NGA-LTER

Northern Gulf of Alaska Long-Term Ecological Research

Cruise Report September 2020

Cruise ID: SKQ2020-12S

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

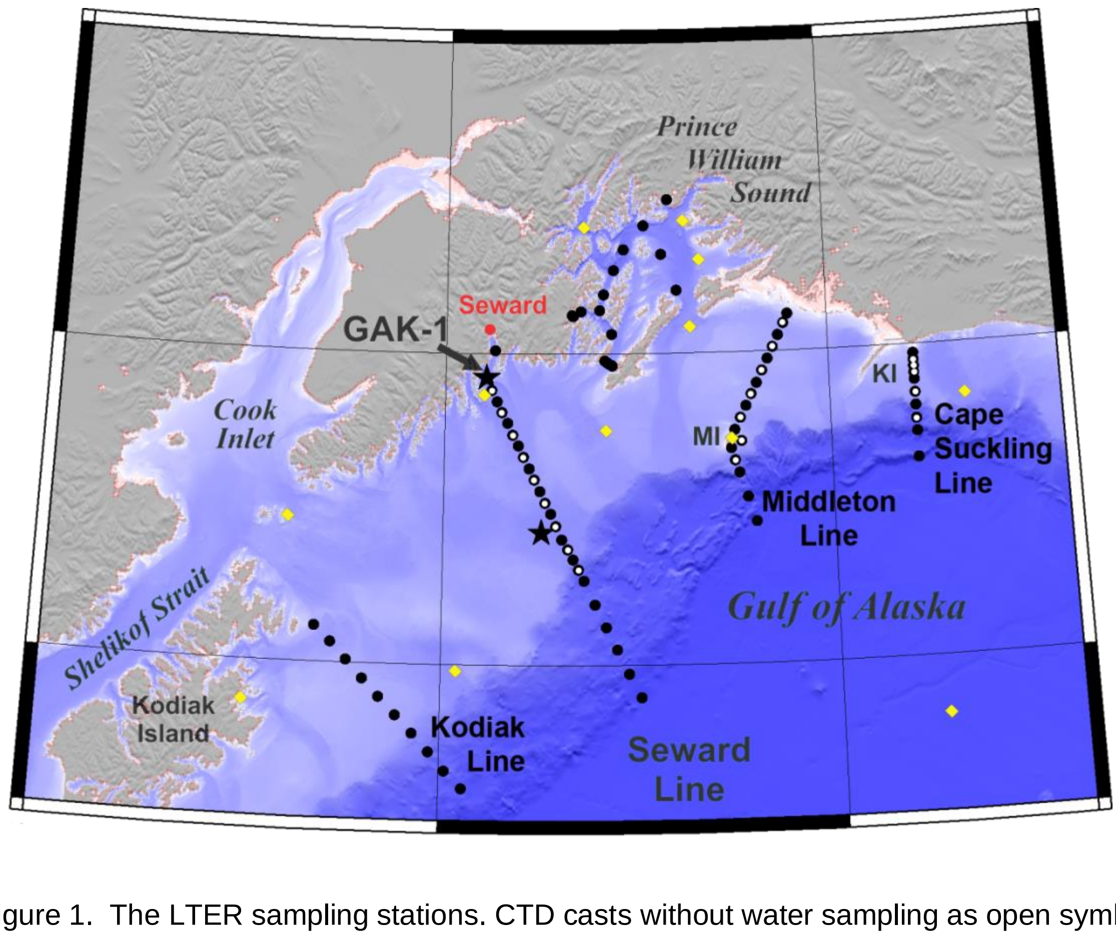


Figure 1. The LTER sampling stations. CTD casts without water sampling as open symbols. Yellow diamonds represent locations of meteorological data from NOAA buoys or ground stations. Star shows position of LTER mooring. Cape Suckling is low priority.

Scientific Personnel:

1	Russ Hopcroft (LTER Lead PI)	Zooplankton (days), UAF, Chief Scientist
2	Caitlin Smoot	Zooplankton, UAF, Night Watch Lead Scientist
3	Mette Kaufmann	Chemistry (Nutrients, Iron), UAF
4	Ben Lowin	Plankton/Optics, Gases, UAF
5	Hana Busse	Phytoplankton/Microzooplakton, WWU
6	Delaney Coleman	Zooplankton (nights), UAF
7	Emily Stidham	Zooplankton (nights), UAF
9	Zack Pohlen	Seabirds/Mammals, US Fish & Wildlife Service
9	Isaac Reister	Physics (Moorings/CTD/Acrobat), UAF
10	Emily Ortega	Chemistry (Nutrients, Iron), UAF
11	Kerri Fredrickson	Phytoplankton/Microzooplankton, WWU
12	Annie Kandel	Nutrients/Phytoplankton, UAF
13	Ethan Roth	SKQ Marine technician, Lead
14	Bern McKiernan	SKQ Marine technician

SKQ2020-12S was conducted during the time of the COVID19 global pandemic. Our normal fall vessel the *R/V Tiglax* did not sail during 2020 and we were fortunate the *Sikuliaq* was able to accommodate our needs. Measures were taken to reduce the risk of disease transmission, including sailing with a reduced number of scientists.

Daily summary

August 30 - Day 0 – Setup began after breakfast on board. It went smoothly for all teams given that many items had been left on board from last cruise

Sept 1 – Day 1 – *Sikuliaq* got underway ~07:00, and we reached Res2.5 for a CTD & Calvet at ~08:00, and deployed the FeFish while leaving station. We began the intensive station at GAK1 with a production cast at ~11:00. Two Calvets, a trace metal clean (TMC) rosette, the vertical multinet and a regular CTD cast followed, with station work completed at ~15:30. We proceeded south completing day-work at Stations 1i, 2, 2i and 3 ending at ~22:00, then towed the FeFish to GAK4. Night-work began at GAK4 at 23:20 with Methots and towed Multinets undertaken while heading north to GAK1 and ending at 06:20. Battery failure in the multinet at GAK2 resulted in loss of stratified samples there.

Sept 2 – Day2 – The day began with installation of parts for the underwire winch that had been delivered the prior day via *R/V Nanuq*. Installation, under shelter from land, was completed at ~09:00 then transit began to GAK4. A Calvet at GAK4 began at 11:50 followed by a CTD and deployment of the FeFish. We reached intensive station GAK5 at ~14:00, beginning with a production cast. Two Calvets, a TMC rosette, the regular CTD and the vertical Multinet followed, with station work completed at ~16:50. We worked south completing GAK7 at 21:30. We transited to GAK8 and worked north with Methots and Multinets ending GAK5 at ~06:00

Sept 3 – Day-3 – The day began with a transit from GAK5 to GAK8 starting sampling at ~09:15. We reached Intensive station GAK9 at 11:50 starting with a pair of Calvets, followed by the production CTD, a TMC rosette, the vertical Multinet, and the regular CTD cast, ending that station at 15:00. We worked south with Calvets and CTDs via GAK10 and ended GAK11 at 21:45. Night-work began with a Methot at 22:00 and worked north to GAK9 ending at ~03:30, followed by a transit out to GAK15.

Sept 4 – Day-4 – The day began at Intensive Station GAK15 with a pair of Calvets at ~09:00, followed by 200m vertical Multinet, the Production cast, the deep multinet, the standard CTD and a TMC rosette cast. GAK15 was completed at ~15:00, the FeFish deployed and we worked north toe GAK13 ending daywork at 20:30 then transiting to GAK12. Night sampling began at GAK12 with a Methot at ~23:00 and worked southward to completing the final multinet for GAK15 at ~16:15 including a recast at that station to compensate for contamination of a net by a very large jellyfish.

Sept 5 – Day 5 – The day began at GAK15 with the deployment of the Acrobat and FeFish a ~06:30 and transit northward. Instruments were retrieved at ~13:00 for a Calvet and CTD at GAK12, then redeployed until the Acrobat failed just south of GAK7 at ~22:20. While the Acrobat was being repaired, we transited to the GEO mooring for a CTD cast at ~midnight then returned to where the Acrobat had failed and redeployed the Acrobat and FeFish to complete the transect northward.

Sept 6 – Day 6 – The Acrobat and FeFish were recovered at GAK1 around 11:00. We transited to the MS Line, arriving MS4 at ~16:00 for a series of 4 CTDs and a single Calvet (MS2) completed at ~19:00. The SUNA died on the upcast at MS3, and had a variable success rate for the remainder of the cruise related to issues with battery pack. We proceeded to KIP2 and began with a Methot at 22:30 heading northward and completing PWS3 at 06:00.

Sept 7- Day 7 – Day-work began with a CTD and Calvet at PWS3, followed by intensive station PWS2 that began at 10:00 with a deep vertical Multinet, followed by the production cast, the shallow Multinet, two Calvets, the TMC rosette, and main CTD, all ending by 15:15. We continued south to PWS1 and KIP2 ending normal sampling at 20:15, then continued to KIP0 for a bottleless CTD cast that ended at ~23:00. The night was spent towing the Acrobat back northward to PWS3 until ~06:00.

Sept 8 – Day 8 – Day-work began at 09:45 with a Calvet at 09:45 we worked Calvets and CTDs at IB1 and then IB0 ending regular sampling at 15:30. We took advantage of having Sikuliaq to map Icy Bay, while the work boat was deployed to let scientist and crew get closer to the Cheniga Glacier. We departed the Bay at ~20:00 and headed for GAK2 to repeat a failed Multinet deployment from 04:30-05:00 then conducted at bottleless CTD cast at GAK1 at 06:00.

Sept 9 – Day 9 – We turned control of operations over to the ship to complete several calibration procedures, and arrived at the dock ~14:00. Offloading began thereafter.

Sept 10 – Science party completely final pack-up and was underway for Fairbanks midmorning.

General Comment: *the weather this cruise was favorable overall. PWS was reduced to one day given the short duration of the cruise.*

Physics Report:

PI: Seth Danielson, Participant: Issac Reister

On SKQ202012S we conducted 37 CTD casts for water column hydrography using a 24 place rosette with 10 liter Niskin bottles. Bottles were tripped on 32 of these 37 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 (which due to calibration issues was not utilized during this cruise); one channel provided power and communication to a self-logging SUNA nitrate sensor.

The CTD stations were occupied on one shelf transect (Seward line) plus stations in Western Prince William Sound.

Ocean velocity data were 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.

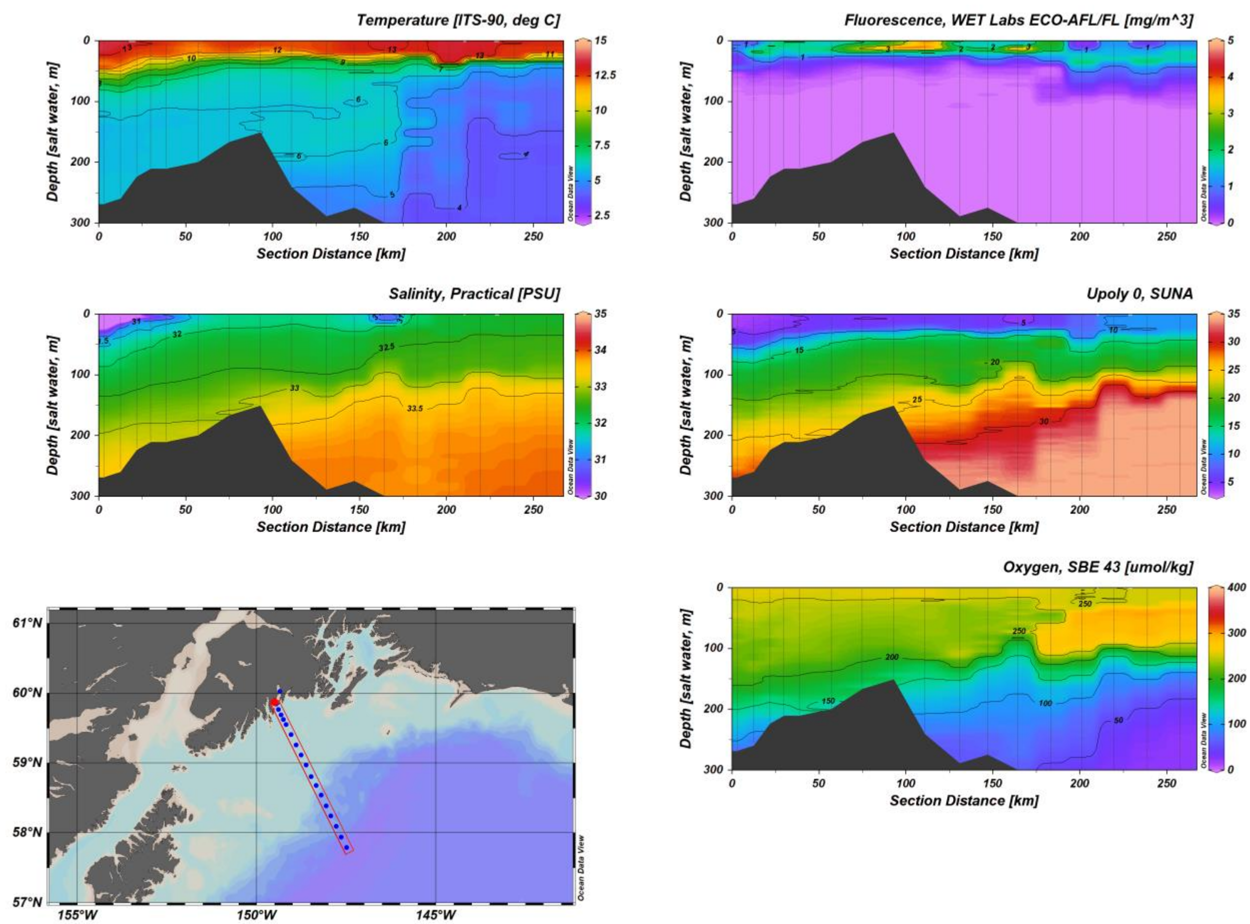
We ran the ADCPs triggered from the K-sync system so as to provide an interference-free time interval for the EK-60 fisheries acoustics pings. Over shallow waters (< 1000 m depth) all acoustic instruments could be run simultaneously. In deep water (>1000 m depth) the time for the return acoustic pings become exceedingly. Since our track-line had already been mapped in deep water, we secured the EM302 multibeam and operated only the ADCP and EK-60 in deep water.

Regions previously unmapped by multibeam acoustics were preferentially selected for ship routes in order to map uncharted areas of the seafloor. Many portions of the cruise occurred in previously unmapped regions, including especially portions of Prince William Sound. Future cruises will continue to fill in mapping coverage gaps.

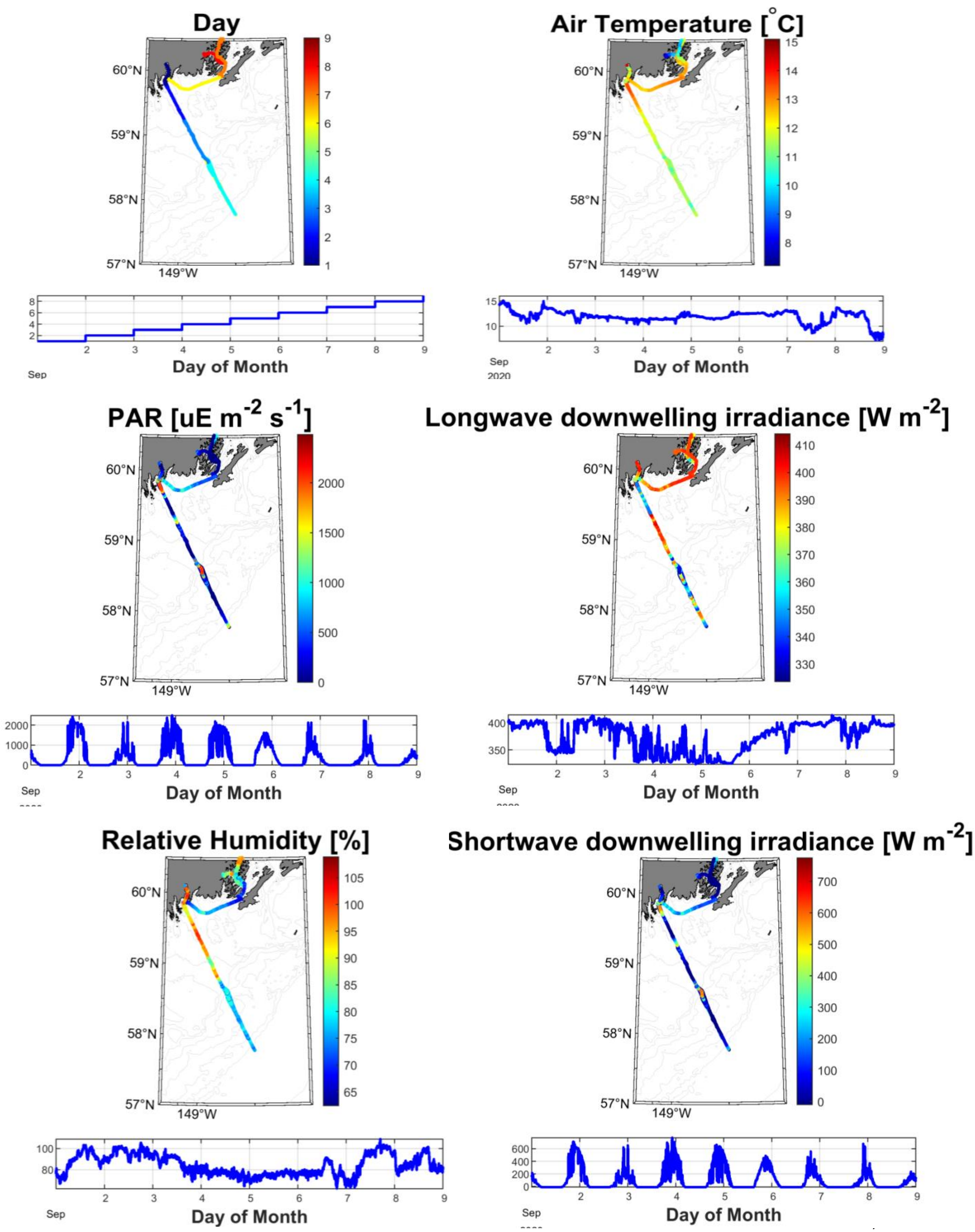
Other underway data collected include the ship's operational data, meteorological data and ocean surface data. Operational data of ships equipment (e.g., navigation and winch payout and tensions) were also logged. Navigation data parameters include GMT date time, latitude, longitude and water depth. 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 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 energized 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. In the later part of the cruise, the SUNA developed issues likely relating to the SUNA batteries inability to hold a charge, due to the age of those batteries (estimated to have >50 discharge cycles or more).

High resolution (~ 300m horizontal spacing) CTD profiles over the upper water column (50 to 60 m depth) were collected using a towed Sea Sciences Acrobat system, which undulates at a rate of about 0.5 to 1.0 m s^{-1} while being towed at a ship speed of 6.5 knots through the water. The Acrobat was equipped with a SBE49 FastCat CTD and a WetLabs ECO-Triplett optical sensor with channels for chlorophyll a fluorescence, CDOM and optical backscatter (OBS) at 700 nm. We towed the Acrobat along the length of the Seward Line, and along knight's passage. For ship speeds of about 7 knots and 220 m of Acrobat cable paid out from the winch, we were able to consistently profile to about 50 m depth.



Seward Line transect physical hydrography from SKQ2020-12S.


Day
Air Temperature [°C]
PAR [uE m-2 s-1]
Longwave downwelling irradiance [W m-2]
Relative Humidity [%]
Shortwave downwelling irradiance [W m-2]
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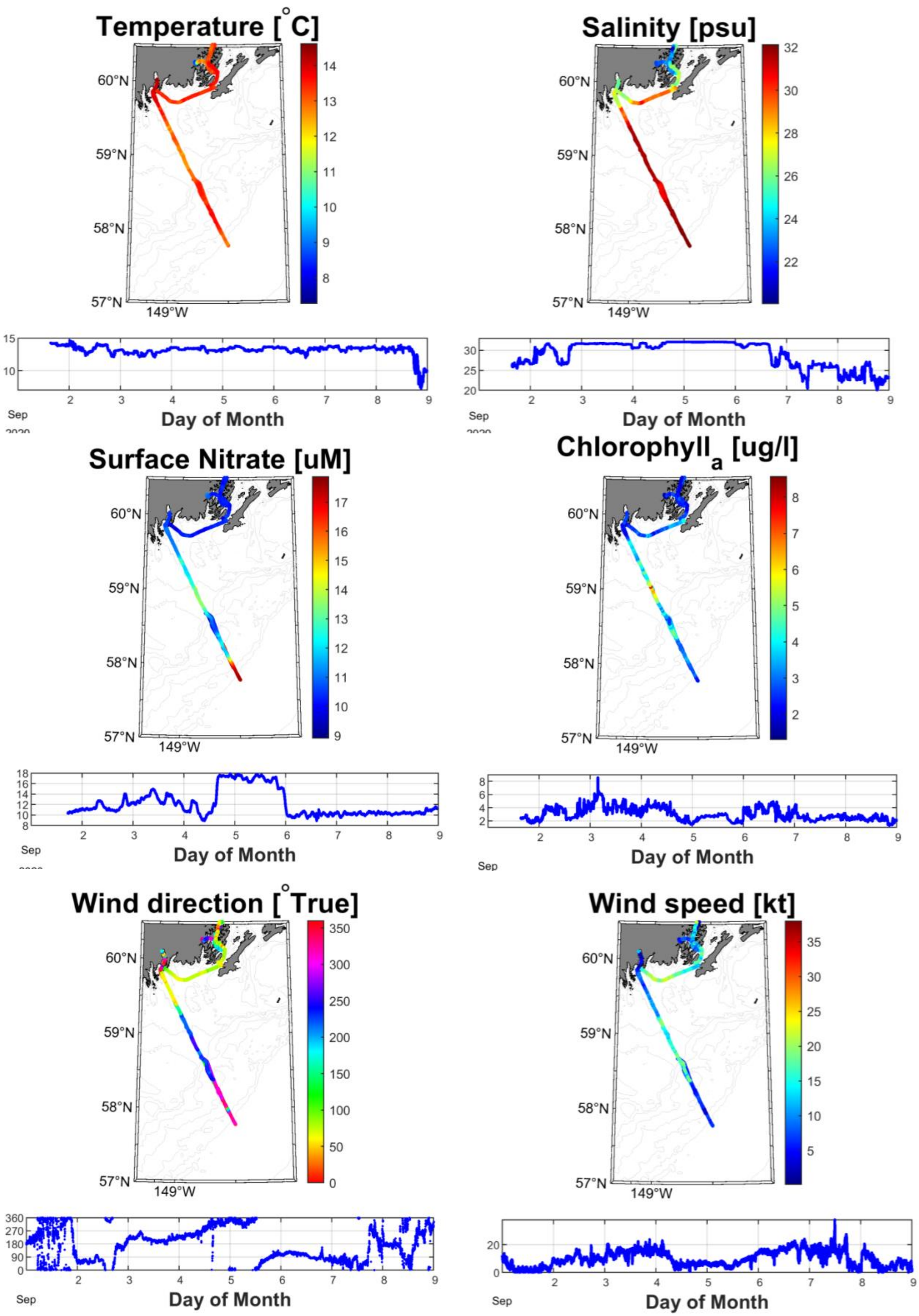
59°N
58°N
57°N
149°W
Day of Month
Sep
2020


Temperature [°C]
Salinity [psu]
Surface Nitrate [uM]
Chlorophyll_a [ug/l]
Wind direction [°True]
Wind speed [kt]
60°N
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Sep
2020

Macro- and Micronutrient sample collection and processing

PI: Ana M. Aguilar-Islas
Participants: Mette Kaufman (Res.Tech.), Emily Ortega (MS student), and Annie Kandel (MS student)

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. The survey of the GAK Line was the major focus of the cruise. 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 students in field-related work.

Table 1. Samples 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
RES2.5	13	GAK10	17	OTHER	# samples
GAK1	13	GAK11	17	Transect	28
GAK2	12	GAK12	17	PP casts	40
GAK3	11	GAK13	17		
GAK4	11	GAK14	17		
GAK5	11	**GAK15**	17		
GAK6	10	GEO2	11 (*)		
GAK7	12	MS2	11 (!)		
GAK8	13	PWS3	14 (!)		
GAK9	13	**PWS2**	13		
GAK10	17	PWS1	13		
GAK11	17	KIP2	14		
GAK12	16 (*)	IB2	10		
GAK13	17	IB1	10		
GAK14	17	IB0	12 (*)		
GAK15	17	**TOTAL**	**324**	**TOTAL**	**392**

<u>Sample collection and processing for macronutrient analysis</u>:

Filtered seawater samples were collected from 31 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 and surface water during a coordinated transect with the Acrobat. Annie Kandel was responsible for CTD macronutrient sampling. In total, 392 samples were collected for nutrient analysis.

Several CTD casts had issues with the firing of bottles. As a result, surface waters were collected using a plastic bucket from the starboard side. The bucket was rinsed in situ prior to each collection. Exclamation marks on Table 1 indicate the stations where bucket samples were collected. The bottom bottle did not fire in several casts, but make-up cast were not conducted, and those stations, (*) in Table 1, do not have a bottom sample.

Additional nutrient samples were collected for an intercalibration exercise between UAF nutrient lab and Scripts Institute of Oceanography nutrient lab.

Biological Parameters:

Annie Kandel responsible for Chl analysis during the cruise. She also assisted the Strom group with CTD sampling.

Photo 1. Left: Annie Kandel (right) and Hana Busse (left) sampling from the CTD in the Baltic Room. Photo by Emily Ortega.

Sample collection for iron analysis:

a) Seawater samples were collected from 5 vertical profiles (see Table 2) from 15 to 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 (MASH2K) with 5/16" Amsteel line and a TMC block mounted on the starboard crane were used to deploy/recover the TMC rosette. The winch and block were borrowed from the UNOLS East Coast winch pool. Ortega and Kaufman were involved in deck operations, with assistance from crew and marine technician. Ortega was in charge of selecting sampling depths. Unfortunately, she had to do this blindly at several stations because due to lack of time, there was only water column information down to 50 m (from the productivity cast) and not information to the bottom (from either the regular CTD, or deployment below 50 m during the productivity cast). The MASH2K turntable was seized up and required rigging with a come-along to rotate.

b) Surface seawater samples were collected underway while arriving (or departing) the stations along the GAK Line and PWS2. These samples were used to complete vertical profiles and obtain surface information along the GAK Line in concert with the Acrobat tow vehicle. 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 4-9 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 2). Ortega and Kaufman were involved in deck operations, with assistance from the crew and marine technician. The winch used during the summer to deploy the fish was not available during fall because of repairs. The Fefish performed generally well throughout the cruise.

However, there were two or three times when the bridge increased the speed to 9.5 + knots, and the Fefish came out of the water. This leads to kinking in the tube, and the need to pull the Fefish out of the water to repair it. In the end, this takes more time than keeping the ship at 9 knots in between stations.

<u>Sample processing for iron analysis:</u>

A positive-pressure, plastic enclosure supplied with HEPA filtered air (the “bubble”) was constructed by all participants 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. Samples were 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

Photo 2. Left: Fefish being towed at 7-9 knots during one of the many calm days of the cruise. **Center:** Emily Ortega assisting during FeFish operations. **Right:** Fish sampling station inside the “bubble”.

for total dissolvable iron analysis, and filters for particulate iron analysis were obtained from a subset of samples (see Table 2). 0.2 um polycarbonate filter discs (Nuclepore) were used for the collection of particles using trace metal clean techniques. Ortega and Kaufman were responsible for subsampling and filtration. Time consuming ultrafiltration for soluble iron was not carried out during this cruise due to personnel shortages.

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	9	0	3	1	3
GAK5	9	0	3	1	3
GAK9	9	0	3	1	3
GAK15	12	0	2	1	2
PWS2	12	0	3	2	3
TOTAL	**51**	**0**	**14**	**6**	**14**
TRANSECT	**DFe**	**SFe**	**TDFe**	**Ligands**	**PFe**
GAK	44	0	0	0	0
PWS	1	0	0	0	0
TOTAL	**45**	**0**	**0**	**0**	**0**
GRAND TOTAL	**96**	**0**	**14**	**6**	**14**

No experimental work was performed during this cruise

General Notes

We had a successful cruise and were able to accomplish all the programmed sampling for macro-nutrients and iron parameters. We used the same new Fefish design as in summer 2020 and it continued to perform well. The deck crew provided excellent support and their help ensure the success of our operations. The marine technicians also 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, and the -80 ^{o}C freezer were in good working condition. There were issues with CTD bottles firing that were addressed by marine technicians. Internet access was great. The quality of the food was excellent. There were logistic issues with loading of gear for shipment to UAF that can be addressed by having an explicit pre-plan for all participants to adhere to.

Carbonate Chemistry

PI: Claudine Hauri, Participant: None (Ben Lowin assisted)

Dissolved inorganic carbon (DIC) samples were taken for both the Hauri Lab and the Ocean Acidification Research Center (AORC). Full profiles were taken at GAK 1 and GAK 3 for OARC. Full water column samples were taken at the intensive stations on the GAK line (GAK1, 4 9, 15), the GEO mooring and PWS2 for the Hauri Lab. All of the samples were preserved 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 0.45-µm filter using a peristaltic pump. Inside Prince William Sound, triplicates were taken for filtered and unfiltered, as instructed by the Hauri Lab.

Particles

PI: Andrew McDonnell, Participant: None

Although the LISST was deployed this cruise there are concerns data may not be usable. The UVP was not available for deployment on this cruise.

Underway optics

PI: Will Burt. Participant Ben Lowin

The Optics sampling system was mounted in the main lab and was left on the ship between the July and September cruises. 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). Sampling began and ended at RES 2.5. Overall, the system performed well, requiring minimal maintenance. There was minimal bubble entrainment when the blanks were run, from a leaky ACS O-ring, which was on the exit side, so it did not affect the blank sampling for the ACS. On this note, the system struggled the worst with bubble entrainment during the visit to Icy Bay, where the additional glacial sediment led to even slower flow rates during blank periods. Other than that, an additional bungie was added to hold the BB3 casket to the wall; this kept it secure throughout the cruise.

Unlike the July cruise, there were no discrete chlorophyll samples taken. If Icy Bay is sampled again, it is suggested that exit water is taken for chlorophyll analysis to check that the additional sediment does not impact data quality. Finally, it should be noted that during sampling in high sediment systems the dark chamber housing the BB3 needs to be cleaned daily to avoid accumulation sediment. The ACS was not affected as the flow rates through the tubes is quite high compared to the casket that houses the BB3.

Phytoplankton and Microzooplankton

PI: Suzanne Strom
Participants: Kerri Fredrickson, Hana Busse (WWU)

Phytoplankton biomass: Phytoplankton biomass was characterized by size-fractionated chlorophyll at all non-intermediate shelf stations and most PWS stations (total = 20 vertical profiles); only total chlorophyll (GFF) was measured in Icy Bay and GAK14. Samples were analyzed fluorimetrically on board (7 depths per station). Primary production estimates were made at all intensive stations sampled (total = 5) using the 13-C method and 24-h deck incubations. 6 'light depths' were sampled per station based on the attenuation coefficient as estimated from the CTD PAR profile. Chlorophyll (GFF only) and nutrient samples were also taken from each of these productivity depths during experiment set-up.

Community characterization: Photosynthetic organisms and other protists were sampled at approximately every other shelf station, generally at 10 m depth only, as well as at selected stations in PWS. Samples were fixed in acid Lugol's for standard microzooplankton biomass and composition estimates, and in borate-buffered formalin for characterization of diatoms. At intensive stations only, additional samples were taken from 10 and either 0, 20 or 30 m for HPLC analysis of phytoplankton pigments (chemotaxonomy) and from 10 m only (in duplicate) for molecular characterization of the protist community. At intensive stations a 4-depth vertical profile of acid Lugol's microzooplankton samples was also collected. We also did extensive sampling for Gwenn Hennon (not shown in table below). Specifically, flow cytometry samples were sampled at every station on the GAK line and at PWS2; sample depths corresponded to surface, 10 m, sub-surface chlorophyll max (SCM) and the oxygen minimum zone (OMZ, 58 total samples collected). DNA samples were collected from the odd stations along the GAK line and at PWS2 at the surface, 10 m, SCM and OMZ (total = 34). DNA samples preserved using the Polony method were collected at the 5 intensive stations (surface and SCM, 12 total samples collected).

Organic carbon characterization: For DOC profiles, samples were filtered and frozen from each intensive stations (total = 5); depths sampled were mainly 150 m and above, and corresponded to nutrient sampling depths. At intensive stations only (total =5), a 4-depth vertical profile (0, 10, 20, 40 m) was sampled for POC and PIC.

Preliminary observations: Near-surface (0-20 m) chl-a concentrations were moderate on the shelf and out to GAK-11, ranging up to 1.7 µg/liter. Concentrations were sharply reduced seaward of GAK-11 (≤0.3 µg/liter). There was a subsurface chl-a maximum at approximately 10 m at most stations on the shelf, and a deeper SCM (20-30 m) in offshore waters. On the mid shelf and in offshore waters, nearly all chl-a (>90%) was in small (<20 µm) cells. Large (>20 µm) cells were only significant in the ACC (GAK-1 and 2, where total integrated chl-a was highest) and near the shelf break. Prince William Sound had uniformly low chl-a concentrations, particularly in Icy Bay, and was dominated by small photosynthetic organisms, with nearly all (≥80%) of cells in the <20 µm size fraction.

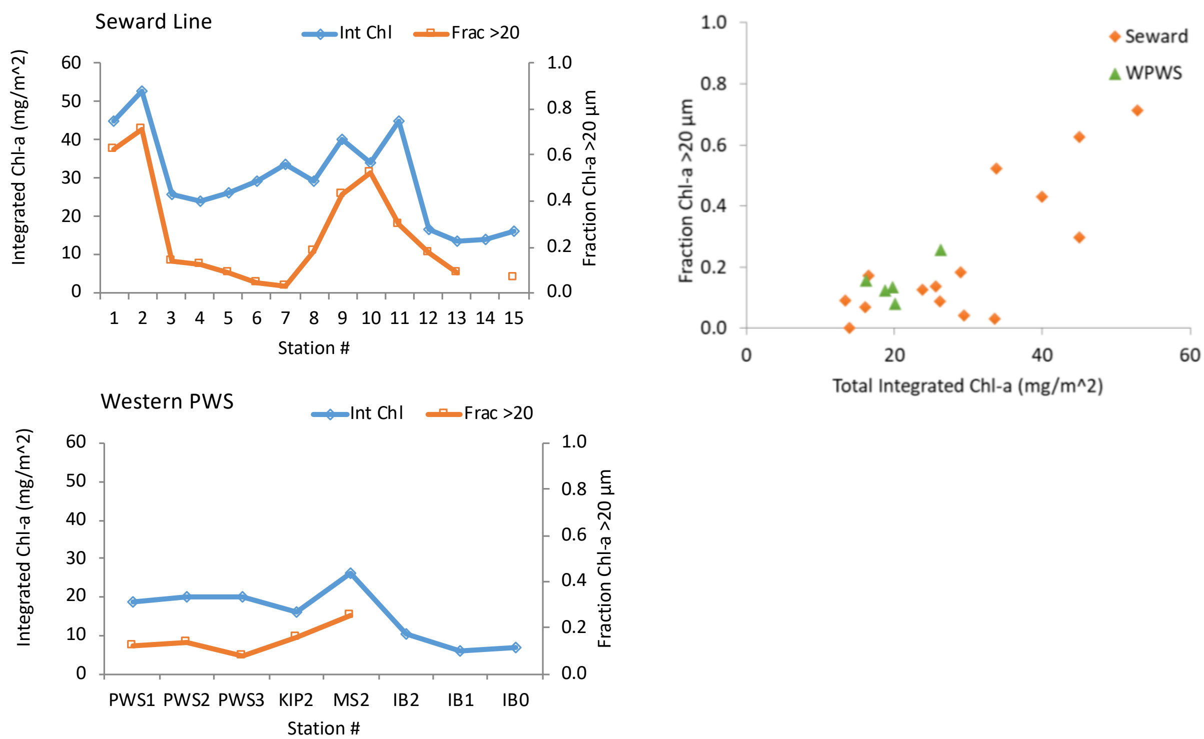

Figure 10. Size-fractioned chlorophyll integrated over 0-75m along transects during September 2020. Upper right panel shows the relationship between these two properties for all stations.

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

Station	Chl SF	Chl Tot	Lugols Prof	Lugols 10m	Diatom	DOC	HPLC	Mol	POC/PIC	Prod
RES2.5	x									
GAK1	x		x		x	x	x	x	x	x
GAK2	x									
GAK3	x			x	x					
GAK4	x									
GAK5	x		x		x	x	x	x	x	x
GAK6	x									
GAK7	x			x	x					
GAK8	x									
GAK9	x		x		x	x	x	x	x	x
GAK10	x									
GAK11	x			x	x					
GAK12	x									
GAK13	x			x	x					
GAK14		X		x	x					
GAK15	x			x	x					
PWS3	x									
PWS2	x		x		x	x	x	x	x	x
PWS1	x									
KIP2	x									
IB0		x								
IB1		x								
IB2		x								
MS2	x			x	x					
TOTAL	**37**	**1**	**7**	**14**	**21**	**7**	**7**	**7**	**7**	**7**

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)

Tot Chl: total chlorophyll-a; water sample filtered through glass fiber filter only

Lugol's 10m: 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.

Lugol's profile: Same as above but samples collected from 4 depths to yield a vertical profile.

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).

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 (Quad frame has 4 nets, 2 of 150 µm mesh and 2 of 53 µm mesh) casts were conducted 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 vertical Multinet could not be completed on the outer Seward Line due to weather). 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. Methot nets were collected at night concurrent with Multinets.

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**	**Methot**
RES2.5	x				
GAK1	X*	x	x		x
GAK2	x		x		x
GAK3	x		x		x
GAK4	x		x		x
GAK5	X*	x	x		x
GAK6	x		x		x
GAK7	x		x		x
GAK8	x		x		x
GAK9	X*	x	x		x
GAK10	x		x		x
GAK11	x		x		x
GAK12	x		x		x
GAK13	x		x		x
GAK14	x		x		x
GAK15	x	X*	x		x
MS2	x		x		
KIP2	x		x		x
PWS1	x		x		x
PWS2	X*	X*	X		x
PWS3	x		x		x
IB0	X*				
IB1	x				
IB2	x				
TOTAL	**39**	**4**	**14**	**15**	**23**

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, Christie and Hartline) – transcriptional profiling of individuals in the genus *Neocalanus* in the adult stage. 2020 marks the 6th year of fall collection of Neocalanus flemingeri from our PWS2 station.

Research Activities:

- Deep collections were taken with Multinet (150 µm mesh nets) towed vertically from depth (PWS2: 750 m) for samples to enumerate diapausing individuals (no aggregations of Neocalanus were found above 200 m).
- *N. flemingeri*, *N. plumchrus* and *N. cristatus* were imaged in all strata for GAK15 and PWS2 for prosome length & width and lipid sac volume (up to 50 per species) prior to preservation. *Calanus marshallae*, *Pseudocalanus minutus* and *Metridia spp.* were also imaged from selected depths.

Marine bird and marine mammal surveys (USFWS)

PI: Dr. Kathy Kuletz, U.S. Fish and Wildlife Service
Zak Pohlen, U.S. Fish & Wildlife Service, onboard observer and report contributions
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), 1-9 September 2020, aboard the 80-m R/V Sikuliaq, as a component of the NGA Long-term Ecological Research (NGA-LTER) cruise lead by chief scientist Russell Hopcroft of the University of Alaska Fairbanks. Due to constraints caused by the COVID-19 pandemic, the fall 2020 cruise focused on the continuation of sampling time-series along the Seward line and in Prince William Sound (PWS). Seabird and marine mammal surveys were conducted when the vessel was underway, including transits between sampling stations, sampling lines, and from/to the port of Seward. Weather conditions during the cruise were favorable for sampling and for seabird and marine mammal surveys. Our departure on 1 September immediately followed a large low-pressure system moving into the Gulf of Alaska, and conditions improved daily during sampling along the Seward line. A second smaller system moved through during transit to Prince William Sound, but work within the shelter of the Sound was not impeded.

Methods

Observer Z. Pohlen 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 for species identification. Observations were recorded using four perpendicular 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”. The behavior of each animal was recorded as flying, on water, on ice, or foraging. Birds and mammals on the water or ice, or actively foraging from the air, were recorded continuously. Flying birds were recorded using instantaneous scans (frequency based on ship speed, typically about 1 per minute), to minimize bias due to movement of flying birds. 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. We encountered glacial ice in the vicinity of Icy Bay in PWS.

Preliminary results
We conducted 756 linear km of surveys during the September 2020 cruise (Figure 1). On-transect, we observed a total of 1165 individuals of 29 species of birds, with an additional 17 species observed off transect during surveys or while at stations (Table 1). There were no dead birds or marine mammals seen during the cruise. Fork-tailed storm-petrels were the most abundant avian species observed on transect (20.9% of total; Table 1). Fork-tailed storm-petrels were detected throughout the entire cruise, with sightings well within Resurrection Bay, and flocks of 20-40 were observed just over the shelf break between stations GAK9 and GAK 11 and in PWS, north of Knight Island (Figure 2).

The second most abundant species of seabird during the cruise was the glaucous-winged gull, which made up 14.8% of sightings. This species was mostly restricted to nearshore waters (Figure 3). Most detections occurred in Icy Bay, where the vessel transited past a flock of over 100 individuals that came into the bay to roost on the glacial ice during the night. Most individuals were adults and roughly 15% were juveniles and immatures.

Tufted puffins were the third most abundant avian species, and made up 14.4% of bird observations. Tufted puffins were widely distributed along the Seward Line, but were not observed in protected inshore waters such as upper Resurrection Bay or Knight Island Passage in PWS (Figure 4). The highest concentrations of tufted puffins were observed just outside of Resurrection Bay, over the inner shelf.

Black-legged kittiwakes comprised 11.5% of sightings and were the most frequently detected species on and off transect throughout the cruise with 415 sightings in total. Small concentrations of kittiwakes gathered around the boat at most sampling stations along the Seward line, and large numbers were present near Chenega Glacier in Icy Bay. The distribution of kittiwakes during surveys along the Seward Line was bimodal, with the highest numbers observed close to shore as well as beyond the shelf-break, over deep waters of the continental slope (Figure 5).

Common murres made up 9.0% of sightings and were present throughout near shore waters to the middle shelf (Figure 6). Roughly 12% of sightings were comprised of adults accompanying recently fledged juveniles that were not fully developed. After ‘fledging’ from cliff nests, common murre young are accompanied and fed at sea by the male parent.

Northern fulmars made up 6.4% of sightings, with individuals and small groups occurring along the length of the Seward Line, except near the coast. Fulmars were absent from Resurrection Bay and PWS (Figure 7).

Black-footed albatrosses comprised 5.9% of sightings. While a few albatrosses were observed over the inner shelf, the largest groups were seen near the shelf break (Figure 8). At sampling stations, the maximum count of albatross that appeared to be attracted to the vessel was four, a stark contrast to the dozens to hundreds seen in the vicinity of the vessel at shelf-break stations in past years.

Relatively few shearwaters were observed during the fall 2020 cruise. Combined, sooty and short-tailed shearwater observations comprised < 3% of total observations. In contrast, sooty shearwaters made up 43% of all observations during the fall 2019 cruise. This substantial difference was largely due to the lack of survey coverage in 2020 in the western portion of the LTER study area, where high densities of sooty shearwaters were observed over Albatross Bank and Lower Cook Inlet in 2019. However, shearwater observations were also low along the Seward Line during the fall 2020 cruise. Compared to fall Seward Line observations over the previous decade, the 2020 cruise was the fourth-lowest year for abundance of sooty shearwaters and tied for the lowest year for abundance of short-tailed shearwaters. During the fall 2020 cruise, a single Buller's shearwater was observed on-transect. This was the lowest number seen along the Seward Line during the prior decade, and a strong contrast from fall 2019, when Buller's shearwaters were unusually abundant.

We observed five species of marine mammal (Table 2), with 57 individuals on-transect and 466 off-transect. Most marine mammal sightings were harbor seals, with 373 individuals hauled out on the glacial ice in Icy Bay. Other harbor seal sightings occurred in near shore and coastal waters of Resurrection Bay and PWS. Sea otters, harbor porpoise, and most Dall's porpoise sightings were also primarily observed in coastal waters. Fin whales were the only baleen whale (mysticete) species encountered, and were most common around the shelf break. No humpback or killer whales were observed during the cruise.

Of note, an ocean sunfish (*Mola mola*) was photographed on 5 September 2020 at Latitude 58.19° N, Longitude 147.88° W. *Mola mola* were also observed during September 2018 and 2019 cruises.

Table 1. Avian species observed during the September 2020 NGA-LTER cruise. Numbers include on-transect observations only. Species only observed off-transect are indicated by an asterisk.

Common Name	Scientific Name	Number	% of total
White-winged scoter	*Melanitta deglandi*	*	-
Common merganser	*Mergus merganser*	*	-
American golden-plover	*Pluvialis dominica*	*	-
Pacific golden-plover	*Pluvialis fulva*	*	-
Red-necked phalarope	*Phalaropus lobatus*	4	0.3
Red phalarope	*Phalaropus fulicarius*	10	0.9
Red or red-necked phalarope	*Phalaropus lobatus/fulicarius*	3	0.3
Wandering tattler	*Tringa incana*	1	0.1
Greater yellowlegs	*Tringa melanoleuca*	*	-
Pomarine jaeger	*Stercorarius pomarinus*	12	1.0
Parasitic jaeger	*Stercorarius parasiticus*	3	0.3
Jaeger spp.	*Stercorarius* spp.	2	0.2
Common murre	*Uria aalge*	105	9.0
Thick-billed murre	*Uria lomvia*	1	0.1
Murre spp.	*Uria* spp.	5	0.4
Marbled murrelet	*Brachyramphus marmoratus*	*	-
Cassin's auklet	*Ptychoramphus aleuticus*	22	1.9
Parakeet auklet	*Aethia psittacula*	19	1.6
Rhinoceros auklet	*Cerorhinca monocerata*	1	0.1
Auklet sp.	*Aethia/Ptychoramphus* spp.	12	1.0
Horned puffin	*Fratercula corniculata*	10	0.9
Tufted puffin	*Fratercula cirrhata*	168	14.4
Alcid spp.	*Alcidae spp.*	5	0.4
Black-legged kittiwake	*Rissa tridactyla*	134	11.5
Mew gull	*Larus canus*	3	0.3
Herring gull	*Larus argentatus*	18	1.5
Glaucous-winged gull	*Larus glaucescens*	173	14.8

Table 1 (continued).

Common Name	Scientific Name	Number	% of total
Glaucous-winged x herring gull hybrid	*Larus glaucescens x argentatus*	*	-
Red-throated loon	*Gavia stellata*	*	-
Pacific loon	*Gavia pacifica*	*	-
Common loon	*Gavia immer*	*	-
Laysan albatross	*Phoebastria immutabilis*	7	0.6
Black-footed albatross	*Phoebastria nigripes*	69	5.9
Fork-tailed storm-petrel	*Oceanodroma furcata*	243	20.9
Leach's storm-petrel	*Oceanodroma leucorhoa*	17	1.5
Northern fulmar	*Fulmarus glacialis*	74	6.4
Mottled petrel	*Pterodroma inexpectata*	1	0.1
Buller's shearwater	*Ardenna bulleri*	1	0.1
Sooty shearwater	*Ardenna grisea*	15	1.3
Short-tailed shearwater	*Ardenna tenuirostris*	1	0.1
Sooty or short-tailed shearwater	*Ardenna grisea/tenuirostris*	14	1.2
Pelagic cormorant	*Phalacrocorax pelagicus*	8	0.7
Double-crested cormorant	*Phalacrocorax auritus*	2	0.2
Northern harrier	*Circus hudsonius*	*	-
Bald eagle	*Haliaeetus leucocephalus*	*	-
Merlin	*Falco columbarius*	*	-
Peregrine falcon	*Falco peregrinus*	1	0.1
American crow	*Corvus brachyrhynchos*	*	-
Tree swallow	*Tachycineta bicolor*	*	-
Lapland longspur	*Calcarius lapponicus*	*	-
Dark-eyed junco	*Junco hyemalis*	1	0.1
Golden-crowned sparrow	*Zonotrichia atricapilla*	*	-
Yellow warbler	*Setophaga petechia*	*	-
Total		**1165**	**100.00**

Table 2. Marine mammal species observed during the September 2019 NGA-LTER cruise.

Common Name	Scientific Name	Number on-transect	Number off-transect
Fin whale	*Balaenoptera physalus*	7	32
Whale spp.	*Cetacea* spp.	0	3
Dall's Porpoise	*Phocoenoides dalli*	7	20
Harbor porpoise	*Phocoena phocoena*	0	12
Harbor seal	*Phoca vitulina*	37	394
Sea otter	*Enhydra lutris*	6	5
Total		**57**	**466**

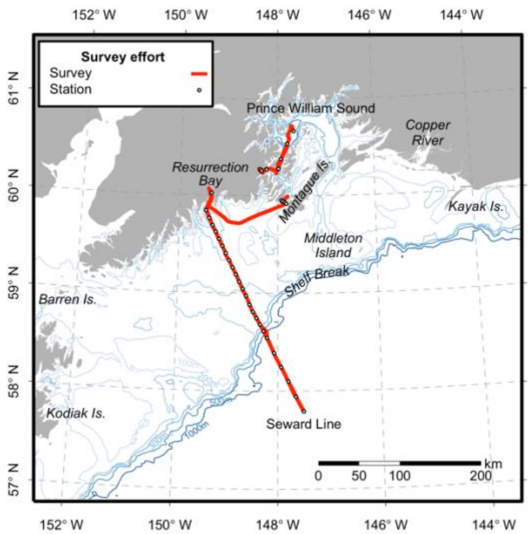

Figure 1. Location surveys

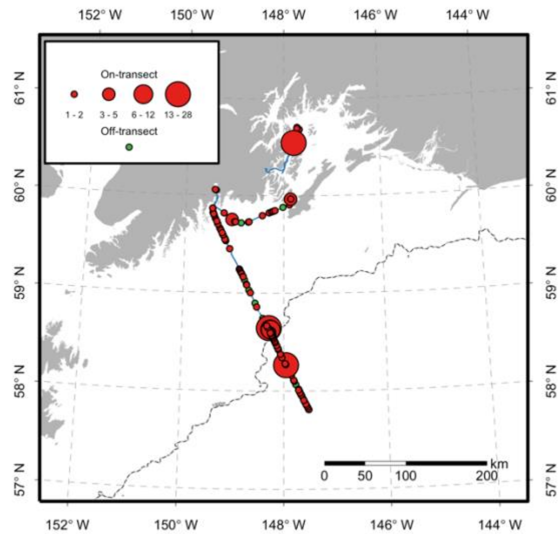

Figure 2. Fork-tailed storm-petrel

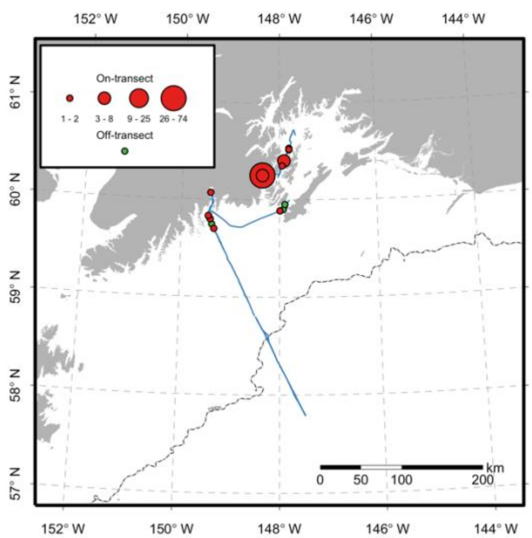

Figure 3. Glaucous-winged gull.

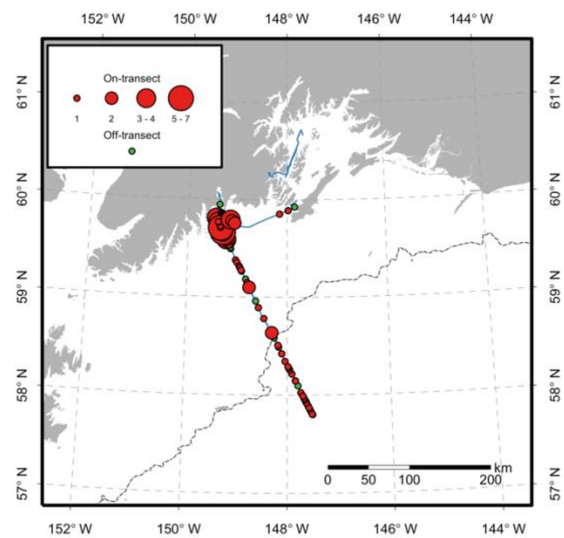

Figure 4. Tufted

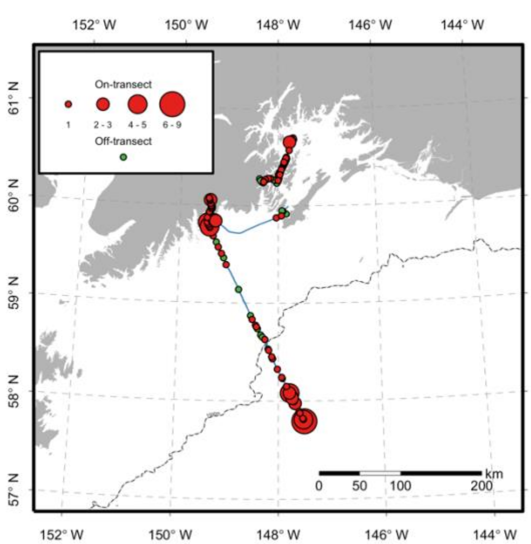

Figure 5. Black-legged kittiwake.

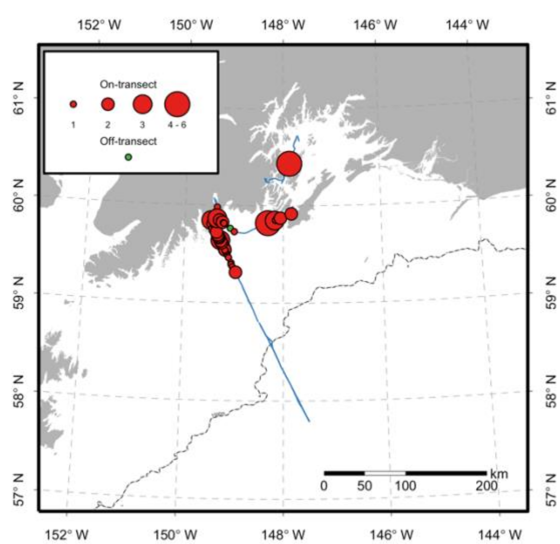

Figure 6. Common murre.

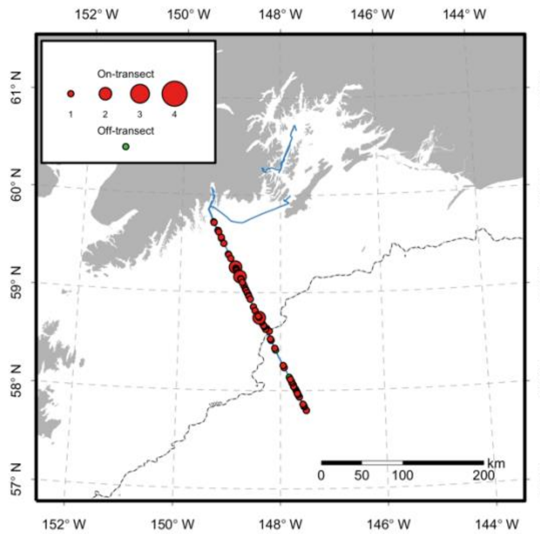

Figure 6. Northern fulmar.

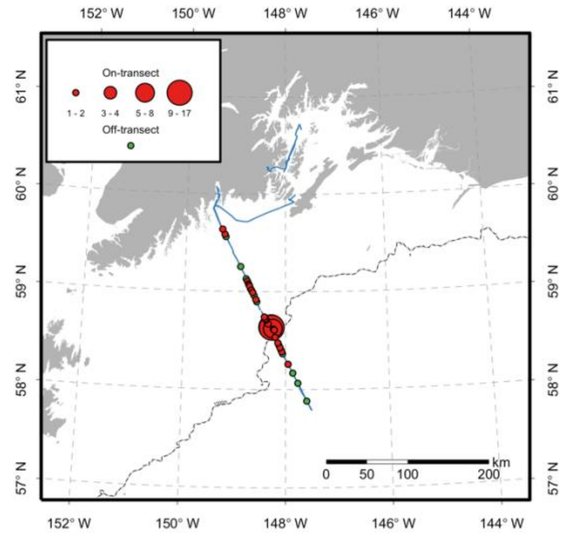

Figure 8. Black-footed albatross.

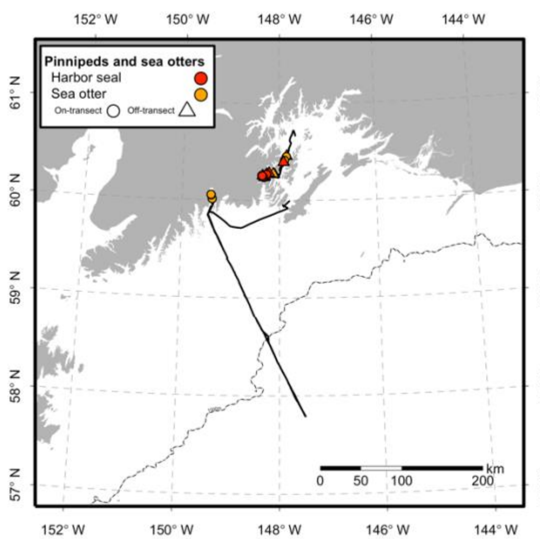

Figure 9. Toothed whales.

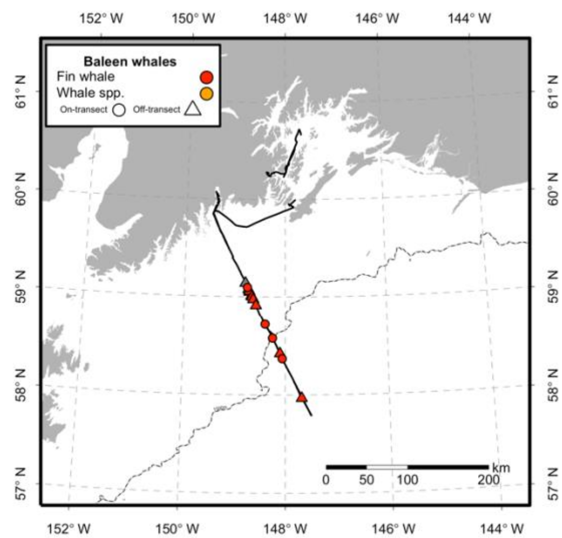

Figure 10. Baleen whales.

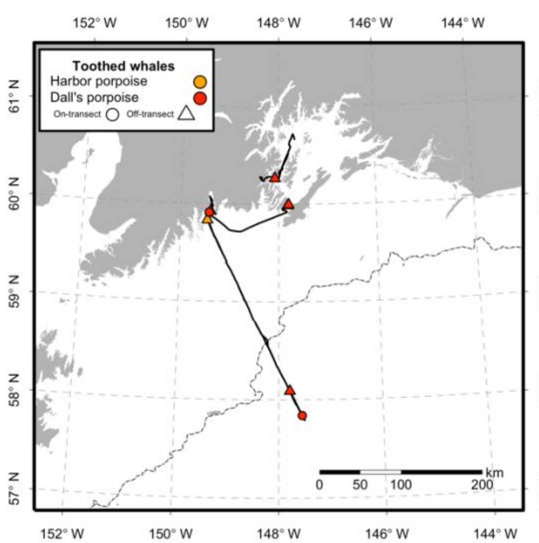

Figure 11. Pinnipeds and sea otters.

Figure 12. Ocean sunfish (*Mola mola*).

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	GMT	Latitude	Longitude	Seafloor	Author	Comment
1	Ship	start	NaN	NaN	9/1/2020 6:51:57	9/1/2020 14:51	60.0974	-149.4407		ERoth	
2	CTD911	deploy	RES2.5	1	9/1/2020 7:52:57	9/1/2020 15:52	60.0251	-149.3589	294	IReister	
3	Science Seawater	start	NaN	NaN	9/1/2020 8:17:45	9/1/2020 16:17	60.0251	-149.3589		BMcKiernan	
4	CTD911	recover	RES2.5	1	9/1/2020 8:37:05	9/1/2020 16:37	60.0251	-149.3589	294	IReister	
5	PCO2	start	NaN	NaN	9/1/2020 8:38:46	9/1/2020 16:38	60.0251	-149.3589		BMcKiernan	
6	CalVet net	deploy	RES2.5	1	9/1/2020 8:51:47	9/1/2020 16:51	60.0251	-149.3589	294	IReister	
7	centerBoard	deploy	NaN	NaN	9/1/2020 8:56:15	9/1/2020 16:56	60.0251	-149.3589		BMcKiernan	
8	CalVet net	recover	RES2.5	1	9/1/2020 9:02:45	9/1/2020 17:02	60.0251	-149.3589	294	IReister	
9	Incubator	start	NaN	NaN	9/1/2020 9:13:45	9/1/2020 17:13	60.0251	-149.3589		BMcKiernan	
10	Iron tow fish	deploy	Res 2.5	NaN	9/1/2020 9:20:54	9/1/2020 17:20	60.0247	-149.3582		EOrtega	
11	Iron tow fish	recover	GAK1	NaN	9/1/2020 10:49:39	9/1/2020 18:49	59.8438	-149.4700	269	EOrtega	
12	CTD911	deploy	GAK1	2	9/1/2020 11:03:09	9/1/2020 19:03	59.8445	-149.4669	269	IReister	prod cast
13	CTD911	recover	GAK1	2	9/1/2020 12:11:24	9/1/2020 20:11	59.8444	-149.4679	269	IReister	
14	CalVet net	deploy	GAK1	2	9/1/2020 12:18:50	9/1/2020 20:18	59.8444	-149.4679	269	RHopcroft	
15	CalVet net	recover	GAK1	2	9/1/2020 12:26:11	9/1/2020 20:26	59.8444	-149.4679	269	RHopcroft	
16	CalVet net	deploy	GAK1	02A	9/1/2020 12:38:39	9/1/2020 20:38	59.8446	-149.4673	269	RHopcroft	GENETICS
17	CalVet net	recover	GAK1	02A	9/1/2020 12:45:44	9/1/2020 20:45	59.8446	-149.4673	269	RHopcroft	
18	Trace Metal Bottle	deploy	GAK1	1	9/1/2020 12:55:09	9/1/2020 20:55	59.8446	-149.4673	269	RHopcroft	
19	Trace Metal Bottle	recover	GAK1	1	9/1/2020 13:24:30	9/1/2020 21:24	59.8444	-149.4677	269	RHopcroft	
20	multinet	deploy	GAK1	MNV1	9/1/2020 13:53:09	9/1/2020 21:53	59.8451	-149.4671	270	RHopcroft	
21	multinet	recover	GAK1	MNV1	9/1/2020 14:07:54	9/1/2020 22:07	59.8451	-149.4671	270	RHopcroft	
22	CTD911	deploy	GAK1	3	9/1/2020 14:28:24	9/1/2020 22:28	59.8451	-149.4671	271	IReister	
23	CTD911	recover	GAK1	3	9/1/2020 15:21:09	9/1/2020 23:21	59.8451	-149.4671	271	IReister	
24	Iron tow fish	deploy	GAK1	NaN	9/1/2020 15:26:39	9/1/2020 23:26	59.8451	-149.4671	271	AKandel	
25	Iron tow fish	recover	GAK2	NaN	9/1/2020 15:31:54	9/1/2020 23:31	59.8442	-149.4660		EOrtega	
26	CTD911	deploy	GAK1i	4	9/1/2020 16:25:54	9/2/2020 0:25	59.7665	-149.3977	260	IReister	
27	CTD911	recover	GAK1i	4	9/1/2020 16:48:09	9/2/2020 0:48	59.7665	-149.3977	260	IReister	
28	CalVet net	deploy	GAK2	3	9/1/2020 17:41:33	9/2/2020 1:41	59.6917	-149.3269	230	RHopcroft	
29	CalVet net	recover	GAK2	3	9/1/2020 17:48:53	9/2/2020 1:48	59.6913	-149.3267	230	RHopcroft	
30	CTD911	deploy	GAK2	5	9/1/2020 17:57:39	9/2/2020 1:57	59.6908	-149.3264	224	IReister	
31	CTD911	recover	GAK2	5	9/1/2020 18:44:24	9/2/2020 2:44	59.6903	-149.3264	224	IReister	
32	Iron tow fish	deploy	GAK2	NaN	9/1/2020 18:59:24	9/2/2020 2:59	59.6845	-149.3216		MKaufman	
33	CTD911	deploy	GAK2i	6	9/1/2020 19:42:24	9/2/2020 3:42	59.6260	-149.2615	211	IReister	
301	Iron tow fish	recover	GAK3	NaN	9/1/2020 19:59:54	9/2/2020 3:59	59.6244	-149.2632		EOrtega	
34	CTD911	recover	GAK2i	6	9/1/2020 20:02:39	9/2/2020 4:02	59.6242	-149.2636	211	IReister	

Event#	Instrument	Action	Station	Cast	Local	GMT	Latitude	Longitude	Seafloor	Author	Comment
35	CalVet net	deploy	GAK3	4	9/1/2020 20:43:21	9/2/2020 4:43	59.5548	-149.1880	230	RHopcroft	
37	CalVet net	recover	GAK3	4	9/1/2020 20:52:05	9/2/2020 4:52	59.5541	-149.1879	211	RHopcroft	
38	CTD911	deploy	GAK3	7	9/1/2020 21:06:39	9/2/2020 5:06	59.5544	-149.1882	211	IReister	
39	CTD911	recover	GAK3	7	9/1/2020 21:51:39	9/2/2020 5:51	59.5552	-149.1911	211	IReister	
40	Iron tow fish	deploy	GAK3	NaN	9/1/2020 21:59:45	9/2/2020 5:59	59.5542	-149.1924		EOrtega	
41	Iron tow fish	recover	GAK4	NaN	9/1/2020 23:15:54	9/2/2020 7:15	59.4237	-149.0670		MKaufman	
42	Methot Net	deploy	GAK4	1	9/1/2020 23:20:09	9/2/2020 7:20	59.4207	-149.0652	200	CSmoot	
43	Methot Net	recover	GAK4	1	9/1/2020 23:43:54	9/2/2020 7:43	59.4072	-149.0478	200	CSmoot	
44	multinet	deploy	GAK4	1	9/1/2020 23:48:16	9/2/2020 7:48	59.4052	-149.0448	200	CSmoot	
45	multinet	recover	GAK4	1	9/2/2020 0:26:25	9/2/2020 8:26	59.3893	-149.0220	200	CSmoot	
46	Methot Net	deploy	GAK3	2	9/2/2020 1:37:10	9/2/2020 9:37	59.5274	-149.1654	211	CSmoot	
47	Methot Net	recover	GAK3	2	9/2/2020 1:57:39	9/2/2020 9:57	59.5419	-149.1770	211	CSmoot	
48	multinet	deploy	GAK3	2	9/2/2020 2:05:45	9/2/2020 10:05	59.5474	-149.1822	214	CSmoot	
49	multinet	recover	GAK3	2	9/2/2020 2:48:34	9/2/2020 10:48	59.5713	-149.2125	214	CSmoot	
50	Methot Net	deploy	GAK2	3	9/2/2020 3:38:49	9/2/2020 11:38	59.6677	-149.3025	218	CSmoot	
51	Methot Net	recover	GAK2	3	9/2/2020 4:01:49	9/2/2020 12:01	59.6815	-149.3170	218	CSmoot	
52	multinet	deploy	GAK2	Bad	9/2/2020 4:06:09	9/2/2020 12:06	59.6835	-149.3195	221	CSmoot	
53	multinet	abort	GAK2	Bad	9/2/2020 5:16:24	9/2/2020 13:16	59.8023	-149.4515	221	CSmoot	BATTERIES DIED MID TO
54	Methot Net	deploy	GAK1	4	9/2/2020 5:29:09	9/2/2020 13:29	59.8140	-149.4593	270	CSmoot	
55	Methot Net	recover	GAK1	4	9/2/2020 5:51:24	9/2/2020 13:51	59.8298	-149.4606	270	CSmoot	
56	multinet	deploy	GAK1	3	9/2/2020 5:59:38	9/2/2020 13:59	59.8347	-149.4614	272	CSmoot	5 min late
57	multinet	recover	GAK1	3	9/2/2020 6:35:05	9/2/2020 14:35	59.8542	-149.4660	272	CSmoot	
58	CalVet net	deploy	GAK4	5	9/2/2020 11:53:24	9/2/2020 19:53	59.4083	-149.0490	199	RHopcroft	
59	CalVet net	recover	GAK4	5	9/2/2020 11:58:13	9/2/2020 19:58	59.4076	-149.0503	199	RHopcroft	
60	CTD911	deploy	GAK4	8	9/2/2020 12:08:24	9/2/2020 20:08	59.4071	-149.0509	200	IReister	
61	CTD911	recover	GAK4	8	9/2/2020 12:45:54	9/2/2020 20:45	59.4093	-149.0651	200	IReister	
62	Iron tow fish	deploy	GAK4	NaN	9/2/2020 12:58:13	9/2/2020 20:58	59.3944	-149.0511		EOrtega	
63	Iron tow fish	recover	GAK5	NaN	9/2/2020 14:09:37	9/2/2020 22:09	59.2630	-148.9076		EOrtega	
64	CTD911	deploy	GAK5	9	9/2/2020 14:17:09	9/2/2020 22:17	59.2626	-148.9067	169	IReister	prod cast
65	CTD911	recover	GAK5	9	9/2/2020 14:38:24	9/2/2020 22:38	59.2626	-148.9067	169	IReister	prod cast
66	CalVet net	deploy	GAK5	6	9/2/2020 14:41:08	9/2/2020 22:41	59.2626	-148.9067	169	RHopcroft	
67	CalVet net	recover	GAK5	6	9/2/2020 14:47:56	9/2/2020 22:47	59.2631	-148.9063	169	RHopcroft	
68	CalVet net	deploy	GAK5	06A	9/2/2020 14:58:14	9/2/2020 22:58	59.2626	-148.9060	169	RHopcroft	
69	CalVet net	recover	GAK5	06A	9/2/2020 15:03:31	9/2/2020 23:03	59.2628	-148.9055	169	RHopcroft	
70	Trace Metal Bottle	deploy	GAK5	2	9/2/2020 15:18:54	9/2/2020 23:18	59.2629	-148.9055		EOrtega	

Event#	Instrument	Action	Station	Cast	Local	GMT	Latitude	Longitude	Seafloor	Author	Comment
300	Trace Metal Bottle	recover	GAK5	TM02	9/2/2020 15:30:54	9/2/2020 23:30	59.2633	-148.9037		EOrtega	
71	CTD911	deploy	GAK5	10	9/2/2020 15:43:24	9/2/2020 23:43	59.2627	-148.9041	167	IReister	
72	CTD911	recover	GAK5	10	9/2/2020 16:20:45	9/3/2020 0:20	59.2627	-148.9040	167	IReister	
73	multinet	deploy	GAK5	MNV2	9/2/2020 16:30:54	9/3/2020 0:30	59.2627	-148.9037	167	RHopcroft	
74	multinet	recover	GAK5	MNV2	9/2/2020 16:43:09	9/3/2020 0:43	59.2625	-148.9025	167	RHopcroft	
75	Iron tow fish	deploy	GAK5	NaN	9/2/2020 16:51:34	9/3/2020 0:51	59.2616	-148.9004		EOrtega	
76	Iron tow fish	recover	GAK6	NaN	9/2/2020 18:02:09	9/3/2020 2:02	59.1171	-148.7686		EOrtega	
77	CalVet net	deploy	GAK6	7	9/2/2020 18:05:14	9/3/2020 2:05	59.1170	-148.7683	151	RHopcroft	
78	CalVet net	recover	GAK6	7	9/2/2020 18:10:27	9/3/2020 2:10	59.1167	-148.7675	151	RHopcroft	
79	CTD911	deploy	GAK6	11	9/2/2020 18:23:21	9/3/2020 2:23	59.1169	-148.7680	151	IReister	
80	CTD911	recover	GAK6	11	9/2/2020 18:54:43	9/3/2020 2:54	59.1162	-148.7656	151	IReister	
81	Iron tow fish	deploy	GAK6	NaN	9/2/2020 19:07:42	9/3/2020 3:07	59.1132	-148.7635		EOrtega	
82	Iron tow fish	recover	GAK7	NaN	9/2/2020 20:14:08	9/3/2020 4:14	58.9723	-148.6304		EOrtega	
83	CalVet net	deploy	GAK7	8	9/2/2020 20:18:53	9/3/2020 4:18	58.9714	-148.6283	240	RHopcroft	
84	CalVet net	recover	GAK7	8	9/2/2020 20:23:54	9/3/2020 4:23	58.9712	-148.6276	240	RHopcroft	
85	CTD911	deploy	GAK7	12	9/2/2020 20:33:09	9/3/2020 4:33	58.9708	-148.6272	241	IReister	
86	CTD911	recover	GAK7	12	9/2/2020 21:16:54	9/3/2020 5:16	58.9703	-148.6265	241	IReister	
87	Iron tow fish	deploy	GAK7	NaN	9/2/2020 21:25:16	9/3/2020 5:25	58.9658	-148.6260		EOrtega	
88	Iron tow fish	recover	GAK8	NaN	9/2/2020 22:53:09	9/3/2020 6:53	58.7808	-148.4585		EOrtega	
89	Methot Net	deploy	GAK8	5	9/2/2020 23:00:09	9/3/2020 7:00	58.7820	-148.4606	282	CSmoot	
90	Methot Net	recover	GAK8	5	9/2/2020 23:24:16	9/3/2020 7:24	58.7929	-148.4739	282	CSmoot	
91	multinet	deploy	GAK8	4	9/2/2020 23:29:30	9/3/2020 7:29	58.7948	-148.4763	282	CSmoot	
92	multinet	recover	GAK8	4	9/3/2020 0:02:10	9/3/2020 8:02	58.8068	-148.4910	288	CSmoot	
93	Methot Net	deploy	GAK7	6	9/3/2020 1:10:09	9/3/2020 9:10	58.9528	-148.6279	255	CSmoot	
94	Methot Net	recover	GAK7	6	9/3/2020 1:32:12	9/3/2020 9:32	58.9698	-148.6312	255	CSmoot	
95	multinet	deploy	GAK7	5	9/3/2020 1:35:49	9/3/2020 9:35	58.9725	-148.6313	242	CSmoot	
96	multinet	recover	GAK7	5	9/3/2020 2:18:40	9/3/2020 10:18	59.0033	-148.6367	242	CSmoot	
97	Science Seawater	service	NaN	NaN	9/3/2020 2:35:23	9/3/2020 10:35	59.0313	-148.6781		BMcKiernan	swapped strainer
98	Methot Net	deploy	GAK6	7	9/3/2020 3:06:54	9/3/2020 11:06	59.0884	-148.7630	170	CSmoot	
99	Methot Net	recover	GAK6	7	9/3/2020 3:29:51	9/3/2020 11:29	59.1052	-148.7608	170	CSmoot	
100	multinet	deploy	GAK6	6	9/3/2020 3:33:15	9/3/2020 11:33	59.1073	-148.7617	156	CSmoot	
101	multinet	recover	GAK6	6	9/3/2020 4:08:39	9/3/2020 12:08	59.1276	-148.7781	147	CSmoot	
102	Methot Net	deploy	GAK5	8	9/3/2020 5:04:24	9/3/2020 13:04	59.2304	-148.8982	161	CSmoot	
103	Methot Net	recover	GAK5	8	9/3/2020 5:26:25	9/3/2020 13:26	59.2424	-148.8968	161	CSmoot	
104	multinet	deploy	GAK5	7	9/3/2020 5:33:08	9/3/2020 13:33	59.2454	-148.8977	167	CSmoot	

Event#	Instrument	Action	Station	Cast	Local	GMT	Latitude	Longitude	Seafloor	Author	Comment
105	multinet	recover	GAK5	7	9/3/2020 6:02:44	9/3/2020 14:02	59.2565	-148.9063	167	CSmoot	
106	CalVet net	deploy	GAK8	9	9/3/2020 9:14:54	9/3/2020 17:14	58.8080	-148.4925	287	RHopcroft	
107	CalVet net	recover	GAK8	9	9/3/2020 9:21:21	9/3/2020 17:21	58.8077	-148.4915	287	RHopcroft	
108	CTD911	deploy	GAK8	13	9/3/2020 9:29:10	9/3/2020 17:29	58.8072	-148.4888	289	IReister	
109	CTD911	recover	GAK8	13	9/3/2020 10:21:02	9/3/2020 18:21	58.8061	-148.4830	289	IReister	
110	Iron tow fish	deploy	GAK8	NaN	9/3/2020 10:34:52	9/3/2020 18:34	58.8000	-148.4746		MKaufman	
111	Iron tow fish	recover	GAK9	NaN	9/3/2020 11:41:00	9/3/2020 19:41	58.6805	-148.3525		EOrtega	
112	CalVet net	deploy	GAK9	10	9/3/2020 11:46:54	9/3/2020 19:46	58.6801	-148.3500	277	RHopcroft	
113	CalVet net	recover	GAK9	10	9/3/2020 11:52:09	9/3/2020 19:52	58.6801	-148.3500	277	RHopcroft	
114	CalVet net	deploy	GAK9	10A	9/3/2020 12:03:09	9/3/2020 20:03	58.6796	-148.3495	277	RHopcroft	
115	CalVet net	recover	GAK9	10A	9/3/2020 12:08:39	9/3/2020 20:08	58.6797	-148.3509	277	RHopcroft	
116	CTD911	deploy	GAK9	14	9/3/2020 12:13:54	9/3/2020 20:13	58.6798	-148.3513	275	IReister	prod cast
117	CTD911	recover	GAK9	14	9/3/2020 12:43:56	9/3/2020 20:43	58.6796	-148.3495	275	IReister	
118	Trace Metal Bottle	deploy	GAK9	TM03	9/3/2020 12:55:24	9/3/2020 20:55	58.6796	-148.3508		MKaufman	
119	multinet	deploy	GAK9	VMN3	9/3/2020 13:26:09	9/3/2020 21:26	58.6806	-148.3572	277	RHopcroft	
120	multinet	recover	GAK9	VMN3	9/3/2020 13:41:02	9/3/2020 21:41	58.6798	-148.3626	277	RHopcroft	
121	CTD911	deploy	GAK9	15	9/3/2020 14:09:49	9/3/2020 22:09	58.6801	-148.3515	275	IReister	
122	CTD911	recover	GAK9	15	9/3/2020 14:53:24	9/3/2020 22:53	58.6802	-148.3526	275	IReister	
123	Trace Metal Bottle	recover	GAK9	3	9/3/2020 13:15:54	9/3/2020 21:15	58.6801	-148.3545		EOrtega	
124	Iron tow fish	deploy	GAK9	NaN	9/3/2020 14:59:29	9/3/2020 22:59	58.6791	-148.3511		EOrtega	
125	Iron tow fish	recover	GAK10	NaN	9/3/2020 16:23:24	9/4/2020 0:23	58.5426	-148.2079		EOrtega	
126	CalVet net	deploy	GAK10	11	9/3/2020 16:23:54	9/4/2020 0:23	58.5427	-148.2078	1464	RHopcroft	
127	CalVet net	recover	GAK10	11	9/3/2020 16:28:36	9/4/2020 0:28	58.5431	-148.2089	1464	RHopcroft	
128	CTD911	deploy	GAK10	16	9/3/2020 16:38:09	9/4/2020 0:38	58.5429	-148.2103	1453	IReister	
129	CTD911	recover	GAK10	16	9/3/2020 18:10:39	9/4/2020 2:10	58.5428	-148.2120	1453	IReister	
130	Iron tow fish	deploy	GAK10	NaN	9/3/2020 18:19:56	9/4/2020 2:19	58.5405	-148.2071		EOrtega	
131	Iron tow fish	recover	GAK11	NaN	9/3/2020 19:38:01	9/4/2020 3:38	58.3887	-148.0680		EOrtega	
132	CalVet net	deploy	GAK11	12	9/3/2020 19:44:16	9/4/2020 3:44	58.3886	-148.0668	1416	RHopcroft	
133	CalVet net	recover	GAK11	12	9/3/2020 19:49:08	9/4/2020 3:49	58.3886	-148.0672	1416	RHopcroft	
134	CTD911	deploy	GAK11	17	9/3/2020 19:58:54	9/4/2020 3:58	58.3886	-148.0688	1414	IReister	
135	CTD911	recover	GAK11	17	9/3/2020 21:44:51	9/4/2020 5:44	58.3875	-148.0658	1414	IReister	
136	Methot Net	deploy	GAK11	9	9/3/2020 22:07:53	9/4/2020 6:07	58.3828	-148.0410	1400	CSmoot	
137	Methot Net	recover	GAK11	9	9/3/2020 22:30:29	9/4/2020 6:30	58.3854	-148.0589	1400	CSmoot	
138	multinet	deploy	GAK11	8	9/3/2020 22:35:11	9/4/2020 6:35	58.3858	-148.0612	1413	CSmoot	
139	multinet	recover	GAK11	8	9/3/2020 23:06:32	9/4/2020 7:06	58.3886	-148.0744	1413	CSmoot	

Event#	Instrument	Action	Station	Cast	Local	GMT	Latitude	Longitude	Seafloor	Author	Comment
140	Methot Net	deploy	GAK10	10	9/4/2020 0:20:39	9/4/2020 8:20	58.5282	-148.2214	1450	CSmoot	
141	Methot Net	recover	GAK10	10	9/4/2020 0:43:39	9/4/2020 8:43	58.5341	-148.2200	1450	CSmoot	
142	multinet	deploy	GAK10	9	9/4/2020 0:49:09	9/4/2020 8:49	58.5348	-148.2198	1450	CSmoot	
143	multinet	recover	GAK10	9	9/4/2020 1:20:09	9/4/2020 9:20	58.5402	-148.2133	1450	CSmoot	
144	Methot Net	deploy	GAK9	11	9/4/2020 2:34:39	9/4/2020 10:34	58.6799	-148.3752	275	CSmoot	
145	Methot Net	recover	GAK9	11	9/4/2020 2:56:24	9/4/2020 10:56	58.6800	-148.3629	275	CSmoot	
146	multinet	deploy	GAK9	10	9/4/2020 3:02:54	9/4/2020 11:02	58.6799	-148.3591	275	CSmoot	
147	multinet	recover	GAK9	10	9/4/2020 3:34:30	9/4/2020 11:34	58.6805	-148.3432	275	CSmoot	
148	PCO2	other	NaN	NaN	9/4/2020 6:04:08	9/4/2020 14:04	58.3106	-147.9896		BMcKiernan	Crashed & rebooted
149	CalVet net	deploy	GAK15	13A	9/4/2020 9:09:57	9/4/2020 17:09	57.7922	-147.5007	4497	RHopcroft	
150	CalVet net	recover	GAK15	13A	9/4/2020 9:15:15	9/4/2020 17:15	57.7922	-147.5011	4497	RHopcroft	
151	CalVet net	deploy	GAK15	13	9/4/2020 9:26:47	9/4/2020 17:26	57.7922	-147.5008	4497	RHopcroft	
152	CalVet net	recover	GAK15	13	9/4/2020 9:31:58	9/4/2020 17:31	57.7922	-147.5013	4497	RHopcroft	
153	multinet	deploy	GAK9	VMN4s	9/4/2020 9:38:24	9/4/2020 17:38	57.7922	-147.5013	4497	RHopcroft	
154	multinet	recover	GAK9	VMN4s	9/4/2020 9:54:39	9/4/2020 17:54	57.7922	-147.5013	4497	RHopcroft	
155	CTD911	deploy	GAK15	18	9/4/2020 10:00:24	9/4/2020 18:00	57.7922	-147.5013	4490	IReister	prod cast
156	CTD911	recover	GAK15	18	9/4/2020 10:44:54	9/4/2020 18:44	57.7922	-147.5013	4490	IReister	
157	multinet	deploy	GAK15	MNV4d	9/4/2020 10:53:39	9/4/2020 18:53	57.7922	-147.5012	4486	RHopcroft	
158	multinet	recover	GAK15	MNV4d	9/4/2020 12:07:26	9/4/2020 20:07	57.7922	-147.5012	4486	RHopcroft	
159	CTD911	deploy	GAK15	19	9/4/2020 12:12:24	9/4/2020 20:12	57.7922	-147.5012	4497	IReister	
160	CTD911	recover	GAK15	19	9/4/2020 13:46:39	9/4/2020 21:46	57.7917	-147.5002	4497	IReister	
299	Trace Metal Bottle	deploy	GAK15	TM04	9/4/2020 13:59:54	9/4/2020 21:59	57.7917	-147.5002		EOrtega	
161	Trace Metal Bottle	recover	GAK15	4	9/4/2020 14:59:09	9/4/2020 22:59	57.7917	-147.5002		MKaufman	
162	Iron tow fish	deploy	GAK15	NaN	9/4/2020 15:02:07	9/4/2020 23:02	57.7917	-147.5004		MKaufman	
163	Iron tow fish	other	GAK15	NaN	9/4/2020 15:19:06	9/4/2020 23:19	57.8190	-147.5296		EOrtega	ABORTED
164	CalVet net	deploy	GAK14	14	9/4/2020 16:16:41	9/5/2020 0:16	57.9427	-147.6504	3064	RHopcroft	
165	CalVet net	recover	GAK14	14	9/4/2020 16:21:49	9/5/2020 0:21	57.9425	-147.6509	3064	RHopcroft	
166	CTD911	deploy	GAK14	20	9/4/2020 16:29:24	9/5/2020 0:29	57.9424	-147.6515	3019	IReister	
167	CTD911	recover	GAK14	20	9/4/2020 18:06:05	9/5/2020 2:06	57.9413	-147.6560	3019	IReister	
168	Iron tow fish	deploy	GAK14		9/4/2020 18:12:24	9/5/2020 2:12	57.9460	-147.6613		MKaufman	GAK14 to GAK13
169	Iron tow fish	recover	GAK13	NaN	9/4/2020 19:28:39	9/5/2020 3:28	58.0981	-147.7910		EOrtega	
170	CalVet net	deploy	GAK 13	15	9/4/2020 19:30:09	9/5/2020 3:30	58.0981	-147.7909	2062	DColeman	
171	CalVet net	recover	GAK13	15	9/4/2020 19:35:54	9/5/2020 3:35	58.0981	-147.7919	2062	DColeman	
172	CTD911	deploy	GAK13	21	9/4/2020 19:42:21	9/5/2020 3:42	58.0981	-147.7926	2062	IReister	
176	CTD911	recover	GAK13	21	9/4/2020 21:24:24	9/5/2020 5:24	58.0989	-147.8047	2062	IReister	

Event#	Instrument	Action	Station	Cast	Local	GMT	Latitude	Longitude	Seafloor	Author	Comment
173	CalVet net	deploy	GAK13	16	9/4/2020 20:21:39	9/5/2020 4:21	58.0983	-147.7962	2062	DColeman	RECAST
174	CalVet net	recover	GAK13	16	9/4/2020 20:26:54	9/5/2020 4:26	58.0985	-147.7972	2062	DColeman	RECAST
175	Methot Net	deploy	GAK12	12	9/4/2020 22:26:09	9/5/2020 6:26	58.2212	-147.9334	2170	CSmoot	
177	Methot Net	recover	GAK12	12	9/4/2020 22:48:39	9/5/2020 6:48	58.2382	-147.9328	2170	CSmoot	
178	multinet	deploy	GAK12	11	9/4/2020 22:53:09	9/5/2020 6:53	58.2412	-147.9328	2170	CSmoot	
179	multinet	recover	GAK12	11	9/4/2020 23:35:39	9/5/2020 7:35	58.2649	-147.9370	2170	CSmoot	
180	Methot Net	deploy	GAK13	13	9/5/2020 0:41:24	9/5/2020 8:41	58.1234	-147.8188	2060	CSmoot	
181	Methot Net	recover	GAK13	13	9/5/2020 1:03:54	9/5/2020 9:03	58.1070	-147.8012	2060	CSmoot	
182	multinet	deploy	GAK13	12	9/5/2020 1:09:09	9/5/2020 9:09	58.1033	-147.7978	2060	CSmoot	Logged 2 min late
183	multinet	recover	GAK13	12	9/5/2020 1:46:39	9/5/2020 9:46	58.0788	-147.7764	2060	CSmoot	
184	Methot Net	deploy	GAK14	14	9/5/2020 2:39:09	9/5/2020 10:39	57.9668	-147.6720	3020	CSmoot	
185	Methot Net	recover	GAK14	14	9/5/2020 3:01:39	9/5/2020 11:01	57.9515	-147.6582	3020	CSmoot	
186	multinet	deploy	GAK14	13	9/5/2020 3:05:24	9/5/2020 11:05	57.9490	-147.6557	2030	CSmoot	
187	multinet	recover	GAK14	13	9/5/2020 3:44:24	9/5/2020 11:44	57.9268	-147.6340	3020	CSmoot	
188	Methot Net	deploy	GAK15	15	9/5/2020 4:35:39	9/5/2020 12:35	57.8163	-147.5257	4430	CSmoot	
189	Methot Net	recover	GAK15	15	9/5/2020 4:59:39	9/5/2020 12:59	57.8026	-147.5114	4490	CSmoot	SHARK IN THE NET!
190	multinet	deploy	GAK15	14	9/5/2020 5:03:54	9/5/2020 13:03	57.8003	-147.5090	4490	CSmoot	
191	multinet	recover	GAK15	14	9/5/2020 5:41:09	9/5/2020 13:41	57.7813	-147.4861	4490	CSmoot	
192	multinet	deploy	GAK15	14A	9/5/2020 6:02:54	9/5/2020 14:02	57.7797	-147.4850	490	CSmoot	Recast for 60-40 layer
193	multinet	recover	GAK15	14A	9/5/2020 6:13:39	9/5/2020 14:13	57.7851	-147.4893	4490	CSmoot	
194	Iron tow fish	deploy	GAK15	NaN	9/5/2020 6:27:17	9/5/2020 14:27	57.7860	-147.4923		EOrtega	
200	Acrobat	deploy	GAK15	NaN	9/5/2020 7:20:54	9/5/2020 15:20	57.7877	-147.4952		IReister	Lat, long & time from Instr.
195	Acrobat	recover	GAK12	NaN	9/5/2020 12:18:02	9/5/2020 20:18	58.2560	-147.9450		IReister	
196	Iron tow fish	recover	GAK12	NaN	9/5/2020 12:18:39	9/5/2020 20:18	58.2561	-147.9451		EOrtega	
197	CalVet net	deploy	GAK12	17	9/5/2020 12:40:00	9/5/2020 20:40	58.2432	-147.9333	2173	RHopcroft	
198	CalVet net	recover	GAK12	17	9/5/2020 12:48:54	9/5/2020 20:48	58.2432	-147.9333	2173	RHopcroft	
199	CTD911	deploy	GAK12	22	9/5/2020 12:59:54	9/5/2020 20:59	58.2430	-147.9335	2168	IReister	
201	CTD911	recover	GAK12	22	9/5/2020 14:28:34	9/5/2020 22:28	58.2422	-147.9330	2168	IReister	
202	Iron tow fish	deploy	GAK12	NaN	9/5/2020 14:54:14	9/5/2020 22:54	58.2352	-147.9286		EOrtega	
203	Acrobat	deploy	GAK12	NaN	9/5/2020 15:02:09	9/5/2020 23:02	58.2394	-147.9329		IReister	
204	Iron tow fish	recover	GAK8	NaN	9/5/2020 19:25:54	9/6/2020 3:25	58.6518	-148.3171		EOrtega	
205	Iron tow fish	deploy	GAK8	NaN	9/5/2020 20:39:22	9/6/2020 4:39	58.7728	-148.4499		EOrtega	
206	Iron tow fish	recover	GAK7	NaN	9/5/2020 23:00:24	9/6/2020 7:00	58.9816	-148.6393		EOrtega	
207	CTD911	deploy	GEO	23	9/5/2020 23:54:59	9/6/2020 7:54	59.0136	-148.6882	232	RHopcroft	
208	CTD911	recover	GEO	23	9/6/2020 0:33:19	9/6/2020 8:33	59.0137	-148.6881	232	RHopcroft	

Event#	Instrument	Action	Station	Cast	Local	GMT	Latitude	Longitude	Seafloor	Author	Comment
209	Acrobat	abort	GAK7	NaN	9/5/2020 22:19:54	9/6/2020 6:19	58.9398	-148.6077		IReister	instrument com failed GAK7
210	Iron tow fish	deploy	GAK7		9/6/2020 1:44:45	9/6/2020 9:44	58.9335	-148.6014		MKaufman	GAK7 Tow in with Acrobat
246	Acrobat	deploy	GAK7	NaN	9/6/2020 1:47:54	9/6/2020 9:47	58.9361	-148.6017		IReister	Retry after replacing cable.
211	Science Seawater	service	NaN	NaN	9/6/2020 7:02:02	9/6/2020 15:02	59.4699	-149.1112		EStidman	swapped strainer
212	Acrobat	recover	GAK1	NaN	9/6/2020 11:05:53	9/6/2020 19:05	59.8552	-149.4792	268	IReister	
213	CTD911	deploy	MS4	24	9/6/2020 16:22:17	9/7/2020 0:22	59.9198	-147.8289	116	IReister	
214	CTD911	recover	MS4	24	9/6/2020 16:38:39	9/7/2020 0:38	59.9208	-147.8283	116	IReister	
215	CTD911	deploy	MS3	25	9/6/2020 16:59:58	9/7/2020 0:59	59.9301	-147.8577	165	IReister	
216	CTD911	recover	MS3	25	9/6/2020 17:18:27	9/7/2020 1:18	59.9304	-147.8576	165	IReister	
217	CTD911	deploy	MS1	26	9/6/2020 17:51:31	9/7/2020 1:51	59.9534	-147.9284	169	IReister	
218	CTD911	recover	MS1	26	9/6/2020 18:08:00	9/7/2020 2:08	59.9527	-147.9314	169	IReister	
219	CalVet net	deploy	MS2	18	9/6/2020 18:32:40	9/7/2020 2:32	59.9457	-147.8950	195	RHopcroft	
220	CalVet net	recover	MS2	18	9/6/2020 18:37:49	9/7/2020 2:37	59.9449	-147.8974	195	RHopcroft	
221	CTD911	deploy	MS2	27	9/6/2020 18:48:51	9/7/2020 2:48	59.9447	-147.8939	190	IReister	
222	CTD911	recover	MS2	27	9/6/2020 18:48:54	9/7/2020 2:48	59.9447	-147.8939	188	IReister	lost com on surface bottle.
223	Methot Net	deploy	KIP2	16	9/6/2020 22:38:09	9/7/2020 6:38	60.2647	-147.9818		CSmoot	
224	Methot Net	recover	KIP2	16	9/6/2020 23:00:54	9/7/2020 7:00	60.2754	-147.9854		CSmoot	
225	multinet	deploy	KIP2	15	9/6/2020 23:06:09	9/7/2020 7:06	60.2772	-147.9865	580	CSmoot	
227	multinet	recover	KIP2	15	9/6/2020 23:37:24	9/7/2020 7:37	60.2878	-147.9829	580	CSmoot	
228	Methot Net	deploy	PWS1	17	9/7/2020 0:17:39	9/7/2020 8:17	60.3629	-147.9320	345	CSmoot	
229	Methot Net	recover	PWS1	17	9/7/2020 0:39:54	9/7/2020 8:39	60.3762	-147.9366		CSmoot	
230	multinet	deploy	PWS1	16	9/7/2020 0:42:39	9/7/2020 8:42	60.3777	-147.9367	345	CSmoot	
231	multinet	recover	PWS1	16	9/7/2020 1:16:54	9/7/2020 9:16	60.3941	-147.9309	345	CSmoot	
232	Methot Net	deploy	PWS2	18	9/7/2020 2:35:54	9/7/2020 10:35	60.5278	-147.8509		CSmoot	
233	Methot Net	recover	PWS2	18	9/7/2020 2:58:09	9/7/2020 10:58	60.5318	-147.8259		CSmoot	
234	multinet	deploy	PWS2	17	9/7/2020 3:01:24	9/7/2020 11:01	60.5323	-147.8225	727	CSmoot	
235	multinet	recover	PWS2	17	9/7/2020 3:36:24	9/7/2020 11:36	60.5370	-147.7877	727	CSmoot	
236	EM710	stop	NaN	NaN	9/7/2020 3:58:16	9/7/2020 11:58	60.5714	-147.7390		BMcKiernan	Stopped logging over 750m
237	Methot Net	deploy	PWS3	19	9/7/2020 4:43:39	9/7/2020 12:43	60.6473	-147.6903		CSmoot	
238	Methot Net	recover	PWS3	19	9/7/2020 5:05:39	9/7/2020 13:05	60.6650	-147.6735		CSmoot	
239	multinet	deploy	PWS3	18	9/7/2020 5:09:09	9/7/2020 13:09	60.6674	-147.6703	749	CSmoot	
240	multinet	recover	PWS3	18	9/7/2020 5:56:09	9/7/2020 13:56	60.6978	-147.6454	749	CSmoot	
241	CTD911	deploy	PWS3	28	9/7/2020 6:43:46	9/7/2020 14:43	60.6665	-147.6679	730	IReister	
242	CTD911	recover	PWS3	28	9/7/2020 7:46:59	9/7/2020 15:46	60.6673	-147.6698	730	IReister	lost com on surface bottle.
243	CalVet net	deploy	PWS3	19	9/7/2020 7:58:09	9/7/2020 15:58	60.6668	-147.6695	739	RHopcroft	

Event#	Instrument	Action	Station	Cast	Local	GMT	Latitude	Longitude	Seafloor	Author	Comment
244	CalVet net	recover	PWS3	19	9/7/2020 8:03:10	9/7/2020 16:03	60.6669	-147.6697	739	RHopcroft	
245	Acrobat	recover	GAK7	NaN	9/5/2020 22:25:54	9/6/2020 6:25	58.9505	-148.6155		IReister	No com. recovering
247	multinet	deploy	PWS2	MNV5d	9/7/2020 10:04:23	9/7/2020 18:04	60.5350	-147.8026	730	RHopcroft	
248	multinet	recover	PWS2	MNV5d	9/7/2020 10:50:54	9/7/2020 18:50	60.5351	-147.8034	730	RHopcroft	
249	CTD911	deploy	PWS2	29	9/7/2020 11:04:54	9/7/2020 19:04	60.5351	-147.8034	728	IReister	prod cast
250	CTD911	recover	PWS2	29	9/7/2020 11:49:49	9/7/2020 19:49	60.5351	-147.8033	728	IReister	
251	multinet	deploy	PWS2	MNV5s	9/7/2020 11:54:20	9/7/2020 19:54	60.5351	-147.8033	730	RHopcroft	
252	multinet	recover	PWS2	MNV5s	9/7/2020 12:09:12	9/7/2020 20:09	60.5350	-147.8034	730	RHopcroft	
253	CalVet net	deploy	PWS2	20	9/7/2020 12:17:24	9/7/2020 20:17	60.5352	-147.8033	730	RHopcroft	
254	CalVet net	recover	PWS2	20	9/7/2020 12:22:51	9/7/2020 20:22	60.5352	-147.8033	730	RHopcroft	
255	CalVet net	deploy	PWS2	20A	9/7/2020 12:32:53	9/7/2020 20:32	60.5352	-147.8033	730	RHopcroft	
256	CalVet net	recover	PWS2	20A	9/7/2020 12:38:22	9/7/2020 20:38	60.5352	-147.8033	730	RHopcroft	
257	Trace Metal Bottle	deploy	PWS2	TM05	9/7/2020 13:13:06	9/7/2020 21:13	60.5350	-147.8035		MKaufman	
258	Trace Metal Bottle	recover	PWS2	TM05	9/7/2020 14:01:27	9/7/2020 22:01	60.5350	-147.8035		EOrtega	
259	CTD911	deploy	PWS2	30	9/7/2020 14:05:24	9/7/2020 22:05	60.5350	-147.8035	737	IReister	
260	CTD911	recover	PWS2	30	9/7/2020 15:09:02	9/7/2020 23:09	60.5350	-147.8035	737	IReister	
261	Iron tow fish	deploy	PWS2	NaN	9/7/2020 15:20:34	9/7/2020 23:20	60.5322	-147.8038		EOrtega	
262	Iron tow fish	recover	PWS1	NaN	9/7/2020 16:36:39	9/8/2020 0:36	60.3802	-147.9348		EOrtega	
263	CalVet net	deploy	PWS1	21	9/7/2020 16:37:54	9/8/2020 0:37	60.3802	-147.9348	347	RHopcroft	
264	CalVet net	recover	PWS1	21	9/7/2020 16:43:00	9/8/2020 0:43	60.3802	-147.9348	347	RHopcroft	
265	CTD911	deploy	PWS1	31	9/7/2020 16:50:24	9/8/2020 0:50	60.3802	-147.9348	348	IReister	
266	CTD911	recover	PWS1	31	9/7/2020 17:36:55	9/8/2020 1:36	60.3802	-147.9348	348	IReister	
267	CalVet net	deploy	KIP2	22	9/7/2020 18:58:55	9/8/2020 2:58	60.2788	-147.9865	582	RHopcroft	
268	CalVet net	recover	KIP2	22	9/7/2020 19:03:55	9/8/2020 3:03	60.2787	-147.9867	582	RHopcroft	
269	CTD911	deploy	KIP2	32	9/7/2020 19:11:09	9/8/2020 3:11	60.2786	-147.9871	581	IReister	
270	CTD911	recover	KIP2	32	9/7/2020 20:06:01	9/8/2020 4:06	60.2786	-147.9872	581	IReister	
271	CTD911	deploy	KIP0	33	9/7/2020 22:23:48	9/8/2020 6:23	60.1243	-147.8315	290	IReister	
272	CTD911	recover	KIP0	33	9/7/2020 22:46:39	9/8/2020 6:46	60.1235	-147.8294	290	IReister	Data dropped at 90m on upca
273	Acrobat	deploy	KIP0	NaN	9/7/2020 23:03:39	9/8/2020 7:03	60.1212	-147.8289		IReister	start of Knights Passage ru
274	Acrobat	recover		NaN	9/8/2020 4:20:24	9/8/2020 12:20	60.5591	-147.7771		IReister	Acrobat would not go to dep
275	Acrobat	deploy		NaN	9/8/2020 4:40:24	9/8/2020 12:40	60.5648	-147.7687		IReister	redeployed. issues with ethernet data
276	Acrobat	recover	PWS3	NaN	9/8/2020 6:06:58	9/8/2020 14:06	60.6824	-147.6473		IReister	
277	CalVet net	deploy	IB2	23	9/8/2020 9:42:24	9/8/2020 17:42	60.2720	-148.2330	158	RHopcroft	
Event#	Instrument	Action	Station	Cast	Local	GMT	Latitude	Longitude	Seafloor	Author	Comment

278	CalVet net	recover	IB2	23	9/8/2020 9:47:25	9/8/2020 17:47	60.2720	-148.2330	156	RHopcroft	
279	CTD911	deploy	IB2	34	9/8/2020 9:54:09	9/8/2020 17:54	60.2720	-148.2330	156	IReister	
280	CTD911	recover	IB2	34	9/8/2020 10:32:24	9/8/2020 18:32	60.2720	-148.2330	156	IReister	
281	CalVet net	deploy	IB1	24	9/8/2020 12:32:31	9/8/2020 20:32	60.2416	-148.3331	158	RHopcroft	
282	CalVet net	recover	IB1	24	9/8/2020 12:38:19	9/8/2020 20:38	60.2416	-148.3331	158	RHopcroft	
283	CTD911	deploy	IB1	35	9/8/2020 12:40:24	9/8/2020 20:40	60.2416	-148.3331	140	IReister	
284	CTD911	recover	IB1	35	9/8/2020 13:20:24	9/8/2020 21:20	60.2414	-148.3324	140	IReister	
285	CalVet net	deploy	IB0	25	9/8/2020 14:13:53	9/8/2020 22:13	60.2714	-148.3600	280	RHopcroft	
286	CalVet net	recover	IB0	25	9/8/2020 14:18:53	9/8/2020 22:18	60.2714	-148.3600	280	RHopcroft	
287	CTD911	deploy	IB0	36	9/8/2020 14:24:22	9/8/2020 22:24	60.2714	-148.3600	280	IReister	
288	CTD911	abort	IB0	36	9/8/2020 14:50:39	9/8/2020 22:50	60.2714	-148.3600	280	IReister	Did not archive upcast past 145m. continued as 36A
289	CTD911	other	IB0	36A	9/8/2020 14:55:39	9/8/2020 22:55	60.2714	-148.3600	280	IReister	Continuation of cast 36.
290	CTD911	recover	IB0	36A	9/8/2020 15:17:28	9/8/2020 23:17	60.2714	-148.3600	280	IReister	
291	CalVet net	deploy	IB0	25A	9/8/2020 15:25:35	9/8/2020 23:25	60.2714	-148.3600	276	RHopcroft	
292	CalVet net	recover	IB0	25A	9/8/2020 15:30:35	9/8/2020 23:30	60.2714	-148.3600	276	RHopcroft	
293	EM710	stop	NaN	NaN	9/9/2020 0:05:06	9/9/2020 8:05	59.9868	-147.8323		BMcKiernan	Stopped logging once in MS
294	multinet	deploy	GAK2	19	9/9/2020 4:29:07	9/9/2020 12:29	59.6968	-149.3356	230	CSmoot	505 TOW 19
295	multinet	recover	GAK2	19	9/9/2020 4:59:59	9/9/2020 12:59	59.6893	-149.3225	230	CSmoot	
296	Science Seawater	service	NaN	NaN	9/9/2020 5:21:06	9/9/2020 13:21	59.6852	-149.3332		BMcKiernan	Swapped strainer
297	CTD911	deploy	GAK1	37	9/9/2020 6:58:09	9/9/2020 14:58	59.8453	-149.4667	268	ERoth	
298	CTD911	recover	GAK1	37	9/9/2020 7:20:39	9/9/2020 15:20	59.8453	-149.4667	268	ERoth	
302	Ship	endCruise	NaN	NaN	9/9/2020 14:19:49	9/9/2020 22:19	60.0981	-149.4423		ERoth	