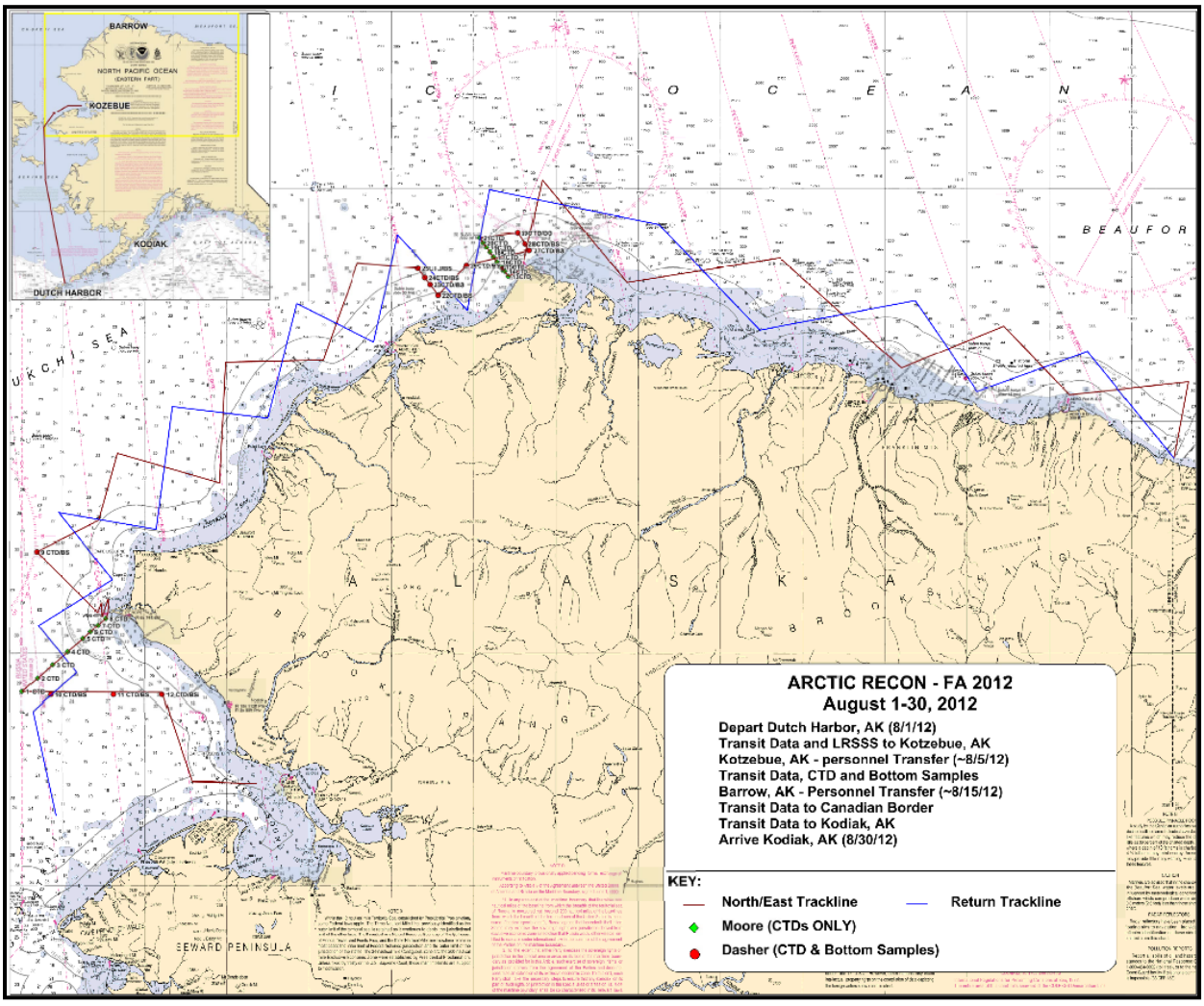
Arctic Hydrographic Reconnaissance Project

NOAA Ship *Fairweather*

August 1 to 30, 2012

Commander James M. Crocker, NOAA
Commanding Officer
NOAA Ship *Fairweather*



Project Overview

The purpose of this reconnaissance project was to acquire data during the *Fairweather's* transit from Dutch Harbor, Alaska to Demarcation Point, Alaska via the Bering Sea, Chukchi Sea, Beaufort Sea and back. The data acquired will be used to support safe navigation by identifying dangers to navigation and areas in need of updating. The data collected are also being used to validate previously collected data by other organizations.

In conjunction with the ship collecting transit data other institutes such as University of Alaska (Fairbanks), Alaska Department of Environmental Conservation, NOAA/NOA/National Centers for Coastal and Ocean Sciences (NCCOS), NOAA/NMFS Alaska Fisheries Science Center (AFSC), and U.S. Navy Naval Undersea Warfare Center, Keyport Division (Navy) were also onboard to collect various data to support their respective projects.

Project Summary

The ship departed Dutch Harbor on August 1st and transited the Bering Sea en route to Kotzebue, Alaska. During the transit the ship towed AFSC's Klein 7180 long range high resolution sonar to acquire data to further support *Fairweather*'s 2012 FISHPAC project. The Klein 7180 was most effective in depths greater than 25 fathoms and was recovered west of Nunivak Island where the water depth became shallower than 25 fathoms. On August 5th the ship arrived in Kotzebue Sound to transferred personnel at Kotzebue, Alaska and continued along the planned transit track acquiring multibeam and sound speed profile data. The ship stopped at assigned stations to conduct CTD transects and bottom samples to support the Distributed Biological Observatory (DBO) and Alaska State Department of Conservation's AKMAP projects.

Sea ice coverage west of Barrow and in the Beaufort Sea was not favorable for the ship's planned operations requiring the ship to work along the ice edge making several attempts to reach assigned stations that were covered by heavy concentrations of sea ice. Due to the sea ice, the project plan was modified to make the best use of time while waiting for the ice conditions to change. The ship was able to complete all of the southern stations and only 50% of the station west of Barrow before the scientists departed on August 15th in Barrow.

The ice remained in high concentration west of Barrow but had receded enough for the ship to make a safe transit to Demarcation Point at the US/Canadian border. Due to the ice forecast the planned route was modified to stay closer to shore and stay inshore of the heavier ice concentrations as the ship transited east. Ice conditions were found to be better than forecast and allowed the ship to transit further offshore on the return west. Heavy ice concentrations were encountered north of Point Barrow and the ship had to modify the planned route to stay inshore

of the ice until the ship was north of Wainwright. At that point the ship continued on the planned track line south to the Bering Sea. Unexpected sea ice was encountered in the Chukchi Seas as we approached the 67° latitude and approximately 2.5 nautical miles east of the US/Russia border. The ice field remained relatively closely packed for approximately 3.5 nautical miles as the ship transited south, after which point the area became sea ice free. The ship transited the Bering Strait on August 23rd and through Unimak Pass on August 26th.

The high concentrations of sea ice off Barrow and the late movement of ice offshore in the Beaufort had the greatest impact on executing the project as planned. Additionally, the weather and sea state encountered from the Bering Strait south on both the northern and southern transits had the greatest effect on data quality.

Aside from these minor challenges this was a very successful project. Specific observations and issues encountered are addressed in more detail below. Looking forward to more detailed hydrographic survey projects, it is recommended that alternative survey methods be applied for areas along the Arctic coast. Near shore survey operations should be designed for set line spacing surveys run perpendicular to the shore out to 15 fathoms water depth. Line spacing should be established based on product scale and 100 percent side scan sonar, run parallel to the shore and/or bottom contours, should augment the bathymetry out to 15 fathoms. In depths greater than 15 fathoms either complete multibeam or 200 percent side scan sonar should be acquired.

Global Positioning System

The *Fairweather* used an Integrated Differential GPS (DGPS) system offered within the POS MV 320 unit for real-time positioning of the ship for this project. Normal methods for real-time positioning are dependent on broadcast of USCG DGPS correctors. However, there are no USCG DGPS Stations within broadcast range of the Chukchi or Beaufort Seas. The *Fairweather* is equipped with only two of these POS MV 320 units which afford the option of using Satellite-Based Augmentation Systems (SBAS) - such as WAAS - for real-time decimeter level accuracy in position data. This feature is only available if the systems are upgraded to POS MV Firmware version 5.00 or later, MV-POSView version 5.0.0.0 or later, the unit must be integrated with BD960 receiver cards (with GNSS Firmware version 3.65 or later) and the vessel must be using Zephyr II (or comparable) antennas.

During this project there were minimal DGPS data gaps while using the Integrated DGPS causing almost no data quality issues. An adequate satellite constellation was maintained throughout the project. The average number of GAMS SVs visible was between 6-12 satellites. (See Appendix 1 for GNSS Analysis).

For future projects around the Bering, Chukchi and Beaufort Seas, it is recommended that all survey platforms be equipped with this POS MV unit. Using the SBAS/WAAS network via the POS MV does not require a subscription and provides an accurate, reliable, and real-time position solution.

Sound Speed Profile and correctors

Sound velocity data were acquired underway using an AML SVP sensor mounted on the MVP200 (Moving Vessel Profiler) single-sensor towfish. Stationary casts were performed using a Seabird SBE19 Plus CTD sensor at specified Distributed Biological Observatory (DBO) as well as at bottom sampling sites coordinated with Alaska State Department of Conservation projects. High variability in sound speed was experienced in various locations along the trackline, particularly in the Bering Strait and areas west of Point Barrow (See appendix 2 for an 8 hour time span of MVP casts). These areas are particularly well known for their variability due to mixing of Arctic and Pacific water-masses. Analysis done by Jonathan Beaudoin at the University of New Hampshire in which *Fairweather* sound speed trackline profiles were compared to data from the World Ocean Database verify that we experienced the full range of known conditions for the month of August (sound speed variations throughout the entire water column of up to 30 m/s) over the course of an 8 hour period. Sound speed cast intervals were reduced when surveying in these variable areas by *Fairweather* personnel to capture a representative sample of the changing water properties. Ship operations were adapted to allow for continuous casting during high sound speed variability. Additional discussion and documentation of new surveying techniques will have to be incorporated into shipboard procedure for future Arctic missions.

As the 2012 Arctic survey is only for trackline purposes, sound speed variations and artifacts seen in the outer beams of multibeam systems can be filtered. However, for future projects in the area surrounding Point Barrow special consideration should be paid to this sound speed variability when planning for full bottom coverage multibeam or side scan surveys. Sound speed prediction maps and additional tools currently in development at the University of New Hampshire's Center for Coastal and Ocean Mapping may be a reasonable solution in ensuring quality charting in the future for these highly variable sound speed areas.

Water Level Correction

Due to the large coverage area of this project the tide correctors provided included both TCARI grids as well as discrete zoning. TCARI was provided for the south Arctic portion and discrete zoning was used for the north Arctic portion. Data management was a bit challenging do to the amount of data, and the number of TCARI grids and zoning files. Three TCARI grids were provided for this project. A better solution would have been to provide one TCARI grid per project. It is not possible in post-processing to load multiple grids into a project. This processing limitation required some tedious data management.

Water levels in the North Slope where minimal and averaged less than 0.5 meters during this project.

Charted to Survey Sounding Comparison

For most of the data collected the surveyed soundings were noted to be consistent or deeper than the charted depths. However, the vast differences between chart scales makes it difficult to compare; for example, some surveyed soundings were over 1000 meters away from the nearest charted depths.

In a number of areas surveyed soundings were deeper than charted depths by 1 to 10 feet. The largest disagreement between surveyed and charted depths showed surveyed soundings deeper by approximately 200 fathoms. The majority of areas found to be shallower than charted depths where approximately 3 feet shallower on average. However, some areas of chart disagreement have shown surveyed soundings to be as much as 10 fathoms shallower than charted depths. (See Appendix 3 for chart to survey sounding comparison images).

Chart Scale and Projections

The charts for the area transited by the *Fairweather* conspicuously did not meet the expectations of modern mariners. There are small scale charts (1:700,000) that cover the area which have large white spaces devoid of charted depths. Closer to shore there are larger scale charts (1:50,000) along the coast which again have large areas devoid of charted depths. Both scale charts should be updated and new larger (1:20,000) scale charts should be created for heavily transited harbors.

UTM zones were challenging for collecting, data processing and creating products during the transit of the North Slope. In the future, if there are more transit projects which cross a number of UTM zones other projections should be explored.

Coast Pilot

In general the Coast Pilot agreed well with what the ship was seeing along the trackline. A point of note not mentioned in the Coast Pilot are the additional communications requested by certain towns/villages or cities. When transiting in the vicinity of Barrow and Katovik local communication centers requested a call in every 4 hours on VHF-FM CH – 68. The information each requested were name, location and destination.

In the vicinity of Barrow depths can vary to as much as six feet due to ice gouging (see appendix 4 for images). Larger vessels may anchor off shore and receive supplies and transfer personnel

using small boats or landing crafts, however, there is no protection from heavy weather afforded at any anchorages in the vicinity of Barrow.

On the transit east to Demarcation Point the bluffs along the shore are as high as 25 ft and are very steep. There are several huts around Demarcation Bay that seem to be seasonal hunting shelters.

Weather and Sea Ice

During this project weather data were collected and logged hourly using both a scientific computer system as well as manual observations. The *Fairweather* referred to the National Weather Service (NWS) marine forecasts while underway. The ship mainly considered the text product produced for five regions of the Alaskan arctic.

General text forecasts for the region were fairly accurate. The forecasts for visibility, weather and wind remained extremely accurate throughout the forecast regions. Forecasts for wave height however showed some discrepancies. It appeared that when near sea ice, wave height was significantly less than the forecast value. This may be due to the effect that the sea ice has by lessening the open water fetch and therefore lessening the sea wave height. Overall, the forecasts issued by the NWS were reliable, even in the arctic region. (See Appendix 5 for the Arctic Weather Synopsis)

Sea ice observations were supported this season via daily satellite products from The National/Naval Ice Center (NIC) and frequent photos from the National Marine Mammal Laboratory who were conducting a NMFS Marine Mammal Survey. The ship also referenced the National Weather Service Sea Ice Analysis web page. The collaboration of all these products allowed the ship to transit in these waters with confidence.

Localized dense fog was a normal occurrence observed while transiting close to sea ice. The water and sea temperatures change quickly around the ice which produced either fog or created a phenomenon known as the arctic mirage (objects or land appear to be closer or larger than they really are). The ships radar, which is always a key tool during navigation, was able to detect the ice about 3 miles out which assisted in the safe navigation near the ice.

Vessel Traffic

The *Fairweather* recorded vessel traffic that were seen via the AIS (Automated Identification System) the entire transit starting from departing Dutch Harbor and transiting north via the Bering Sea to Chukchi Sea to Beaufort Seas and the return transit back just north of Dutch Harbor. The information recorded included: Date, local time, Vessel name, type, Nav Status, length, width, draft, IMO number, MMSI, Latitude, Longitude, Destination, Arrival Time, and

any notes watchstanders deemed relevant. Vessels were recorded multiple times if they were seen on different days or locations.

The *Fairweather* recorded seeing 49 separate vessels on AIS between August 2 - 26, 2012. Self-reported lengths ranged from 12m to 228m with 8 greater than 100m, 11 between 50m and 100m, and 22 vessels less than 50m in length. 8 Vessels did not broadcast their size. 16 Vessels identified themselves as tugs/towing vessels, 2 as cargo ships, 3 as fishing, 2 as carrying hazardous cargo, 2 as tankers, 2 as passenger ships, and 1 as engaged in military operations. 1 vessel erroneously reported itself as a wing-in-ground, as officers reported visually identifying a large ship. Often vessels would report arrival times that were already past.

Passenger Ship *The World* was seen on Aug 21st headed for Herchel Island. Passenger ship *Hanseatic*, seen Aug 18th, reported that it was East bound for the Northwest Passage. The northernmost vessel seen was the Tor Viking, which was underway using engines at 71° 35.70'N 155° 49.30'W. In total, *Fairweather* recorded 19 vessels north of 70°N. (See Appendix 6 for completed AIS report.)

Project Support Logistic

Logistics for the entire project were coordinated between the Operations Branch, Visiting Scientists, USCG, Harbor Masters, Perto-Star, National Weather Service, DLA, Bowhead Marine and *Fairweather* Personnel.

The Operations Branch provided the ship with the project instructions for the entire project which included collection of transit data as well as the other small piggy back projects from the visiting scientist. As soon as the scientists were identified the ship coordinated directly with them for ship scheduled locations, arrival and departure times, loading and offloading gear and other project coordination.

Dutch Harbor port of call logistics were initiated through the USCG LOGREQ system sent via email to D17-DG-M-K-BaseKodiak-PCD-PortServices@uscg.mil. After the initial LOGREQ, logistics for port calls were made through direct email correspondence with the City of Unalaska - Port of Dutch Harbor - Harbormaster.

Refueling in Dutch Harbor was handled by direct correspondence with Perto-Star and with the assistance of MOC-P Resource Management Branch. Another option for refueling logistics the USCG pursued was having Crowley and Delta Western enroll in the "SEA Card" open market program. Such enrolment should make it relatively easy to take on fuel at sea directly from one of their fuel barges operating off the North Slope. However, refueling at sea would undoubtedly require close communication with the USCG and would likely warrant inclusion in the USCG

NEPA. POC for the USCG at sea refueling are; CDR James Robinson (James.P.Robinson@uscg.mil) and CDR Frank McConnell (Frank.V.McConnell@uscg.mil).

Several options for stores replenishment at Barrow were investigated including; purchasing stores from the USCG commissary in Kodiak, using a USCG C-130 logistics flight from Kodiak to Barrow and transferring the stores to the ship via USCG HH-60 vertical replenishment. This option was disregarded in favor of ordering stores through DLA Sysco Alaska Food Service and subsequently delivered on a commercial air flight. To recover and transport the stores from the airport a vehicle was borrowed from the NWS office in Barrow and a private landing craft barge was hired to transport the stores to the ship's anchorage location. This replenishment was conducted in tandem with a crew transfer in which visiting scientists were disembarked and taken to the airport. The stores replenishment was relatively small (approximately one pallet) and there was no guarantee that the commercial air shipment would arrive in the narrow window of opportunity to utilize the barge to transfer the stores to the ship (the barge was available for approximately 12 hours). For future, larger, and/or more time sensitive stores replenishments it is recommended to use the USCG C-130 logistics flight and HH-60 VERTREP. The POC for USCG logistics and replenishment flights is: David Seris (David.M.Seris@uscg.mil)

Appendix

Analysis of GNSS data collected for Project M-S974-FA-12

Data were gathered with the ship's POS MV 320 in segments using internal logging mode. Each segment is delineated with an extension of .xxx, where xxx equals the number of the segment. All analysis was done using POSPac MMS v5.4.2.0. The purpose of this analysis was to determine areas where the ship lost its DGPS corrector and relevant satellite information during this period. Below are the results.

Using 2012_225_S220.069 through .096:

8/14/2012 1132 through 8/16/2012 0344

NO DGPS Time Outs

GAMS SVs: 6-12, average 9-10

Using 2012_229_S220.000 through .017:

8/16/2012 0603 through 8/17/2012 0041

NO DGPS Time Outs

GAMS SVs: 6-12, average 10

Using 2012_229_S220.017 through .041

8/16/2012 2339 through 8/18/2012 0132

NO DGPS Time Outs

GAMS SVs: 6-12, average 9-10

Using 2012_229_S220.041 through .054

8/18/2012 0030 through 8/18/2012 1434

NO DGPS Time Outs

GAMS SVs: 7-12, average 9-10

Using 2012_232_S220.000 through .021

8/19/2012 0230 through 8/20/2012 0117

NO DGPS Time Outs

GAMS SVs: 7-12, average 10

Using 2012_232_S220.019 through .043

8/19/2012 2253 through 8/21/2012 0004

NO DGPS Time Outs

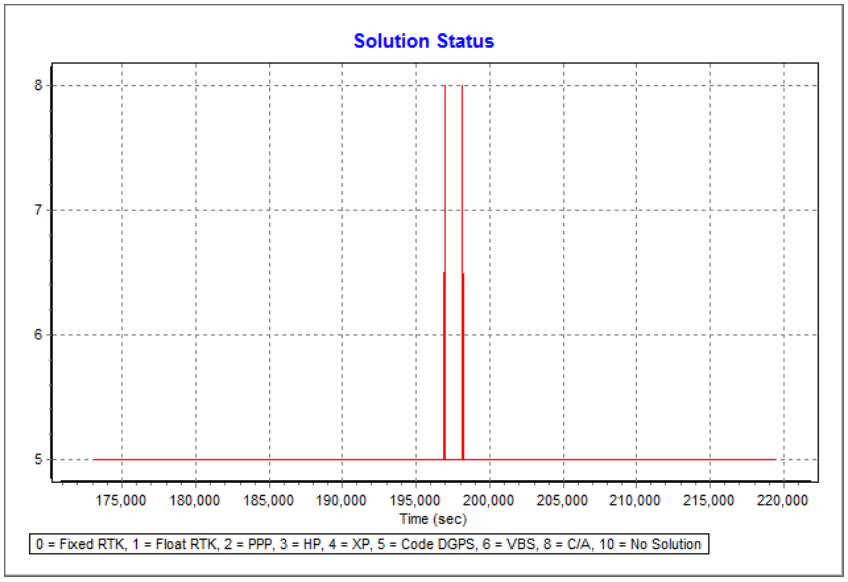
GAMS SVs: 6-12, average 9-10

Using 2012_232_S220.044 through .056

8/21/2012 0004 through 8/21/2012 1259

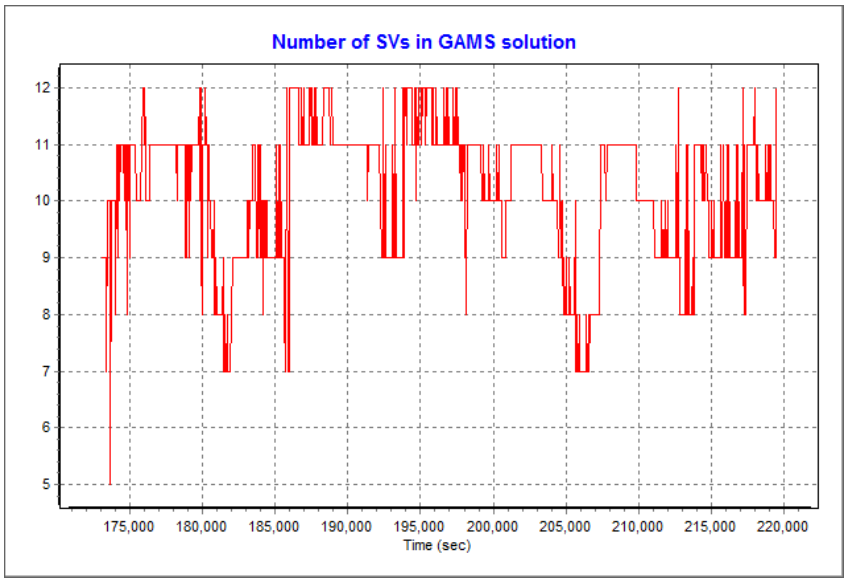
Two instances of running in C/A mode, approximately 0910 and 0925, see Figure 1

Figure 1: 8/21/2012 GNSS Solution Status, POSPAC Report screen



GAMS SVs: 5-12, average 9, see Figure 2

Figure 2: 8/21/2012 GAMS SVs, POSPAC Report screen



Using 2012_232_S220.056.068 through 2012_232_S220.056.092

(Note: These file names are correct, I believe they were simply setup incorrectly)

8/21/2012 2325 through 8/23/2012 0120

One instance of running in C/A mode, at approximately 8/23/2012 0010

GAMS SVs: 6-12, average 9-10

Using 2012_232_S220.092 through 2012_232_S220.115

8/23/2012 0018 through 8/24/2012 0110

Two instances of running in C/A mode, at approximately 8/23/2012 0030 and 0245

GAMS SVs: 6-12, average 9-10

Sound Speed Variability

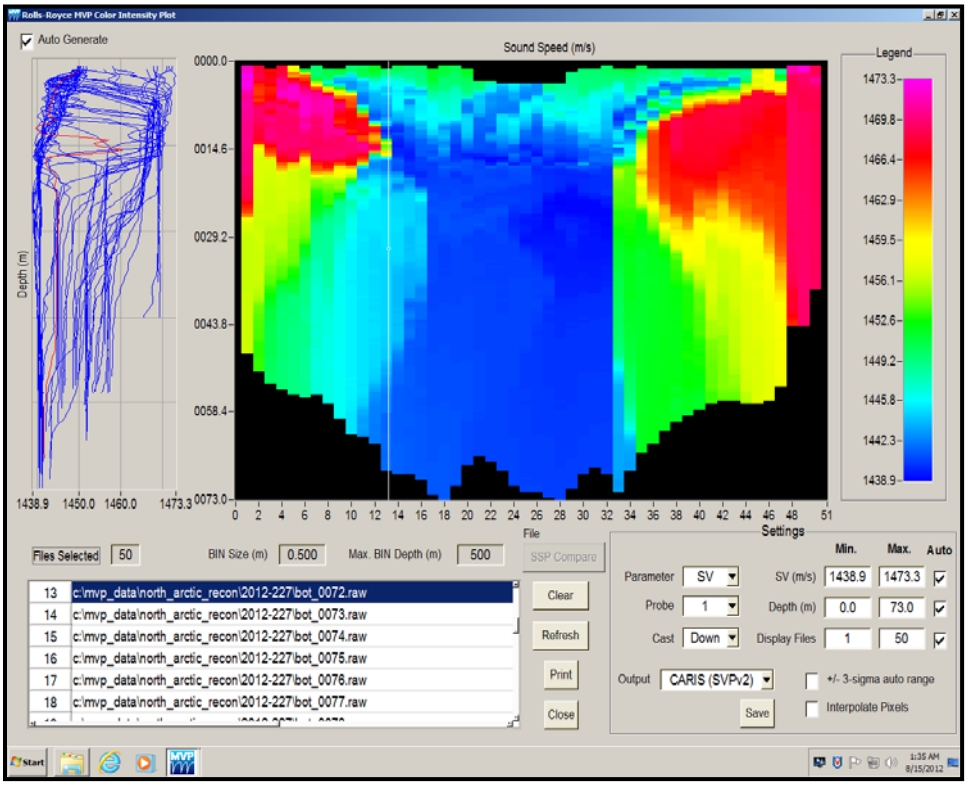


Image 1: Sound Speed data collected over 8 hours (trackline highlighted in yellow below)

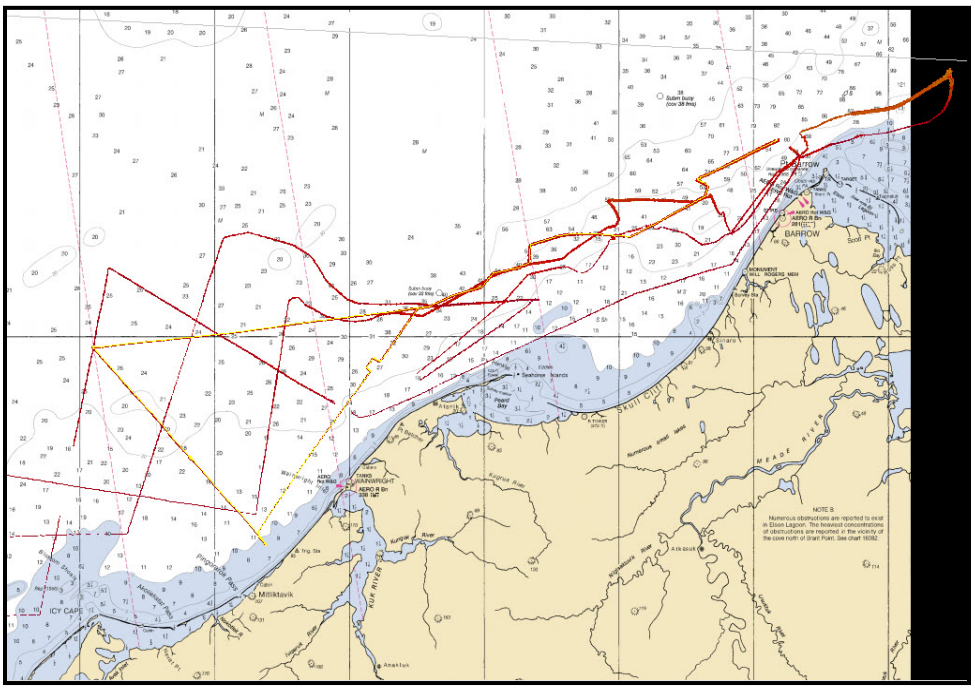


Image 2: West of Point Barrow Tracklines

Chart to Survey Sounding Comparison

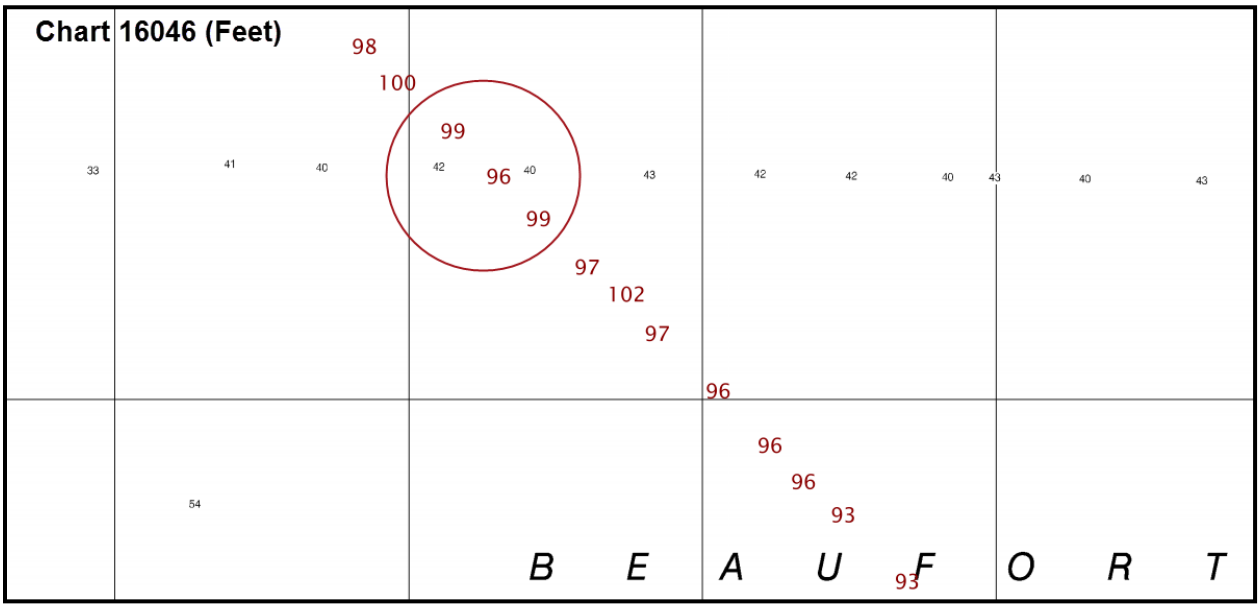


Image 1: Surveyed soundings approximately 50 feet deeper than charted depths.

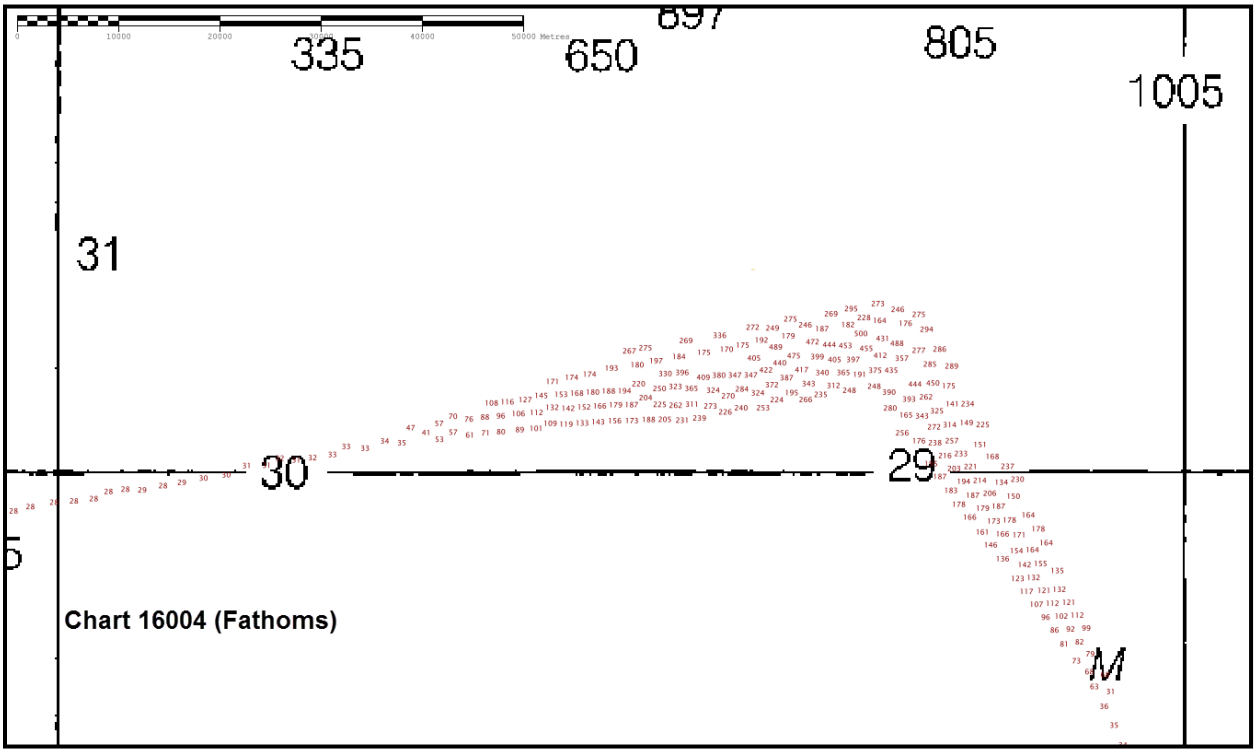


Image 2: Surveyed soundings over 200 fathoms deeper than nearest charted depth.

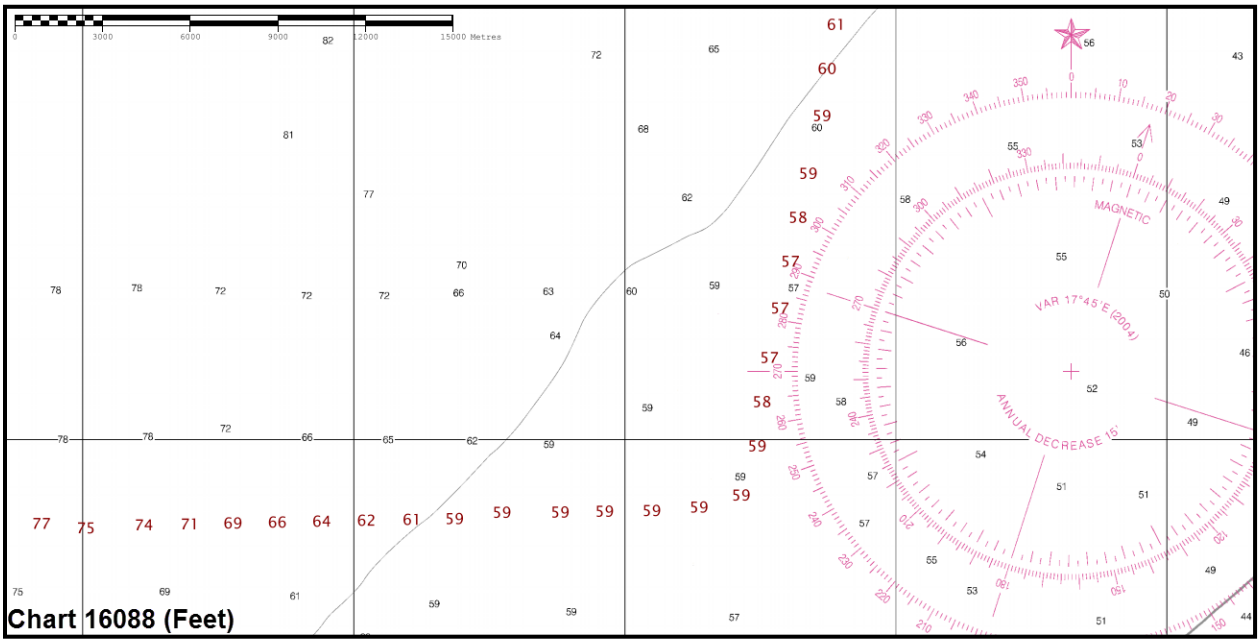


Image 3: Surveyed soundings and charted depths agree well.

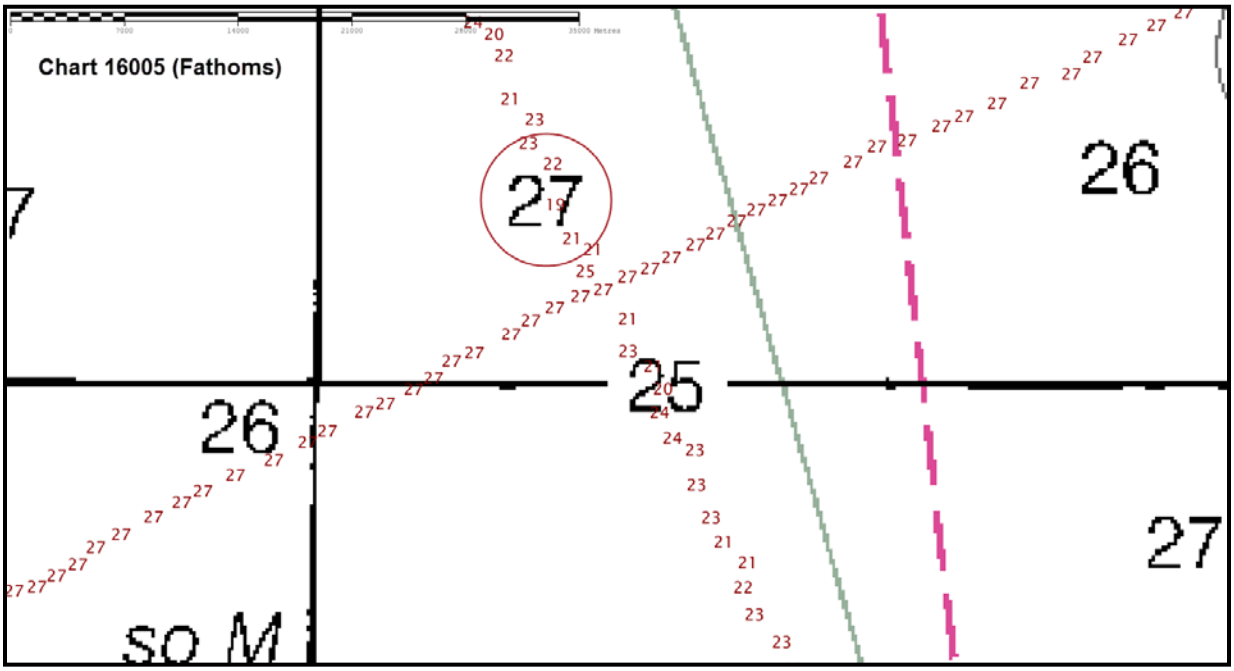
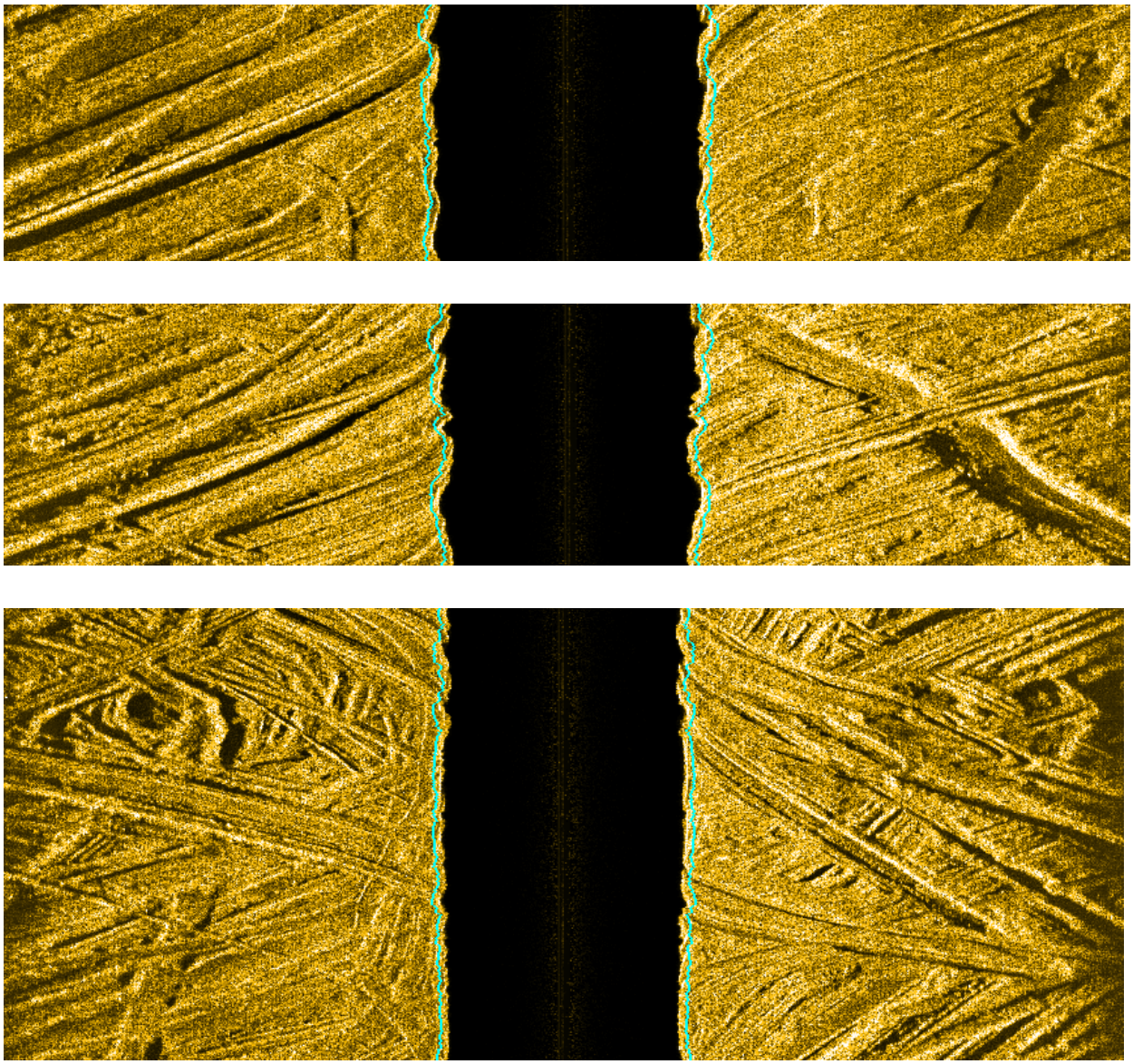


Image 4: Surveyed soundings 5-8 fathoms shallower than charted depths.

Ice Gouging images off Barrow, AK



Arctic Weather Synopsis

NOAA Ship Fairweather (S-220), Arctic Reconnaissance, August 2012

Over the month of August, 2012, the NOAA Ship Fairweather conducted an arctic reconnaissance mission to demarcation point Alaska. During this mission weather data was collected and logged hourly using both an scientific computer system as well as manual observations. Below is a summary of the hourly manual observations taken by the ship as well as the map of the observation's locations. Attached with this document is a full copy the ship's weather log for the month of August.

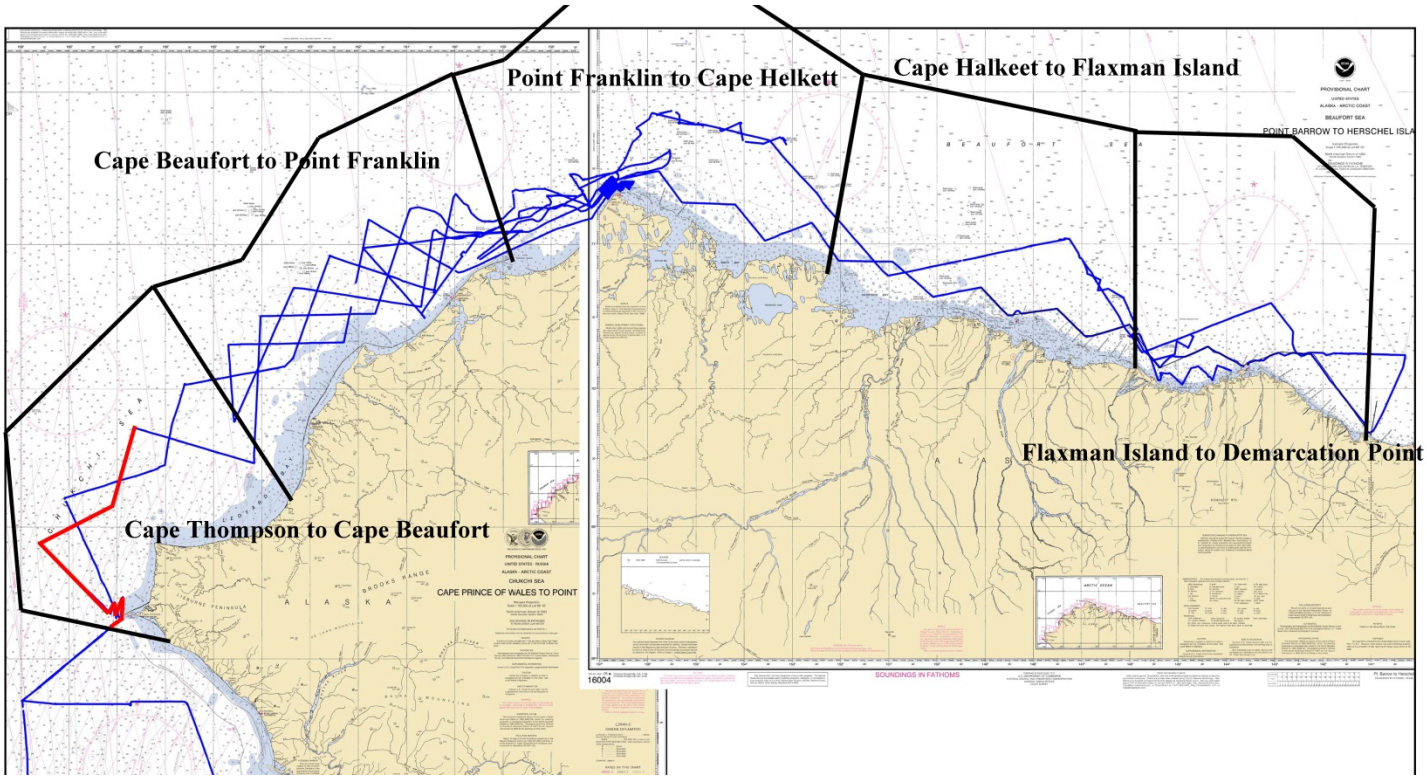
General NWS Forecast Observations

Fairweather referred to the National Weather Service (NWS) marine forecasts while underway. The ship mainly considered the text product produced for five regions of the Alaskan arctic. The forecast regions have been denoted on the ship's location images.

General text forecasts for the region were fairly accurate. The forecasts for visibility, weather and wind remained extremely accurate throughout the forecast regions. Forecasts for wave height however showed some discrepancies. It appeared that when near sea ice, wave height was significantly less than the forecast value. This may be due to the effect that the sea ice has by lessening the open water fetch and therefore lessening the sea wave height. Overall, the forecasts issued by the NWS were reliable, even in the arctic region.

Aug 8, 2012

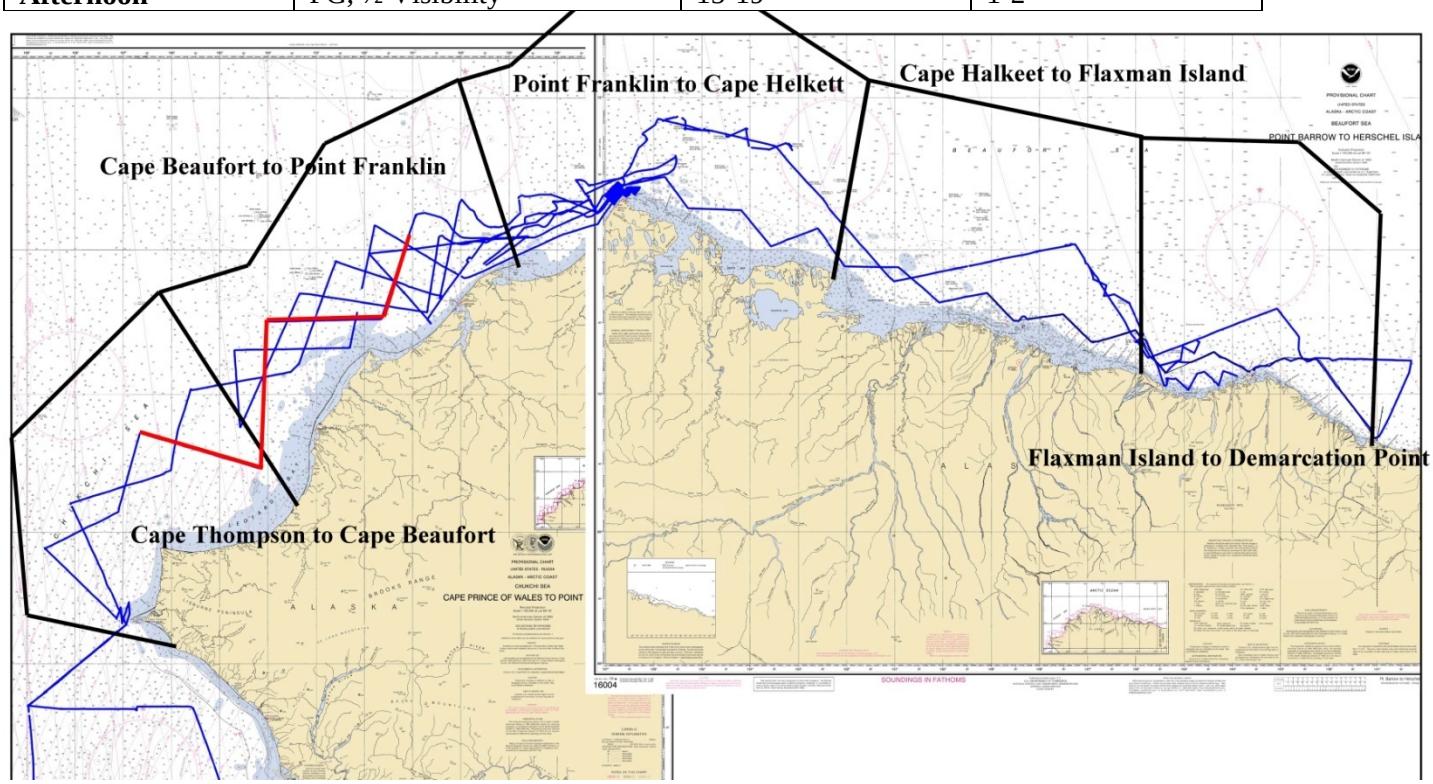
	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	OVC, 10+ Visibility	8-10	1-2
Afternoon	MC, 10+ Visibility	15-16	1-3



Note: The ship's location during the day is denoted in red.

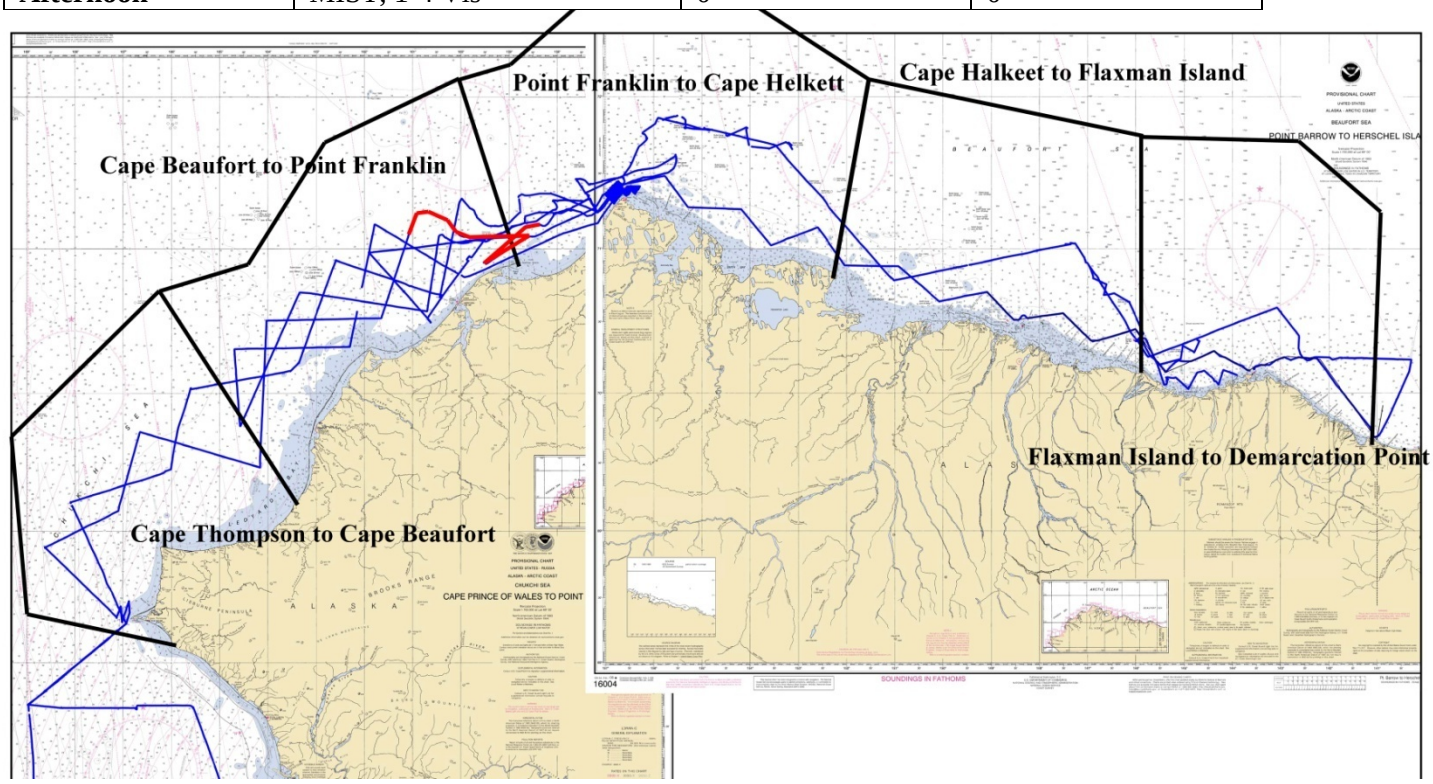
Aug 9, 2012

	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	OVC, 10+ Visibility	10-14	3
Afternoon	FG, ½ Visibility	15-19	1-2



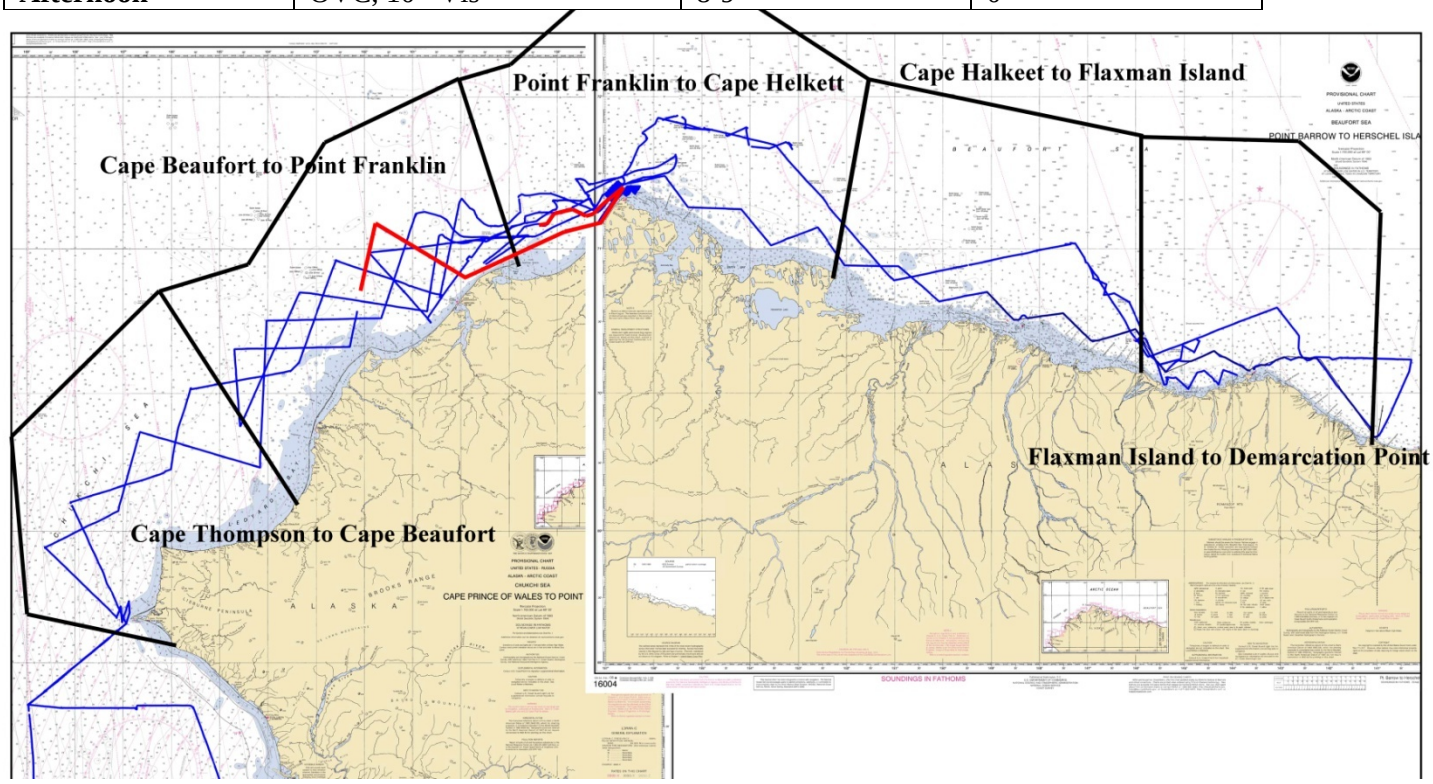
Aug 10, 2012

	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	MIST, 1-4 Vis	0-1	0-1
Afternoon	MIST, 1-4 Vis	0	0



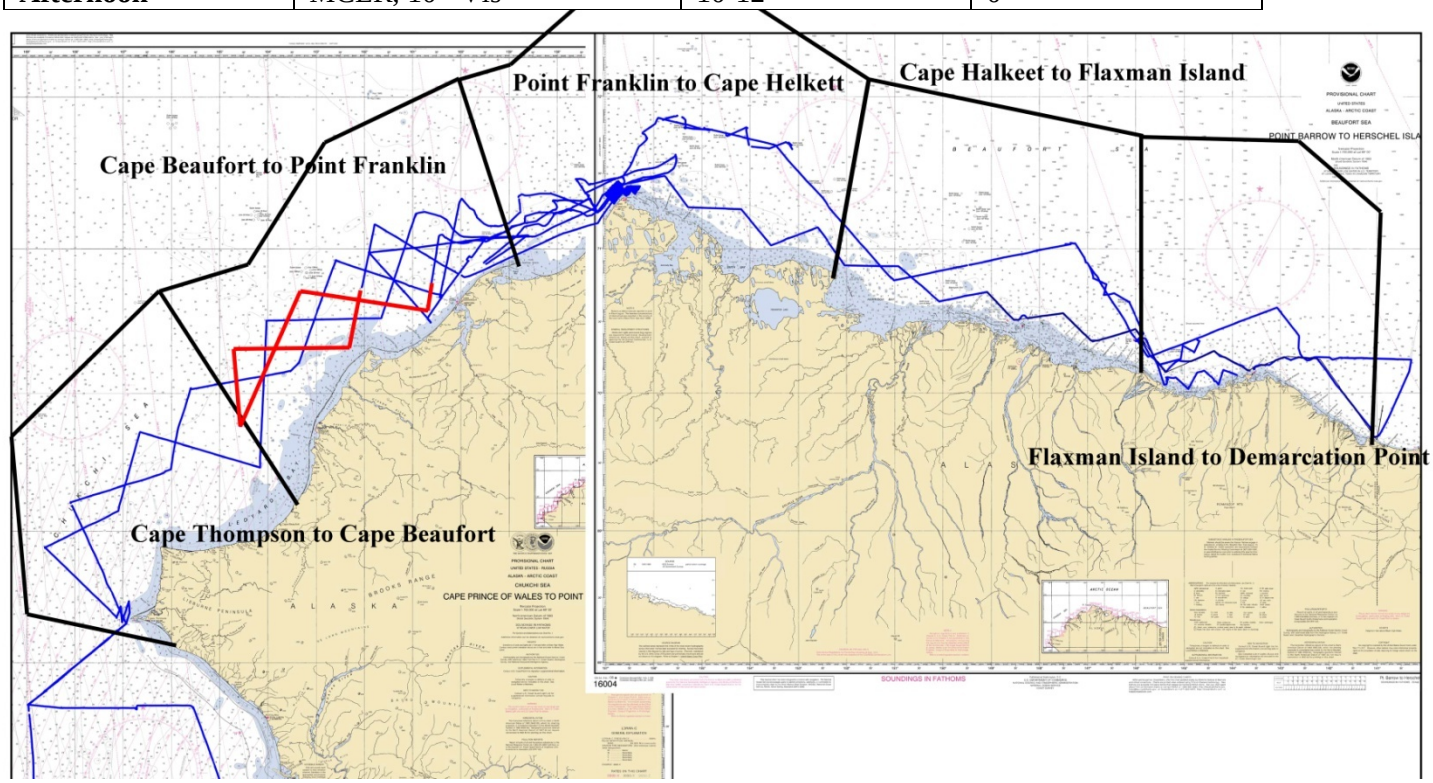
Aug 11, 2012

	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	OVC, 7-10Vis	5	0
Afternoon	OVC, 10+ Vis	8-9	0



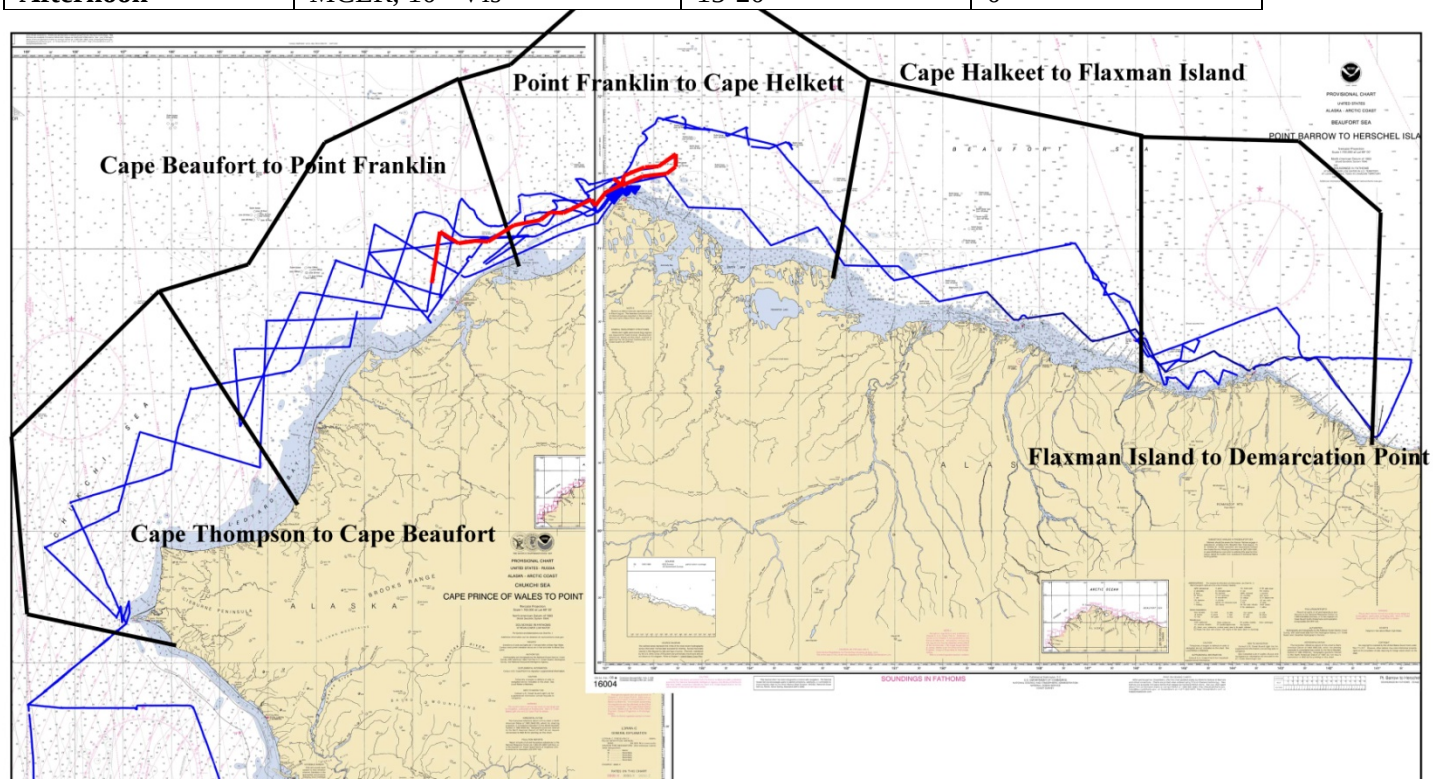
Aug 12, 2012

	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	OVC, 10+ Vis	5-10	0
Afternoon	MCLR, 10+ Vis	10-12	0



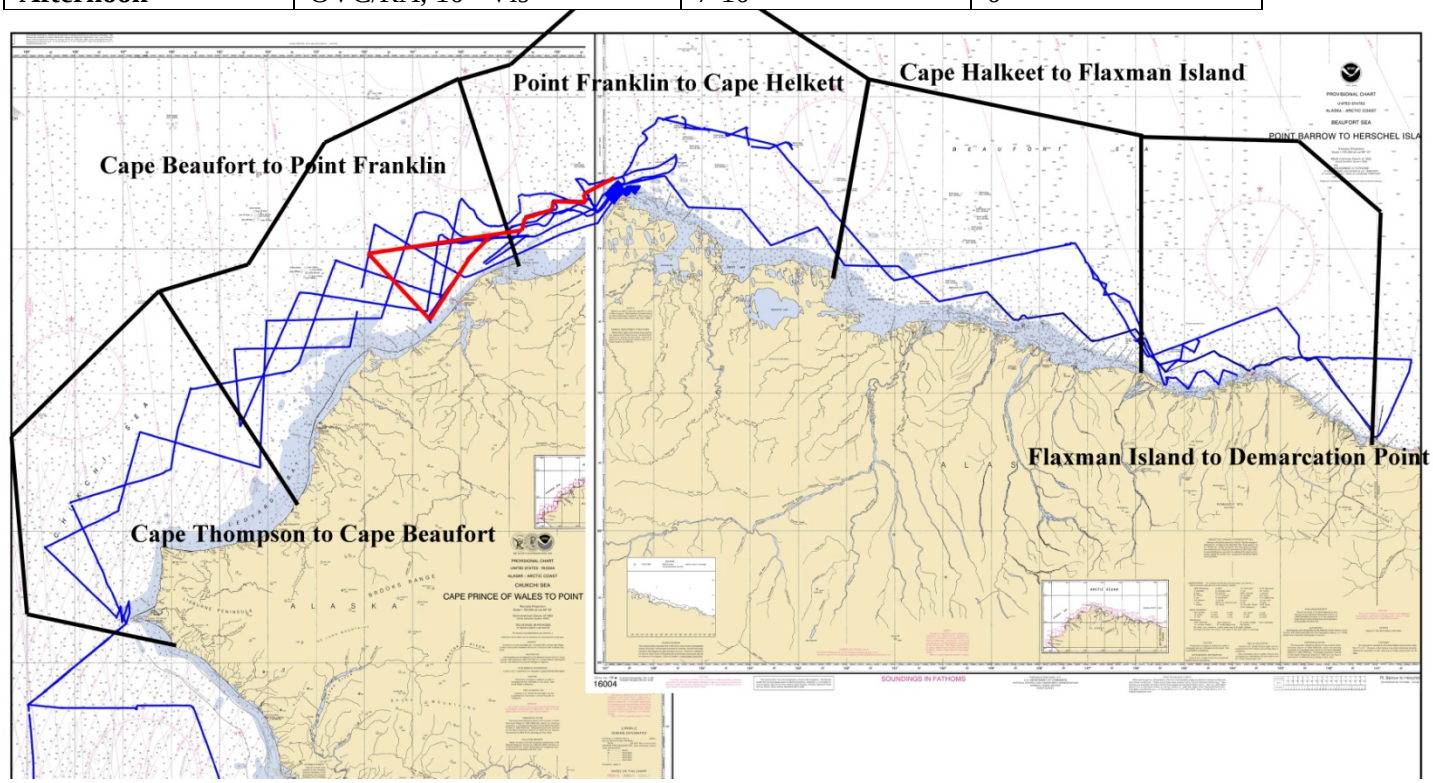
Aug 13, 2012

	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	MCLR, 10+ Vis	10-14	0-1
Afternoon	MCLR, 10+ Vis	15-20	0



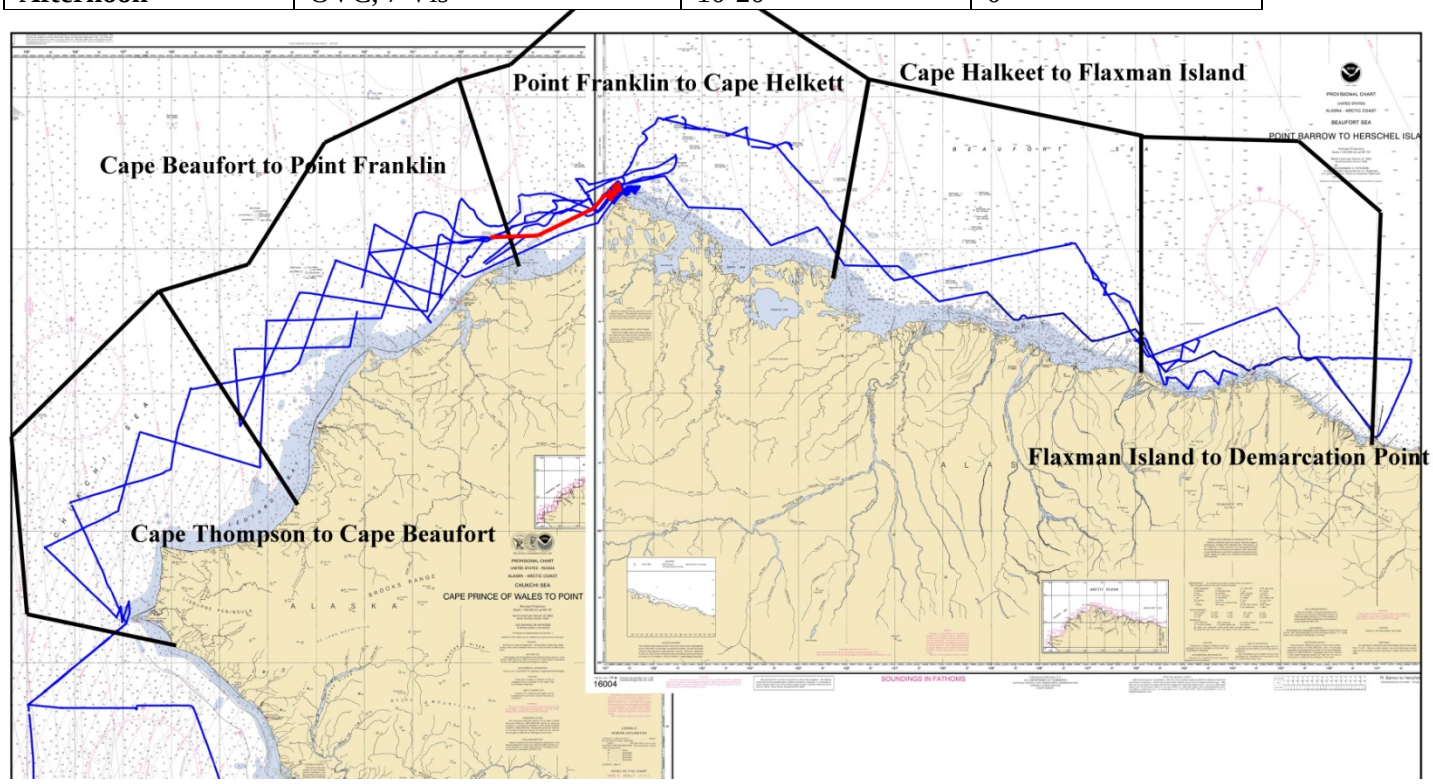
Aug 14, 2012

	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	OVC/FG, ½ Vis	LGT	0
Afternoon	OVC/RA, 10+ Vis	7-10	0



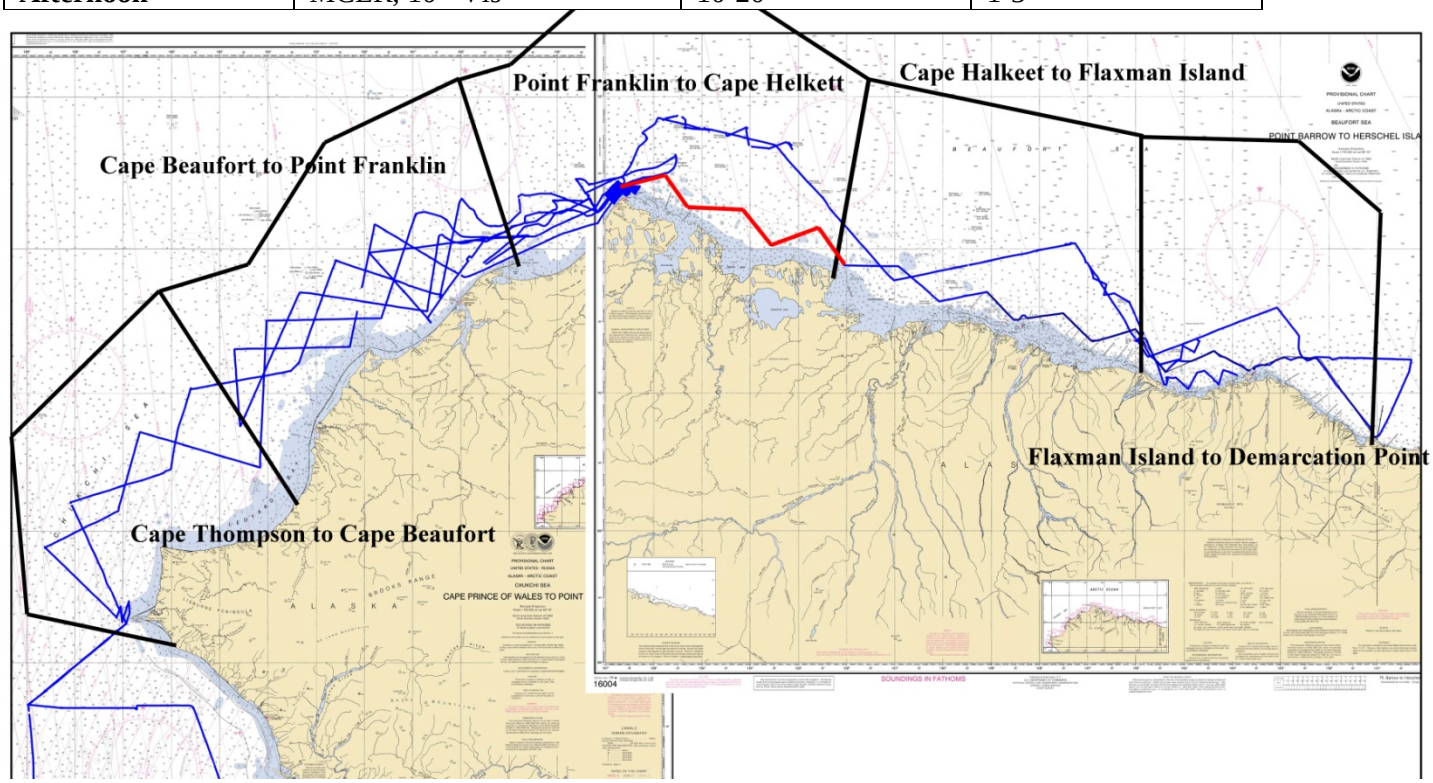
Aug 15, 2012

	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	-RA/FG, ½ Vis	5-10	0-2
Afternoon	OVC, 7 Vis	10-20	0



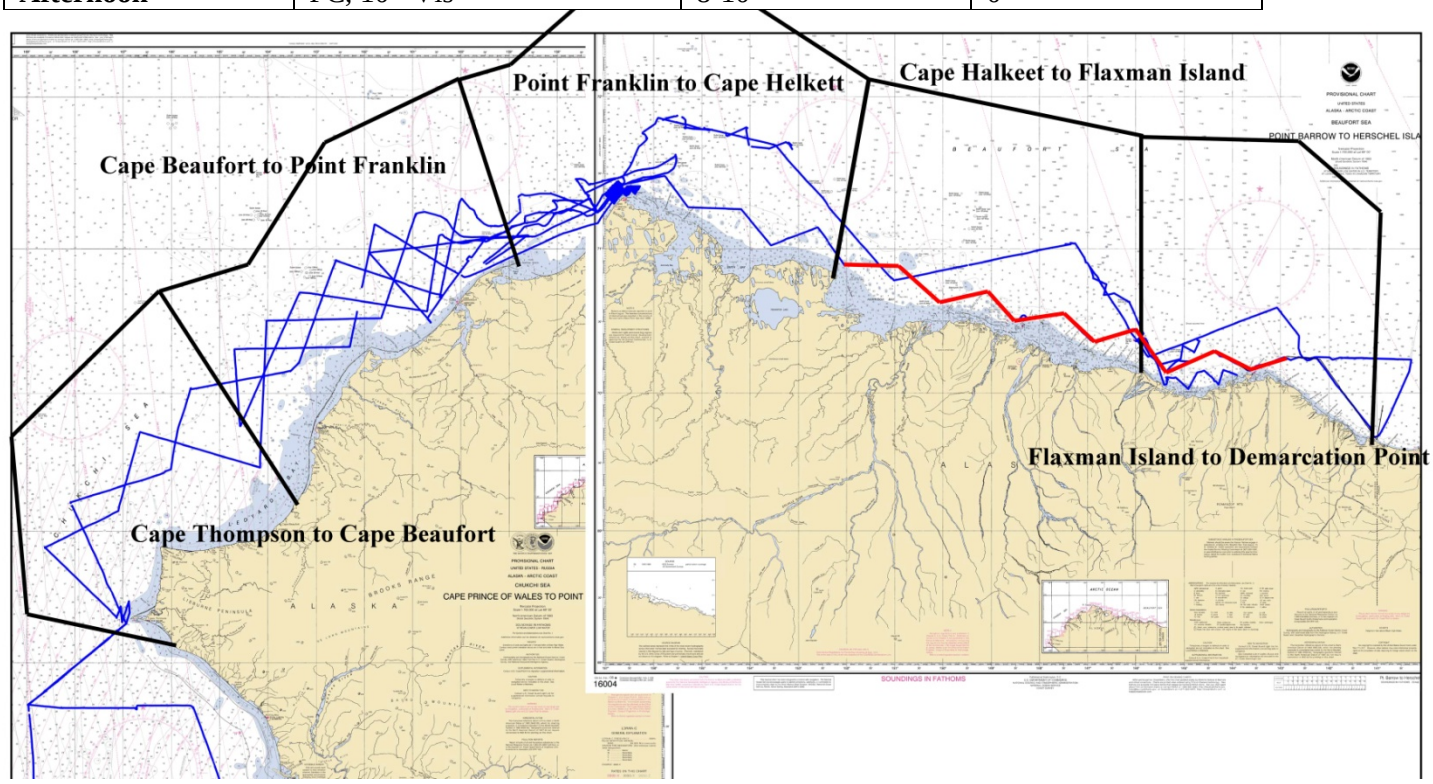
Aug 16, 2012

	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	OVC, 6-9 Vis	15-20	2-4
Afternoon	MCLR, 10+ Vis	10-20	1-3



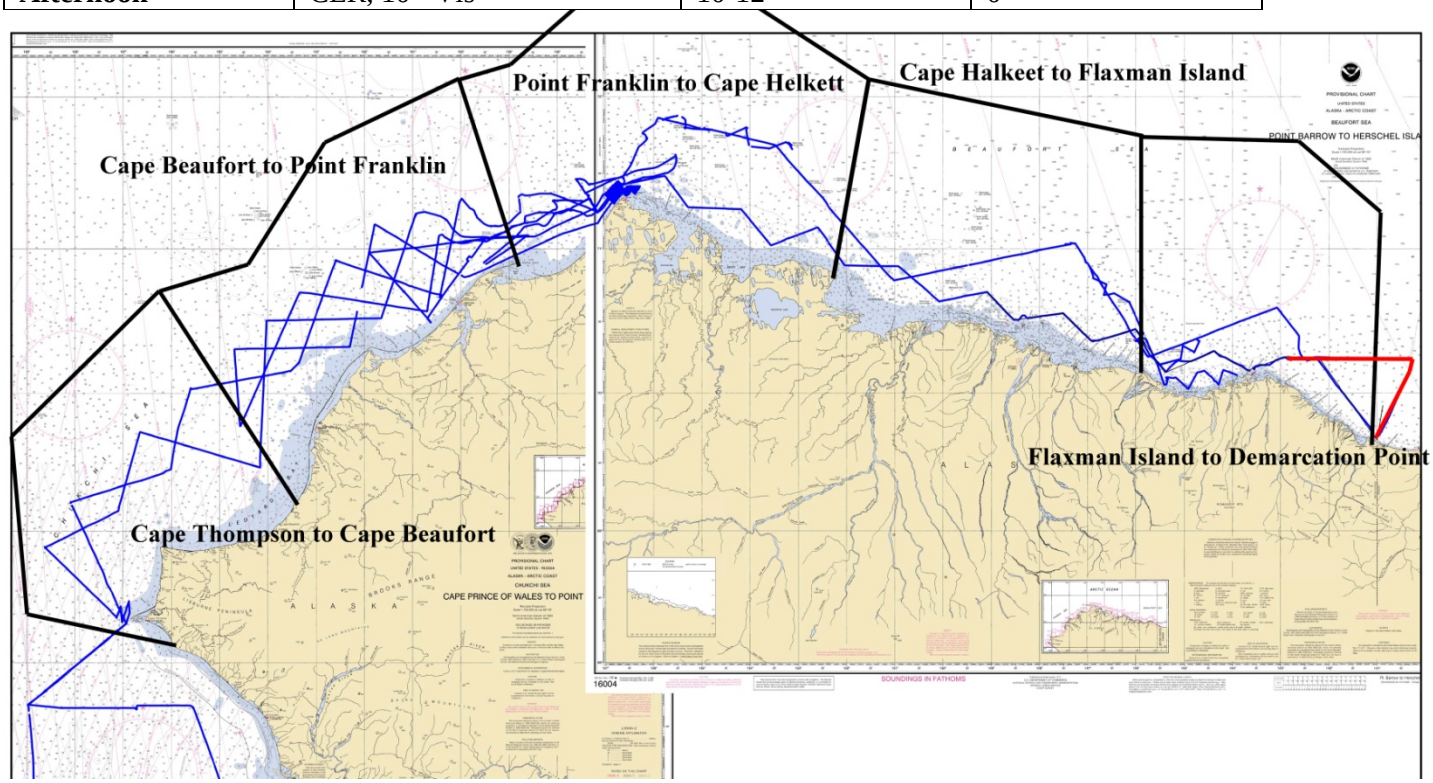
Aug 17, 2012

	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	OVC, 10+ Vis	10-12	0-1
Afternoon	PC, 10+ Vis	8-10	0



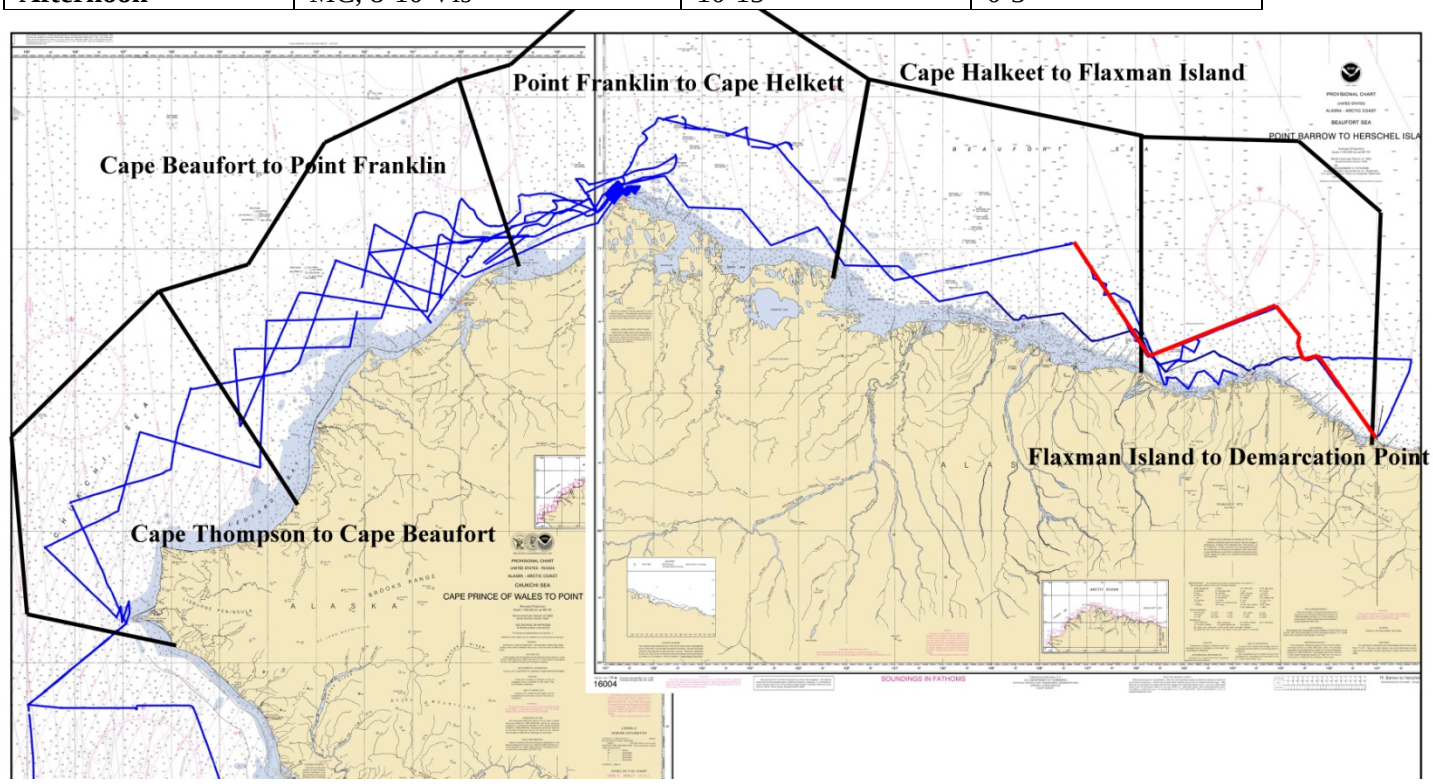
Aug 18, 2012

	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	MCLR, 8-10+ Vis	0-10	0
Afternoon	CLR, 10+ Vis	10-12	0



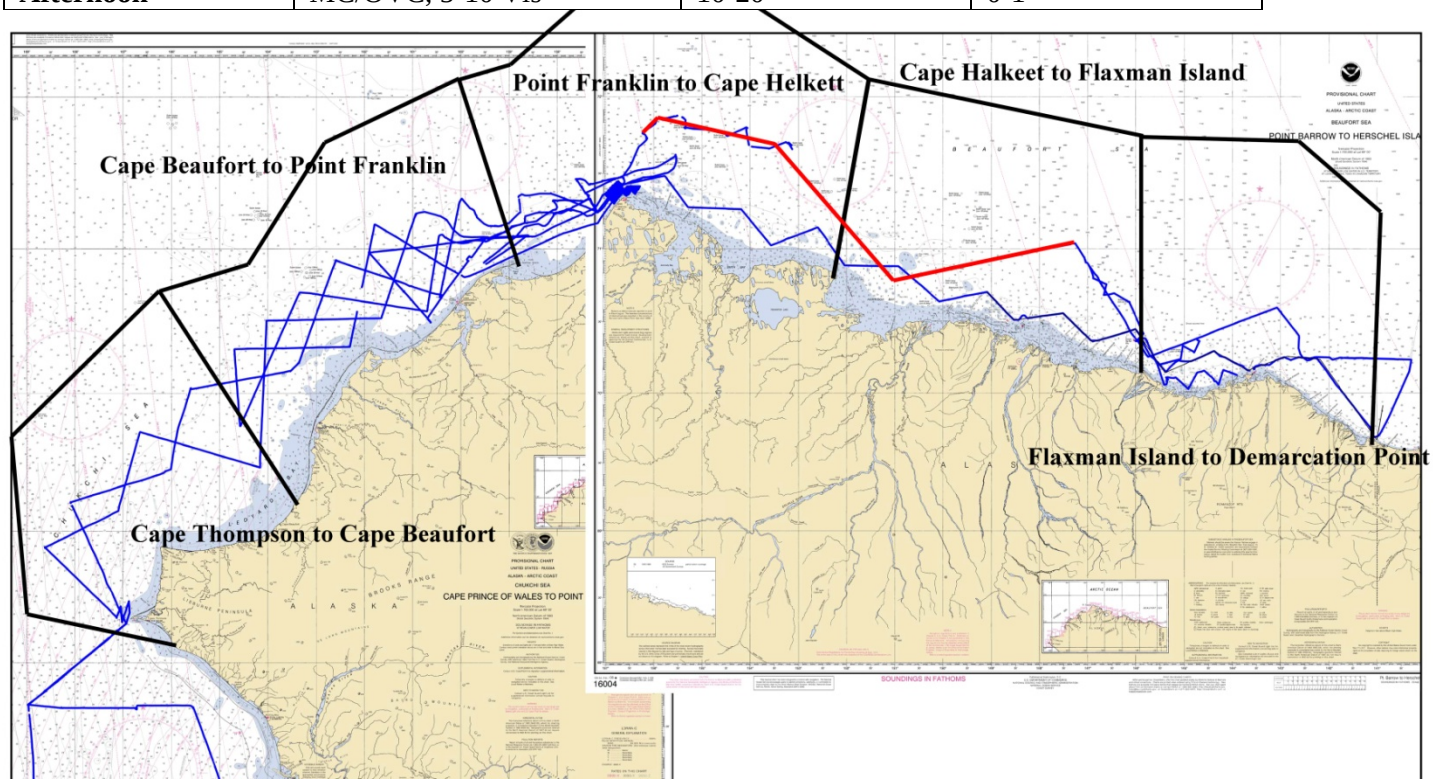
Aug 19, 2012

	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	MCLR, 10+ Vis	6-14	0-1
Afternoon	MC, 8-10 Vis	10-15	0-3



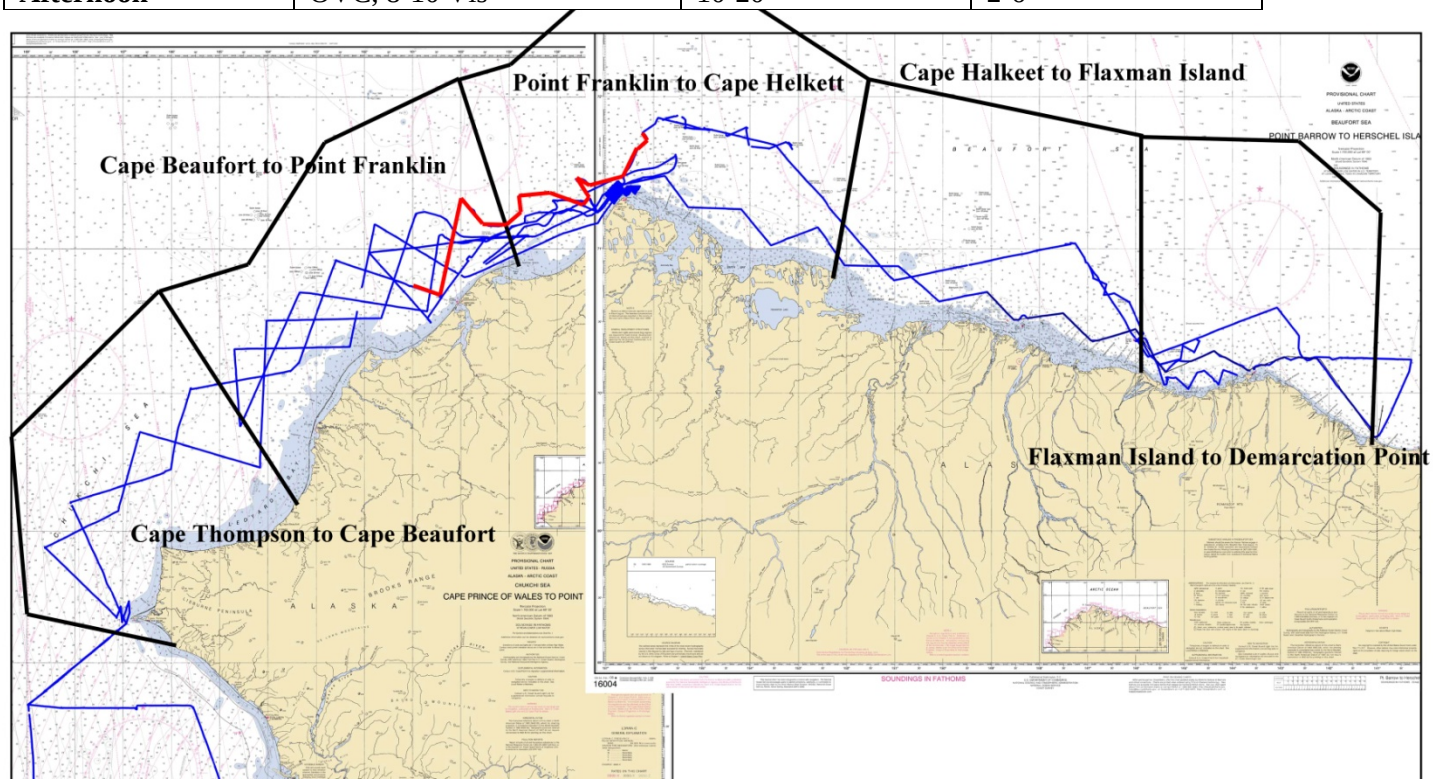
Aug 20, 2012

	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	MC, 10+ Vis	10-15	0-1
Afternoon	MC/OVC, 5-10 Vis	10-20	0-1



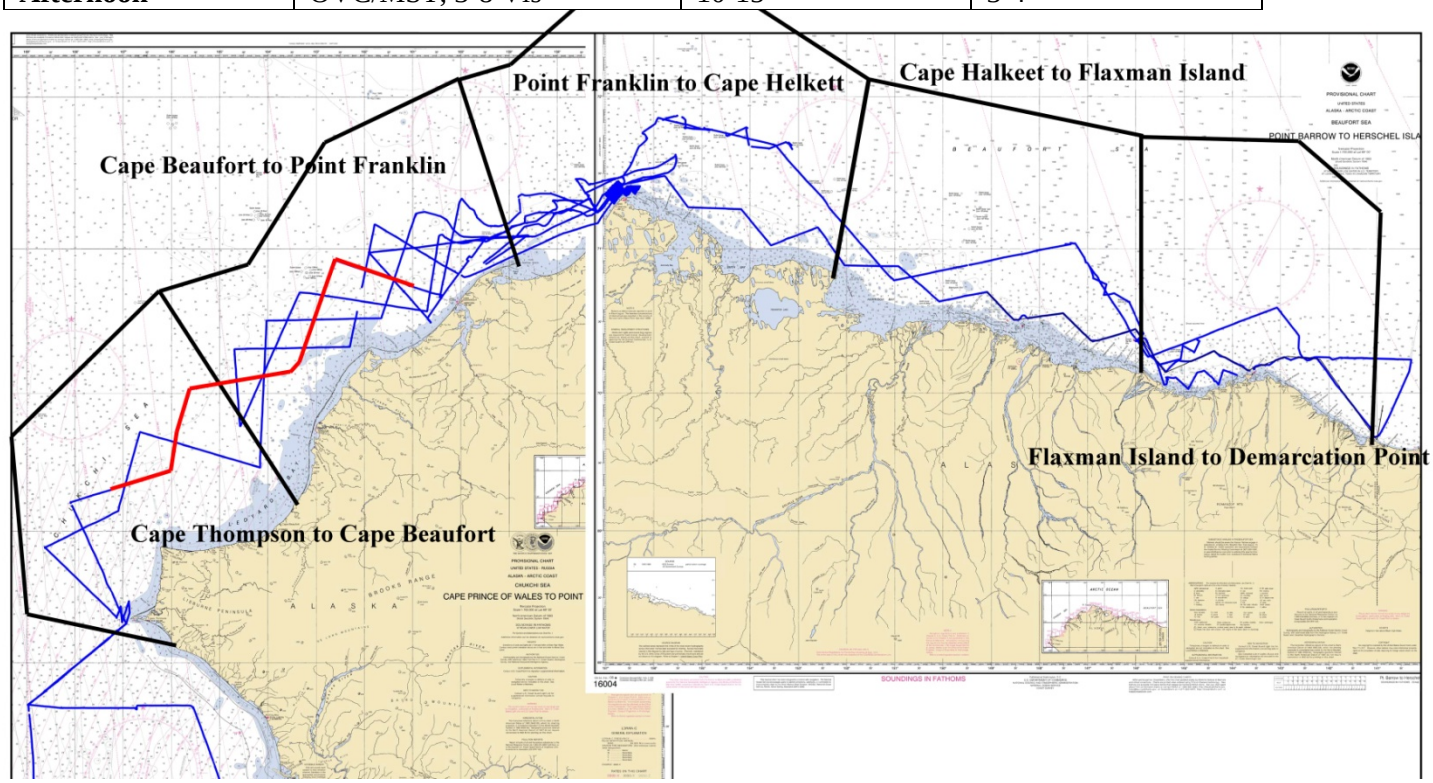
Aug 21, 2012

	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	MC/OVC/MST, 1-10 Vis	5-10	0-1
Afternoon	OVC, 8-10 Vis	10-20	2-6



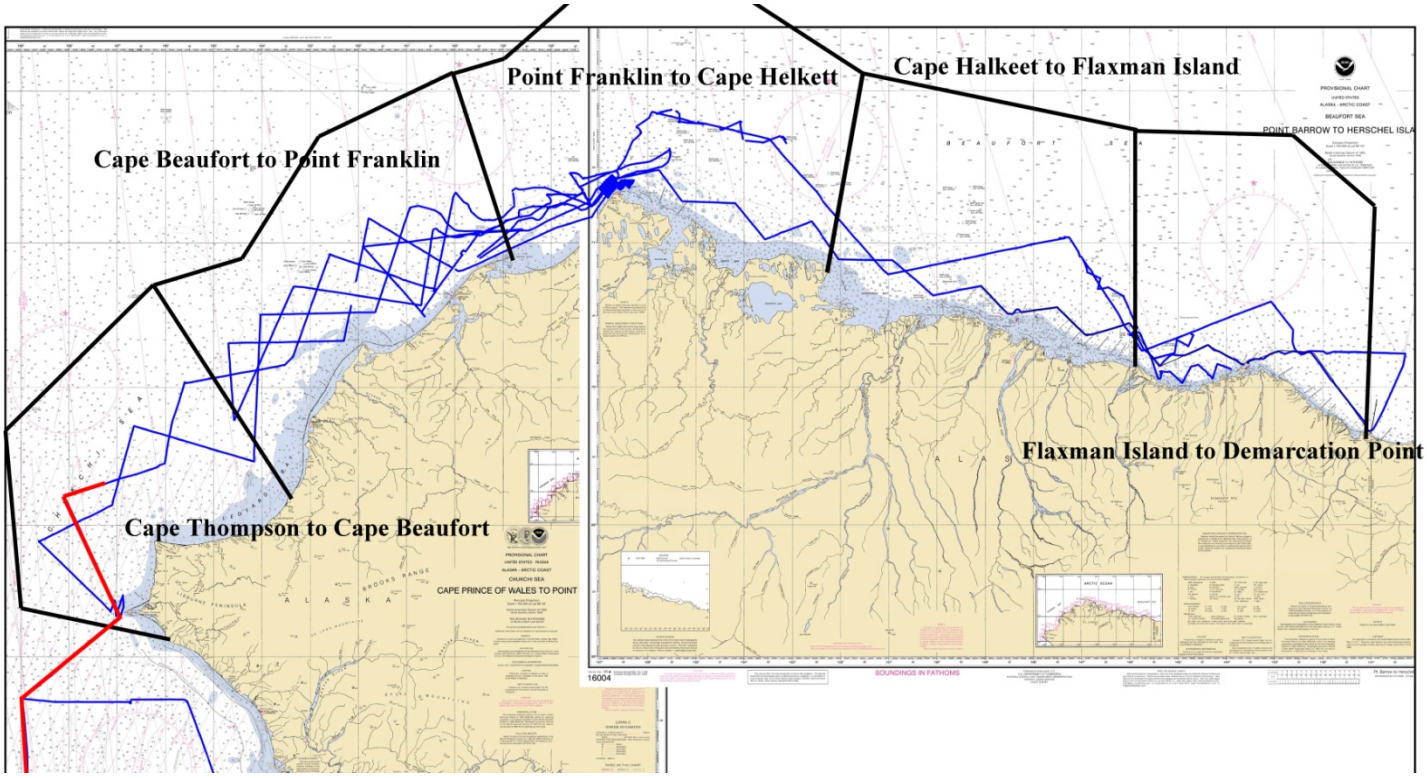
Aug 22, 2012

	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	OVC, 10+ Vis	20-22	10-12
Afternoon	OVC/MST, 3-8 Vis	10-15	3-4



Aug 23, 2012

	Weather (Vis in nm)	Wind (kts)	Wave (ft)
Morning	FG/OVC, ½ Vis	0-5	2-4
Afternoon	MC/OVC, 5-10+ Vis	10 → 40	0 → 14



Date	Time (local)	Vessel Name	Type	Nav Status	Length (m)	Width (m)	Draft (m)	IMO number	MMSI	Latitude (N)	Longitude (W)	Destination	Arrival Time	Notes
2-Aug-12	1737	Columbia	Cargo Ship	Engaged in Fishing	36m	10m	15m	000615729	366556140	55° 45.52'	166° 11.51'	Akutan	3/31 2100	Arrival time past
2-Aug-12	0734								366743980	54° 59.62'	165° 54.23'			
2-Aug-12	1448									56° 02.07'	168° 13.24'			
3-Aug-12	0600	Esperanza		U/W using engines	72	14	4.6	840459900	244690000	58° 25.30'	167° 18.30'	Dutch Harbor	04AUG12 1500	present for 2 hrs
5-Aug-12	2250	Chukchi Sea	Towing	At Anchor	31	9	2.7	008966705	367322830	66° 53.51'	162° 37.10'	Kotzebue	8/2 1800	Arrival time past
5-Aug-12	2320	Sam M Taalak		U/W using engines	44	14	1.5		368494000	66° 54.23'	162° 34.20'	Kotzebue		
5-Aug-12	2205	Sea Halk	Towing Vessel greater then 200m	U/W using engines	36	11	15.7	007729526	367309440	66° 34.49'	163° 25.70'	Kotzebue Anchor	7/31 2200	Arrival time past
5-Aug-12	2150	Sesok	Tug	U/W using engines	23	10	1.5	009502491	367399110	66° 49.53'	163° 00.46'	Cape Deceit	8/5 0600	Remains at location on 8/6
5-Aug-12	2030			At Anchor					354455000	67° 31.55'	164° 10.60'			
5-Aug-12	2030			At Anchor					538002531	67° 33.02'	164° 10.54'			
6-Aug-12	1912	Giant Sky	Cargo Ship	At Anchor	225	32	29.2 ft	009370185	354455000	67° 31.27'	164° 10.58'	US RDB	7/29 0500 UTC	
6-Aug-12	1720	Nachik	Towing	U/W using engines	23	10	1.5	009502489	367399170	66° 46.84'	163° 47.99'	Point Lay	8/8 1930	
6-Aug-12	1912	Yasta Pioneer	Cargo Ship	U/W using engines	229	32	29.9ft	009286578	538002531	67° 32.85'	164° 10.67'	Red Dog, AK	7/26 0100	SOG 0.0 kt
6-Aug-12	2020			U/W using engines					366934290	67° 33.24'	164° 10.86'			
6-Aug-12	2053			At Anchor					636015035	67° 33.48'	164° 12.22'			
7-Aug-12	2111	CG Sycamore	Engaged in Military Operations	U/W using engines	69	14	missing		368014000	68° 03.10'	166° 06.85'			
7-Aug-12	1624	Nanchick	Tug	U/W using engines	23	10	4.9	009502489	367399170	67-59.0N	166° 16.10'	Pt. Lay	8/8 1930 UTC	WDE7904
7-Aug-12	2014	Nokea	Tug	U/W using engines	31	10	4.5	007826908	367309280	68° 11.58'	166° 54.42'	Wainwright	8/8 8:00	
7-Aug-12	1650	Sesok	Tug	U/W using engines	23	10	4.9ft	009502491	367399110	67-57.6N	166° 14.60'	Wainwright	8/9 1800 UTC	WDE7899
7-Aug-12	1715	Siku	Towing	U/W using engines	28	9	6.6FT	009107837	366888910	6/-48.3N	166° 38.30'	Wainwright	8/10 0600	WCQ6174
7-Aug-12	1617	Westward Wind	Other	U/W using engines	45	10	42 FT	007743467	367000620	67° 43.30'	167° 43.90'	Osk. Nikiski		WCX9055
9-Aug-12	0504	Fennica	RAM	RAM	116	26	8.4	009043615	230245000	70 54.996'N	163 29.95'W	Dutch Harbor		
9-Aug-12	0048	Fish Hawk	Towing vesses	U/W using engines	20	8	2.3		367014080	69° 47.45'	163° 13.88'	Point Lay	8/9 0600	
9-Aug-12	1150	Sesok	Tug	U/W using engines	23	10	4.9ft	009502491	367399110	70-33.44N	160-25.33W	Wainwright	8/9 1800 UTC	WDE7899
10-Aug-12	1720	Greta	Other	U/W using engines	44	15	2		367438220	71° 21.12'	156° 36.88'		26 April 2300	WDF3219
10-Aug-12	1716	Maia H	Tug	Moored	26	8	4		366622140	71° 20.17'	156° 41.07'	Barrow	now	WYX2079
10-Aug-12	0730	Nokea	Tug	U/W using engines	31	10	4.5	007826908	367309280	70 46.80	160 07.60	Wainwright	8/10 0500	
10-Aug-12	0800	Nordica	Cargo Ship	Restricted Man.	116	26	8.2	009056985	230275000	71 04.18	162 43.55	Arctic Sea	7/26 0800	
10-Aug-12	0730	Sesok	Tug	U/W using engines	23	10	1.5	009502491	367399110	70 37.67	160 12.21	Wainwright	8/09 1800	
10-Aug-12	0730	Siku	Towing	U/W using engines	28	9	2	009107837	366888910	70 38.72	160 04.66	Wainwright	8/10 0600	
10-Aug-12	1943	Westward Wind		U/W using engines					367000620	71° 10.07'	158° 31.28'	Osk. Nikiski	5 Oct 1030	
10-Aug-12	1720			RAM					230245000					
11-Aug-12	1723	Fennica	Other	U/W using engines	116	26	8.4	009043615	230245000	71° 19.17'	163° 06.86'	Chukchi	31/10 1200	Seen all day
11-Aug-12	0820	Nokea	tug	U/W using engines	31	10	4.5	007826908	367309280	70° 46.80'	160° 07.60'	Wainwright	8/10 0500	
11-Aug-12	0026	Nordica	Cargo Ship	U/W using engines	116	26	8.2	009056985	230275000	71° 11.37'	158° 05.36'	Beaufort Sea	8/12 0930 UTC	
11-Aug-12	0800	Sesok	Tug	Moored	23	10	4.9ft	009502491	367399110	70° 38.67'	160° 01.97'	Wainwright	8/9 1800UTC	
11-Aug-12	0750	Siku	Towing	At Anchor	28	9	6.6FT	009107837	366888910	70° 38.70'	160° 01.95'	Wainwright	8/10 0600	WCQ6174
12-Aug-12	2054	Nordica	Cargo Ship	Restricted Man.	116	26	26.9 ft	009056985	230275000	71° 13.54'	157° 51.45'	Beaufort Sea	8/10 0930	
14-Aug-12	1930	Greta	Other	U/W using engines	44	15	2		367438220	71° 19.92'	156° 40.20'		4/26 2300	SOG 0.0 kt; still present 0600 8/15
14-Aug-12	1930	Maia H	Towing Vessel greater then 200m	Moored	26	8	4		366622140	71° 20.18'	156° 40.55'	Barrow	28 July 1230	still present 0600 8/15
14-Aug-12	0900	Siku	Towing	At Anchor	28	9	2	009107837	366888910	70° 38.99'	160 03.14W	Wainwright	8/10 0600	WCQ6174
14-Aug-12	0630	Westward Wind		U/W using engines	45	10	15	007743467	367000620	70 37.41N	160 15.41W	Osk. Nikiski	5 Oct 1030	> 2hrs
15-Aug-12	0600	Nordica	Cargo Ship	U/W using engines	116	26	26.9 ft	009056985	230275000	71° 33.94'	155° 14.98'	Beaufort Sea	8/16 0300	
15-Aug-12	2115	Sag River	Tugs	U/W using engines	20	9	1		366889350	71° 19.53'	156° 41.61'	Barrow	Oct 4th 2100	>2hrs
16-Aug-12	1820	Hook Point	Fishing		27	8			367182670	70° 32.09'	149° 45.94'			WDD7159
16-Aug-12	2232	Kavik River	Tug	U/W using engines	20	9	1		366888820	70° 23.84'	148° 31.45'	N Star		SOG is 0.0kts
16-Aug-12	0645	Nunaniq	Other	U/W using engines	45	15	2		366197000	71° 02.00'	153 30.08W	None	30JUN 1600	>2hrs
16-Aug-12	1750	Old Bull	Tug	U/W using engines	12	6			367492440	70° 30.56'	149° 51.65'			SOG is 0.0kts
17-Aug-12	0645	Louis S. ST Laurent	Other	U/W using engines	120	24	9	006705937	316165000	70° 50.46'	145° 12.45'	Resolute	28JUL 1430	
17-Aug-12	0530	Nordica	Cargo Ship	RAM	116	26	26.9	009056985	230275000	70° 24.63'	146° 01.55'	Beaufort Sea	16 Aug 0330	
17-Aug-12	0636	Norseman II	Undefined	U/W using engines	35	10	4	007908122	367176270	70° 21.71'	146° 00.10'	Beaufort Sea	N/A	
18-Aug-12	2300	Hanseatic	Passenger Ship	U/W using engines	123	21	5	009000168	309577000	70° 22.02'	142° 36.52'	NW Passage (E-Bound)	14 Aug 1500	Arrival time past
19-Aug-12	0700	Aiviq	Towing	RAM	109	24	9.3	009759016	367141000	70° 24.02'	145° 58.85'	Beaufort Sea	18Aug 2200	
19-Aug-12	2100	Hook Point	Fishing		27	8			367182670	70° 35.00'	149° 39.31'			SOG=0.1 kt
19-Aug-12	0745	Nordica	Cargo Ship	RAM	116	26	26.9	009056985	230275000	70° 25.92'	146° 03.41'	Beaufort Sea	18 Aug 0330	
19-Aug-12	2055	Nunaniq	Other	U/W using engines	45	15	2		366197000	70° 31.46'	149° 00.67'	None	30JUN 1600	
19-Aug-12	2107	Old Bull	Tug	U/W using engines	12	6			367492440	70° 30.56'	149° 51.65'			SOG is 0.0kts
19-Aug-12	2058	PT Thompson	Towing	U/W using engines	27	10	2.5	008867882	366888930	70° 30.07'	148° 50.15'	Prudhoe Bay, AK	20 Aug 0800	
19-Aug-12	2150	Siku	Towing Vessel greater then 200m	U/W using engines	28	9	2	009107837	366888910	70° 37.64'	149° 42.25'	Kaktovik	28 Aug 1800	
20-Aug-12	1432	Tor Viking	Undefined	U/W using engines	93	18	7.1	009199622	266004000	71° 35.70'	155° 49.30'	Barrow	07 Aug 0300	
21-Aug-12	1115	Affinity	Tanker	At Anchor	228	32	10.5	009289776	564719000	71° 04.86'	160° 49.34'	west of barrow	17AUG 1200	
21-Aug-12	0140	Nachik	Towing	U/W using engines	23	10	1.5	009502489	367399170	71° 10.90'	157° 39.10'	Barrow	8/21 0730	
21-Aug-12	1045	NANUQ	WIG FUTURE USE	U/W using engines	93	20	5.2		366284000	71° 03.99'	160° 37.35'	Point Franklin	17AUG 0800	
21-Aug-12	1622	NANUQ	WIG FUTURE USE	U/W using engines	93	20	5.2		366284000			Point Franklin	17AUG 0800	Definitely NOT WIG
21-Aug-12	1720	The World	Passenger Ship	U/W using engines	196	30	7	009219331	311213000	70° 46.05'	161° 11.88'	Herchel Island	23 Aug 1300	
21-Aug-12	0600	USCGC ALEX HALEY	Undefined	U/W using engines	94	8			338945000	71° 02.09'	158° 56.35'			
22-Aug-12	2000	Bristol Explorer		Engaged in Fishing	54	12	4	008030647	367108560	68° 49.92'	166° 46.11'	Chukchi Sea	19 Aug 0800	
22-Aug-12	0052	Sesok	Tug	U/W using engines	23	10	4.9ft	009502491	367399110	70° 05.60'	162° 55.80'	Barrow	23 Aug 0800	
22-Aug-12	0925	UNK	UNK	U/W using engines	UNK	UNK	UNK		367309280	69° 33.09'	165° 26.16'			AT 12 NM BUT NO NAME
23-Aug-12	1642	Moor	Tanker	U/W using engines	127	20	7.1	009359593	565632000	66° 33.57'	168° 08.90'	Port Clarence	24 Aug 0030	
24-Aug-12	1645	Sam M Taalak		U/W using engines	44	14	1.5		368494000	63° 21.43'	168° 58.22'			
24-Aug-12	1740	Polar Endurance	Towing Vessel greater then 200m	U/W using engines			14.8ft	007367146	303144000	63° 26.64'	169° 06.12'	NE Cape St. Lawrence	23 Aug 300 UTC	
24-Aug-12	0200	USNS Sumner	Navy Hydrographic	U/W using engines						65° 17.00'	169° 07.00'			
25-Aug-12	1020	Warrior	Lenth exceeds 200m or breadth exceeds 25m	U/W using engines	40	10	6	007390908	366887190	59° 56.46'	169° 24.66'	Prudhoe Bay, AK	30 AUG 1201	
25-Aug-12	1020	Guardsman	Tug	U/W using engines	45	12	5.8	007506003	366887950	59° 56.68'	169° 24.76'	Port Clarence	28 Aug 1200	
25-Aug-12	2145	Ocean Peace	Carrying DG, HS, or MP IMO Hazard or Pollutant Category D	U/W using engines	73	12	6	000677399	338693000	58° 16.68'	166° 50.18'	Adak, AK	17 July 0800	

25-Aug-12	2205	Alaskan Lady	Carrying DG, HS, or MP IMO Hazard or Pollutant Category B	Engaged in Fishing	70	15	14	007742358	367528690	58° 09.30'	167° 09.18'	Dutch Harbor	31 July 1200	no mistake in recording type for Ocean Peace & Alaskan Lady
25-Aug-12	2251	Alaska Spirit	Fishing	U/W using engines	70	12	6	007397091	366705860	58° 15.67'	166° 21.76'	Dutch Harbor	9 Dec 0300	
25-Aug-12	2255	Katie Ann	Fishing	U/W using engines	96	14	6	006931055	366499000	57° 54.68'	167° 25.80'	Dutch Harbor	5 Aug 1200	
26-Aug-12	0300	Alaskan Endeavor	-	U/W using engines	39	9	3.7	793355550	367650000	56° 46.02'	166° 23.67'	Meat Patch	-	>2 hrs
26-Aug-12	0300	Alaska Juris	-	Engaged in Fishing	72	13	6.7	341003073	341003073	56° 34.00'	166° 16.65'	-	12AUG 1712	>2 hrs
26-Aug-12	0300	Seafreeze Alaska	Other	Reserved Future Use	-	-	-	000517242	367390380	56° 45.37'	166° 24.31'	-	-	>2 hrs