed a

Prod cast at ~12:30, two Calvets, the TMC, and the main CTD ending at ~15:30. The Iron fish was deployed and we worked northward with CTDs at MID1i and MID1 completing that CTD and retrieving the Iron fish at ~17:00. We headed for northern Prince William Sound. Night work reached PWS at ~Midnight, and began sampling with the MOCNESS at PWS3 ~00:30, and then PWS2 , since we would be spending two nights in PWS, we completed an additional 700m deep cast at PWS2, that ended at ~6:00. The MOCNESS proved much slower to process than the Multinet we have been using for the past 15 years.

Apr. 29 – Day 7 – The day began at PWS3 with a CTD at ~07:00 followed by at Calvet. We began Intensive station PWS2 with a Calvet at ~9:40 followed by the Prod CTD, the TMC, an second Calvet, the standard CTD, and then both a deep and shallow vertical Multinet deployment. The station was completed at ~15:00, the Iron fish deployed then we headed for PWS1, KIP2 and IB2 completing Calvets and CTDs there. Day work ended at 21:15. Night work began at KIP2 ~23:00, deploying both the MOCNESS and Multinets at KIP2 and PWS1, ending at 03:45.

Apr. 30 – Day 8 – We entered Icy Bay at breakfast time, breaking ~0.6m soft ice to reach IBO. IBO was sampled with at Calvet at ~10:00 followed by a CTD, and both again on our way out at IB1. An extra Calvet was collected for live work at IB1, then we transited to Montague Strait. MS1-MS4 were sampled from 16:30 – 20:00 with nets and bottles employed only at MS2. We transited to the Seward Line. A Sediment Trap was deployed at ~00:30 near GAK4, then multinets were sampled form GAK4 through GAK1 (with a second deployment at GAK1) ending at ~7:00.

May 1 – Day 9 – We began Intensive Station GAK1 at 07:00 with a Calvet, followed by the standard CTD, a vertical Multinet, the TMC, 2 more Calvets and the Prod cast ending the station at ~10:30, deploying the Iron fish then working south with Calvets and CTDs to GAK 4i, ending there at 21:30, then going back to GAK4 to retrieve the Sediment Trap. Night work began at GAK5 at 23:00, with two multinets then worked south to GAK8 ending there at 6:00 and deploying a Sediment Trap there before heading back to GAK5.

May 2 – Day 10 - We reached intensive station GAK5 at ~10:00, beginning with a Calvet and a production cast. A second Calvets, a TMC rosette, the regular CTD and the vertical Multinet followed, with station work completed by ~14:00. We worked south to GAK 6, then completed a partial mooring recovery at GEO. The GEO stop took more time than anticipated and it was 20:30 before we could resume sampling at GAK7. We transitted outward to GAK8 to deploy the Sediment Trap, then Night work began with a Multinet at GAK9 deployed at ~01:00. They completed GAK10 and GAK11 by 06:00 before needs to reposition for Day work

May 3 – Day11 – The day began Intensive station GAK9 at ~9:00 with the production CTD, followed by two Calvets, the TMC rosette, the vertical Multinet, and the regular CTD cast, ending that station at 11:45. We headed north to pick up at Calvet and CTD at GAK8, then samples Calvets and CTDs at GAK 10 and GAK11 We worked south with Calvets and CTDs via GAK10 and ended GAK11 at 00:45. Night-work sampled Multinets from GAK12-14 ending at 07:00.

May 4 – Day12 – The day began deploying a Sediment Trap at GAK15 at 10:00, large swell+waves and high winds made work impossible both TMC and vertical Mutinets. Thus we decide to reoccupy the station when we would come back for the sediment traps next day. We then headed north conducting a Calvet at GAK14, but a spooling issue with the CTD winch necessitated wire re-termination. We headed to GAK12 while the wire was being repaired and fortunately weather improved so were able to sample nets and CTDs at GAK12-14 ending there

at ~23:30. The night team completed sampling at GAK14 and GAK15 running both an addition Multinet and a deep MOCNESS (to 2000m) before turning over to days at 07:30

May 5 – Day13 – The day began Intensive station GAK15 at ~9:00 with the production CTD. Attempts to run the vertical multinet indicted the wire needed re-termination and time was lost setting up the Multinet for autonomous mode. A deep and shallow vertical multinet were ultimately completed, as were two Calvets, the TMC rosette, and the regular CTD cast. The TMC CTD auto-fire was misprogramed and needed a second deployment, thus these two instrument issues resulted in the station not being completed until 18:00. The Sediment trap was retrieved at 17:45 and we headed for Seward, picking up a missed Multinet at GAK9 (~midnight) on the way in.

May 6 – Day 14 – The day-team completed at Calvet and CTD at Gak1 ~08:00 and both again at RES2.5 ~11:00. We docked at ~12:30. Offloading began thereafter.

May 7 – Science party completely final pack-up and was underway for Fairbanks midmorning.

General Comment: *The entire shelf was undergoing intensive spring bloom conditions during this cruise. The SUNA had battery issues much of the cruise and consequently data was not collected at some stations. LISST data is absent from deep casts.*

Sikuliaq in Icy Bay, Prince William Sound. Photo Credit: Ian Sherwood.

Physics Report:

PI: Seth Danielson, Participant: Issac Reister

On SKQ202106S we conducted 72 CTD casts for water column hydrography (Figure 2) using a 24-place rosette with 10 liter Niskin bottles. Bottles were tripped on 59 of these 72 casts. For normal operations, bottles were made at standard levels: 0, 10, 20, 30, 40, 50, 75, 100, 125, 150, 200, 250, 500, 750, 1000, 1250 and 1500 m depths and within 5 m of the bottom when the bottom depth was less than 1500 m. On many casts we also collected water at the depth of the chlorophyll a maximum. The SBE9-11 CTD was outfitted with pressure, dual temperature, dual conductivity, and dual oxygen sensors. Ancillary sensors included a WetLabs fluorometer, a WetLabs C-Star transmissometer, a Biospherical PAR sensor, and a Tritech altimeter. One channel was assigned to a self-logging Sequoia LISST particle size spectra instrument; one channel provided power and communication to a self-logging SUNA nitrate sensor. The 2000m LISST-Deep normally deployed on cruise was not available, but a 600m LISST-200x was use it its place – this necessitated the LISST be removed on casts deeper than its rating.

The CTD stations were occupied on three shelf transects (Kodiak, Middleton and Seward Line) plus stations in Western Prince William Sound (see Figure 2). Data revealed a likely mid-shelf eddy between about stations GAK3 and GAK6 (Figure 3) on the Seward Line.

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-meter 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 mulitbeam and operated only the ADCP and EK-60 so as to have concurrent acoustics data alongside the nighttime trawl operations. In the “day operations mode” we would run the EM-302 so as to map the seafloor along our trackline.

Regions previously unmapped by multibeam acoustics were preferentially selected for ship routes in order to map uncharted areas of the seafloor. Many portions of the cruise occurred in previously unmapped regions,

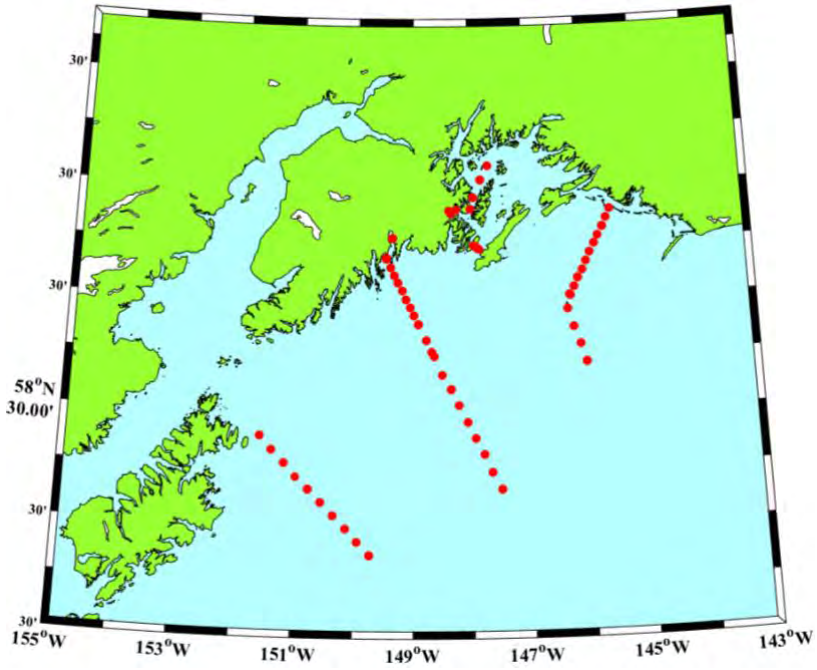


Figure 2. SKQ2021-06S CTD Stations

including especially portions of Prince William Sound and on transit between station KOD10 and station MID10. Future cruises will continue to fill in mapping coverage gaps.

Other underway data collected include the ship's operational data, meteorological data and ocean surface data. Operational data of ships equipment (e.g., navigation and winch payout and tensions) were also logged. Navigation data parameters include GMT date time, latitude, longitude and water depth. Atmospheric data parameters measured by the ship's underway system included atmospheric pressure, wind speed/direction, air temperature, humidity, 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. This instrument was set to take three samples every five minutes. The ISUS had a new lamp installed just prior to summer 2020. The lamp was burned in with 10 hours of operation prior to the cruise, but 100 hours of burn-in has been recommended. Assuming that the flow through system is normally in nitrate-depleted near-surface waters, we did notice some small baseline drift that may have be a result of the new lamp further settling in in 2020. On the SKQ202106S cruise, no drift was noticed, and it was concluded that the ISUS lamp appears to have finally settled. The second nitrate sensor was a deep SUNA instrument strapped to the CTD frame. The SUNA was powered by a stand-alone battery pack that was powered-up when the CTD sent power to the bulkhead connectors. This dataset was stored internally to the SUNA and its full data will require a matching of dataset time stamps to align the nitrate profile with the rest of the CTD profile, however a simple analog signal provides preliminary estimates. Both instruments were calibrated prior to cruise.

During SKQ20210-6S, adjustments were made to the SUNA internal Digital Analog Converter so that the SUNA no longer maxes out its analog voltage when passing the signal to the CTD. Previous cruises had been ranged to 0-45 uM Nitrate. However, measurements in deep water often exceed that maximum. The SUNA is now ranged to 0-50 uM Nitrate, and no maxing out of the signal was seen. This change was made mid-cruise on April 24. This change would not affect the data stored internally in the SUNA in any way. Additionally, during the cruise, a damaged charging cable was replaced. This damaged charging cable was certainly a source of battery issues on this cruise and likely caused similar issues noted on the Fall 2020 SKQ202012S cruise. The SUNA battery case also flooded on May 1, putting the SUNA offline for that day. The SUNA battery was repaired on May 2, and the SUNA was fully functional for the remainder of the cruise, apart from a couple deep casts where it ran out of battery.

Notes:

- Thursday, April 22: SUNA analog range is set too low and is incorrect. Issue resolved after cast.
- Thursday, April 23: SUNA coefficients in configuration file adjusted to reflect SUNA calibration file. While doing so, typo in the config file caused Temperature-2 and Conductivity-2 (the backup sensors on the SBE 9) to not record at KOD4. Issue was noted immediately after cast and resolved for subsequent casts.
- Saturday, April 25: SUNA's internal Digital Analog Converter modified (prior to day's first cast) to increase its range to 50 µM so that analog signal going to the CTD no longer maxes out.
- Sunday, April 26: SUNA ran out of battery part way through cast at MID 8 and is not present for MID7 due to lack of charge.

- Monday, April 27: SUNA charging cable electronics were found to be corroded, certainly a source for charging issues. No SUNA for MID5 main cast.
- Friday, May 1: SUNA battery flooded at GAK1i, likely due to lid not being closed properly. SUNA battery rebuilt and operational for GAK3i.
- Saturday, May 2: CTD had trouble on the second cast of GAK 5 (the main CTD cast (~12:00), not the productivity cast). Connection to the water sampler was lost at depth several times. Brought it aboard and replaced cable between the CTD and rosette which appears to have corrosion on connectors. The rosette worked smoothly after that. SUNA battery charger was also replaced, SUNA now fully functional with plug in charger. The remnant of GEO3 mooring was recovered using creative lassoing. Acoustic release upright and attached. Surface buoy broke about 5 meters from the steel float, just above the mini orange plastic catenary float attached there.
- Monday, May 4: While CTD was in the process of being lifted off the deck, the winch drum experienced a wire cross. Crew decided to halt cast and reterminate the connection, so we transited to GAK12 instead. At GAK12 we the retermination was complete and normal operation resumed at ~15:00. GAK12 does not have SUNA data as it ran out of battery (failure to charge between deep casts)
- Tuesday, May 5: Picked up sediment traps in early morning. Started GAK 15 productivity cast ~9 am. Started GAK 15 main CTD cast at 14:45 am. Reasonable condition with sun and ~12 knot winds.

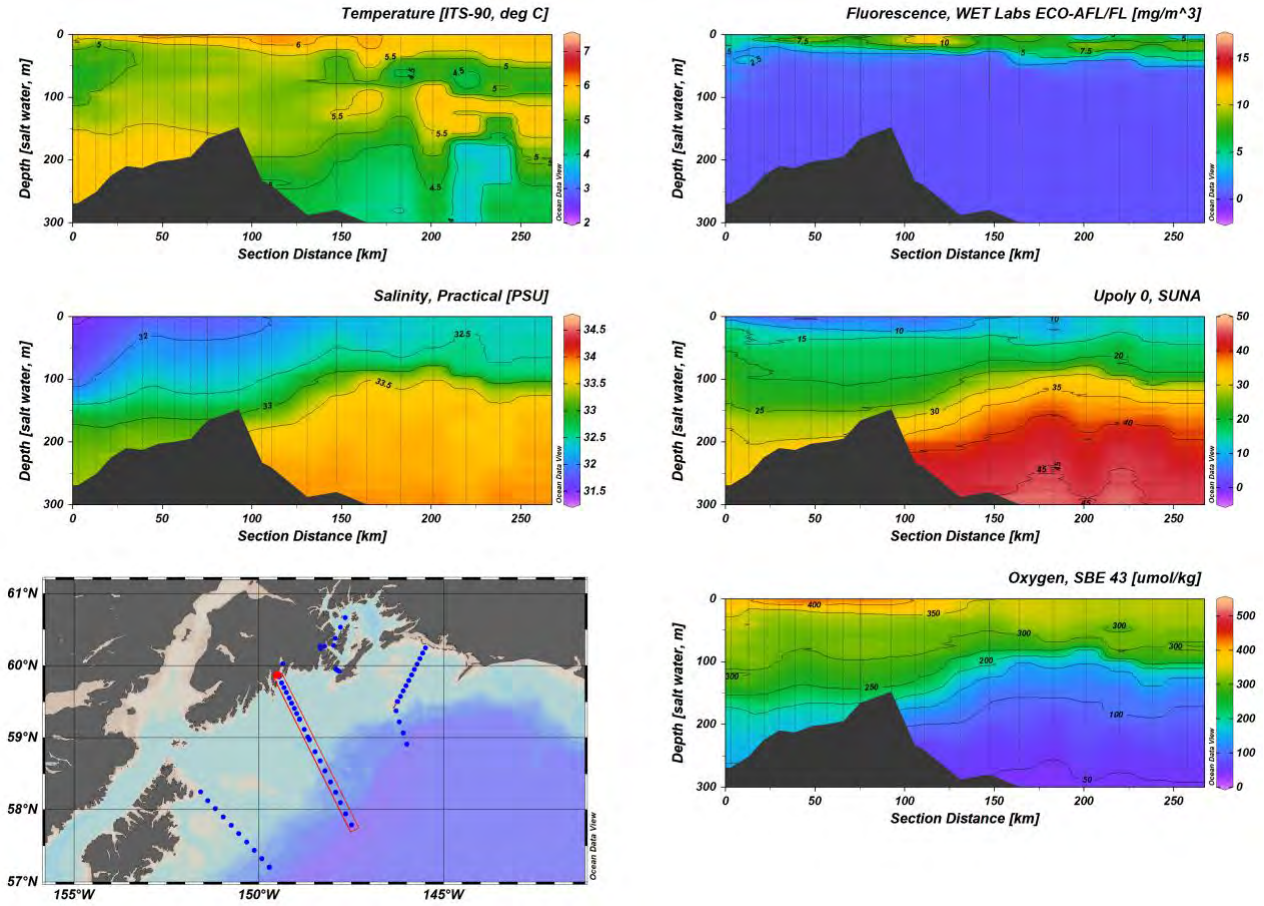


Fig. 3 Seward Line transect physical hydrography from SKQ2021-06S.

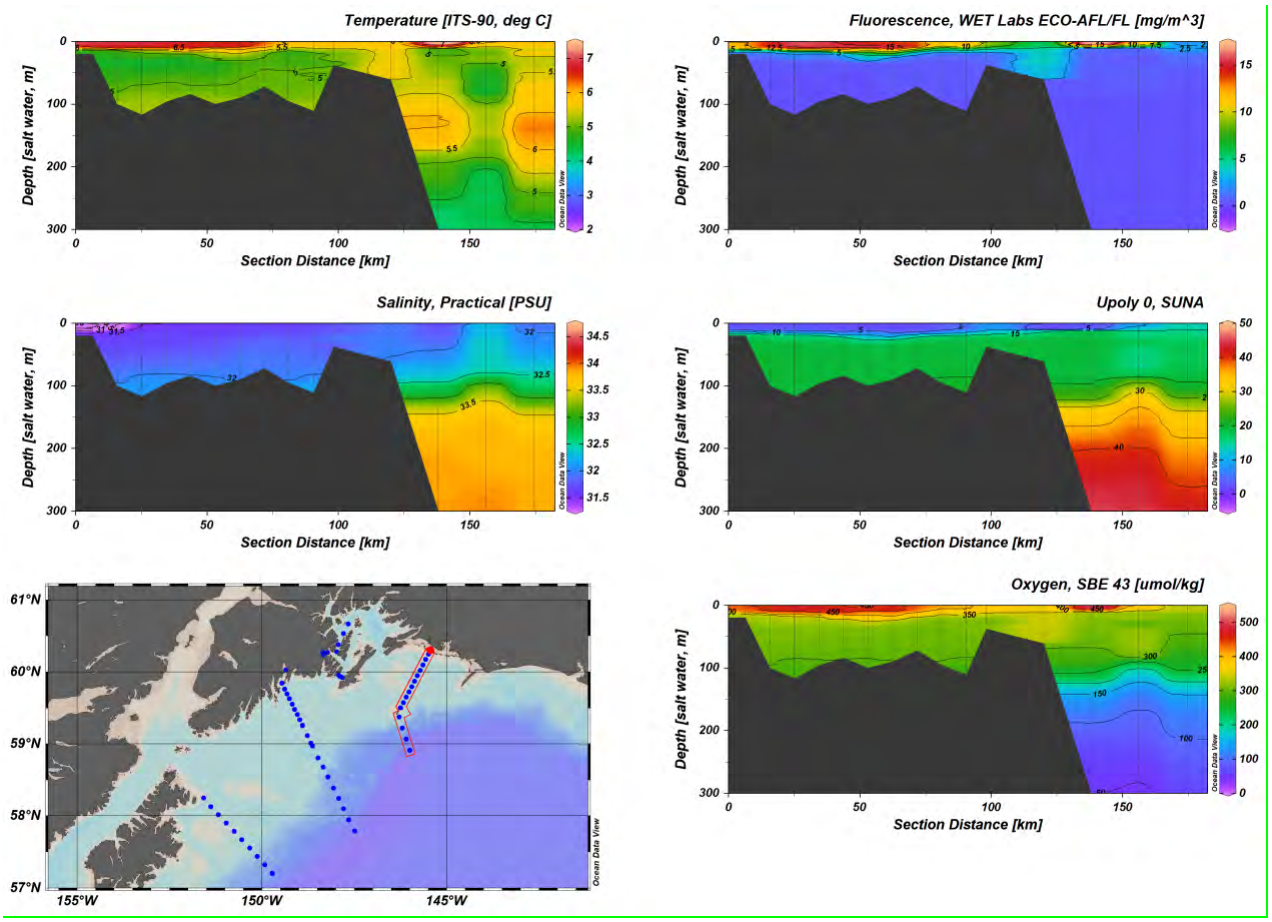


Fig. 4 Middleton Line transect physical hydrography from SKQ2021-06S.

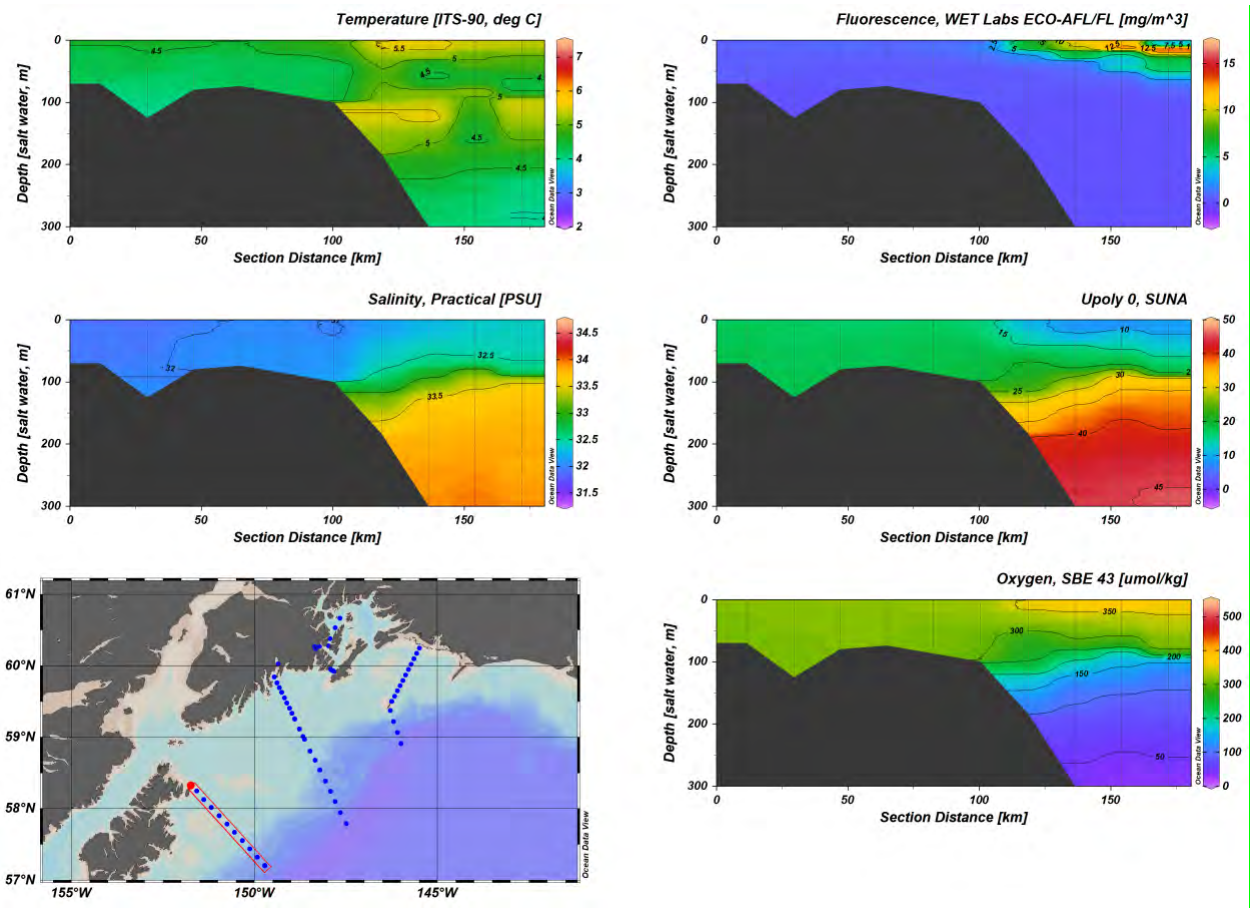
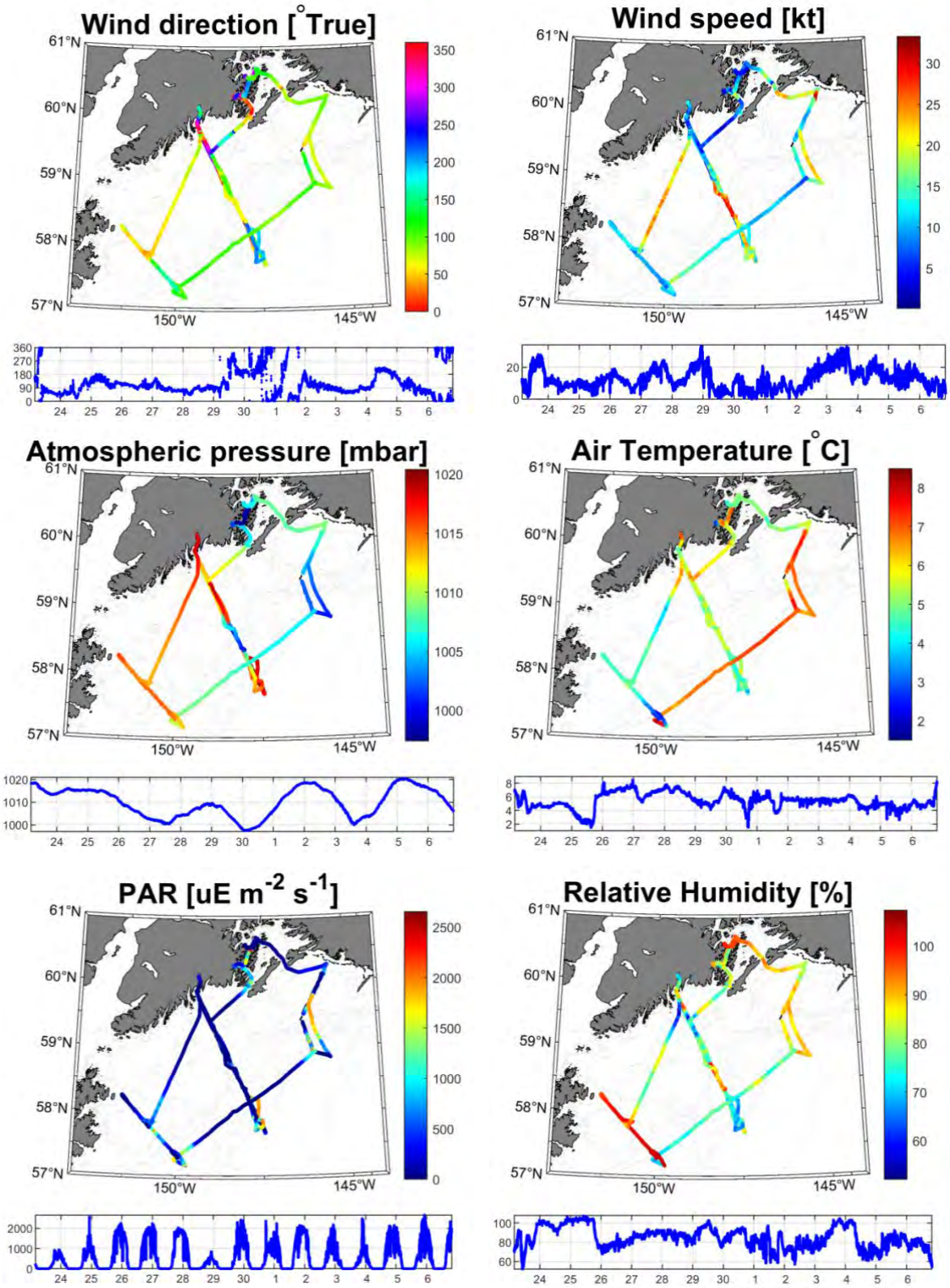
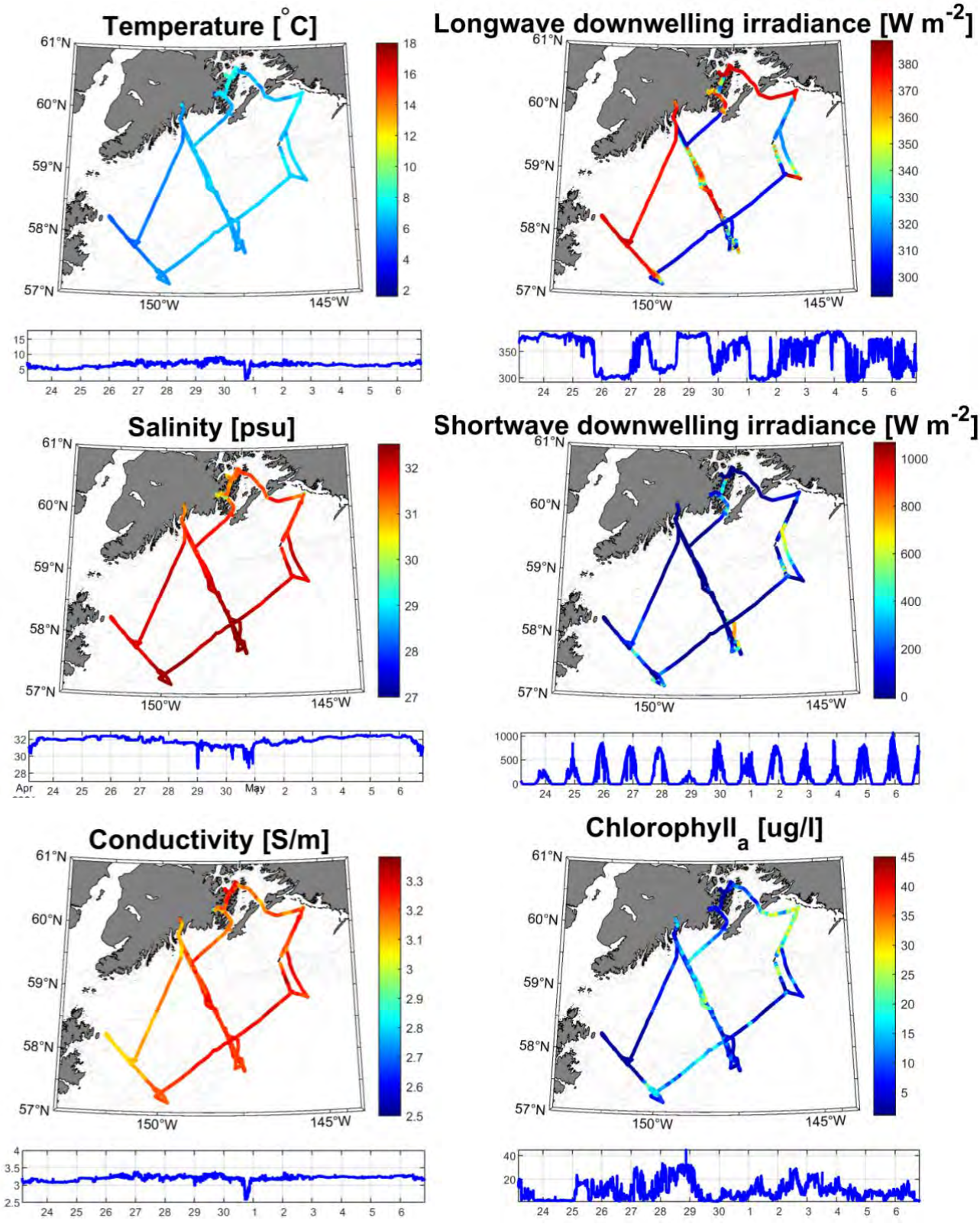


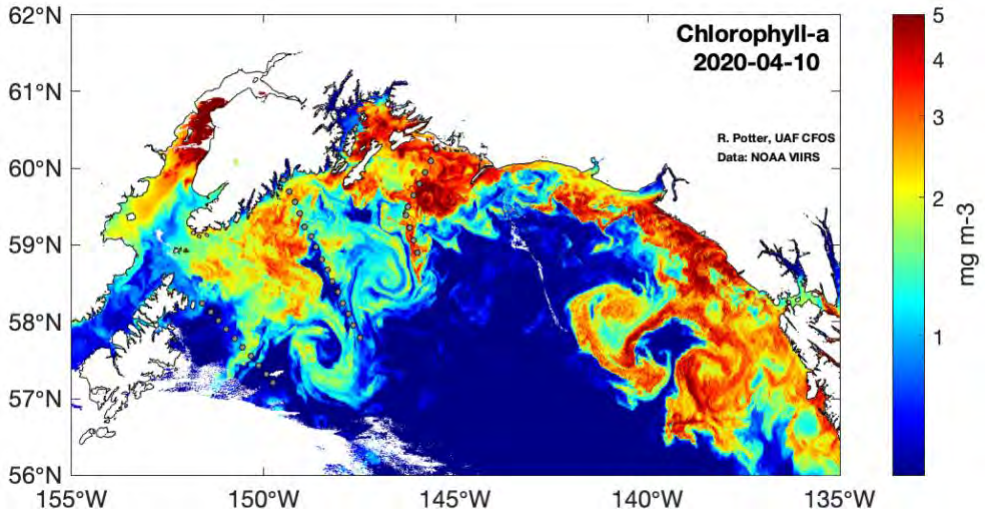
Fig. 5 Kodiak Line transect physical hydrography from SKQ2021-06S.

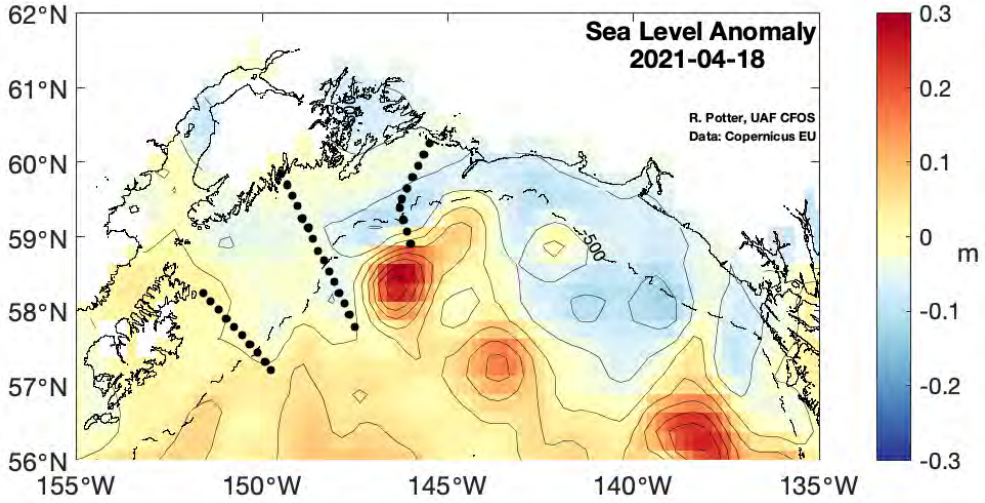
Underway Sensor Data:

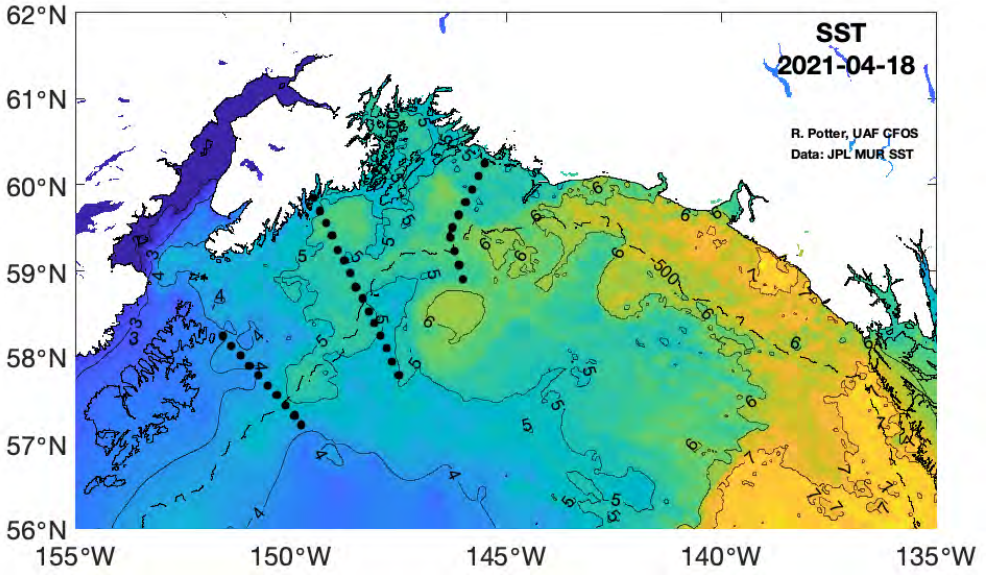



Temperature [°C]
Longwave downwelling irradiance [W m-2]
Salinity [psu]
Shortwave downwelling irradiance [W m-2]
Conductivity [S/m]
Chlorophyll a [ug/l]
61°N
60°N
59°N
58°N
57°N
150°W
145°W
Apr
May

The View from Space:







Macro- and Micronutrient sample collection and processing

PI: Ana M. Aguilar-Islas
Participants: Marissa Despins (UAF technician), Ana Aguilar-Islas (UAF)

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, 14	MID1	3	KOD1	7
GAK1	13, 14, 14	**MID2**	9	KOD2	9
GAK2	13	MID3	8	KOD3	8
GAK3	13	MID4	8	KOD4	7
GAK4	12	**MID5**	8	KOD5	8
GAK5	12	MID6	4	KOD6	8
GAK6	10	MID7	7	KOD7	11
GAK7	13	MID8	15	KOD8	15
GAK8	14	MID9	17	KOD9	17
GAK9	14	**MID10**	17	KOD10	18
GAK10	17				
GAK11	18	**PWS2**	15	GEO Mooring	13
GAK12	18	PWS3	15		
GAK13	18	PWS1	14	OTHER	# samples
GAK14	18	KIP2	15	Transects	68
GAK15	18	IB1	10	PP casts	60
		MS2	12	**TOTAL**	**702**

Sample collection and processing for macronutrient analysis:
Filtered seawater samples were collected from 46 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 (~60-66) and surface water during transects along the KOD, GAK, MID lines (68). Despins and Aguilar-Islas were responsible for CTD macronutrient sampling with some help from members of the Strom team. In total 708 samples were collected for nutrient analysis.

Sample collection for iron analysis:
a) Seawater samples were collected from 11 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. Marissa Despins learned to program the Auto Fire module, download cast data and to operate the winch.

b) Surface seawater samples were collected underway while arriving (or departing) the stations where TMC casts took place. These samples are used to complete vertical profiles. Surface seawater samples were also collected in between stations along the KOD, GAK and MID lines, as well as a sample from Icy Bay. 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 5-9 knots (see Photo 1). Water was pumped with the use of an air actuated diaphragm pump that delivered the sample into "the bubble" through Teflon-lined polyethylene tubing (see Photo). Despins and Aguilar-Islas were involved in deck operations, with assistance from the crew and marine technician. The sample in Icy Bay was collected using a pole and a 2-L bottle (See Photo)

Sample processing for iron analysis:
A positive-pressure, plastic enclosure supplied with HEPA filtered air (the "bubble") was constructed in the analytical lab to house the Niskin bottles, IronFish sampling spigots and filtration rigs. Immediately after collection Niskin bottles were transferred to the bubble for subsampling. Filtered (through 0.2 um Acropak capsules) subsamples for dissolved Fe analysis were processed from all casts at all depths, and from all IronFish samples. Filtered subsamples for the analysis of iron-binding organic ligands, unfiltered samples for total dissolvable iron analysis, and filters for particulate iron analysis were obtained from a subset of samples (see Table 2). Samples were filtered through 0.2 um polycarbonate filter discs (Nuclepore) using trace metal clean techniques. Ana Aguilar-Islas was responsible for subsampling and filtration. Time consuming ultrafiltration for soluble iron was not carried out during this cruise due to personnel shortages. In total there were 159 DFe samples, 105 TDFe samples, 39 Ligand samples, and 27 particulate samples taken during the cruise.

Left: FeFish at GAK 1 while waiting to get underway. **Right:** Sampling surface water with a pole at IcyBay0.

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

STATION	DFe	SFe	TDFe	Ligands	PFe
GAK1	10	0	10	4	3
GAK5	10	0	10	3	3
GAK9	10	0	10	3	3
GAK15	13	0	13	6	3
MID10	13	0	13	5	3
MID5	6	0	6	4	3
MID2	7	0	7	4	4
PWS2	10	0	10	1	0
KOD2	6	0	6	2	0
KOD5	7	0	7	2	2
KOD10	13	0	13	5	3
TOTAL	**105**		**105**	**39**	**27**
TRANSECT	**DFe**	**SFe**	**TDFe**	**Ligands**	**PFe**
GAK	27	0	0	0	0
MID	11	0	0	0	0
KOD	16	0	0	0	0
TOTAL	**54**	**0**	**0**	**0**	**0**
GRAND TOTAL	**159**		**105**	**39**	**27**

General Notes

We had a successful cruise and were able to accomplish all the programmed sampling for macro-nutrients and iron parameters. The large spring bloom that was underway in all the sampled waters was in contrast to other years, and nutrient fields should reflect enhanced uptake and likely altered ratios as compared to other spring distributions. A narrow, fresher surface water layer was present at most stations, in contrast to previous springs with deeper surface mixed layers. This should also influence the nutrient distributions available to the phytoplankton community.

The warehouse was easy to access before and after the cruise, and the SMC personnel were helpful during loading and offloading. The marine technicians provided excellent support throughout the cruise. The crew was always helpful responding promptly to requests in a happy and professional manner. We experienced no issues with ship's facilities needed for macro- and micronutrient work. Laboratory spaces were adequate, the ship's deck gear, -80 ^{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, as were the linens provided.

Carbonate Chemistry

PI: Claudine Hauri, Participant: Ben Lowin

Dissolved inorganic carbon (DIC) samples were taken for both the Hauri Lab and the Ocean Acidification Research Center (AORC). The assistance of **Tom Kelly** was greatly appreciated for both the speed and effectiveness of taking these samples. Top and bottom triplicates were taken twice at GAK 1 for OARC. Full water column samples were taken at the intensive stations on the GAK line for the Hauri Lab. All of the samples were pickled and stored for analysis at UAF. The samples were checked for seal integrity before shipping to UAF. The samples for OARC were not filtered whereas the ones for the Hauri Lab were filtered through at 45-micron filter using a peristaltic pump. This peristaltic pump stopped working and displayed error code 3 multiple times during the trip, but later would begin working again. I recommend a backup pump be sent with the next trip.

Dissolved Oxygen

Participant: Ben Lowin

A total of 80 oxygen samples were taken during the spring cruise. This led to samples at every station, frequently top and bottom, with triplicates at GAK 1. All samples were pickled and stored for analysis at UAF. Before shipping all samples were checked for seal integrity, topped up and wrapped with cellophane. Along the way there was trouble with the pumps used for the pickling reagents. They were washed frequently (3x) during the cruise to resolve clogging issues. The MnCl2 was the major issue. One potential solution could be to dilute by a factor of 2 to reduce build up. Also, samples may dry up during transit to UAF, which would impact data quality, suggesting that we consider titrating samples onboard in future.

Particles

PI: Andrew McDonnell. Participant: Thomas Kelly, UAF

During the cruise 6 deployments of the surface-tethered sediment trap arrays were completed with a target duration of 24h. Deployments were conducted across a representative set of pelagic stations (KOD5, KOD9, MID10, GAK4, GAK8, and GAK15) in order to measure gravitationally settling organic matter quantity and quality. Each array was outfitted with 2-3 cross-frames placed (1) near the base of the euphotic zone at 40 m, (2) 100 m, and 180 m (when water depth permitted). Four collection tubes per depth allowed for replicate sampling for Chl-*a* (n = 60) and carbon and nitrogen abundance and isotopic composition (n = 90) of sinking matter. Additionally, samples for biogenic silica were collected from one tube per depth (n = 15). Use of a 5m spar buoy, SPOT satellite beacon, and strobe light permitted efficient recovery. Pigment fluxes have been calculated for all sediment trap deployments (Figure 6).

Two autonomous instruments (Underwater Vision Profiler, UVP5; Laser In Situ Scatterometer and Transmissometer, LISST-200x) were attached to the CTD Niskin frame in order to measure in situ particle size spectra. The LISST-220x measures the abundance of particles across 36 size classes from 1 – 500 µm, while the UVP5 captures photographs of particles > ~250 µm. Both instruments were deployed on every cast with the exception of casts > 600 m which necessitated the removal of the LISST-200x from the rosette. Background blanking of the LISST-200x was conducted regularly throughout the cruise with deionized water and showed minimal variability between casts and no secular drift throughout the cruise. Data for both

instruments has been backed up on UAF servers and the UVP5 data has been uploaded to Ecotaxa data portal for analysis.

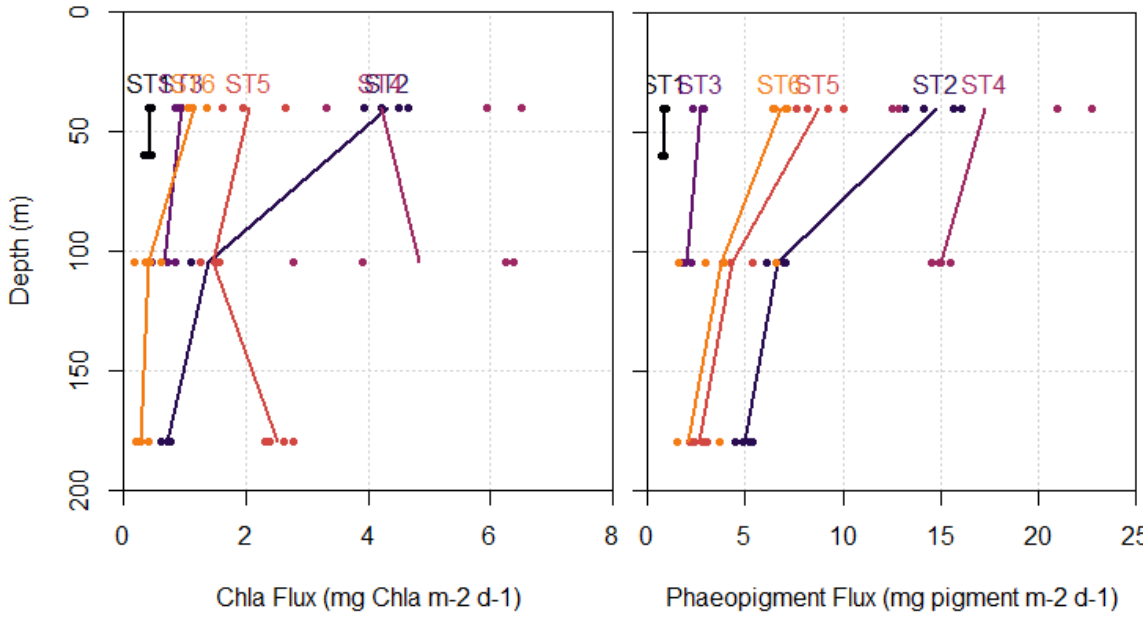


Figure 6. Vertical profiles of pigment flux for Chl-a and phaeopigments from SKQ202106.

Underway optics

PI: Will Burt. Participant Ben Lowin

The Optics sampling system was mounted on the wall in the main lab. The system is comprised of a WET Labs AC-S (ACS) for hyperspectral (400–750 nm) absorption (m^{-1}) and attenuation (m^{-1}) measurements and a WET Labs ECO-BB3 (BB3) for measurement of the volume scattering function at 117° (β, m^{-1} s^{-1}) at three wavelengths (470, 532, and 650 nm). The underway optics system took both mobilization days to set up. This has inspired a re-design of the system, so that it will be easier to deploy in the future while implementing previous objectives to improve data quality and consistency. Sampling began at Res 2.5, and was continuous through the Kodiak, Middleton, Prince William Sound and the Seward Lines. The Spring bloom had a serious effect on the rate of filters that were used. This led to innovation and re-thinking so that filters were backflushed with hot water to extend their lifetime. After the trip into Icy Bay, the instruments were cleaned, to prevent sediment build up. This was oddly unnecessary as the ice had not truly begun thawing yet so there was minimal sediment in the water.

Discrete Chl samples were taken on sunny days to match up with MODIS-AQUA satellite overpasses. The information for satellite passes was found on Heavens Above. The addition of this was fit into the schedule with some difficulty as the timing of passes often conflicted with O2 and CO2 sampling. Productivity samples were also taken with each intensive station to ground truth the comparison between the cast and underway system.

Phytoplankton and Microzooplankton

PI: Suzanne Strom
Participants: Suzanne Strom, Kelley Bright, Megan O'Hara (all WWU)

State Measurements
All three of the standard LTER transect lines (KOD, GAK, MID) were sampled in their entirety, as well as 6 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 was sampled 3 times, including at the beginning of the cruise, during the full occupation of the GAK line, and on the way back to the dock on May 6, while RES-2.5 was sampled on the first and last days of the cruise (7 depths per station; total = 46 vertical profiles). Samples were analyzed fluorimetrically on board except for 6 May samples from GAK-1 and 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: Preserved samples were taken at a higher frequency than usual on this cruise in hopes that the relationship between bloom stage and microzooplankton community composition and biomass could be studied. Samples were taken from nearly every station on GAK and MID lines and at a high frequency on the KOD line. 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. At a slightly lower sampling frequency (see table), samples from 10 m were fixed in borate-buffered formalin for diatom characterization. Additional microscopy samples, collected at a similar frequency to the acid Lugol's samples, were fixed in glutaraldehyde, DAPI-stained, and made into slides for biomass and composition of nano- and picoplankton with the focus on cryptophytes (O'Hara thesis research). Samples for HPLC analysis of phytoplankton pigments (chemotaxonomy) were taken from all intensive stations; these were from 10m 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. We also did extensive sampling for Gwenn Hennon (not shown in table below), including glutaraldehyde-fixed samples for flow cytometry (generally 4 depths per station at all stations except KOD 1-9), and frozen filtered samples for DNA analysis (also 4 depths per station). A detailed log of these samples is available.

Organic carbon characterization: Samples for DOC analysis were filtered and frozen all intensive stations as well as additional stations on the MID line (total profiles = 12); 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 shelf hosted a massive spring diatom bloom that had rapidly developed between 18 and 24 April 2021, as evident in MODIS Aqua satellite imagery (see Fig. 7). We encountered some of the highest chlorophyll-a concentrations we have ever measured in this ecosystem, reaching an observed peak of 28 µg/liter at 10 m at station MID-4 on 4/27/21, and showing concentrations >5 (and often >10) µg/liter in the upper 10-20 m at most MID and GAK stations (Fig. 8). Nearly all of this biomass was in cells >20 µm, which microscope observation showed to be a diverse assemblage of mainly centric, chain diatoms including *Thalassiosira* and *Chaetoceros* spp. and others. At many stations the highest biomass was confined to a relatively shallow surface layer that was also slightly fresher than the waters just below (Fig. 9). At slope stations GAK 11-15 chlorophyll concentrations were higher than expected for HNLC waters but much lower than on most of the shelf, ranging from 1-2 µg/liter; this along with the size composition (fraction chl-a in large cells generally <50%) suggests we were in a transition regime between iron-replete shelf waters and fully iron-limited oceanic waters.

Notably, the inner KOD line (KOD 1-6) hosted the lowest chl-a concentrations of the entire cruise (≤0.7 µg/liter), with most of that biomass in small cells (Fig. 8). This is likely a consequence of intense tidal mixing associated with Albatross Bank and the inner KOD line bathymetry, eliminating the salinity stratification that was evident elsewhere on the shelf. An analogous effect, although less dramatic, can be seen at stations MID-5 and MID-6 which are in relatively shallow waters near Middleton Island (Fig. 8). In PWS the near-surface chl-a concentrations were moderate (1-6 µg/liter) compared with most of the shelf, and still dominated by >20 µm cells (Fig. 8). At several stations a subsurface chl-a maximum layer had developed, suggesting the western PWS ecosystem was beginning to transition to a more summer-like condition.

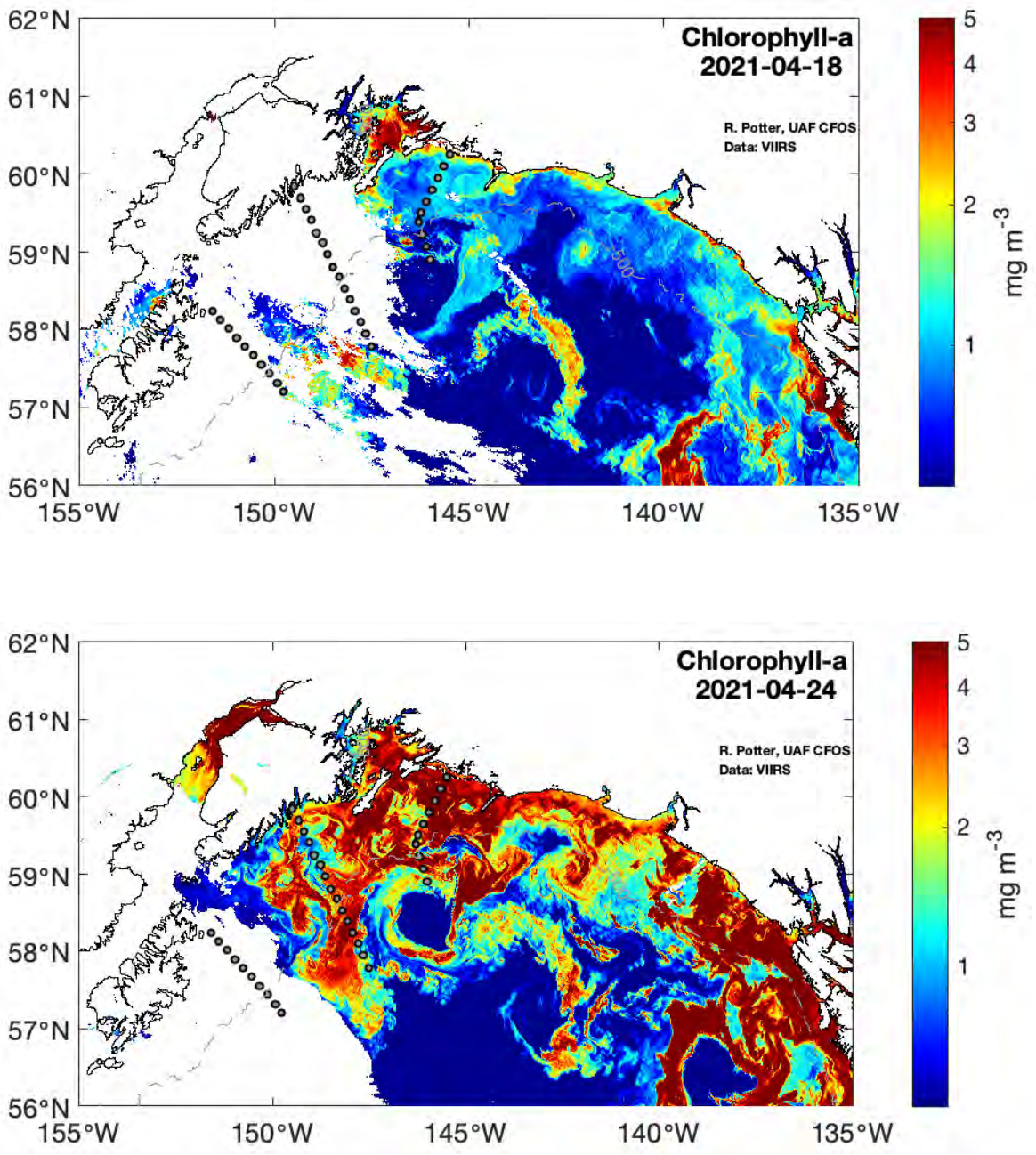


Fig. 7. MODIS Aqua false color images of the study region from April 18th and April 24th 2021, showing rapid development of intense diatom bloom.

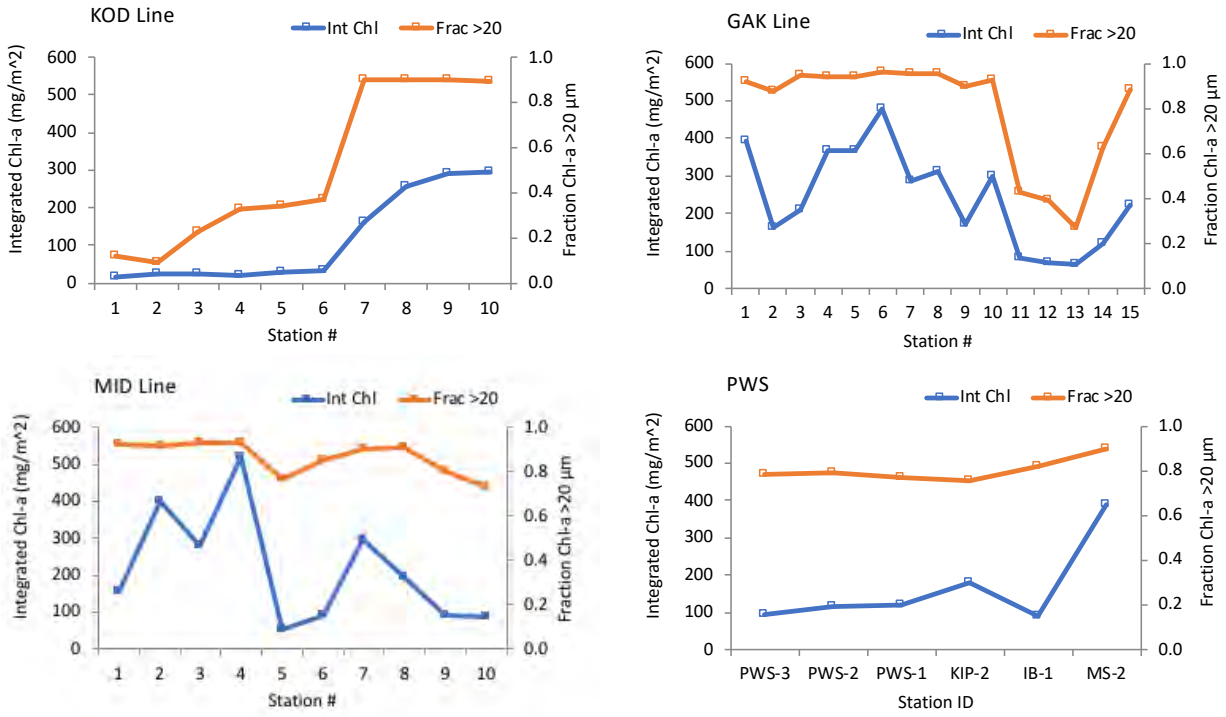


Figure 8. Size-fractioned chlorophyll integrated over 0-75m along transects during Apr-May 2021 for *the KOD, GAK, MID, and PWS stations.*

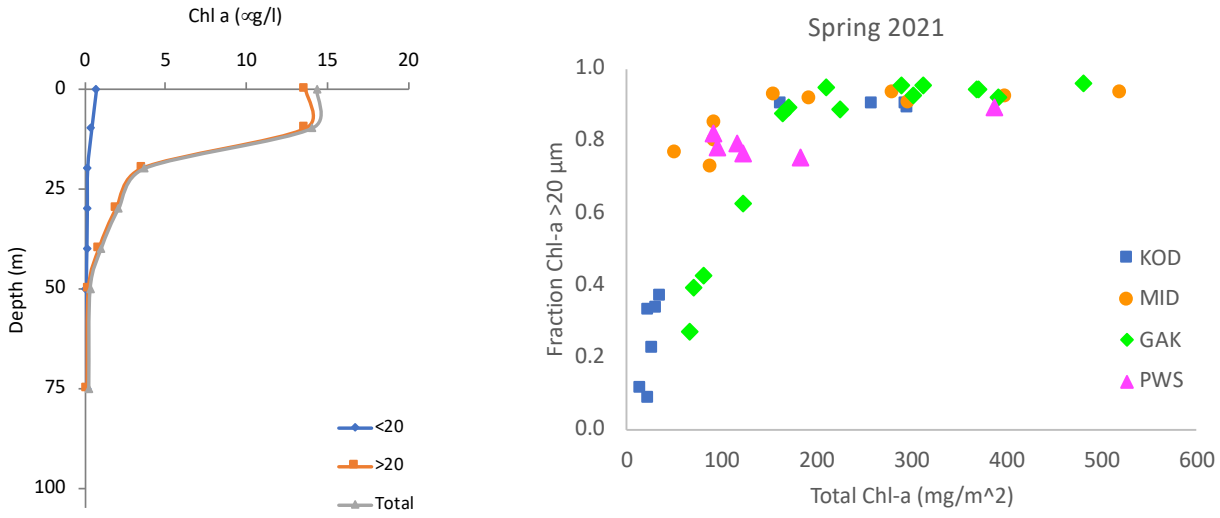


Fig. 9. Left: Vertical profile of chl-a at GAK-7 on 5/2/21, showing the (typical for this cruise) predominantly near-surface distribution of high chl-a biomass. Right: Total integrated (0-75 m) chl-a versus fraction of chl-a in large (>20 µm) cells during spring 2021 NGA cruise.

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

Station	SF Chl	Lugols µzoo	Diatom	Nano/ pico	HPLC	Euk Mol	DOC	POC/ PIC	13C prod
RES2.5	x								
GAK1-A	x	x		x					
KOD1	x	x	x	x					
KOD2	x			x					
KOD3	x	x	x	x					
KOD4	x			x					
KOD5	x	x	x	x	x	x	x	x	x
KOD6	x			x					
KOD7	x	x	x	x					
KOD8	x			x					
KOD9	x			x					
KOD10	x	x	x	x	x	x	x	x	x
MID1	x						x		
MID2	x	x	x	x	x	x	x	x	x
MID3	x	x	x	x					
MID4	x	x	x	x					
MID5	x	x	x	x	x	x	x	x	x
MID6	x	x	x	x					
MID7	x	x	x	x			x		
MID8	x	x	x	x					
MID9	x	x	x	x					
MID10	x	x	x	x	x	x	x	x	x
PWS3	x			x					
PWS2	x	x	x	x	x	x	x	x	x
PWS1	x			x					
KIP2	x			x					
IB1	x								
MS2	x	x	x	x					
GAK1-B	x	x	x	x	x	x	x	x	x
GAK2	x	x	x	x					
GAK3	x	x	x	x					
GAK4	x	x	x	x					
GAK5	x	x	x	x	x	x	x	x	x
GAK6	x	x		x					
GEO	x								
GAK7	x	x	x	x					
GAK8	x	x		x					
GAK9	x	x	x	x	x	x	x	x	x
GAK10	x	x		x					
GAK11	x	x	x	x					
GAK12	x	x		x					
GAK13	x	x	x	x					
GAK14	x	x		x					
GAK15	x	x	x	x	x	x	x	x	x
GAK1-C	x								
RES2.5	x								
Totals:	**46**	**32**	**26**	**40**	**10**	**10**	**12**	**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). Sample collected from 10 m.

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

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.

Meso/Macro Zooplankton

PI: Hopcroft, Participants: Caitlin Smoot, Delaney Coleman, Emily Stidham

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 Mulinet was also deployed at GAK15 to 1200 m dividing strata at 600, 400, 300, 200,100, 60, 40, and 20 m.

During night-time, a Multinet equipped with 505 µm-mesh nets was towed obliquely to 200 m depth (or 5 m above the bottom) dividing strata at 100, 60, 40, and 20 m. A second collection was made at Intensive stations and preserve din Ethanol for molecular analysis. We also made efforts this cruise to consider the logistical practicality of replacing the Multinet with a MOCNESS for routine use. A deep MOCNESS cast was completed at GAK15 and PWS2. 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 sent to NOAA Eco-FOCI for larval fish analysis.

Overall, *Neocalanus* abundances appeared to be above average at several of the stations live-sorted along the Seward Line. In contrast, the zooplankton community over Albatross Bank (on the Kodiak Line) appeared as if they were still phenologically in winter. The Middleton Line was more similar to the Seward Line albeit somewhat earlier in zooplankton community phenology.

Unlike recent years where *N.plumchrus* was the most abundance *Neocalanus* species, *N. flemingeri* was the most abundant of the 3 species at every station live-sorted.

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	MOCNESS
RES2.5	x				
GAK1	X*	x	x		
GAK2	x		x		
GAK3	x		x		
GAK4	x		x		
GAK5	X*	x	x		
GAK6	x		x		
GAK7	x		x		
GAK8	x		x		
GAK9	X*	x	x		
GAK10	x		x		
GAK11	x		x		
GAK12	x		x		
GAK13	x		x		
GAK14	x		x		
GAK15	x	X*	x		x
MS2	x				
KIP2	x		x		x
PWS1	x		x		x
PWS2	X*	X*	X		XX
PWS3	x		x		x
IB0	X*				
IB1	x				
IB2	x				
KOD1	X*			X	
KOD2	x			X	
KOD3	x			X	
KOD4	x			X	
KOD5	X*			X	
KOD6	x			X	
KOD7	x			X	
KOD8	x			X	
KOD9	x			X	
KOD10	X*			X	
MID1	x			X	
MID2	X*			X	
MID3	x			X	
MID4	x			X	
MID5	X*			X	
MID6	x			X	
MID7	x			X	
MID8	x			X	
MID9	x			X	
MID10	X*			X	
TOTAL	**44**	**4**	**19**	**10**	**6**

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 50 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 were also examined for *Neocalanus*, and notable numbers of *N flemingeri* 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*. It is clear *N. flemingeri* were already loaded with lipids and descending at the time of this cruise.
- *N. flemingeri* were sorted from all intensive stations for transciptomics, and several additional taxa were targeted for whole genome sequencing.

Marine bird and marine mammal surveys (USFWS)

PI & participant: Dr. Kathy Kuletz, U.S. Fish and Wildlife Service
Dan Cushing, Pole Star Ecological Research LLC, maps and report contributions

Background

We conducted marine bird and marine mammal surveys in the Northern Gulf of Alaska (NGA), April 22 to May 6, 2021, aboard the 80-m R/V *Sikuliaq*, as a component of the NGA-LTER. The seabird component is primarily funded by the North Pacific Research Board (Project L37-01A) and the Exxon Valdez Oil Spill Trustee Council (Project 20120114-M). The processed data will be uploaded to the NGA-LTER workspace and submitted to the North Pacific Pelagic Seabird Database.

Methods

Observer K. Kuletz 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. 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 1156 linear km of surveys during the April-May 2021 cruise (Figure 1). On-transect, we observed a total of 1457 individuals of 31 species of birds, with an additional 10 species observed off-transect (Table 1). Averaged across all 3-km transect segments, the mean

density (all bird species combined) was 4.4 birds km^{-2}, which was the lowest value observed during any NGA LTER cruise to date. For comparison, mean densities were 6.2 birds km^{-2} during April-May 2018 and 8.5 birds km^{-2} during April-May 2019. Avian species richness was also lower in 2021 (41 species observed both on- and off-transect) than in 2018 or 2019 spring cruises (56 and 49 species, respectively).

Of the three cross-shelf lines sampled during the April-May 2021 cruise, the lowest overall density of birds occurred on the Kodiak Line (Figure 2). Along the Middleton line, abundance of birds was generally low on the shelf, while foraging flocks occurred offshore. Overall density was highest on the Seward Line, which had patches of higher- and lower-density areas along its length. However, compared to other spring surveys of the Seward Line during 2007-2019, the average density during spring 2021 (6.9 birds km^{-2}) was one of the lowest years, behind only 2019 (3.2 birds km^{-2}) and 2007 (4.0 birds km^{-2}). Species with mean density values below their long-term average along the Seward Line included common murre, tufted puffin, black-legged kittiwake (all primarily piscivorous), black-footed albatross, northern fulmar, and sooty shearwater (omnivorous, but typically feed on a variety of invertebrates and small fish). Mean density of glaucous-winged gull (primarily piscivorous at sea) was near average, and mean density of fork-tailed storm-petrel (a surface planktivore) was above average.

Fork-tailed storm-petrels were the most abundant avian species observed on transect (23.4% of total; Table 1). The highest densities of storm-petrels occurred on the Seward Line, in the area from GAK5 – GAK 6i, where depths become shallower over the middle shelf, and also near GAK13 – GAK14 in deep oceanic waters (Figure 3). The second most abundant avian species was the black-legged kittiwake, which comprised 18.9% of sightings. Kittiwakes were abundant in Knight Island Passage and Icy Bay in PWS (Figure 4). Few kittiwakes occurred in the Copper River plume region, but were regularly observed over the outer shelf and oceanic waters of the Middleton Line, closer to the island, with foraging flocks observed in offshore waters. Along the Seward Line, kittiwakes were most common on the inner shelf and over the mid-shelf rise.

The third most abundant bird was the common murre, which made up 8.4% of sightings. Murres were most abundant within about 20 km of the coast of the Kenai Peninsula and outer PWS (Figure 5).

Northern fulmars comprised 8.2% of sightings. The largest aggregations of fulmars occurred near the shelf-break along the Seward Line, in offshore locations on the Seward Line and southeast of Middleton Island, over the mid-shelf rise on the Seward Line, and over Portlock Bank (Figure 6).

Glaucous-winged gulls comprised 7.5% of sightings. Overall abundance of glaucous-winged gulls was highest over the inner shelf along the Seward Line (Figure 7). They were also common in Resurrection Bay, PWS, and the Copper River plume.

Tufted puffins comprised 5.8% of sightings. Small numbers occurred in most regions surveyed, from PWS to oceanic waters (Figure 8). The highest densities of tufted puffins occurred along portions of the inner and middle shelf along the Seward Line.

Ducks, geese, and loons were observed migrating over marine waters during the cruise. In total, ducks and geese comprised 8.0% of all on-transect sightings. While most waterfowl were observed near the coast, greater white-fronted geese, brant, and northern pintail were all observed over oceanic waters south of Middleton Island (Figure 9). Pacific loons made up 4.1% of sightings, with most observed near the Kenai coastline and over the shelf north of Middleton Island (Figure 10).

The abundance of shearwaters was unusually low during this cruise, comprising 4% of all bird sightings; 90% of shearwaters were identified to the species level, and nearly all were sooty shearwaters, with 1 short-tailed shearwater identified (Table 1). The majority of the sooty

shearwaters occurred in a single flock over Portlock Bank (Figure 11). Timing of the spring influx of shearwaters into the Gulf of Alaska is likely influenced by environmental conditions during migration from southern hemisphere breeding gounds, and the spring NGA LTER survey occurs at the beginning of their influx into Alaska's waters.

While albatrosses and murrelets each comprised relatively low proportions of total avian sightings, both groups are of conservation concern. Black-footed albatrosses comprised 2.9% of sightings. Their highest numbers occurred near the shelf-break along the Seward and Middleton lines (Figure 12). Murrelet species made up 1.9% of sightings. Marbled murrelets were observed within 50 km of shore on the Kodiak, Seward, and Middleton lines (Figure 13). A few Kittlitz's murrelets were observed east of Whale Bay in PWS. Ancient murrelets occurred over the inner shelf along the Seward Line.

Most of the non-marine birds recorded during this cruise were individuals or pairs that landed on the vessel and remained for up to a day. These included a white-fronted goose, peregrine falcon, dark-eyed junco, Lapland longspur, and a pair of rufus hummingbirds. There were no vessel collisions and no dead birds were encountered. Low numbers of debris items were encountered (9 items on transect), which were primarily near Middleton Island, and near station GAK6 on the Seward Line.

We observed a total of 5 species of marine mammals (Table 2), which contrasts with 9 species observed during Spring cruises in both 2018 and 2019. Dall's porpoise, the most abundant marine mammal observed, were near the coast of the Kenai Peninsula and in PWS (Figure 14). A single fin whale was observed beyond the shelf-break on the Middleton Line, and low numbers of humpback whales occurred in Resurrection Bay and Montague Strait in PWS (Figure 15). Harbor seals were the only pinniped observed on transect during the cruise, and occurred in PWS, primarily in Icy Bay (Figure 16). A northern fur seal was observed while on station at MID9.

Table 1. Birds observed during the April-May 2021 NGA-LTER cruise. Numbers include on-transect observations only. Species only observed off-transect during surveys or while on station are indicated by an asterisk.

Common name	Scientific name	Number	% of total
Greater white-fronted goose	*Anser albifrons*	13	0.9
Brant	*Branta bernicla*	4	0.3
Northern pintail	*Anas acuta*	*	*
Long-tailed duck	*Clangula hyemalis*	7	0.5
Goldeneye spp.	*Bucephala* spp.	1	0.1
Common merganser	*Mergus merganser*	*	*
Waterfowl spp.	*Anatidae* spp.	90	6.2
Rufus hummingbird	*Selasphorus rufus*	*	*
Black oystercatcher	*Haematopus bachmani*	*	*
Black-bellied plover	*Pluvialis squatarola*	*	*
Black turnstone	*Arenaria melanocephala*	4	0.3
Red-necked phalarope	*Phalaropus lobatus*	20	1.4
Phalarope spp.	*Phalaropus* spp.	5	0.3
Pomarine jaeger	*Stercorarius pomarinus*	1	0.1
Common murre	*Uria aalge*	123	8.4
Murre spp.	*Uria* spp.	3	0.2
Pigeon guillemot	*Cepphus columba*	3	0.2
Marbled murrelet	*Brachyramphus marmoratus*	8	0.5
Kittlitz's murrelet	*Brachyramphus brevirostris*	*	*

Table 1. (continued)

Common name	Scientific name	Number	% of total
Marbled or Kittlitz's murrelet	*Brachyramphus* spp.	9	0.6
Ancient murrelet	*Synthliboramphus antiquus*	8	0.5
Murrelet spp.	*Brachyramphus* or *Synthliboramphus*	4	0.3
Parakeet auklet	*Aethia psittacula*	5	0.3
Rhinoceros auklet	*Cerorhinca monocerata*	3	0.2
Tufted puffin	*Fratercula cirrhata*	84	5.8
Alcid spp.	*Alcidae* spp.	18	1.2
Black-legged kittiwake	*Rissa tridactyla*	276	18.9
Sabine's gull	*Xema sabini*	3	0.2
Mew gull	*Larus canus*	6	0.4
Herring gull	*Larus argentatus*	9	0.6
Glaucous-winged gull	*Larus glaucescens*	110	7.5
Glaucous-winged x herring gull	*Larus glaucescens* x *argentatus*	*	*
Glaucous gull	*Larus hyperboreus*	1	0.1
Arctic tern	*Sterna paradisaea*	1	0.1
Red-throated loon	*Gavia stellate*	2	0.1
Pacific loon	*Gavia pacifica*	60	4.1
Loon spp.	*Gavia* spp.	4	0.3
Black-footed albatross	*Phoebastria nigripes*	42	2.9
Laysan albatross	*Phoebastria immutabilis*	*	*
Fork-tailed storm-petrel	*Hydrobates furcatus*	341	23.4
Northern fulmar	*Fulmarus glacialis*	120	8.2
Short-tailed shearwater	*Ardenna tenuirostris*	1	0.1
Sooty shearwater	*Ardenna grisea*	53	3.6
Dark shearwater spp.	*Ardenna* spp.	6	0.4
Procellariid spp.	*Procellariidae* spp.	1	0.1
Double-crested cormorant	*Phalacrocorax auritus*	3	0.2
Cormorant spp.	*Phalacrocorax* spp.	1	0.1
Great blue heron	*Ardea herodias*	1	0.1
Bald eagle	*Haliaeetus leucocephalus*	2	0.1
Peregrine falcon	*Falco oeregrinus*	*	*
Lapland longspur	*Calcarius lapponicus*	*	*
Dark-eyed junco	*Junco hyemalis*	*	*
Bird spp.	*Aves* spp.	2	0.1
Total		**1458**	**100.0**

Table 2. Marine mammal species observed during the April-May 2021 NGA-LTER cruise.

Common name	Scientific name	On-transect	Off-transect
Fin whale	*Balaenoptera physalus*	1	0
Humpback whale	*Megaptera novaeangliae*	2	4
Whale spp.	*Cetacea* spp.	0	2
Dall's porpoise	*Phocoenoides dalli*	15	0
Porpoise spp.	*Phocoenoides* spp.	0	3
Northern fur seal	*Callorhinus ursinus*	0	1
Harbor seal	*Phoca vitulina*	4	33
Total		**22**	**43**

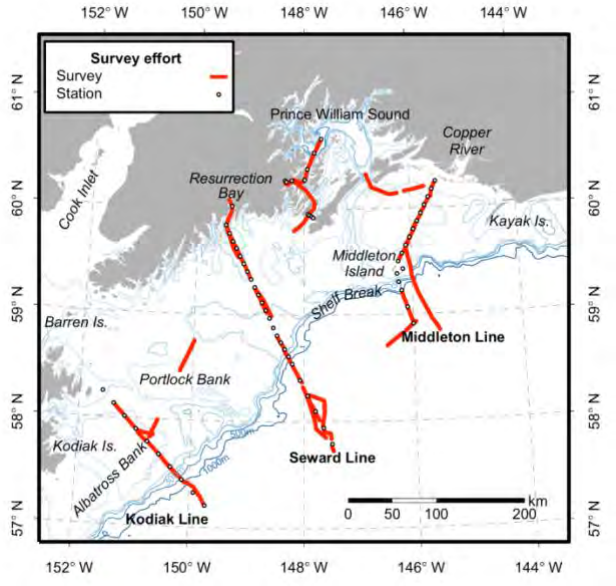


Figure 1. Location of seabird and marine mammal surveys (red).

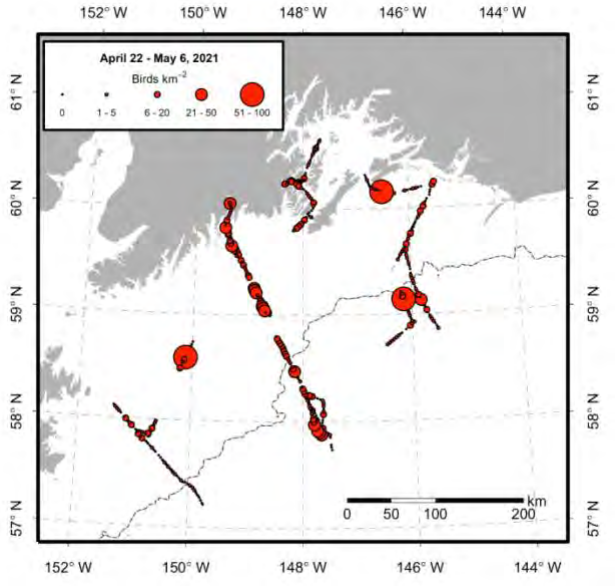


Figure 2. Densities (birds km^{-2}) of total seabirds (all species combined).

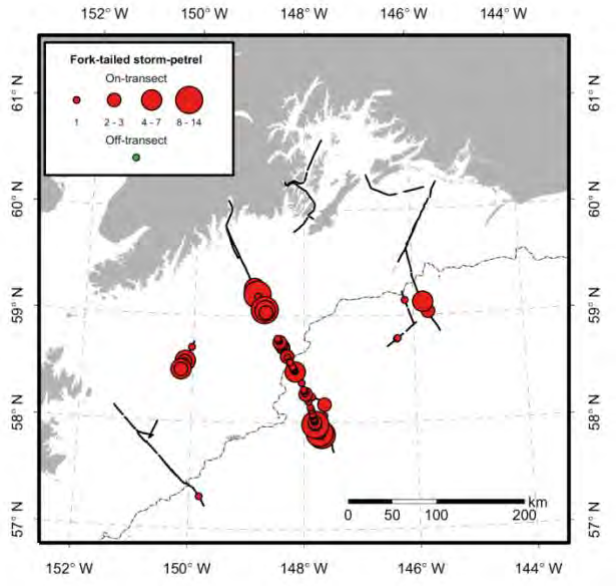


Figure 3. Fork-tailed storm-petrel

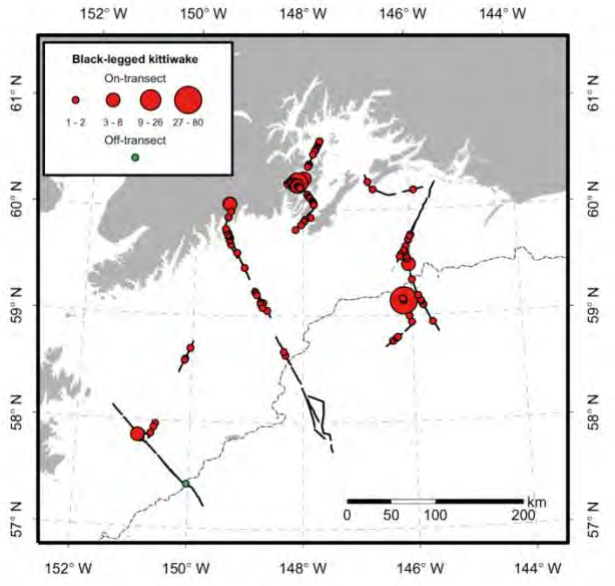


Figure 4. Black-legged kittiwake.

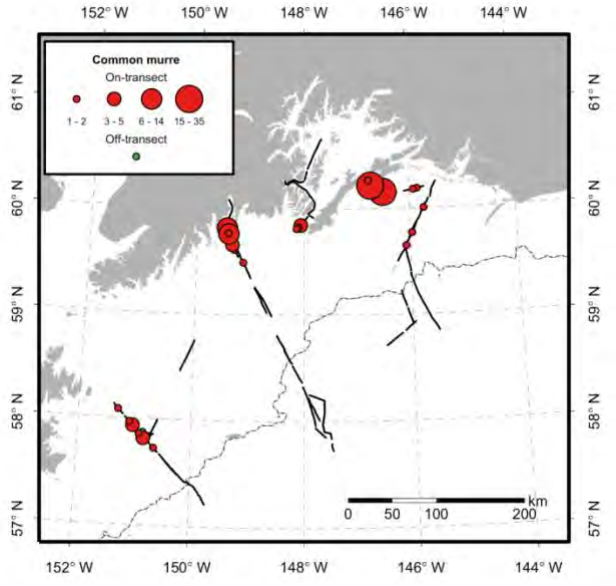


Figure 5. Common murre.

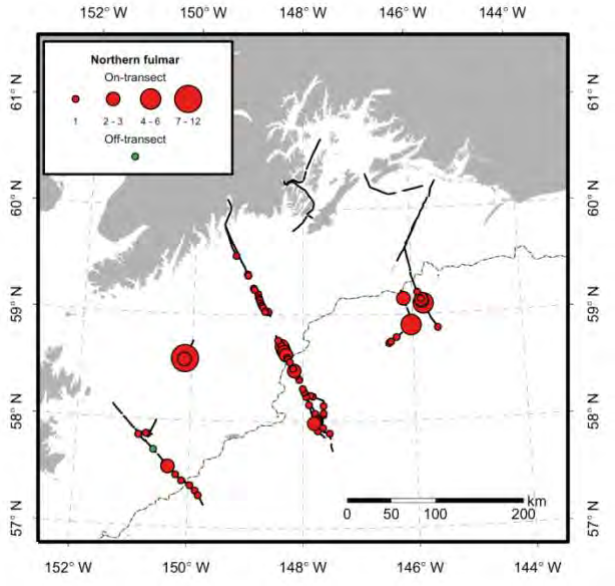


Figure 6. Northern fulmar.

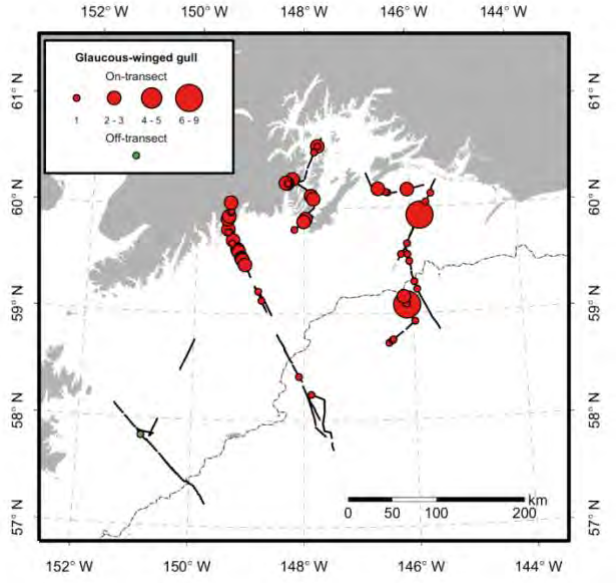


Figure 7. Glaucous-winged gull.

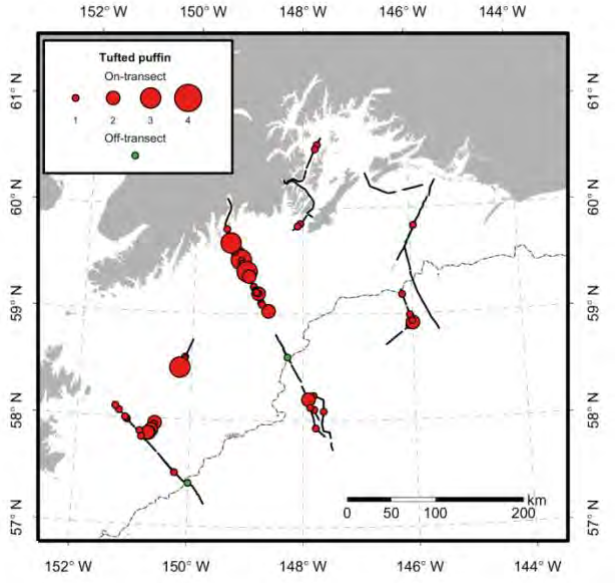


Figure 8. Tufted puffin.

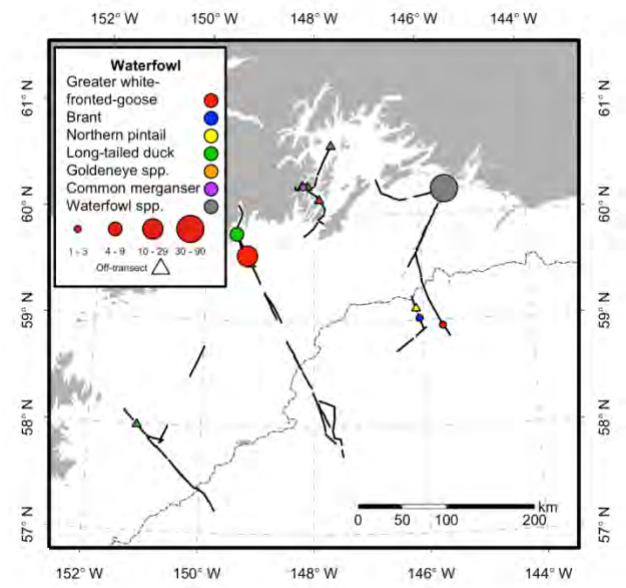


Figure 9. Waterfowl.

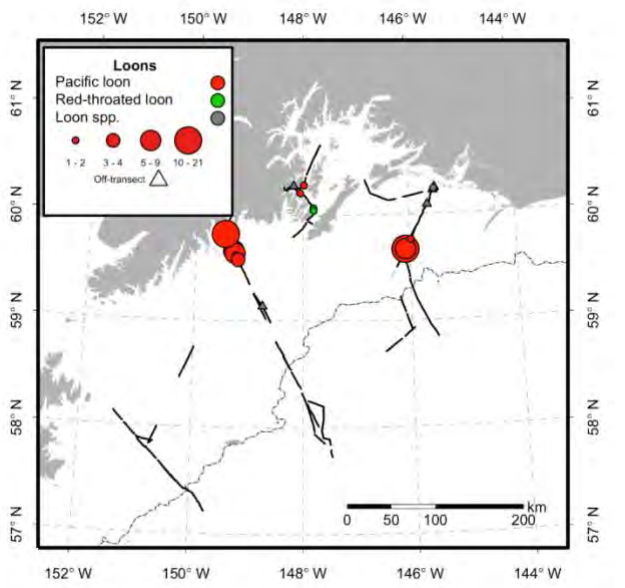


Figure 10. Loons.

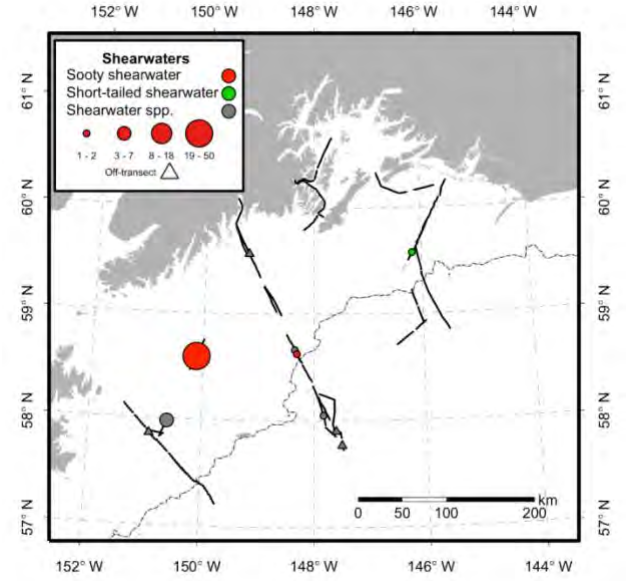


Figure 11. Shearwaters.

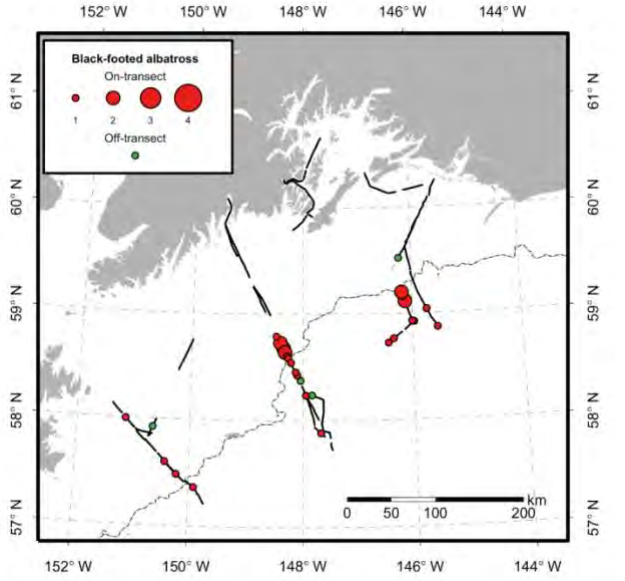


Figure 12. Black-footed albatross.

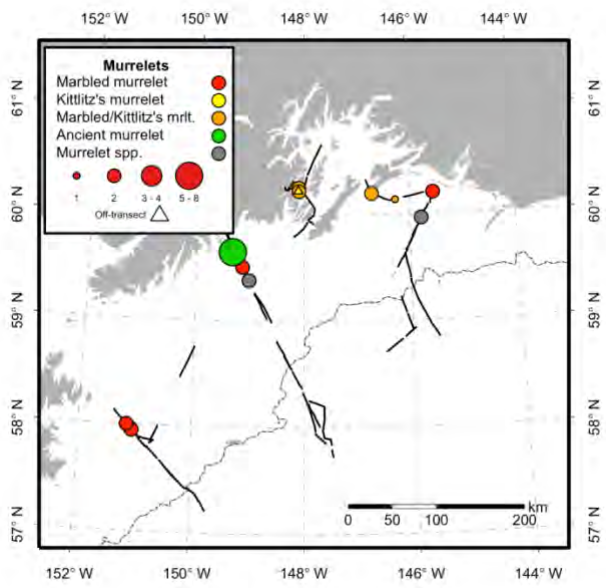


Figure 13. Murrelets.

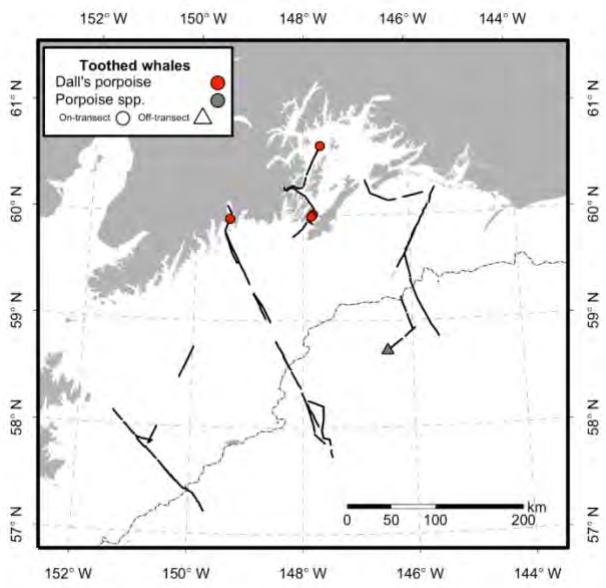


Figure 14. Toothed whales.

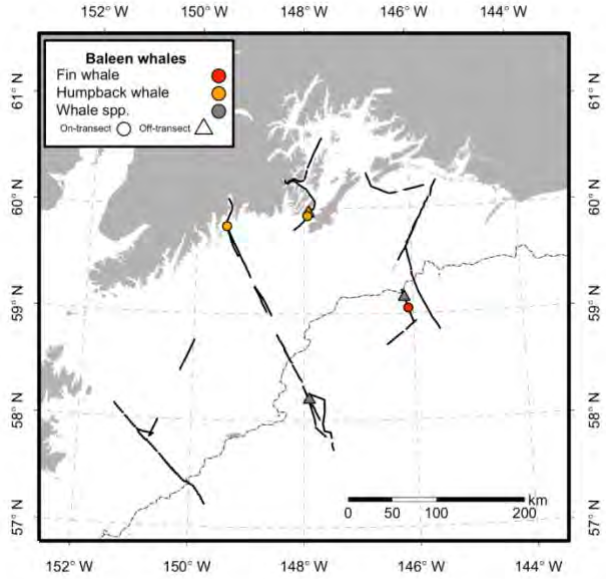


Figure 15. Baleen whales.

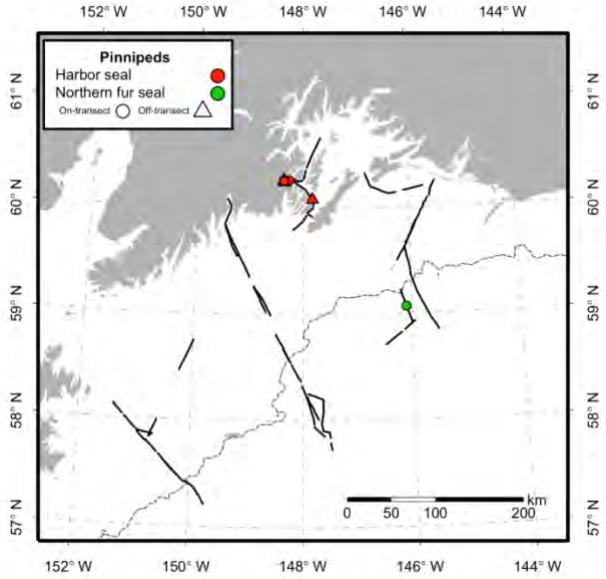


Figure 16. Pinnipeds.

Appendix. STANDARD STATIONS (intensive stations highlighted)

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

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

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
1	CalVet net	deploy	RES2.5	1	4/22/2021 20:22	4/23/2021 4:22	60.02536	-149.358	300	rHopcroft	
2	CalVet net	recover	RES2.5	1	4/22/2021 20:28	4/23/2021 4:28	60.02544	-149.358	292	rHopcroft	
3	CTD911	deploy	RES2_5	1	4/22/2021 20:49	4/23/2021 4:49	60.02562	-149.358	292	iReister	SUNA voltage data output to Seasave (not internally logged) incorrect. Do not use. DAC set t
4	CTD911	recover	RES2_5	1	4/22/2021 21:35	4/23/2021 5:35	60.02556	-149.358	292	iReister	
5	CalVet net	deploy	GAK1	2	4/22/2021 23:03	4/23/2021 7:03	59.8453	-149.466	269	rHopcroft	very dark and raining!
6	CalVet net	recover	GAK1	2	4/22/2021 23:09	4/23/2021 7:09	59.84521	-149.466	269	rHopcroft	
7	CTD911	deploy	GAK1	2	4/22/2021 23:22	4/23/2021 7:22	59.8453	-149.466	269	iReister	20 meter surface soak for all casts due to UVP. SUNA voltage data output to Seasave (not in
8	CTD911	recover	GAK1	2	4/23/2021 0:08	4/23/2021 8:08	59.84488	-149.467	269	iReister	
9	Sediment Trap	deploy	KOD5	ST1	4/23/2021 14:35	4/23/2021 22:35	57.8155	-150.736	89	tKelly	2 depths
10	IronFish	deploy	KOD5 to KOD4		4/23/2021 14:46	4/23/2021 22:46	57.8169	-150.734		aAguilarIslas	
11	IronFish	recover	KOD5 to KOD4		4/23/2021 17:15	4/24/2021 1:15	57.89854	-150.968		aAguilarIslas	
12	CalVet net	deploy	KOD4	3	4/23/2021 17:26	4/24/2021 1:26	57.8996	-150.97	74	rHopcroft	
13	CalVet net	recover	KOD4	3	4/23/2021 17:30	4/24/2021 1:30	57.8996	-150.97	74	rHopcroft	
14	CTD911	deploy	KOD4	3	4/23/2021 17:40	4/24/2021 1:40	57.89976	-150.97	74	iReister	SUNA now calibrated and DAC now set to 0-45uM.
15	CTD911	recover	KOD4	3	4/23/2021 18:04	4/24/2021 2:04	57.90005	-150.971	74	iReister	
16	CalVet net	deploy	KOD3	4	4/23/2021 19:19	4/24/2021 3:19	58.01517	-151.18	80	rHopcroft	
17	CalVet net	recover	KOD3	4	4/23/2021 19:23	4/24/2021 3:23	58.0154	-151.181	80	rHopcroft	
18	CTD911	deploy	KOD3	4	4/23/2021 19:30	4/24/2021 3:30	58.01563	-151.181	80	iReister	
19	CTD911	recover	KOD3	4	4/23/2021 19:57	4/24/2021 3:57	58.01613	-151.182	80	iReister	
20	CalVet net	deploy	KOD2	5	4/23/2021 21:12	4/24/2021 5:12	58.13005	-151.386	125	rHopcroft	
21	CalVet net	recover	KOD2	5	4/23/2021 21:17	4/24/2021 5:17	58.13021	-151.386	125	rHopcroft	duskish
22	CTD911	deploy	KOD2	5	4/23/2021 21:25	4/24/2021 5:25	58.13022	-151.386	125	iReister	
23	CTD911	recover	KOD2	5	4/23/2021 21:56	4/24/2021 5:56	58.13045	-151.385	125	iReister	
24	Trace Metal	deploy	KOD2	TM01	4/23/2021 22:34	4/24/2021 6:34	58.13047	-151.385		aAguilarIslas	
25	Trace Metal	recover	KOD2	TM01	4/23/2021 22:40	4/24/2021 6:40	58.13048	-151.385		aAguilarIslas	
26	CalVet net	deploy	KOD1	6	4/24/2021 0:15	4/24/2021 8:15	58.246	-151.59	70	rHopcroft	very dark and raining!
27	CalVet net	recover	KOD1	6	4/24/2021 0:19	4/24/2021 8:19	58.24745	-151.59	70	rHopcroft	
28	CTD911	deploy	KOD1	6	4/24/2021 0:27	4/24/2021 8:27	58.25057	-151.589	70	iReister	
29	CTD911	recover	KOD1	6	4/24/2021 0:56	4/24/2021 8:56	58.25903	-151.583	70	iReister	
30	Bongo Net	deploy	KOD1	1	4/24/2021 1:04	4/24/2021 9:04	58.25973	-151.579	71	jQuestel	
31	Bongo Net	maxDepth	KOD1	1	4/24/2021 1:08	4/24/2021 9:08	58.25864	-151.576	71	jQuestel	
32	Bongo Net	recover	KOD1	1	4/24/2021 1:17	4/24/2021 9:17	58.25481	-151.568	71	jQuestel	
33	Bongo Net	deploy	KOD2	2	4/24/2021 2:29	4/24/2021 10:29	58.13207	-151.391	128	jQuestel	

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
34	Bongo Net	maxDepth	KOD2	2	4/24/2021 2:36	4/24/2021 10:36	58.12846	-151.383	126	jQuestel	
35	Bongo Net	recover	KOD2	2	4/24/2021 2:45	4/24/2021 10:45	58.12498	-151.373	126	jQuestel	
36	Bongo Net	deploy	KOD3	3	4/24/2021 3:51	4/24/2021 11:51	58.01417	-151.19	80	jQuestel	
37	Bongo Net	maxDepth	KOD3	3	4/24/2021 3:56	4/24/2021 11:56	58.01431	-151.181	80	jQuestel	
38	Bongo Net	recover	KOD3	3	4/24/2021 4:02	4/24/2021 12:02	58.01462	-151.171	80	jQuestel	
39	Bongo Net	deploy	KOD4	4	4/24/2021 5:10	4/24/2021 13:10	57.8976	-150.98	74	jQuestel	
40	Bongo Net	maxDepth	KOD4	4	4/24/2021 5:15	4/24/2021 13:15	57.89806	-150.973	74	jQuestel	
41	Bongo Net	recover	KOD4	4	4/24/2021 5:18	4/24/2021 13:18	57.89839	-150.969	74	jQuestel	
42	Bongo Net	deploy	KOD5	5	4/24/2021 6:24	4/24/2021 14:24	57.77503	-150.772	83	jQuestel	
43	Bongo Net	maxDepth	KOD5	5	4/24/2021 6:28	4/24/2021 14:28	57.77664	-150.77	83	jQuestel	
44	Bongo Net	recover	KOD5	5	4/24/2021 6:32	4/24/2021 14:32	57.77834	-150.768	83	jQuestel	
45	CalVet net	deploy	KOD5	7	4/24/2021 8:47	4/24/2021 16:47	57.78515	-150.76	87	rHopcroft	
46	CalVet net	recover	KOD5	7	4/24/2021 8:52	4/24/2021 16:52	57.78535	-150.76	87	rHopcroft	
47	CTD911	deploy	KOD5	7	4/24/2021 8:59	4/24/2021 16:59	57.78518	-150.76	87	iReister	
48	CTD911	recover	KOD5	7	4/24/2021 9:30	4/24/2021 17:30	57.78819	-150.761	87	iReister	
49	CalVet net	deploy	KOD5	7A	4/24/2021 9:50	4/24/2021 17:50	57.78982	-150.762	87	rHopcroft	genetics
50	CalVet net	recover	KOD5	7A	4/24/2021 9:55	4/24/2021 17:55	57.79029	-150.762	87	rHopcroft	
51	CTD911	deploy	KOD5	8	4/24/2021 10:55	4/24/2021 18:55	57.78515	-150.76	88	iReister	
52	CTD911	recover	KOD5	8	4/24/2021 11:23	4/24/2021 19:23	57.78676	-150.759	88	iReister	
53	Trace Metal	deploy	KOD5	TM02	4/24/2021 11:36	4/24/2021 19:36	57.78732	-150.759	87	aAguilarIslas	
54	Trace Metal	recover	KOD5	TM02	4/24/2021 12:02	4/24/2021 20:02	57.78866	-150.761	87	aAguilarIslas	
55	Sediment Trap	recover	KOD5	ST1	4/24/2021 13:01	4/24/2021 21:01	57.81252	-150.829		tKelly	
56	IronFish	deploy	KOD6	Trans	4/24/2021 14:47	4/24/2021 22:47	57.68791	-150.579	97	aAguilarIslas	
57	IronFish	recover	KOD6	Trans	4/24/2021 14:48	4/24/2021 22:48	57.68675	-150.576	97	aAguilarIslas	
58	CalVet net	deploy	KOD6	8	4/24/2021 15:22	4/24/2021 23:22	57.67126	-150.55	98	rHopcroft	
59	CalVet net	recover	KOD6	8	4/24/2021 15:28	4/24/2021 23:28	57.6714	-150.55	100	rHopcroft	
60	CTD911	deploy	KOD6	9	4/24/2021 15:37	4/24/2021 23:37	57.67124	-150.549	100	iReister	
61	CTD911	recover	KOD6	9	4/24/2021 16:13	4/25/2021 0:13	57.67153	-150.549	100	iReister	
62	IronFish	deploy	KOD6 to KOD7		4/24/2021 16:24	4/25/2021 0:24	57.67029	-150.545		aAguilarIslas	
63	IronFish	recover	KOD6 to KOD7		4/24/2021 17:42	4/25/2021 1:42	57.55894	-150.349		aAguilarIslas	
64	CalVet net	deploy	KOD7	9	4/24/2021 18:03	4/25/2021 2:03	57.55634	-150.339	178	rHopcroft	
65	CalVet net	recover	KOD7	9	4/24/2021 18:09	4/25/2021 2:09	57.55505	-150.339	180	rHopcroft	
66	CTD911	deploy	KOD7	10	4/24/2021 18:16	4/25/2021 2:16	57.55397	-150.339	183	iReister	

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
67	CTD911	recover	KOD7	10	4/24/2021 18:50	4/25/2021 2:50	57.54935	-150.341	183	iReister	
68	IronFish	deploy	KOD7 to KOD8		4/24/2021 18:59	4/25/2021 2:59	57.54749	-150.339		aAguilarIslas	
69	IronFish	recover	KOD7 to KOD8		4/24/2021 20:12	4/25/2021 4:12	57.44044	-150.134		aAguilarIslas	
70	CalVet net	deploy	KOD8	10	4/24/2021 20:22	4/25/2021 4:22	57.43941	-150.132	713	rHopcroft	
71	CalVet net	recover	KOD8	10	4/24/2021 20:27	4/25/2021 4:27	57.4384	-150.132	713	rHopcroft	
72	CTD911	deploy	KOD8	11	4/24/2021 20:33	4/25/2021 4:33	57.43746	-150.131	711	iReister	
73	CTD911	recover	KOD8	11	4/24/2021 21:35	4/25/2021 5:35	57.43651	-150.136	711	iReister	
74	IronFish	deploy	KOD8 to KOD9		4/24/2021 21:45	4/25/2021 5:45	57.43526	-150.134		aAguilarIslas	
75	IronFish	recover	KOD8 to KOD9		4/24/2021 23:02	4/25/2021 7:02	57.32573	-149.929		aAguilarIslas	
76	CalVet net	deploy	KOD9	11	4/24/2021 23:09	4/25/2021 7:09	57.32395	-149.928	1312	rHopcroft	
77	CalVet net	recover	KOD9	11	4/24/2021 23:15	4/25/2021 7:15	57.32279	-149.93	1312	rHopcroft	
78	CTD911	deploy	KOD9	12	4/24/2021 23:23	4/25/2021 7:23	57.32168	-149.93	1310	iReister	
79	CTD911	recover	KOD9	12	4/25/2021 0:54	4/25/2021 8:54	57.31435	-149.954	1310	iReister	
80	Sediment Trap	deploy	KOD9	ST2	4/25/2021 1:20	4/25/2021 9:20	57.31388	-149.958	1310	tKelly	
81	Bongo Net	deploy	KOD9	6	4/25/2021 1:37	4/25/2021 9:37	57.31908	-149.939	1314	jQuestel	
82	Bongo Net	maxDepth	KOD9	6	4/25/2021 1:44	4/25/2021 9:44	57.32013	-149.936	1314	jQuestel	
83	Bongo Net	recover	KOD9	6	4/25/2021 1:51	4/25/2021 9:51	57.32116	-149.934	1314	jQuestel	
84	Bongo Net	deploy	KOD8	7	4/25/2021 2:58	4/25/2021 10:58	57.4321	-150.129	735	jQuestel	
85	Bongo Net	maxDepth	KOD8	7	4/25/2021 3:07	4/25/2021 11:07	57.43671	-150.133	735	jQuestel	
86	Bongo Net	recover	KOD8	7	4/25/2021 3:17	4/25/2021 11:17	57.44195	-150.136	735	jQuestel	
87	Bongo Net	deploy	KOD7	8	4/25/2021 4:24	4/25/2021 12:24	57.55014	-150.331	197	jQuestel	
88	Bongo Net	recover	KOD7	8	4/25/2021 4:39	4/25/2021 12:39	57.55552	-150.336	197	jQuestel	Lost communication with Fastcat; went to about 160 m
89	Bongo Net	deploy	KOD7	9	4/25/2021 5:59	4/25/2021 13:59	57.66477	-150.539	99	jQuestel	
90	Bongo Net	maxDepth	KOD7	9	4/25/2021 6:04	4/25/2021 14:04	57.66524	-150.541	99	jQuestel	
91	Bongo Net	recover	KOD7	9	4/25/2021 6:10	4/25/2021 14:10	57.66589	-150.544	99	jQuestel	
92	Bongo Net	deploy	KOD10	10	4/25/2021 10:00	4/25/2021 18:00	57.20936	-149.726	2410	rHopcroft	DAYTIME
93	Bongo Net	maxDepth	KOD10	10	4/25/2021 10:07	4/25/2021 18:07	57.20623	-149.722	2410	rHopcroft	
94	Bongo Net	recover	KOD10	10	4/25/2021 10:22	4/25/2021 18:22	57.19923	-149.712	2410	rHopcroft	278 WIRE OUT
95	CTD911	deploy	KOD10	13	4/25/2021 10:53	4/25/2021 18:53	57.20511	-149.722	2507	iReister	
96	CTD911	recover	KOD10	13	4/25/2021 11:45	4/25/2021 19:45	57.20516	-149.722	2507	iReister	SUNA DAC range changed from 0-45 to 0-50 to prevent maxing out the voltage
97	CalVet net	deploy	KOD10	12	4/25/2021 11:49	4/25/2021 19:49	57.20515	-149.722	2488	rHopcroft	
98	CalVet net	recover	KOD10	12	4/25/2021 11:55	4/25/2021 19:55	57.20489	-149.722	2488	rHopcroft	
99	CalVet net	deploy	KOD10	12a	4/25/2021 12:18	4/25/2021 20:18	57.20455	-149.723	2488	rHopcroft	

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
100	CalVet net	recover	KOD10	12a	4/25/2021 12:24	4/25/2021 20:24	57.20439	-149.723	2488	rHopcroft	
101	CTD911	deploy	KOD10	14	4/25/2021 12:52	4/25/2021 20:52	57.20411	-149.723	2518	iReister	
102	CTD911	recover	KOD10	14	4/25/2021 14:32	4/25/2021 22:32	57.20444	-149.723	2518	iReister	
103	Trace Metal	deploy	KOD10	TM03	4/25/2021 14:50	4/25/2021 22:50	57.20433	-149.723	2518	aAguilarIslas	
104	Trace Metal	recover	KOD10	TM03	4/25/2021 15:39	4/25/2021 23:39	57.20467	-149.723	2518	aAguilarIslas	
105	IronFish	deploy	KOD10 to		4/25/2021 16:06	4/26/2021 0:06	57.21172	-149.751		aAguilarIslas	
106	IronFish	recover	KOD10 to		4/25/2021 17:18	4/26/2021 1:18	57.28531	-150.046		aAguilarIslas	
107	Sediment Trap	recover	KOD9	ST2	4/25/2021 18:11	4/26/2021 2:11	57.29905	-150.06		tKelly	
108	Sediment Trap	deploy	MID10	ST3	4/26/2021 8:49	4/26/2021 16:49	58.92673	-145.943		tKelly	flat clam and sunny! Good flotation.
109	CalVet net	deploy	MID10	13	4/26/2021 9:13	4/26/2021 17:13	58.91131	-146.005	4432	rHopcroft	
110	CalVet net	recover	MID10	13	4/26/2021 9:19	4/26/2021 17:19	58.91111	-146.001	4432	rHopcroft	
111	CalVet net	deploy	MID10	13A	4/26/2021 9:33	4/26/2021 17:33	58.91079	-146	4432	rHopcroft	
112	CalVet net	recover	MID10	13A	4/26/2021 9:38	4/26/2021 17:38	58.91058	-145.998	4432	rHopcroft	
113	CTD911	deploy	MID10	15	4/26/2021 9:47	4/26/2021 17:47	58.91027	-146.001	4440	iReister	
114	CTD911	recover	MID10	15	4/26/2021 10:39	4/26/2021 18:39	58.91006	-145.986	4440	iReister	
115	Trace Metal	deploy	MID10	TM04	4/26/2021 11:03	4/26/2021 19:03	58.91032	-146.017	4440	aAguilarIslas	
116	Trace Metal	recover	MID10	TM04	4/26/2021 11:55	4/26/2021 19:55	58.91014	-146.003	4440	aAguilarIslas	
117	CTD911	deploy	MID10	16	4/26/2021 12:09	4/26/2021 20:09	58.91026	-146.002	4440	iReister	
118	CTD911	recover	MID10	16	4/26/2021 13:51	4/26/2021 21:51	58.91053	-145.998	4440	iReister	
119	IronFish	deploy	MID10 to MID9		4/26/2021 13:56	4/26/2021 21:56	58.9113	-145.997		aAguilarIslas	
120	IronFish	recover	MID10 to MID9		4/26/2021 15:22	4/26/2021 23:22	59.06735	-146.099		aAguilarIslas	
121	CalVet net	deploy	MID9	14	4/26/2021 15:33	4/26/2021 23:33	59.06792	-146.099	3150	rHopcroft	
122	CalVet net	recover	MID9	14	4/26/2021 15:39	4/26/2021 23:39	59.06771	-146.099	3150	rHopcroft	
123	CTD911	deploy	MID9	17	4/26/2021 15:45	4/26/2021 23:45	59.06753	-146.099	3153	iReister	
124	CTD911	recover	MID9	17	4/26/2021 17:26	4/27/2021 1:26	59.06745	-146.1	3153	iReister	
125	IronFish	deploy	MID9 to MID8		4/26/2021 17:31	4/27/2021 1:31	59.06794	-146.099		aAguilarIslas	
126	IronFish	recover	MID9 to MID8		4/26/2021 18:52	4/27/2021 2:52	59.21932	-146.197		aAguilarIslas	
127	CalVet net	deploy	MID8	15	4/26/2021 19:02	4/27/2021 3:02	59.22417	-146.201	659	rHopcroft	
128	CalVet net	recover	MID8	15	4/26/2021 19:08	4/27/2021 3:08	59.22262	-146.203	659	rHopcroft	
129	CTD911	deploy	MID8	18	4/26/2021 19:15	4/27/2021 3:15	59.2208	-146.204	654	iReister	
130	CTD911	recover	MID8	18	4/26/2021 19:59	4/27/2021 3:59	59.21441	-146.211	654	iReister	SUNA bad below 300 meters
131	IronFish	deploy	MID8 to MID7		4/26/2021 20:23	4/27/2021 4:23	59.21077	-146.216		aAguilarIslas	
132	IronFish	recover	MID8 to MID7		4/26/2021 21:47	4/27/2021 5:47	59.37393	-146.294		aAguilarIslas	

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
133	CalVet net	deploy	MID7	16	4/26/2021 22:01	4/27/2021 6:01	59.37571	-146.297	65	rHopcroft	dusk
134	CalVet net	recover	MID7	16	4/26/2021 22:04	4/27/2021 6:04	59.37584	-146.298	65	rHopcroft	
135	CTD911	deploy	MID7	19	4/26/2021 22:11	4/27/2021 6:11	59.37645	-146.298	61	iReister	
136	CTD911	recover	MID7	19	4/26/2021 22:36	4/27/2021 6:36	59.37604	-146.299	61	iReister	
137	Bongo Net	deploy	MID7	11	4/26/2021 22:50	4/27/2021 6:50	59.37474	-146.296	74	jQuestel	
138	Bongo Net	maxDepth	MID7	11	4/26/2021 22:56	4/27/2021 6:56	59.37146	-146.294	92	jQuestel	
139	Bongo Net	recover	MID7	11	4/26/2021 23:05	4/27/2021 7:05	59.3686	-146.294	92	jQuestel	
140	CTD911	deploy	MID7i	1	4/26/2021 23:46	4/27/2021 7:46	59.30393	-146.252	435	jQuestel	CTD profile with Fastcat
141	CTD911	maxDepth	MID7i	1	4/26/2021 23:53	4/27/2021 7:53	59.30066	-146.25	435	jQuestel	to 200 m
142	CTD911	recover	MID7i	1	4/27/2021 0:01	4/27/2021 8:01	59.29668	-146.248	435	jQuestel	
143	Bongo Net	deploy	MID8	12	4/27/2021 0:49	4/27/2021 8:49	59.22753	-146.215	496	jQuestel	
144	Bongo Net	maxDepth	MID8	12	4/27/2021 0:56	4/27/2021 8:56	59.22859	-146.211	510	jQuestel	
145	Bongo Net	recover	MID8	12	4/27/2021 1:04	4/27/2021 9:04	59.22988	-146.206	533	jQuestel	
146	Bongo Net	deploy	MID9	13	4/27/2021 2:33	4/27/2021 10:33	59.06558	-146.105	3013	jQuestel	
147	Bongo Net	maxDepth	MID9	13	4/27/2021 2:41	4/27/2021 10:41	59.06803	-146.099	2977	jQuestel	
148	Bongo Net	recover	MID9	13	4/27/2021 2:50	4/27/2021 10:50	59.07061	-146.091	2977	jQuestel	
149	Bongo Net	deploy	MID10	14	4/27/2021 4:15	4/27/2021 12:15	58.90772	-146.007	4435	jQuestel	
150	Bongo Net	maxDepth	MID10	14	4/27/2021 4:25	4/27/2021 12:25	58.91106	-145.993	4446	jQuestel	went to 180, ran out of cable. Strong current caused slow ascent
151	Bongo Net	recover	MID10	14	4/27/2021 4:35	4/27/2021 12:35	58.91403	-145.981	4446	jQuestel	
152	Sediment Trap	recover	mid10	ST3	4/27/2021 7:07	4/27/2021 15:07	58.83655	-145.494		tKelly	Wind and Waves.
153	CTD911	deploy	MID5	20	4/27/2021 12:33	4/27/2021 20:33	59.65262	-146.102	95	iReister	
154	CTD911	recover	MID5	20	4/27/2021 13:11	4/27/2021 21:11	59.6526	-146.102	95	iReister	
155	Trace Metal	deploy	MID5	TM05	4/27/2021 13:42	4/27/2021 21:42	59.65267	-146.101	95	aAguilarIslas	
156	Trace Metal	recover	MID5	TM05	4/27/2021 13:42	4/27/2021 21:42	59.65267	-146.101	95	aAguilarIslas	
157	CalVet net	deploy	MID5	17	4/27/2021 13:51	4/27/2021 21:51	59.65269	-146.101	95	rHopcroft	
158	CalVet net	recover	MID5	17	4/27/2021 13:56	4/27/2021 21:56	59.65274	-146.101	95	rHopcroft	
159	CTD911	deploy	MID5	21	4/27/2021 14:06	4/27/2021 22:06	59.65274	-146.101	95	iReister	carbonized short on suna battery pack. no suna
160	CalVet net	deploy	MID5	17A	4/27/2021 14:43	4/27/2021 22:43	59.6527	-146.101	95	rHopcroft	
161	CalVet net	recover	MID5	17A	4/27/2021 14:48	4/27/2021 22:48	59.65268	-146.101	95	rHopcroft	
162	IronFish	deploy	MID5 to MID4		4/27/2021 15:02	4/27/2021 23:02	59.65598	-146.101		aAguilarIslas	
163	IronFish	recover	MID5 to MID4		4/27/2021 15:53	4/27/2021 23:53	59.69665	-146.042		aAguilarIslas	
164	CTD911	deploy	MID4	22	4/27/2021 16:46	4/28/2021 0:46	59.79798	-145.947	90	iReister	
165	CTD911	recover	MID4	22	4/27/2021 17:20	4/28/2021 1:20	59.79802	-145.947	90	iReister	

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
166	CalVet net	deploy	MID4	18	4/27/2021 17:21	4/28/2021 1:21	59.79803	-145.947	89	rHopcroft	
167	CalVet net	recover	MID4	18	4/27/2021 17:26	4/28/2021 1:26	59.79805	-145.947	89	rHopcroft	
168	CTD911	deploy	MID4i	23	4/27/2021 18:16	4/28/2021 2:16	59.72317	-146.026	72	iReister	
169	CTD911	recover	MID4i	23	4/27/2021 18:30	4/28/2021 2:30	59.72154	-146.025	72	iReister	
170	CTD911	recover	MID5	21	4/27/2021 18:34	4/28/2021 2:34	59.72116	-146.025	117	iReister	
171	CTD911	deploy	MID5i	24	4/27/2021 19:49	4/28/2021 3:49	59.57444	-146.176	111	iReister	
172	CTD911	recover	MID5i	24	4/27/2021 20:07	4/28/2021 4:07	59.57503	-146.181	111	iReister	
173	CalVet net	deploy	MID6	19	4/27/2021 20:58	4/28/2021 4:58	59.50253	-146.252	40	rHopcroft	
174	CalVet net	recover	MID6	19	4/27/2021 20:59	4/28/2021 4:59	59.5029	-146.253	40	rHopcroft	30m only
175	CTD911	deploy	MID6	25	4/27/2021 21:07	4/28/2021 5:07	59.50403	-146.256	38	iReister	bottles that needed to be fired were not. Had to redo (see 026 for bottles, BUT use 025 for do
176	CTD911	recover	MID6	25	4/27/2021 21:17	4/28/2021 5:17	59.50543	-146.266	38	iReister	
177	CTD911	deploy	MID6	26	4/27/2021 21:29	4/28/2021 5:29	59.50468	-146.266	38	iReister	bottles for MID6 fired here
178	CTD911	recover	MID6	26	4/27/2021 21:29	4/28/2021 5:29	59.50468	-146.266	38	iReister	
179	Bongo Net	deploy	MID6	15	4/27/2021 22:30	4/28/2021 6:30	59.50119	-146.256	35	jQuestel	
180	Bongo Net	maxDepth	MID6	15	4/27/2021 22:34	4/28/2021 6:34	59.50418	-146.255	35	jQuestel	
181	Bongo Net	recover	MID6	15	4/27/2021 22:36	4/28/2021 6:36	59.50557	-146.255	35	jQuestel	
182	Bongo Net	deploy	MID5	16	4/27/2021 23:46	4/28/2021 7:46	59.64708	-146.109	96	jQuestel	
183	Bongo Net	maxDepth	MID5	16	4/27/2021 23:54	4/28/2021 7:54	59.65158	-146.103	96	jQuestel	
184	Bongo Net	recover	MID5	16	4/28/2021 0:01	4/28/2021 8:01	59.65569	-146.097	96	jQuestel	
185	Bongo Net	deploy	MID4	17	4/28/2021 1:16	4/28/2021 9:16	59.79826	-145.955	90	jQuestel	
186	Bongo Net	maxDepth	MID4	17	4/28/2021 1:25	4/28/2021 9:25	59.80437	-145.952	90	jQuestel	
187	Bongo Net	recover	MID4	17	4/28/2021 1:33	4/28/2021 9:33	59.81022	-145.948	90	jQuestel	
188	Bongo Net	deploy	MID3	18	4/28/2021 2:48	4/28/2021 10:48	59.94705	-145.796	88	jQuestel	
189	Bongo Net	maxDepth	MID3	18	4/28/2021 2:56	4/28/2021 10:56	59.9516	-145.797	88	jQuestel	
190	Bongo Net	recover	MID3	18	4/28/2021 3:04	4/28/2021 11:04	59.95537	-145.798	88	jQuestel	
191	Bongo Net	deploy	MID2	19	4/28/2021 4:19	4/28/2021 12:19	60.09663	-145.648	119	jQuestel	
192	Bongo Net	maxDepth	MID2	19	4/28/2021 4:28	4/28/2021 12:28	60.10146	-145.653	120	jQuestel	
193	Bongo Net	recover	MID2	19	4/28/2021 4:38	4/28/2021 12:38	60.10626	-145.66	120	jQuestel	
194	CTD911	deploy	MID3i	27	4/28/2021 7:30	4/28/2021 15:30	59.87412	-145.876	100	iReister	
195	CTD911	recover	MID3i	27	4/28/2021 7:59	4/28/2021 15:59	59.87558	-145.878	100	iReister	
196	CalVet net	deploy	MID3	20	4/28/2021 8:46	4/28/2021 16:46	59.94951	-145.799	84	rHopcroft	
197	CalVet net	recover	MID3	20	4/28/2021 8:51	4/28/2021 16:51	59.95033	-145.8	84	rHopcroft	
198	CTD911	deploy	MID3	28	4/28/2021 8:56	4/28/2021 16:56	59.95073	-145.8	84	iReister	

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
199	CTD911	recover	MID3	28	4/28/2021 9:25	4/28/2021 17:25	59.95336	-145.802	84	iReister	
200	CTD911	deploy	MID2i	29	4/28/2021 10:22	4/28/2021 18:22	60.02426	-145.725	96	iReister	
201	CTD911	recover	MID2i	29	4/28/2021 10:38	4/28/2021 18:38	60.0281	-145.729	96	iReister	
202	CalVet net	deploy	MID2	21	4/28/2021 11:24	4/28/2021 19:24	60.0951	-145.644	122	rHopcroft	
203	CalVet net	recover	MID2	21	4/28/2021 11:30	4/28/2021 19:30	60.09618	-145.645	122	rHopcroft	
204	CTD911	deploy	MID2	30	4/28/2021 11:35	4/28/2021 19:35	60.09732	-145.646	117	iReister	prod
205	CTD911	recover	MID2	30	4/28/2021 12:10	4/28/2021 20:10	60.09984	-145.648	117	iReister	
206	Trace Metal	deploy	MID2	TM6	4/28/2021 12:26	4/28/2021 20:26	60.09996	-145.648	120	aAguilarIslas	
207	Trace Metal	recover	MID2	TM6	4/28/2021 12:45	4/28/2021 20:45	60.10057	-145.647	120	aAguilarIslas	
208	CalVet net	deploy	MID2	21a	4/28/2021 12:45	4/28/2021 20:45	60.10055	-145.647	122	rHopcroft	
209	CalVet net	recover	MID2	21a	4/28/2021 12:51	4/28/2021 20:51	60.10077	-145.647	119	rHopcroft	
210	CTD911	deploy	MID2	31	4/28/2021 12:57	4/28/2021 20:57	60.10091	-145.647	118	iReister	
211	CTD911	recover	MID2	31	4/28/2021 13:28	4/28/2021 21:28	60.10181	-145.647	118	iReister	
212	IronFish	deploy	MID2		4/28/2021 13:43	4/28/2021 21:43	60.10041	-145.644		aAguilarIslas	
213	IronFish	recover	MID2		4/28/2021 14:05	4/28/2021 22:05	60.09161	-145.607		aAguilarIslas	
214	CTD911	deploy	MID1i	32	4/28/2021 15:02	4/28/2021 23:02	60.17599	-145.578	100	iReister	
215	CTD911	recover	MID1i	32	4/28/2021 15:17	4/28/2021 23:17	60.17577	-145.578	100	iReister	
216	CTD911	deploy	MID1	33	4/28/2021 16:14	4/29/2021 0:14	60.25017	-145.502	20	iReister	
217	CTD911	recover	MID1	33	4/28/2021 16:25	4/29/2021 0:25	60.2504	-145.502	20	iReister	
218	IronFish	deploy	MID1		4/28/2021 16:33	4/29/2021 0:33	60.24934	-145.503		aAguilarIslas	
219	IronFish	recover	MID1		4/28/2021 16:49	4/29/2021 0:49	60.24129	-145.534		aAguilarIslas	
220	MOCNESS1	deploy	PWS3	1	4/29/2021 0:25	4/29/2021 8:25	60.67637	-147.668	746	jQuestel	
221	MOCNESS1	maxDepth	PWS3	1	4/29/2021 0:33	4/29/2021 8:33	60.67181	-147.669	746	jQuestel	
222	MOCNESS1	recover	PWS3	1	4/29/2021 0:50	4/29/2021 8:50	60.66283	-147.666	746	jQuestel	
223	MOCNESS1	deploy	PWS2	2	4/29/2021 2:30	4/29/2021 10:30	60.54508	-147.796	734	jQuestel	
224	MOCNESS1	recover	PWS2	2	4/29/2021 2:52	4/29/2021 10:52	60.53355	-147.803	734	jQuestel	no max depth bc logger crashed
225	MOCNESS1	deploy	PWS2	3	4/29/2021 4:40	4/29/2021 12:40	60.52507	-147.829	719	jQuestel	Deep cast to 700m
226	MOCNESS1	maxDepth	PWS2	3	4/29/2021 5:13	4/29/2021 13:13	60.53648	-147.801	731	jQuestel	
227	MOCNESS1	recover	PWS2	3	4/29/2021 5:55	4/29/2021 13:55	60.55641	-147.778	749	jQuestel	
228	CTD911	deploy	PWS3	34	4/29/2021 7:16	4/29/2021 15:16	60.66655	-147.665	703	iReister	
229	CTD911	recover	PWS3	34	4/29/2021 8:18	4/29/2021 16:18	60.66419	-147.666	703	iReister	
230	CalVet net	deploy	PWS3	22	4/29/2021 8:26	4/29/2021 16:26	60.6638	-147.666	693	rHopcroft	
231	CalVet net	recover	PWS3	22	4/29/2021 8:33	4/29/2021 16:33	60.66345	-147.666	693	rHopcroft	

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
232	CalVet net	deploy	PWS2	23	4/29/2021 9:39	4/29/2021 17:39	60.53572	-147.802	727	rHopcroft	
233	CalVet net	recover	PWS2	23	4/29/2021 9:44	4/29/2021 17:44	60.53563	-147.801	727	rHopcroft	
234	CTD911	deploy	PWS2	35	4/29/2021 9:53	4/29/2021 17:53	60.53553	-147.801	727	iReister	
235	CTD911	recover	PWS2	35	4/29/2021 10:45	4/29/2021 18:45	60.53552	-147.801	727	iReister	
236	Trace Metal	deploy	PWS2	TM07	4/29/2021 10:55	4/29/2021 18:55	60.53552	-147.801		aAguilarIslas	
237	Trace Metal	recover	PWS2	TM07	4/29/2021 11:38	4/29/2021 19:38	60.53552	-147.801		aAguilarIslas	
238	CalVet net	deploy	PWS2	23	4/29/2021 11:39	4/29/2021 19:39	60.53552	-147.801	727	rHopcroft	
239	CalVet net	recover	PWS2	23	4/29/2021 11:44	4/29/2021 19:44	60.53552	-147.801	727	rHopcroft	
240	CTD911	deploy	PWS2	36	4/29/2021 11:49	4/29/2021 19:49	60.53552	-147.801	728	iReister	
241	CTD911	recover	PWS2	36	4/29/2021 13:03	4/29/2021 21:03	60.53552	-147.801	723	iReister	
242	multinet	deploy	PWS2		4/29/2021 13:13	4/29/2021 21:13	60.53552	-147.801	725	rHopcroft	Multinet Vertical Shallow
243	multinet	recover	PWS2		4/29/2021 13:30	4/29/2021 21:30	60.53552	-147.801	725	rHopcroft	Multinet Vertical Shallow
244	multinet	deploy	PWS2		4/29/2021 13:58	4/29/2021 21:58	60.53552	-147.801	725	rHopcroft	Multinet Vertical Deep
245	multinet	recover	PWS2		4/29/2021 14:46	4/29/2021 22:46	60.53552	-147.801	725	rHopcroft	Multinet Vertical Deep
246	IronFish	deploy	PWS2		4/29/2021 14:55	4/29/2021 22:55	60.53536	-147.802		aAguilarIslas	
247	IronFish	recover	PWS2		4/29/2021 16:10	4/30/2021 0:10	60.38541	-147.932		aAguilarIslas	
248	CalVet net	deploy	PWS1	24	4/29/2021 16:20	4/30/2021 0:20	60.38045	-147.936	727	rHopcroft	
249	CalVet net	recover	PWS1	24	4/29/2021 16:26	4/30/2021 0:26	60.38044	-147.936	350	rHopcroft	
250	CTD911	deploy	PWS1	37	4/29/2021 16:37	4/30/2021 0:37	60.38044	-147.936	348	iReister	
251	CTD911	recover	PWS1	37	4/29/2021 17:19	4/30/2021 1:19	60.38044	-147.936	348	iReister	
252	CalVet net	deploy	KIP2	25	4/29/2021 18:14	4/30/2021 2:14	60.27896	-147.986	583	rHopcroft	
253	CalVet net	recover	KIP2	25	4/29/2021 18:20	4/30/2021 2:20	60.27895	-147.986	583	rHopcroft	
254	CTD911	deploy	KIP2	38	4/29/2021 18:24	4/30/2021 2:24	60.27895	-147.986	582	iReister	
255	CTD911	recover	KIP2	38	4/29/2021 19:21	4/30/2021 3:21	60.27896	-147.986	582	iReister	
256	CalVet net	deploy	KIP2	25a	4/29/2021 19:25	4/30/2021 3:25	60.27896	-147.986	582	rHopcroft	
257	CalVet net	recover	KIP2	25a	4/29/2021 19:31	4/30/2021 3:31	60.27896	-147.986	582	rHopcroft	guess
258	CalVet net	deploy	IB2	26	4/29/2021 20:42	4/30/2021 4:42	60.27225	-148.231	582	anOther	
259	CalVet net	recover	IB2	26	4/29/2021 20:48	4/30/2021 4:48	60.27225	-148.231	582	anOther	
260	CTD911	deploy	IB2	39	4/29/2021 20:52	4/30/2021 4:52	60.27225	-148.231	156	iReister	
261	CTD911	recover	IB2	39	4/29/2021 21:13	4/30/2021 5:13	60.27225	-148.231	156	iReister	
262	multinet	deploy	KIP2	1	4/29/2021 22:52	4/30/2021 6:52	60.29014	-147.981	584	jQuestel	
263	multinet	recover	KIP2	1	4/29/2021 23:27	4/30/2021 7:27	60.2709	-147.991	584	jQuestel	
264	MOCNESS1	deploy	KIP2	1	4/30/2021 0:25	4/30/2021 8:25	60.26832	-147.993	588	jQuestel	

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
265	MOCNESS1	recover	KIP2	1	4/30/2021 0:50	4/30/2021 8:50	60.28397	-147.987	588	jQuestel	
266	multinet	deploy	PWS1	2	4/30/2021 2:05	4/30/2021 10:05	60.37713	-147.938	345	jQuestel	
267	multinet	recover	PWS1	2	4/30/2021 2:35	4/30/2021 10:35	60.39302	-147.93	345	jQuestel	
268	MOCNESS1	deploy	PWS1	5	4/30/2021 3:21	4/30/2021 11:21	60.37652	-147.938	346	jQuestel	
269	MOCNESS1	recover	PWS1	5	4/30/2021 3:45	4/30/2021 11:45	60.38868	-147.933	346	jQuestel	
270	CalVet net	deploy	IB2	27	4/30/2021 10:01	4/30/2021 18:01	60.26956	-148.361	316	rHopcroft	in ice led
271	CalVet net	recover	IB2	27	4/30/2021 10:06	4/30/2021 18:06	60.26945	-148.361	316	rHopcroft	
272	CTD911	deploy	IB0	40	4/30/2021 10:16	4/30/2021 18:16	60.26935	-148.361	319	iReister	
273	CTD911	recover	IB0	40	4/30/2021 10:42	4/30/2021 18:42	60.26906	-148.361	319	iReister	
274	CalVet net	deploy	IB1	28	4/30/2021 11:47	4/30/2021 19:47	60.24177	-148.338	168	rHopcroft	
275	CalVet net	recover	IB1	28	4/30/2021 11:53	4/30/2021 19:53	60.24177	-148.338	168	rHopcroft	
276	CTD911	deploy	IB1	41	4/30/2021 11:59	4/30/2021 19:59	60.24177	-148.338	166	iReister	
277	CalVet net	deploy	IB1	28A	4/30/2021 12:40	4/30/2021 20:40	60.24177	-148.338	168	rHopcroft	
278	CTD911	recover	IB1	41	4/30/2021 12:41	4/30/2021 20:41	60.24177	-148.338	166	iReister	
279	CalVet net	recover	IB1	28A	4/30/2021 12:46	4/30/2021 20:46	60.24177	-148.338	168	rHopcroft	
280	CTD911	deploy	MS1	42	4/30/2021 16:28	5/1/2021 0:28	59.95402	-147.927	169	iReister	
281	CTD911	recover	MS1	42	4/30/2021 16:48	5/1/2021 0:48	59.95401	-147.927	169	iReister	
282	CTD911	deploy	MS3	43	4/30/2021 17:23	5/1/2021 1:23	59.93334	-147.859	173	iReister	
283	CTD911	recover	MS3	43	4/30/2021 17:41	5/1/2021 1:41	59.93333	-147.859	173	iReister	
284	CTD911	deploy	MS4	44	4/30/2021 18:12	5/1/2021 2:12	59.92009	-147.829	111	iReister	
285	CTD911	recover	MS4	44	4/30/2021 18:31	5/1/2021 2:31	59.91993	-147.828	111	iReister	
286	CalVet net	deploy	MS2	28	4/30/2021 19:02	5/1/2021 3:02	59.94316	-147.896	111	rHopcroft	
287	CalVet net	recover	MS2	28	4/30/2021 19:07	5/1/2021 3:07	59.94354	-147.897	111	rHopcroft	
288	CTD911	deploy	MS2	45	4/30/2021 19:10	5/1/2021 3:10	59.94372	-147.898	191	iReister	Wetlabs ECO and Beam Transmission instrument had odd spikes that lined up with bottle sa
289	CTD911	recover	MS2	45	4/30/2021 19:51	5/1/2021 3:51	59.94732	-147.909	191	iReister	
290	Sediment Trap	deploy	GAK4	ST4	5/1/2021 0:37	5/1/2021 8:37	59.40131	-149.037		tKelly	40 & 105 meters
291	multinet	deploy	GAK4	3	5/1/2021 0:52	5/1/2021 8:52	59.40382	-149.039	198	jQuestel	
292	multinet	maxDepth	GAK4	3	5/1/2021 0:59	5/1/2021 8:59	59.40583	-149.043	198	jQuestel	
293	multinet	recover	GAK4	3	5/1/2021 1:23	5/1/2021 9:23	59.41406	-149.057	198	jQuestel	
294	multinet	deploy	GAK3	4	5/1/2021 2:22	5/1/2021 10:22	59.54667	-149.182	212	jQuestel	
295	multinet	maxDepth	GAK3	4	5/1/2021 2:28	5/1/2021 10:28	59.54984	-149.186	212	jQuestel	
296	multinet	recover	GAK3	4	5/1/2021 2:56	5/1/2021 10:56	59.56421	-149.202	212	jQuestel	
297	multinet	deploy	GAK2	5	5/1/2021 3:49	5/1/2021 11:49	59.68656	-149.323	224	jQuestel	

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
298	multinet	maxDepth	GAK2	5	5/1/2021 3:58	5/1/2021 11:58	59.69193	-149.329	224	jQuestel	
299	multinet	recover	GAK2	5	5/1/2021 4:28	5/1/2021 12:28	59.70946	-149.344	224	jQuestel	
300	multinet	deploy	GAK1	6	5/1/2021 5:19	5/1/2021 13:19	59.83772	-149.46	271	jQuestel	
301	multinet	maxDepth	GAK1	6	5/1/2021 5:27	5/1/2021 13:27	59.84173	-149.464	271	jQuestel	
302	multinet	recover	GAK1	6	5/1/2021 5:56	5/1/2021 13:56	59.85804	-149.477	271	jQuestel	
303	multinet	deploy	GAK1	7	5/1/2021 6:09	5/1/2021 14:09	59.85716	-149.477	267	jQuestel	tow for molecular
304	multinet	maxDepth	GAK1	7	5/1/2021 6:15	5/1/2021 14:15	59.85367	-149.475	267	jQuestel	
305	multinet	recover	GAK1	7	5/1/2021 6:42	5/1/2021 14:42	59.84038	-149.461	267	jQuestel	tow for molecular
306	CalVet net	deploy	GAK1	29	5/1/2021 7:06	5/1/2021 15:06	59.84451	-149.467	269	rHopcroft	
307	CalVet net	recover	GAK1	29	5/1/2021 7:11	5/1/2021 15:11	59.84451	-149.467	269	rHopcroft	
308	CTD911	deploy	GAK1	46	5/1/2021 7:30	5/1/2021 15:30	59.84451	-149.467	267	iReister	no nitrate cast. See cast 47 for nitrate cast.
309	CTD911	recover	GAK1	46	5/1/2021 8:13	5/1/2021 16:13	59.8445	-149.467	267	iReister	
310	multinet	deploy	GAK1	2	5/1/2021 8:24	5/1/2021 16:24	59.84451	-149.467	267	rHopcroft	vert
311	multinet	recover	GAK1	2	5/1/2021 8:37	5/1/2021 16:37	59.84451	-149.467	267	rHopcroft	
312	Trace Metal	deploy	GAK1	TM08	5/1/2021 9:01	5/1/2021 17:01	59.84465	-149.467	267	aAguilarIslas	
313	Trace Metal	recover	GAK1	TM08	5/1/2021 9:24	5/1/2021 17:24	59.84484	-149.467	267	aAguilarIslas	
314	CalVet net	deploy	GAK1	29A	5/1/2021 9:32	5/1/2021 17:32	59.84484	-149.467	269	rHopcroft	gen
315	CalVet net	recover	GAK1	29A	5/1/2021 9:37	5/1/2021 17:37	59.84484	-149.467	269	rHopcroft	fouled -will need to rect
316	CTD911	deploy	GAK1	47	5/1/2021 9:43	5/1/2021 17:43	59.84484	-149.467	266	iReister	
317	CTD911	recover	GAK1	47	5/1/2021 10:27	5/1/2021 18:27	59.84484	-149.467	266	iReister	nitrate data here. Also prod cast.
318	CalVet net	deploy	GAK1	29A	5/1/2021 10:29	5/1/2021 18:29	59.84484	-149.467	269	rHopcroft	recast
319	CalVet net	recover	GAK1	29A	5/1/2021 10:34	5/1/2021 18:34	59.84484	-149.467	269	rHopcroft	recast
320	IronFish	deploy	GAK1 to GAK2		5/1/2021 10:52	5/1/2021 18:52	59.8441	-149.466		aAguilarIslas	
321	CTD911	deploy	GAK1i	48	5/1/2021 11:45	5/1/2021 19:45	59.76025	-149.392	251	iReister	suna battery flooded
322	CTD911	recover	GAK1i	48	5/1/2021 12:04	5/1/2021 20:04	59.76024	-149.392	251	iReister	
323	IronFish	recover	GAK1 to GAK2		5/1/2021 12:48	5/1/2021 20:48	59.69613	-149.331		aAguilarIslas	
324	CalVet net	deploy	GAK2	30	5/1/2021 12:56	5/1/2021 20:56	59.69411	-149.33	226	rHopcroft	
325	CalVet net	recover	GAK2	30	5/1/2021 13:01	5/1/2021 21:01	59.69411	-149.33	226	rHopcroft	
326	CTD911	deploy	GAK2	49	5/1/2021 13:04	5/1/2021 21:04	59.69411	-149.33	225	iReister	no suna
327	CTD911	recover	GAK2	49	5/1/2021 13:43	5/1/2021 21:43	59.6941	-149.33	225	iReister	
328	IronFish	deploy	GAK2 to GAK3		5/1/2021 13:52	5/1/2021 21:52	59.69297	-149.329		aAguilarIslas	
329	CTD911	deploy	GAK2i	50	5/1/2021 14:35	5/1/2021 22:35	59.62728	-149.26	210	iReister	no suna
330	CTD911	recover	GAK2i	50	5/1/2021 14:52	5/1/2021 22:52	59.62728	-149.26	210	iReister	

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
331	IronFish	recover	GAK2 to GAK3		5/1/2021 15:34	5/1/2021 23:34	59.55414	-149.191		aAguilarIslas	
332	CalVet net	deploy	GAK3	31	5/1/2021 15:40	5/1/2021 23:40	59.55376	-149.191	212	rHopcroft	
333	CalVet net	recover	GAK3	31	5/1/2021 15:45	5/1/2021 23:45	59.55377	-149.191	212	rHopcroft	
334	CTD911	deploy	GAK3	51	5/1/2021 15:53	5/1/2021 23:53	59.55378	-149.191	213	dNaber	no suna
335	CTD911	recover	GAK3	51	5/1/2021 16:26	5/2/2021 0:26	59.55378	-149.191	213	dNaber	
336	IronFish	deploy	GAK3 to GAK4		5/1/2021 16:33	5/2/2021 0:33	59.55303	-149.19		aAguilarIslas	
337	CTD911	deploy	GAK3i	52	5/1/2021 17:16	5/2/2021 1:16	59.4822	-149.119	203	iReister	suna back on line
338	CTD911	recover	GAK3i	52	5/1/2021 17:37	5/2/2021 1:37	59.48223	-149.119	203	iReister	
339	IronFish	recover	GAK3 to GAK4		5/1/2021 18:38	5/2/2021 2:38	59.40916	-149.049		aAguilarIslas	
340	CalVet net	deploy	GAK4	32	5/1/2021 18:39	5/2/2021 2:39	59.40915	-149.049	200	rHopcroft	
341	CalVet net	recover	GAK4	32	5/1/2021 18:45	5/2/2021 2:45	59.40915	-149.049	200	rHopcroft	
342	CTD911	deploy	GAK4	53	5/1/2021 18:50	5/2/2021 2:50	59.40915	-149.049	200	iReister	
343	CTD911	recover	GAK4	53	5/1/2021 19:26	5/2/2021 3:26	59.40916	-149.049	200	iReister	
344	CTD911	deploy	GAK4i	54	5/1/2021 21:17	5/2/2021 5:17	59.33513	-148.979	195	iReister	
345	CTD911	recover	GAK4i	54	5/1/2021 21:32	5/2/2021 5:32	59.33512	-148.979	195	iReister	
346	Sediment Trap	recover	GAK4	ST4	5/1/2021 22:25	5/2/2021 6:25	59.33961	-148.962		tKelly	
347	multinet	deploy	GAK5	8	5/1/2021 23:09	5/2/2021 7:09	59.25483	-148.902	164	jQuestel	tow for molecular
348	multinet	maxDepth	GAK5	8	5/1/2021 23:15	5/2/2021 7:15	59.25871	-148.906	164	jQuestel	
349	multinet	recover	GAK5	8	5/1/2021 23:44	5/2/2021 7:44	59.27246	-148.918	164	jQuestel	
350	multinet	deploy	GAK5	9	5/1/2021 23:57	5/2/2021 7:57	59.2716	-148.919	170	jQuestel	
351	multinet	maxDepth	GAK5	9	5/2/2021 0:03	5/2/2021 8:03	59.26898	-148.916	170	jQuestel	
352	multinet	recover	GAK5	9	5/2/2021 0:27	5/2/2021 8:27	59.25639	-148.904	170	jQuestel	
353	multinet	deploy	GAK6	10	5/2/2021 1:37	5/2/2021 9:37	59.12388	-148.777	146	jQuestel	
354	multinet	maxDepth	GAK6	10	5/2/2021 1:41	5/2/2021 9:41	59.12201	-148.776	146	jQuestel	
355	multinet	recover	GAK6	10	5/2/2021 2:06	5/2/2021 10:06	59.11194	-148.764	146	jQuestel	
356	multinet	deploy	GAK7	11	5/2/2021 3:17	5/2/2021 11:17	58.97781	-148.636	239	jQuestel	
357	multinet	maxDepth	GAK7	11	5/2/2021 3:24	5/2/2021 11:24	58.97368	-148.634	239	jQuestel	
358	multinet	recover	GAK7	11	5/2/2021 3:53	5/2/2021 11:53	58.96316	-148.62	239	jQuestel	
359	multinet	deploy	GAK8	12	5/2/2021 5:16	5/2/2021 13:16	58.81116	-148.496	290	jQuestel	
360	multinet	maxDepth	GAK8	12	5/2/2021 5:24	5/2/2021 13:24	58.80754	-148.49	290	jQuestel	
361	multinet	recover	GAK8	12	5/2/2021 5:56	5/2/2021 13:56	58.79278	-148.469	290	jQuestel	
362	Sediment Trap	deploy	GAK 8	ST5	5/2/2021 6:48	5/2/2021 14:48	58.82327	-148.475		tKelly	40, 105, 180 m
363	CalVet net	deploy	GAK5	33	5/2/2021 9:46	5/2/2021 17:46	59.26178	-148.909	167	rHopcroft	

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
364	CalVet net	recover	GAK5	33	5/2/2021 9:51	5/2/2021 17:51	59.26135	-148.908	167	rHopcroft	
365	CTD911	deploy	GAK5	55	5/2/2021 9:57	5/2/2021 17:57	59.261	-148.908	166	iReister	
366	CTD911	recover	GAK5	55	5/2/2021 10:30	5/2/2021 18:30	59.26083	-148.908	166	iReister	
367	multinet	deploy	GAK5	2	5/2/2021 10:40	5/2/2021 18:40	59.2614	-148.908	167	rHopcroft	vert
368	multinet	recover	GAK5	3	5/2/2021 10:51	5/2/2021 18:51	59.25978	-148.908	167	rHopcroft	vert
369	Trace Metal	deploy	GAK5	TM09	5/2/2021 11:17	5/2/2021 19:17	59.25876	-148.908	167	aAguilarIslas	
370	Trace Metal	recover	GAK5	TM09	5/2/2021 11:37	5/2/2021 19:37	59.25652	-148.907	167	aAguilarIslas	
371	CTD911	deploy	GAK5	56	5/2/2021 11:43	5/2/2021 19:43	59.25647	-148.907	166	iReister	downcast usable. Bottles didn't fire on the upcast
372	CTD911	recover	GAK5	56	5/2/2021 12:15	5/2/2021 20:15	59.25655	-148.907	166	iReister	Bottles would not fire. only downcast usable
373	CTD911	deploy	GAK5	57	5/2/2021 12:31	5/2/2021 20:31	59.25655	-148.907	166	iReister	successful bottle fires. Downcast also usable
374	CalVet net	deploy	GAK5	33A	5/2/2021 12:48	5/2/2021 20:48	59.25736	-148.907	167	rHopcroft	
375	CalVet net	recover	GAK5	33A	5/2/2021 12:53	5/2/2021 20:53	59.25729	-148.907	167	rHopcroft	
376	CTD911	recover	GAK5	57	5/2/2021 13:44	5/2/2021 21:44	59.25835	-148.908	166	iReister	
377	IronFish	deploy	GAK5 to GAK6		5/2/2021 13:49	5/2/2021 21:49	59.25777	-148.909		aAguilarIslas	
378	IronFish	recover	GAK5 to GAK6		5/2/2021 15:16	5/2/2021 23:16	59.11846	-148.774		aAguilarIslas	
379	CalVet net	deploy	GAK6	34	5/2/2021 15:23	5/2/2021 23:23	59.11841	-148.774	151	rHopcroft	
380	CalVet net	recover	GAK6	34	5/2/2021 15:28	5/2/2021 23:28	59.11883	-148.774	151	rHopcroft	
381	CTD911	deploy	GAK6	58	5/2/2021 15:31	5/2/2021 23:31	59.11893	-148.774	148	iReister	
382	CTD911	recover	GAK6	58	5/2/2021 16:04	5/3/2021 0:04	59.11971	-148.774	148	iReister	
383	IronFish	deploy	GAK6 to GAK7		5/2/2021 16:15	5/3/2021 0:15	59.1181	-148.776		aAguilarIslas	
384	CTD911	deploy	GEO3	59	5/2/2021 17:34	5/3/2021 1:34	59.01423	-148.678	233	iReister	
385	CTD911	recover	GEO3	59	5/2/2021 18:16	5/3/2021 2:16	59.01482	-148.678	233	iReister	
386	IronFish	recover	GAK6 to GAK7		5/2/2021 20:32	5/3/2021 4:32	58.97275	-148.635		aAguilarIslas	mark late by 2 hrs
387	CalVet net	deploy	GAK7	35	5/2/2021 20:39	5/3/2021 4:39	58.97225	-148.632	250	rHopcroft	
388	CalVet net	recover	GAK7	35	5/2/2021 20:44	5/3/2021 4:44	58.97206	-148.632	250	rHopcroft	
389	CTD911	deploy	GAK7	60	5/2/2021 20:51	5/3/2021 4:51	58.9717	-148.632	241	iReister	
390	CTD911	recover	GAK7	60	5/2/2021 21:32	5/3/2021 5:32	58.9727	-148.633	241	iReister	
391	Sediment Trap	recover	GAK8	ST5	5/2/2021 23:43	5/3/2021 7:43	58.74257	-148.569		tKelly	Windy
392	multinet	deploy	GAK9	13	5/3/2021 1:09	5/3/2021 9:09	58.68398	-148.356	279	jQuestel	
393	multinet	maxDepth	GAK9	13	5/3/2021 1:21	5/3/2021 9:21	58.68333	-148.344	279	jQuestel	
394	multinet	recover	GAK9	13	5/3/2021 1:48	5/3/2021 9:48	58.68208	-148.313	279	jQuestel	
395	CalVet net	deploy	GAK9	36	5/3/2021 2:42	5/3/2021 10:42	58.58709	-148.242	280	rHopcroft	
396	multinet	deploy	GAK10	14	5/3/2021 3:13	5/3/2021 11:13	58.54058	-148.23	1378	jQuestel	

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
397	multinet	maxDepth	GAK10	14	5/3/2021 3:22	5/3/2021 11:22	58.54108	-148.223	1378	jQuestel	
398	multinet	recover	GAK10	14	5/3/2021 3:46	5/3/2021 11:46	58.54022	-148.205	1378	jQuestel	
399	multinet	deploy	GAK11	15	5/3/2021 5:15	5/3/2021 13:15	58.3917	-148.086	1399	jQuestel	
400	multinet	maxDepth	GAK11	15	5/3/2021 5:29	5/3/2021 13:29	58.38944	-148.075	1399	jQuestel	
401	multinet	recover	GAK11	15	5/3/2021 5:58	5/3/2021 13:58	58.38298	-148.051	1399	jQuestel	
402	CTD911	deploy	GAK9	61	5/3/2021 9:05	5/3/2021 17:05	58.68083	-148.351	280	iReister	Rough conditions force 10 second bottle soaks >10m and no soak >10 m
403	CTD911	recover	GAK9	61	5/3/2021 9:36	5/3/2021 17:36	58.68002	-148.351	280	iReister	
404	CalVet net	recover	GAK9	36	5/3/2021 9:48	5/3/2021 17:48	58.67963	-148.351	280	rHopcroft	nets fouled - need to recast
405	CalVet net	deploy	GAK9	36	5/3/2021 10:21	5/3/2021 18:21	58.68035	-148.351	280	rHopcroft	
406	CalVet net	recover	GAK9	36	5/3/2021 10:27	5/3/2021 18:27	58.67996	-148.351	280	rHopcroft	
407	CTD911	deploy	GAK9	62	5/3/2021 10:37	5/3/2021 18:37	58.67911	-148.351	280	iReister	
408	CTD911	recover	GAK9	62	5/3/2021 11:28	5/3/2021 19:28	58.67777	-148.351	280	iReister	
409	CalVet net	deploy	GAK9	36A	5/3/2021 11:37	5/3/2021 19:37	58.67824	-148.351	275	rHopcroft	
410	CalVet net	recover	GAK9	36A	5/3/2021 11:45	5/3/2021 19:45	58.67767	-148.351	275	rHopcroft	
411	CalVet net	deploy	GAK8	37	5/3/2021 13:22	5/3/2021 21:22	58.8061	-148.491	289	rHopcroft	
412	CalVet net	recover	GAK8	37	5/3/2021 13:28	5/3/2021 21:28	58.80598	-148.491	289	rHopcroft	
413	CTD911	deploy	GAK8	63	5/3/2021 13:31	5/3/2021 21:31	58.80603	-148.491	288	iReister	
414	CTD911	recover	GAK8	63	5/3/2021 14:21	5/3/2021 22:21	58.80615	-148.491	288	iReister	
415	IronFish	recover	GAK8 to GAK9		5/3/2021 14:22	5/3/2021 22:22	58.80615	-148.491		aAguilarIslas	
416	IronFish	recover	GAK8 to GAK9		5/3/2021 15:50	5/3/2021 23:50	58.68028	-148.354		aAguilarIslas	
417	Trace Metal	deploy	GAK9	TM10	5/3/2021 16:16	5/4/2021 0:16	58.68022	-148.354	280	aAguilarIslas	
418	Trace Metal	recover	GAK9	TM10	5/3/2021 16:49	5/4/2021 0:49	58.68026	-148.354	280	aAguilarIslas	
419	multinet	deploy	GAK9	4	5/3/2021 17:02	5/4/2021 1:02	58.68034	-148.354	277	rHopcroft	vert
420	multinet	recover	GAK9	4	5/3/2021 17:19	5/4/2021 1:19	58.68083	-148.355	277	rHopcroft	
421	IronFish	deploy	GAK9 to GAK10		5/3/2021 17:41	5/4/2021 1:41	58.67805	-148.354		aAguilarIslas	
422	IronFish	recover	GAK9 to GAK10		5/3/2021 19:12	5/4/2021 3:12	58.54245	-148.216		aAguilarIslas	
423	CalVet net	deploy	GAK10	38	5/3/2021 19:19	5/4/2021 3:19	58.54163	-148.217	1432	rHopcroft	
424	CalVet net	recover	GAK10	38	5/3/2021 19:24	5/4/2021 3:24	58.54161	-148.219	1432	rHopcroft	
425	CTD911	deploy	GAK10	64	5/3/2021 19:25	5/4/2021 3:25	58.54159	-148.219	1429	iReister	
426	CTD911	recover	GAK10	64	5/3/2021 20:57	5/4/2021 4:57	58.54275	-148.222	1429	iReister	no suna. Might be water in connection/low battery
427	IronFish	deploy	GAK10 to 11		5/3/2021 21:06	5/4/2021 5:06	58.54257	-148.222		aAguilarIslas	
428	IronFish	recover	GAK10 to 11		5/3/2021 22:58	5/4/2021 6:58	58.38919	-148.072		aAguilarIslas	
429	CalVet net	deploy	GAK11	39	5/3/2021 22:59	5/4/2021 6:59	58.38932	-148.072	1412	rHopcroft	

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
430	CalVet net	recover	GAK11	39	5/3/2021 23:06	5/4/2021 7:06	58.38997	-148.071	1412	rHopcroft	
431	CTD911	deploy	GAK11	65	5/3/2021 23:10	5/4/2021 7:10	58.39028	-148.071	1412	iReister	
432	CTD911	recover	GAK11	65	5/4/2021 0:43	5/4/2021 8:43	58.39128	-148.065	1412	iReister	SUNA battery died on upcast
433	multinet	deploy	GAK12	16	5/4/2021 2:06	5/4/2021 10:06	58.24996	-147.93	2180	jQuestel	
434	multinet	maxDepth	GAK12	16	5/4/2021 2:16	5/4/2021 10:16	58.24512	-147.929	2180	jQuestel	
435	multinet	recover	GAK12	16	5/4/2021 2:45	5/4/2021 10:45	58.23024	-147.935	2180	jQuestel	
436	multinet	deploy	GAK13	17	5/4/2021 4:10	5/4/2021 12:10	58.09561	-147.813	2015	jQuestel	Had to tow off of station due to swells
437	multinet	maxDepth	GAK13	17	5/4/2021 4:21	5/4/2021 12:21	58.0898	-147.807	2064	jQuestel	
438	multinet	recover	GAK13	17	5/4/2021 4:51	5/4/2021 12:51	58.07273	-147.803	2064	jQuestel	
439	multinet	deploy	GAK14	17	5/4/2021 6:18	5/4/2021 14:18	57.9381	-147.698	2877	jQuestel	off station due to high seas
440	multinet	maxDepth	GAK14	17	5/4/2021 6:31	5/4/2021 14:31	57.93089	-147.704	2877	jQuestel	
441	multinet	recover	GAK14	17	5/4/2021 7:04	5/4/2021 15:04	57.91295	-147.722	2877	jQuestel	
442	Sediment Trap	deploy	GAK15	ST6	5/4/2021 10:02	5/4/2021 18:02	57.79526	-147.52		tKelly	
443	CalVet net	deploy	GAK14	40	5/4/2021 11:42	5/4/2021 19:42	57.94382	-147.652	3034	rHopcroft	
444	CalVet net	recover	GAK14	40	5/4/2021 11:48	5/4/2021 19:48	57.94422	-147.654	3034	rHopcroft	
445	CalVet net	deploy	GAK12	41	5/4/2021 15:03	5/4/2021 23:03	58.24572	-147.933	2187	rHopcroft	
446	CalVet net	recover	GAK12	41	5/4/2021 15:09	5/4/2021 23:09	58.24574	-147.933	2187	rHopcroft	
447	CTD911	deploy	GAK12	66	5/4/2021 15:18	5/4/2021 23:18	58.24581	-147.933	2186	iReister	
448	CTD911	recover	GAK12	66	5/4/2021 16:54	5/5/2021 0:54	58.24556	-147.932	2186	iReister	
449	CalVet net	deploy	GAK13	42	5/4/2021 18:32	5/5/2021 2:32	58.09922	-147.795	2070	rHopcroft	
450	CalVet net	recover	GAK13	42	5/4/2021 18:38	5/5/2021 2:38	58.09912	-147.794	2070	rHopcroft	
451	CTD911	deploy	GAK13	67	5/4/2021 18:39	5/5/2021 2:39	58.09911	-147.794	2063	iReister	
452	CTD911	recover	GAK13	67	5/4/2021 20:17	5/5/2021 4:17	58.0995	-147.796	2063	iReister	
453	CalVet net	deploy	GAK14	43	5/4/2021 21:36	5/5/2021 5:36	57.94456	-147.654	3027	rHopcroft	second occupation
454	CalVet net	recover	GAK14	43	5/4/2021 21:42	5/5/2021 5:42	57.94463	-147.655	3027	rHopcroft	
455	CTD911	deploy	GAK14	68	5/4/2021 21:49	5/5/2021 5:49	57.9449	-147.656	3016	iReister	
456	CTD911	recover	GAK14	68	5/4/2021 23:24	5/5/2021 7:24	57.94298	-147.668	3016	iReister	
457	multinet	deploy	GAK14	19	5/4/2021 23:36	5/5/2021 7:36	57.94155	-147.669	2917	jQuestel	Redo bc cast #18 was done in too much daylight. Process this sample.
458	multinet	maxDepth	GAK14	19	5/4/2021 23:45	5/5/2021 7:45	57.93761	-147.666	2917	jQuestel	
459	multinet	recover	GAK14	19	5/5/2021 0:13	5/5/2021 8:13	57.92529	-147.656	2917	jQuestel	
460	multinet	deploy	GAK15	20	5/5/2021 1:23	5/5/2021 9:23	57.79851	-147.505	4294	jQuestel	
461	multinet	maxDepth	GAK15	20	5/5/2021 1:30	5/5/2021 9:30	57.79539	-147.503	4294	jQuestel	
462	multinet	recover	GAK15	20	5/5/2021 1:58	5/5/2021 9:58	57.78514	-147.492	4294	jQuestel	

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
463	multinet	deploy	GAK15	21	5/5/2021 2:07	5/5/2021 10:07	57.785	-147.493	4790	jQuestel	tow for molecular
464	multinet	maxDepth	GAK15	21	5/5/2021 2:14	5/5/2021 10:14	57.78979	-147.498	4790	jQuestel	
465	multinet	recover	GAK15	21	5/5/2021 2:44	5/5/2021 10:44	57.80796	-147.513	4790	jQuestel	
466	MOCNESS1	deploy	GAK15	6	5/5/2021 3:27	5/5/2021 11:27	57.83831	-147.537	4071	jQuestel	tow to 2000 m
467	MOCNESS1	maxDepth	GAK15	6	5/5/2021 5:09	5/5/2021 13:09	57.79047	-147.499	4508	jQuestel	
468	MOCNESS1	recover	GAK15	6	5/5/2021 7:30	5/5/2021 15:30	57.71755	-147.449	4865	jQuestel	
469	CTD911	deploy	GAK15	69	5/5/2021 8:50	5/5/2021 16:50	57.79277	-147.502	4462	iReister	
470	CTD911	recover	GAK15	69	5/5/2021 9:41	5/5/2021 17:41	57.79712	-147.504	4462	iReister	
471	multinet	abort	GAK15	5	5/5/2021 9:55	5/5/2021 17:55	57.79911	-147.504	4322	jQuestel	power fail
472	CalVet net	deploy	GAK15	43	5/5/2021 10:25	5/5/2021 18:25	57.80123	-147.509	4140	jQuestel	
473	CalVet net	recover	GAK15	43	5/5/2021 10:31	5/5/2021 18:31	57.80267	-147.511	4140	jQuestel	
474	multinet	deploy	GAK15	5	5/5/2021 10:59	5/5/2021 18:59	57.79426	-147.501	4463	jQuestel	shallow cast
475	multinet	recover	GAK15	5	5/5/2021 11:14	5/5/2021 19:14	57.79766	-147.504	4463	jQuestel	
476	multinet	deploy	GAK15	6	5/5/2021 11:40	5/5/2021 19:40	57.79946	-147.506	4263	jQuestel	deep cast
477	multinet	recover	GAK15	6	5/5/2021 13:01	5/5/2021 21:01	57.80517	-147.51	4263	rHopcroft	
478	Trace Metal	deploy	GAK15	TM11	5/5/2021 13:36	5/5/2021 21:36	57.79255	-147.5	4504	aAguilarIslas	
479	CTD911	deploy	GAK15	70	5/5/2021 14:46	5/5/2021 22:46	57.79254	-147.5	4504	iReister	
480	Trace Metal	recover	GAK15	TM11	5/5/2021 16:21	5/6/2021 0:21	57.79198	-147.5	4504	aAguilarIslas	Bottles did not close
481	CTD911	recover	GAK15	70	5/5/2021 16:24	5/6/2021 0:24	57.79195	-147.5	4504	iReister	
482	Trace Metal	deploy	GAK15	TM11	5/5/2021 16:59	5/6/2021 0:59	57.79198	-147.5	4504	aAguilarIslas	
483	CalVet net	deploy	GAK15	43A	5/5/2021 17:40	5/6/2021 1:40	57.79196	-147.5	4140	jQuestel	
484	Trace Metal	deploy	GAK15	TM11	5/5/2021 17:40	5/6/2021 1:40	57.79196	-147.5		aAguilarIslas	
485	CalVet net	recover	GAK15	43A	5/5/2021 17:45	5/6/2021 1:45	57.7921	-147.5	4140	jQuestel	
486	IronFish	deploy	GAK15 to GAK14		5/5/2021 17:56	5/6/2021 1:56	57.79286	-147.502		aAguilarIslas	
487	IronFish	recover	GAK15 to GAK14		5/5/2021 18:14	5/6/2021 2:14	57.81199	-147.537		aAguilarIslas	
488	Sediment Trap	recover	GAK15	ST6	5/5/2021 19:45	5/6/2021 3:45	57.95089	-147.794		tKelly	
489	multinet	abort	GAK9		5/6/2021 0:07	5/6/2021 8:07	58.67385	-148.344	275	jQuestel	Nets weren't cocked
490	multinet	deploy	GAK9	22	5/6/2021 0:09	5/6/2021 8:09	58.67454	-148.345	275	jQuestel	
491	multinet	recover	GAK9	22	5/6/2021 0:50	5/6/2021 8:50	58.68895	-148.363	275	jQuestel	
492	CalVet net	deploy	GAK1	44	5/6/2021 8:10	5/6/2021 16:10	59.84468	-149.467	269	rHopcroft	
493	CalVet net	recover	GAK1	44	5/6/2021 8:16	5/6/2021 16:16	59.84482	-149.467	269	rHopcroft	
494	CTD911	deploy	GAK1	71	5/6/2021 8:20	5/6/2021 16:20	59.84479	-149.467	268	iReister	
495	CTD911	recover	GAK1	71	5/6/2021 9:03	5/6/2021 17:03	59.84479	-149.467	268	iReister	

Event	Instrument	Action	Station	Cast	Local	GPS_Time	Latitude	Longitude	Seafloor	Author	Comment
496	CalVet net	deploy	RES2.5	45	5/6/2021 10:36	5/6/2021 18:36	60.02452	-149.358	300	rHopcroft	
497	CalVet net	recover	RES2.5	45	5/6/2021 10:41	5/6/2021 18:41	60.02452	-149.358	297	rHopcroft	
498	CTD911	deploy	RES2_5	72	5/6/2021 10:47	5/6/2021 18:47	60.02452	-149.358	293	iReister	
499	CTD911	recover	RES2_5	72	5/6/2021 11:33	5/6/2021 19:33	60.02452	-149.358	293	iReister	