

F00694

NOAA Form 76-35A

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Survey

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: F00694

LOCALITY

State: Alaska

General Locality: Bering Strait and Vicinity

Sub-locality: Approaches to Yukon River

2017

CHIEF OF PARTY
CDR Mark Van Waes

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

F00694

INSTRUCTIONS: The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

State: **Alaska**

General Locality: **Bering Strait and Vicinity**

Sub-Locality: **Approaches to Yukon River**

Scale: **1: 40,000**

Dates of Survey: **07/11/2017 to 09/03/2017**

Instructions Dated: **05/08/2017**

Project Number: **OPR-R365-FA-17**

Field Unit: **NOAA Ship *Fairweather***

Chief of Party: **CDR Mark Van Waes, NOAA**

Soundings by: **Multibeam Echo Sounder**

Imagery by:

Verification by: **Pacific Hydrographic Branch**

Soundings Acquired in: **meters at Mean Lower Low Water**

Remarks:

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via <http://www.ncei.noaa.gov/>.

Descriptive Report Summary F00694	
Project	OPR-R365-FA-17
Survey	F00694
State	Alaska
Locality	Bering Strait and Vicinity
Sub Locality	Approaches to Yukon River
Scale of Survey	1:40000
Sonars Used	Kongsberg EM 2040 (Multibeam Echo Sounder) ODIM CEE Pulse (Vertical Beam Echo Sounder)
Horizontal Datum	North American Datum of 1983 (NAD83)
Vertical Datum	Mean Lower Low Water
Vertical Datum Correction	TCARI
Projection	UTM Zone 03
Field Unit	NOAA Ship <i>Fairweather</i>
Survey Dates	07/11/2017 - 09/03/2017
Chief of Party	CDR Mark Van Waes, NOAA

A. Area Surveyed

This hydrographic survey was acquired in accordance with the requirements defined in the Project Instructions for OPR-R365-FA-17. F00694 is a Reconnaissance Survey, and therefore adheres to Section 5.2.2.5.2 of the HSSD.

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
62° 35' 55.97" N 165° 36' 48.5" W	62° 24' 29.03" N 164° 46' 23.13" W

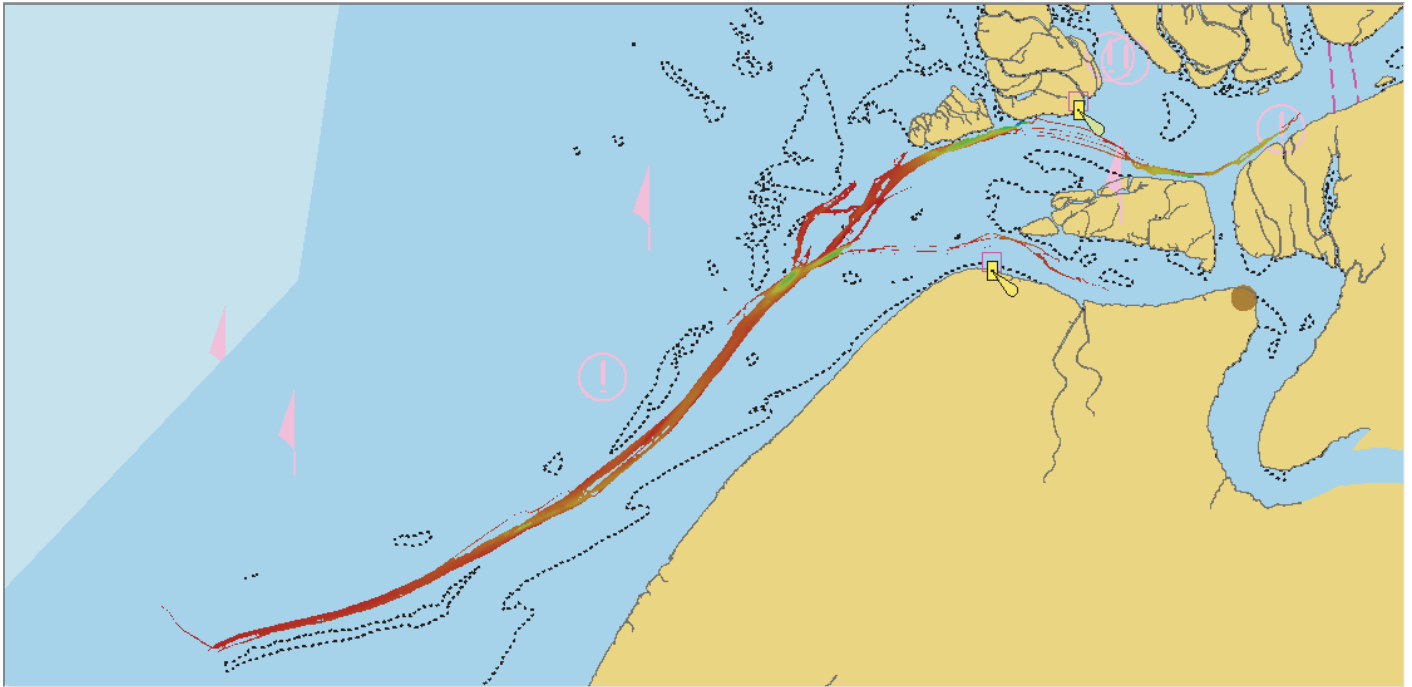


Figure 1, Surface from F00694 overlaid onto ENC US4AK96M

B. Survey Purpose

This survey was conducted in an effort to provide modern bathymetric data in the mouth of the Yukon River to investigate the effectiveness of leveraging satellite derived bathymetry as a method of updating bathymetry in the river. This survey also provides reconnaissance data on the main channel into the river, an area that has not been surveyed since 1899.

C. Intended Use of Survey

The entire survey is adequate to supersede previous data.

D. Data Acquisition and Processing

Please reference Data Acquisition and Processing Report for OPR-R365-FA-17 for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods.

E. Uncertainty

To verify that all data meet the accuracy specifications as stated in the HSSD, the surface generated from the data was entered into the Grid QA function in PydroXL to determine NOAA allowable uncertainty statistics. It was found that 99.78% of nodes meet NOAA allowable uncertainty specifications for all depths.

F. Results and Recommendations

The following are the largest scale RNC and ENC, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US4AK98M	1:90000	1	11/09/2015	11/09/2015	NO

ENC US4A98M contains no sounding data, and therefore a sounding comparison could not be performed between data from F00694 and the ENC. In lieu of a traditional chart comparison, a comparison was done between surveyed data and the satellite derived bathymetry generated by the Office of Coast Survey for this area. See Section H for this analysis.

The following surfaces and/or BAGs were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
F00694_MB_VR_MLLW	CUBE	1.0 - 2.0 m	0.5 m - 35.9 m	NOAA_VR	Reconnaissance
F00694_MB_VR_MLLW_Final	CUBE	1.0 - 2.0 m	0.5 m - 35.9 m	NOAA_VR	Reconnaissance

SAR: ENC US3AK83M (1:300,000), contains sounding data that overlaps with the coverage extents of F00694. Agreement between USAK83M charted soundings and F00694 surveyed depths is poor. Of the 17 soundings portrayed on US3AK83M that share overlap with F00694 MBES coverage, twelve (12) charted soundings are shoaler than surveyed depths by as much as 27 feet, and five (5) charted soundings are deeper than surveyed depths by as much as 13 feet.

G. Vertical and Horizontal Control

The vertical datum for this project is Mean Lower Low Water.

The vertical control method used for this survey was TCARI.

The following National Water Level Observation Network (NWLON) stations served as datum control for this survey:

Station Name	Station ID
Village Cove, AK	9491094

A request for final approved tides was sent to N/OPS1 on 9/06/2017. The final tide note was received on 9/15/2017.

Vertical offsets exist in the tidally referenced data, likely due to differences in river outflow causing variation in the TCARI model. The largest of these differences were noticed in data near the mouth of the river, where a 4.3 meter deep line crosses a 3.3 meter deep line from the previous day, and a 3.5 meter deep line from the same day (Figure 2).

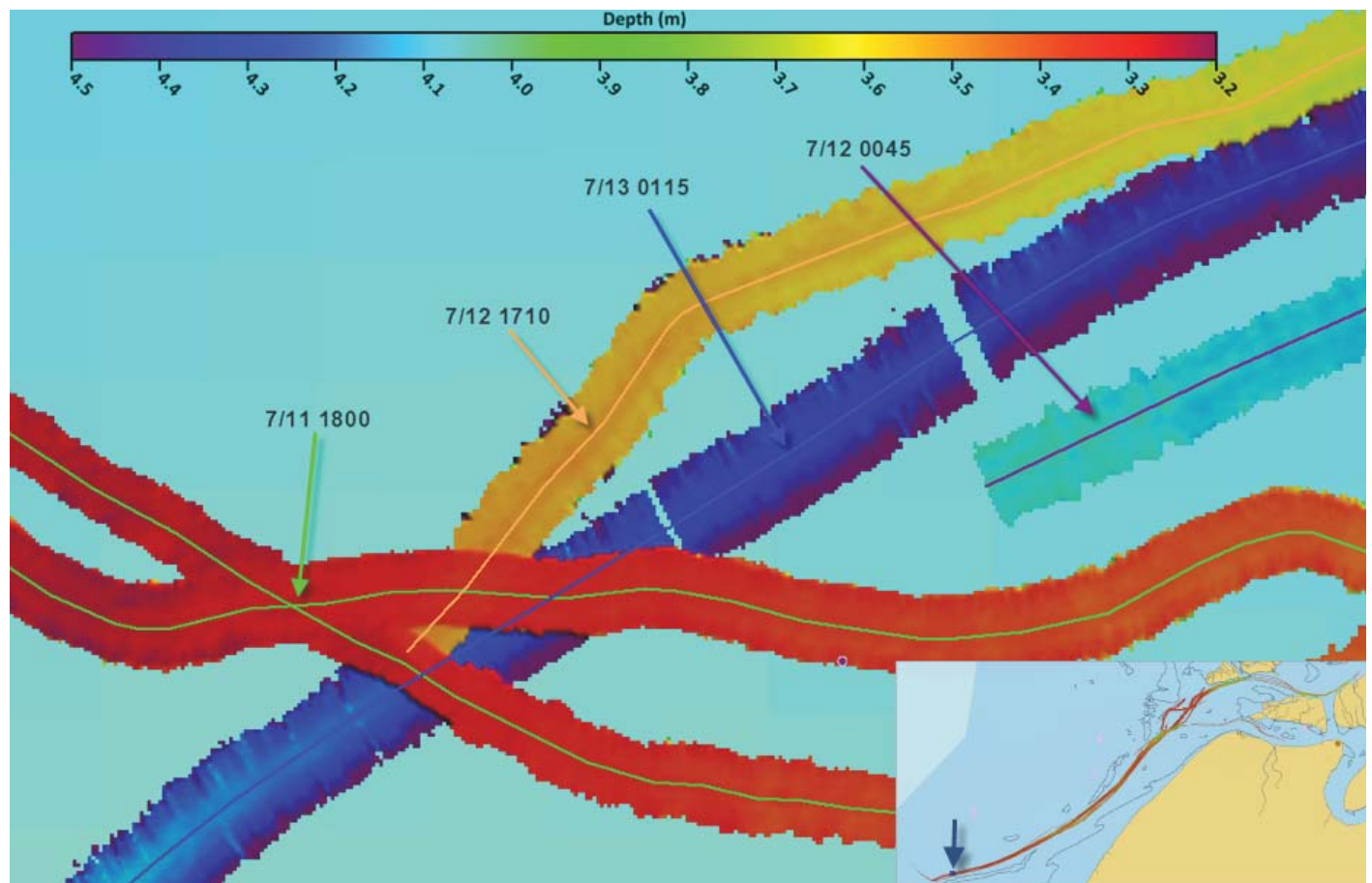


Figure 2, F00694 tidal offset

The horizontal datum for this project is North American Datum of 1983 (NAD83). The projection used for this survey is UTM Zone 03.

The following DGPS Stations were used for horizontal control:

DGPS Stations

During real-time acquisition, the survey vessels received correctors from the Wide Area Augmentation System (WAAS) for increased accuracies similar to United States Coast Guard Differential GPS stations. WAAS was the sole method of correcting position data for F00694, as no DGPS stations were available for real-time horizontal control.

H. Additional Results

Acquisition Technique

Due to the prevalence of shoals and relative uncertainty of depths in this survey area, the argyle pattern suggested in the Project Instructions was deemed by the field unit to be unsafe and inefficient for the development of the main channel into the Yukon River with the survey launches. The field unit opted to run set lines through the area of greatest AIS traffic at a 50 meter spacing where possible, with further development of areas of interest as determined by the field unit through analysis of the satellite derived bathymetry supplied by the Office of Coast Survey. A large shoal was discovered in the center of the AIS channel east of Kutmuknuk Channel (Figure 3), forcing the field unit to deviate from this set line spacing and explore alternate routes through the channel. Through consult with local traffic and multibeam development of the area, the main channel into the Yukon River was determined to be immediately east of this shoal, with average depths of approximately six meters. In general, the field unit endeavored to maintain spacing between tracklines in an effort to cover as much area as possible in the limited time spent on station. This led to occasional intentional gaps in coverage throughout the surface.

Satellite Derived Bathymetry (SDB)

The imagery of the satellite derived bathymetry provided for this project proved helpful in operational planning and launch guidance throughout the survey area. See Figure 4 for an overview of the surveyed data overlaid on the SDB image. Visual analysis indicates that in general lighter blue colors tend to correspond with deeper areas, while dark blues and reds tend to correspond with shoals. One example of a deviation from this trend is a charted shoal that was not observed by the field unit (Figure 5). This may be due to the shifting nature of the shoals in the river mouth, rather than an issue with the SDB. Further analysis and comparison between the surveyed data and updated satellite derived data is necessary to fully evaluate the efficacy of leveraging satellite bathymetry as a charting tool in this area.

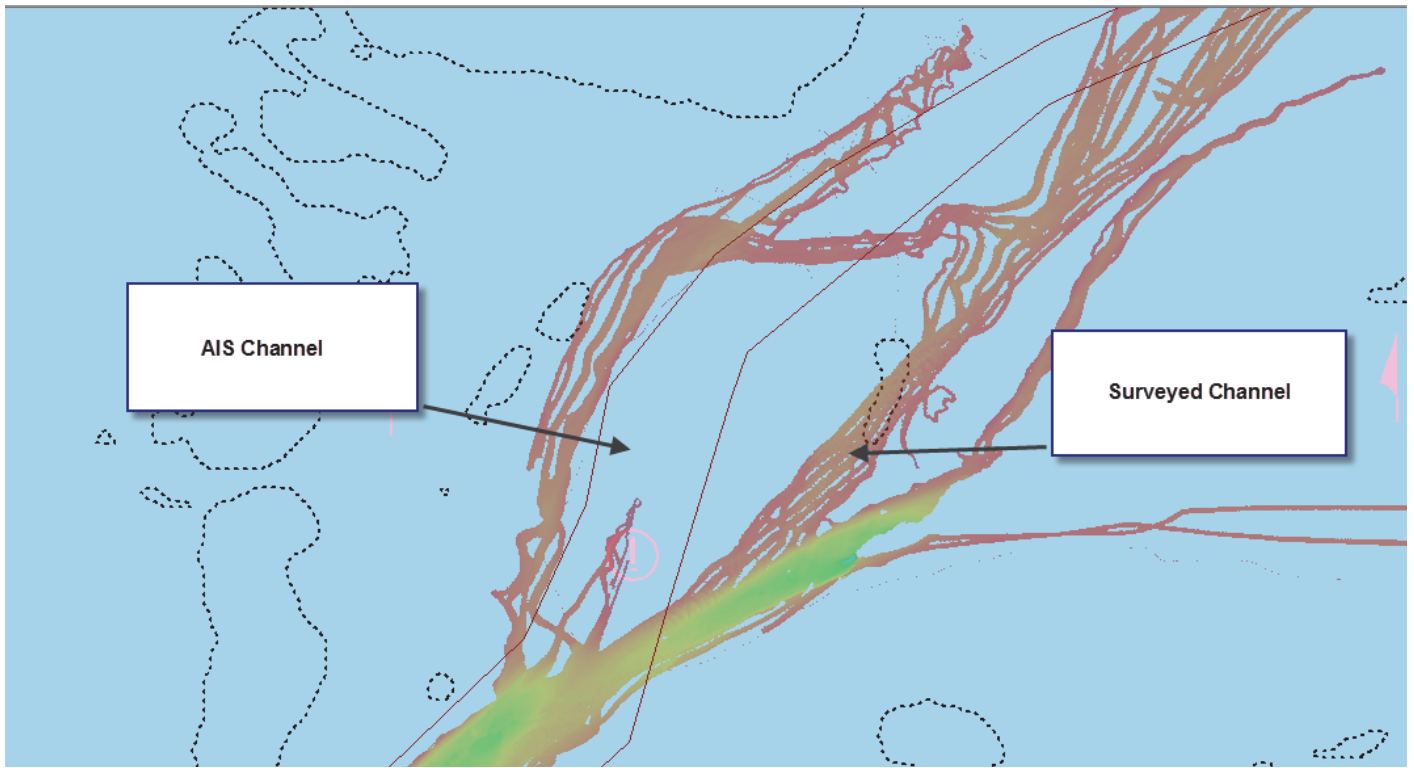


Figure 3, Deviation of main channel from AIS channel

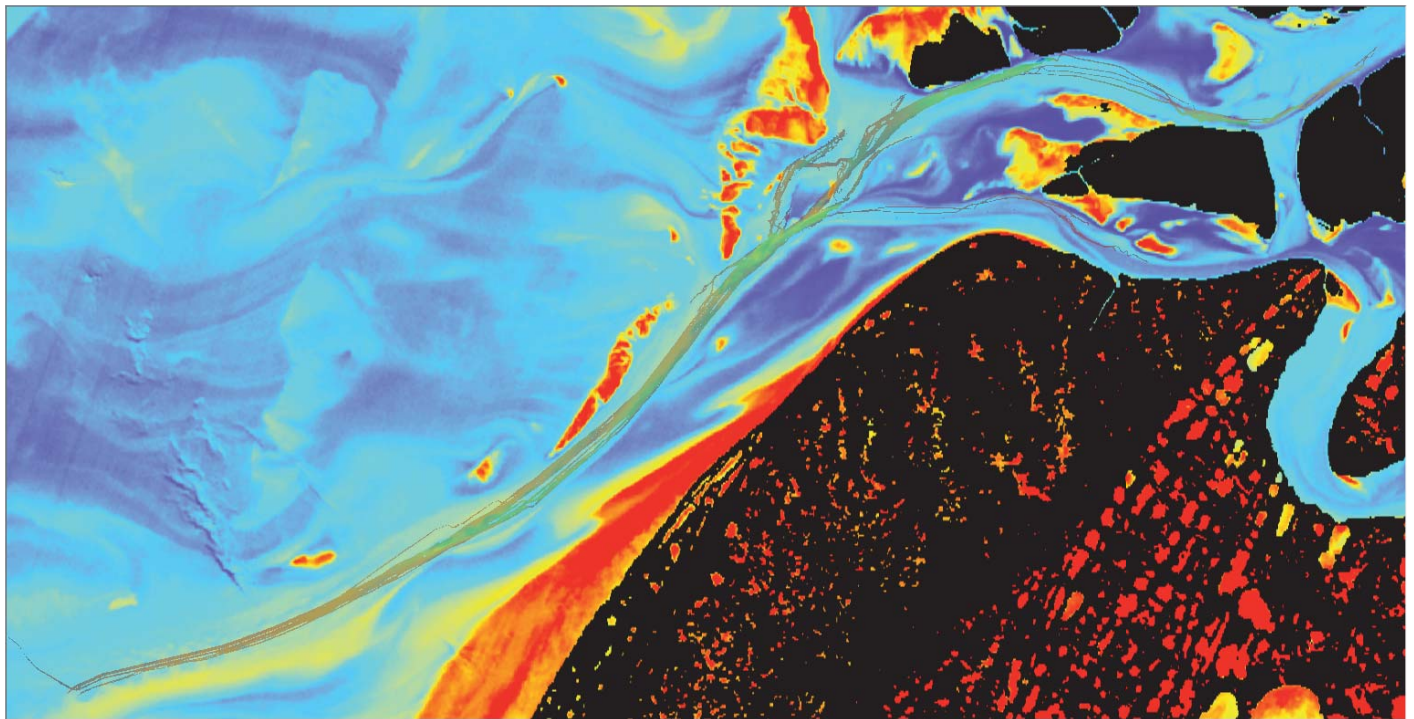


Figure 4, F00694 surface overlaid on satellite derived bathymetry

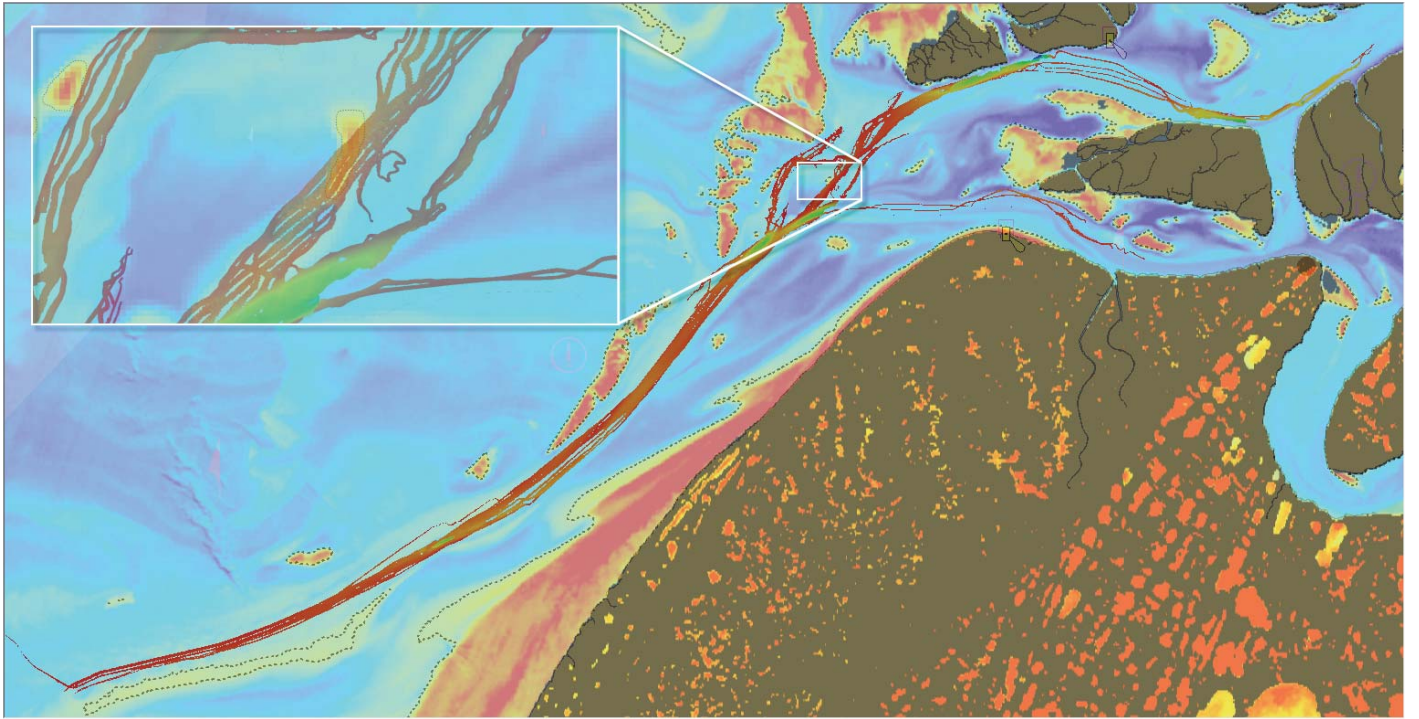





Figure 5, Shoal not observed during field operations

I. Approval

As Chief of Party, field operations for this hydrographic survey were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports.

All field sheets, this Survey Summary Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables, Field Procedures Manual, Standing and Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted herein.

Approver Name	Title	Date	Signature
CDR Mark Van Waes	Chief of Party	12/15/2017	 VAN WAES.MARK.1240076329 2017.12.16 15:59:41 -08'00'
FOR LT Damian Manda	Operations Officer	12/15/2017	 VAN WAES.MARK.1240076329 2017.12.16 15:59:02 -08'00'
HCST Sam Candio	Sheet Manager	12/15/2017	 Digitally signed by CANDIO.SAMUEL.LOUIS.1515897743 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=CANDIO.SAMUEL.LOUIS.1515897743 Date: 2017.12.15 09:34:17 -08'00'



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Silver Spring, Maryland 20910

PROVISIONAL TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : September 14, 2017

HYDROGRAPHIC BRANCH: Pacific

HYDROGRAPHIC PROJECT: OPR-R365-FA-17

HYDROGRAPHIC SHEET: F00694

LOCALITY: Approaches to Yukon River, Bering Strait and Vicinity, AK

TIME PERIOD: July 11 - September 03, 2017

TIDE STATION USED: 9468756 Nome, AK

Lat. 64° 29.7'N Long. 165° 26.4' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 0.406 meters

REMARKS: RECOMMENDED GRID Please use the TCARI grid "R945FA2017.tc" as the final grid for project OPR-R365-FA-17, F00694, during the period between July 11 and September 03, 2017.

Refer to attachments for zoning information.

Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

Note 2: Annual leveling in FY17 for 9468756 Nome, AK was not verified at time of this note. A review of the verified leveling records from June 2008 to June 2016 shows the tide station benchmark network to be stable within an allowable 0.009 m tolerance. This Tide Note may be used as final stability verification for survey OPR-R365-FA-17, F00694. CO-OPS will immediately provide a revised Tide Note should subsequent leveling records indicate any benchmark network stability movement beyond the allowable 0.009 m tolerance.

Note 3: Due to inaccurate shoreline, survey track lines fall outside of the TCARI grid boundaries in some areas. TCARI will extrapolate the tide corrector to cover these soundings.

CHIEF, PRODUCTS AND SERVICES BRANCH



★ 9468756 NOME, NORTON SOUND

Preliminary as Final TCARI Grid for

OPR-R365-FA-17, F00694

Approaches to Yukon River, Bering Strait and Vicinity, AK

0 25





Kurt Mueller - NOAA Federal <kurt.mueller@noaa.gov>

F00694 (Yukon River) charted light in ruined condition

6 messages

Kurt Mueller - NOAA Federal <kurt.mueller@noaa.gov>
To: Bart Buesseler - NOAA Federal <bart.o.buesseler@noaa.gov>

Wed, Nov 7, 2018 at 11:45 AM

Bart,

During survey ops for F00694 (OPR-R365-FA-17) the field reported a charted light in ruined condition. I'm attaching the Project Summary Report the field submitted. The description of the nav aid "which is now at the edge of an area of land extending to the north and in ruined condition" is on page 6 and also shown in figure 7. The SAR has been completed and approved for this survey at PHB, but I am not sure if the field ever reported the ruined light directly to you.

Charts are:

US4AK98M
US3AK83M
16240

I'm also attaching the feature itself which I extracted from US4AK98M.

Let me know if you need any further info,

Kurt

--

*Kurt Mueller
Physical Scientist
National Oceanic and Atmospheric Administration
Pacific Hydrographic Branch
7600 Sand Point Way NE
Seattle WA 98115
206-526-6853*

2 attachments

 **BCNSPP.000**
3K

 **F00694_Project_Summary_Report.pdf**
2247K

LT Bart O. Buesseler, NOAA <bart.o.buesseler@noaa.gov>
To: Kurt Mueller - NOAA Federal <kurt.mueller@noaa.gov>

Fri, Nov 9, 2018 at 3:53 PM

Good Afternoon Kurt,

Thanks for sending this along! I don't think I'd seen this before so I appreciate you making sure I got it. I've shared the info with USCG Waterways so they're aware of it as well.

Very Respectfully,

LT Bart Buesseler, NOAA

Navigation Manager, Alaska
NOAA Office of Coast Survey
[222 West 7th Ave](#)

11/14/2018

National Oceanic and Atmospheric Administration Mail - F00694 (Yukon River) charted light in ruined condition

Box 43 / Room 552
Anchorage, AK 99513

Office: 907.271.3327
Cell: 907.231.7112
Bart.O.Buesseler@noaa.gov

www.nauticalcharts.noaa.gov

[Quoted text hidden]

Kurt Mueller - NOAA Federal <kurt.mueller@noaa.gov>
To: Kurt Brown <kurt.brown@noaa.gov>

Tue, Nov 13, 2018 at 9:25 AM

Hey Kurt,

Bart replied about the ruined AtoN and passed on the info to the USCG -- I've saved the correspondence in Appendix II.

[Quoted text hidden]

Bart Buesseler - NOAA Federal <bart.o.buesseler@noaa.gov>
To: Kurt Mueller - NOAA Federal <kurt.mueller@noaa.gov>

Wed, Nov 14, 2018 at 12:54 PM

Kurt, please see the response below from USCG. Long story short they fixed the light but left the old one there. I'm not sure how long the ruined structure will last or how likely it is to move around with the river, so I'm not sure if we'd want to put anything on the chart though.

-Bart

----- Forwarded message -----

From: **Seris, David M CIV** <David.M.Seris@uscg.mil>
Date: Wed, Nov 14, 2018 at 1:54 PM
Subject: FW: [Non-DoD Source] Fwd: F00694 (Yukon River) charted light in ruined condition
To: LT Bart O. Buesseler, NOAA <bart.o.buesseler@noaa.gov>

Bart: Just closing the loop on this. The light was rebuilt last year but the old ruined structure remains in place. OK by us if NOAA decides to include it on the chart.

-Dave

From: Parker, David N LT
Sent: Wednesday, November 14, 2018 10:05 AM
To: Lacroix, John P BMCS <John.P.Lacroix@uscg.mil>
Cc: Seris, David M CIV <David.M.Seris@uscg.mil>; Buck, Todd R CIV <Todd.R.Buck@uscg.mil>
Subject: RE: [Non-DoD Source] Fwd: F00694 (Yukon River) charted light in ruined condition

Thanks for the info BMC.

V/r

LT P

From: Lacroix, John P BMCS
Sent: Wednesday, November 14, 2018 9:57 AM
To: Parker, David N LT <David.N.Parker@uscg.mil>
Cc: Seris, David M CIV <David.M.Seris@uscg.mil>; Buck, Todd R CIV <Todd.R.Buck@uscg.mil>
Subject: RE: [Non-DoD Source] Fwd: F00694 (Yukon River) charted light in ruined condition

All,

Sorry for the late reply. This is the rebuild we did last summer, Yukon River South Ent Lt (27860). The ruined structure is still there but there is an operating light.

V/r,

BMCS LaCroix

OIC ANT Kodiak

P: (907)487-5161

C: (907)942-2772

<https://cg.portal.uscg.mil/units/antkodiak/SitePages/Home.aspx>

From: Parker, David N LT
Sent: Wednesday, November 14, 2018 9:29 AM
To: Lacroix, John P BMCS <John.P.Lacroix@uscg.mil>
Cc: Seris, David M CIV <David.M.Seris@uscg.mil>; Buck, Todd R CIV <Todd.R.Buck@uscg.mil>
Subject: FW: [Non-DoD Source] Fwd: F00694 (Yukon River) charted light in ruined condition

Good morning BMC,

I'm assuming this aid is one of ours...not sure if you were already tracking this one or not so here's the info I have on it. Thinking this might be the same one that was reported by the hunters a little bit ago? I didn't do the homework to verify that, so it's just a guess. If you can hunt this one down as well I'd appreciate it.

Dave

From: LT Bart O. Buesseler, NOAA <bart.o.buesseler@noaa.gov>
Sent: Friday, November 9, 2018 2:52 PM
To: Parker, David N LT <David.N.Parker@uscg.mil>; Seris, David M CIV <David.M.Seris@uscg.mil>; Buck, Todd R CIV <Todd.R.Buck@uscg.mil>
Subject: [Non-DoD Source] Fwd: F00694 (Yukon River) charted light in ruined condition

Good Afternoon All,

I spoke with Mr. Parker about this briefly at a meeting today, but during a 2017 survey we identified that an ATON at the mouth of the Yukon River that appears to be ruined (email below and attachments). It might be something you're already tracking but I wanted to pass it along all the same to make sure the loop was closed.

Don't hesitate to give me a shout if you have any additional questions. Thanks!

Very Respectfully,

LT Bart Buesseler, NOAA

Navigation Manager, Alaska

NOAA Office of Coast Survey

222 West 7th Ave

Box 43 / Room 552

Anchorage, AK 99513

Office: 907.271.3327

Cell: 907.231.7112

Bart.O.Buesseler@noaa.gov

www.nauticalcharts.noaa.gov

----- Forwarded Message -----

Subject:F00694 (Yukon River) charted light in ruined condition

Date:Wed, 7 Nov 2018 11:45:21 -0800

From:Kurt Mueller - NOAA Federal <kurt.mueller@noaa.gov>

To:Bart Buesseler - NOAA Federal <bart.o.buesseler@noaa.gov>

[Quoted text hidden]

--

LT Bart Buesseler, NOAA
Navigation Manager, Alaska

Please excuse my brevity and any typos, I'm responding from a mobile device.

Kurt Mueller - NOAA Federal <kurt.mueller@noaa.gov>
To: Bart Buesseler - NOAA Federal <bart.o.buesseler@noaa.gov>

Wed, Nov 14, 2018 at 1:12 PM

Hi Bart,

Thanks for the follow up - agree that charting it may not be a good idea. I'll follow up with Pete/Grant to see if there's any additional action we should take here before we send this one onward to MCD for compilation.

-Kurt

[Quoted text hidden]

Kurt Mueller - NOAA Federal <kurt.mueller@noaa.gov>
To: Kurt Brown <kurt.brown@noaa.gov>

Wed, Nov 14, 2018 at 1:14 PM

Hey Kurt,

Sorry that these emails keep trickling in re: the ruined AtoN. Apparently the light has been fixed, but they left the old one there. Do you think the DR should be amended yet again with this additional correspondence?

[Quoted text hidden]



Kurt Mueller - NOAA Federal <kurt.mueller@noaa.gov>

F00694 - correspondence and Coast Pilot

3 messages

Kurt Mueller - NOAA Federal <kurt.mueller@noaa.gov>
To: Samuel Candio - NOAA Federal <samuel.candio@noaa.gov>
Cc: Jacklyn James - NOAA Federal <jacklyn.c.james@noaa.gov>

Mon, Apr 23, 2018 at 2:58 PM

Hi Sam,

I've nearly finished the review for F00694. Just wondering, is there a Coast Pilot, or any correspondence regarding the delivery of a Coast Pilot for this survey that you can send me? I'd like to include it in Appendix II if possible before this one heads off for final review.

I hope your field season is off to a good start.

Thanks in advance,

Kurt

--

Kurt Mueller
Physical Scientist
National Oceanic and Atmospheric Administration
Pacific Hydrographic Branch
7600 Sand Point Way NE
Seattle WA 98115
206-526-6853

Jacklyn <jacklyn.c.james@noaa.gov>
To: Kurt Mueller - NOAA Federal <kurt.mueller@noaa.gov>
Cc: Samuel Candio - NOAA Federal <samuel.candio@noaa.gov>

Mon, Apr 23, 2018 at 3:04 PM

Kurt,

The Coast Pilot Review report for OPR-R365-FA-17, Port Clarence and Vicinity, AK is attached in pdf format. Many of the statements about climate trends were not verified or refuted even for the time period that they were in the vicinity as their observations in a single summer are not enough to provide evidence on climate. Please let me know if you have any questions or need clarifications.

[Quoted text hidden]

--

Jacklyn James
Physical Scientist/ COR II
Hydrographic Surveys Division
1315 East-West Highway
SSMC3 Room 6114
Silver Spring, MD 20910
(o) 240-533-0036 NEW NUMBER
jacklyn.c.james@noaa.gov

To see live feeds from the NOAA Ship Okeanos Explorer go to the web site below.

<http://oceanexplorer.noaa.gov/okeanos/welcome.html#>

OPR-R365-FA-17_Coast Pilot Review Report.pdf

4/23/2018

National Oceanic and Atmospheric Administration Mail - F00694 - correspondence and Coast Pilot

6036K

Kurt Mueller - NOAA Federal <kurt.mueller@noaa.gov>

Mon, Apr 23, 2018 at 3:14 PM

To: Jacklyn <jacklyn.c.james@noaa.gov>

Cc: Samuel Candio - NOAA Federal <samuel.candio@noaa.gov>

Got it - thanks Jacklyn. I've put that report in with the project files.

Sam, please disregard.

-Kurt

[Quoted text hidden]

F00694 - Approaches to Yukon River

Project Summary Report

NOAA Ship Fairweather

Commanding Officer: CDR Mark Van Waes

Background

This project was designated as a reconnaissance survey, to examine the efficacy of using satellite derived bathymetry (SDB) to determine the channel and shoals of the Yukon River delta. The ship was provided with SDB from 2014, along with an estimated channel based on AIS traffic from around the same period. The plan proposed by HSD-OPS defined an argyle pattern across the channel, with investigation up the middle and across specific shoals. This is shown in Figure 1.

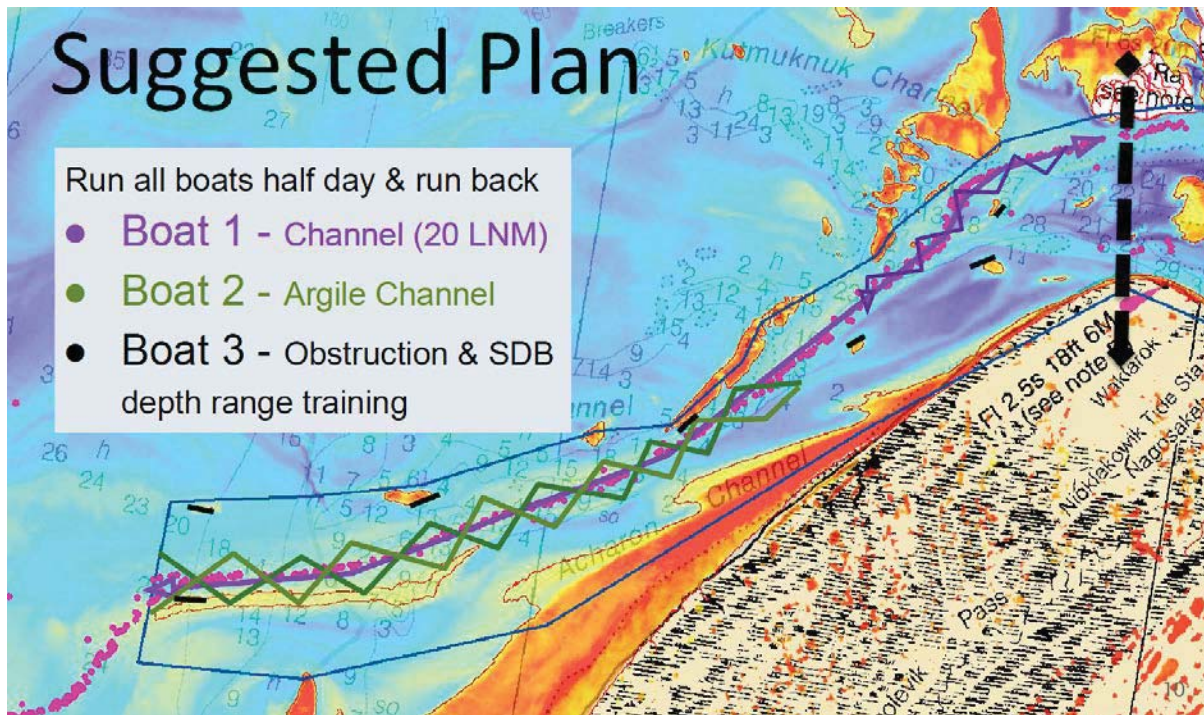


Figure 1: Proposed Plan

Fairweather Initial Planning

Based on this original plan and limited personnel (allowing only two boats the first day), *Fairweather* initially intended to take two launches up the middle of the channel on the first day of acquisition, and then investigate shoals and further develop the channel with launches plus the Ambar shallow draft jet boat on the second day. The Ambar would attempt the argyle pattern or follow the edge of the channel while the Launches filled in relevant additional areas as determined the first day. The Ambar was equipped with a single beam echo sounder for this purpose.

The planned lines to be run by the launches on the first day are shown in Figure 2. These were spaced 30 m apart such that the tracks were not expected to achieve complete coverage in much of

the expected depths, but rather define the extents of the channel as much as possible while leaving minimal gaps. The plan for the first day was to run up the central lines until half the day had passed and then turn around and run the outer lines.

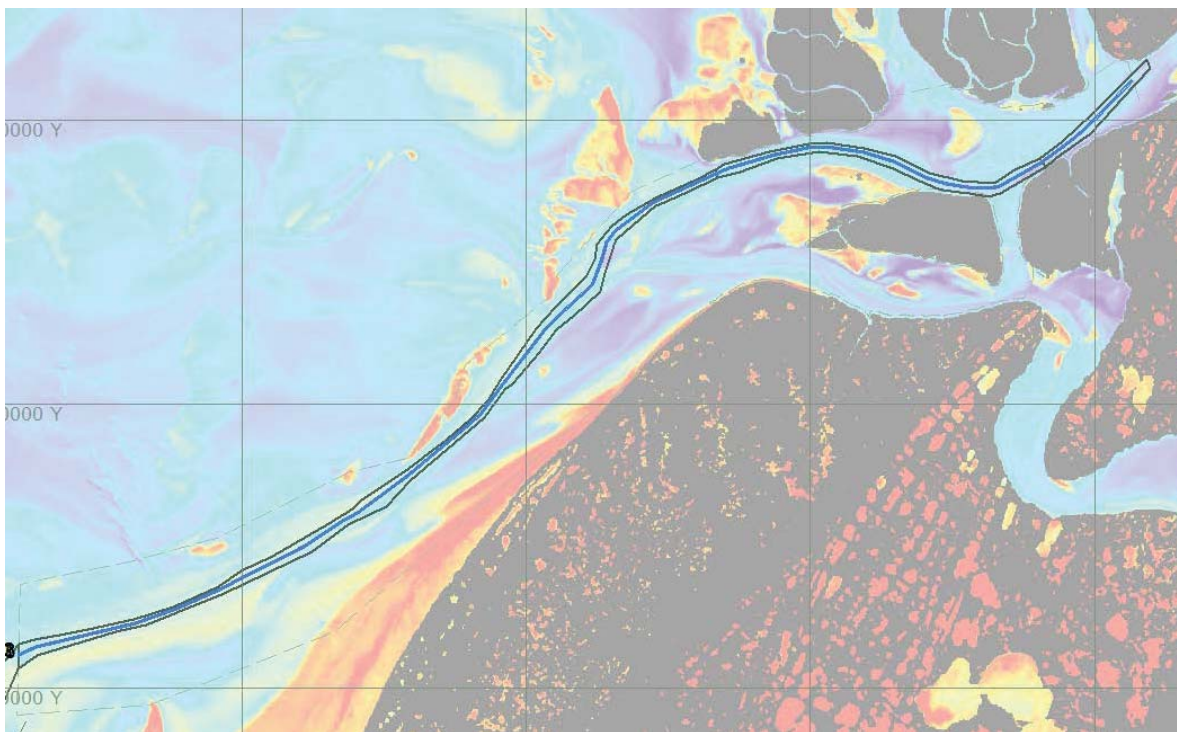


Figure 2: First day plan for two launches, line plan shown in blue

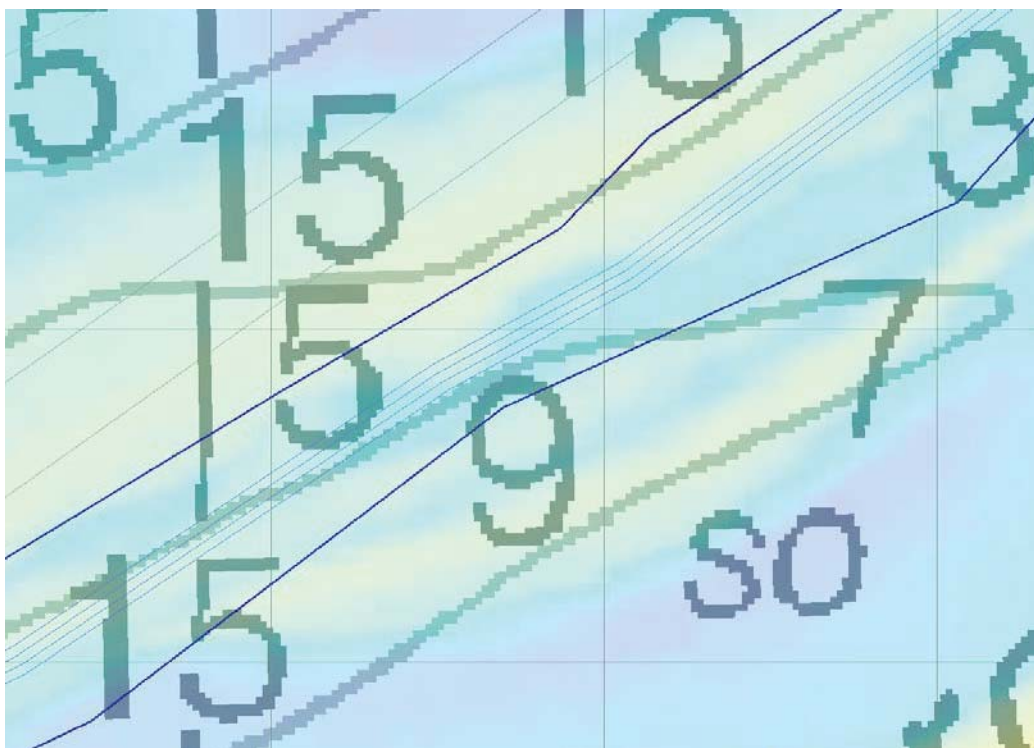


Figure 3: Detail of first day plan

First Day of Survey – July 11

The ship anchored about 15 miles offshore from the end of the AIS track polygon, in about 15 m of water. There were about 2 ft swells at the ship, decreasing to nearly flat seas at the entrance. Shoals were detected along the transit, so logging was started within sheet D00206, and the data will be submitted with that survey.

The two launches began by running the 30 m offset lines in the center of the AIS channel, following the edge of each other's coverage (using the network coverage driver) in areas where coverage was wider than 30 m. An area was reached that shoaled to 1.5 m depths under the sonar, so both launches turned around and explored other paths. One was able to get back to the AIS channel further to the north, while the other turned back and tried to find a channel from the south. After running a bit further up the deeper channel, the northern launch returned to try another route meeting where the southern launch had been. This investigation is shown in Figure 4.

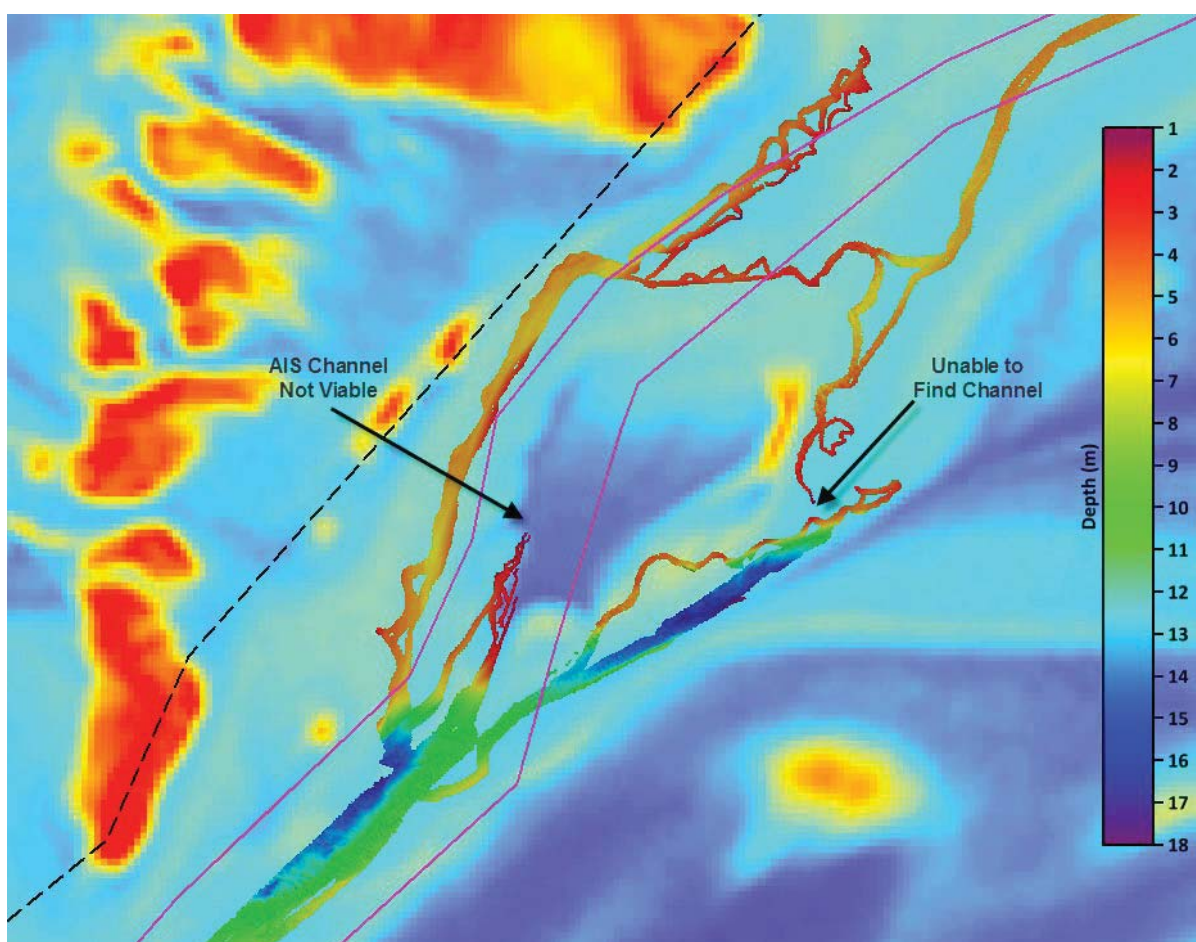


Figure 4: Investigations of channel on July 11

Unable to find a channel, they returned south via the initial route and both launches surveyed out using the outer planned lines, adjusting for coverage in deeper sections. The full coverage from the first day is shown in Figure 5.

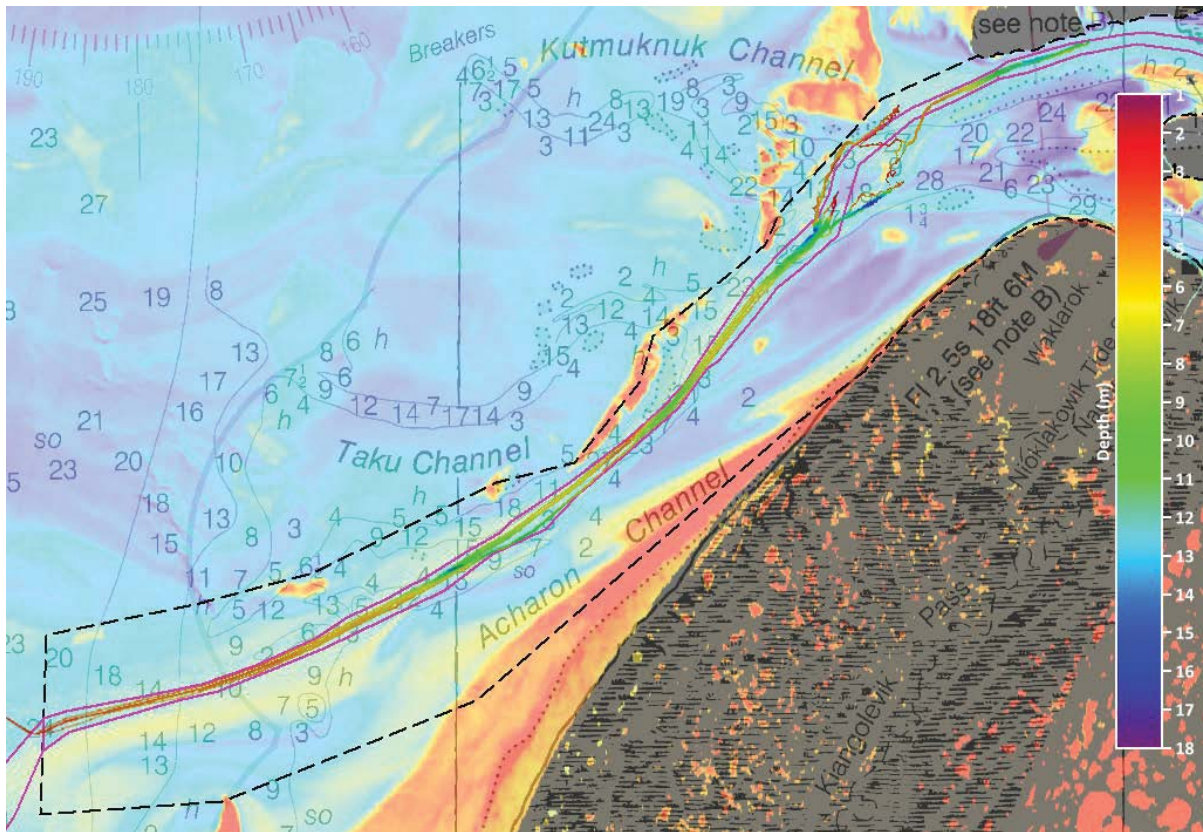


Figure 5: Full coverage inside F00694 sheet limits from July 11

During this first day, the SDB was found to somewhat represent channels with the greenish blue color, but there were areas where this was misleading or areas where things may have changed since 2014. We planned the investigations for the second day still using the SDB as a guide, but also using our observations from the field. For example, the area known to be a shoal in the dark blue area of Figure 4 was avoided, and no further attempts would be made in the AIS channel in that area.

Second Day of Survey – July 12

It was initially planned to take the Ambar to investigate shoals and determine the limits of the channel with a single beam sonar, while two launches continued to fill in relevant areas, investigate further up the channel, and develop any viable channels found by the Ambar. However, the Ambar was determined to not be operable during the day on July 11, so only the two launches could be sent (a third launch had a SSS mounted that we did not want to risk running aground, while the fourth did not have an operation MBES). The revised plan called for the two launches to attempt to find a viable channel through the area of Figure 4, then proceed up to the upriver end of the survey limits. After this, targeted areas would be investigated to further develop the channel and search for additional viable channels to the open ocean. One area was added where the CO had observed a tugboat transit on AIS. The planned investigation areas are shown in Figure 6.

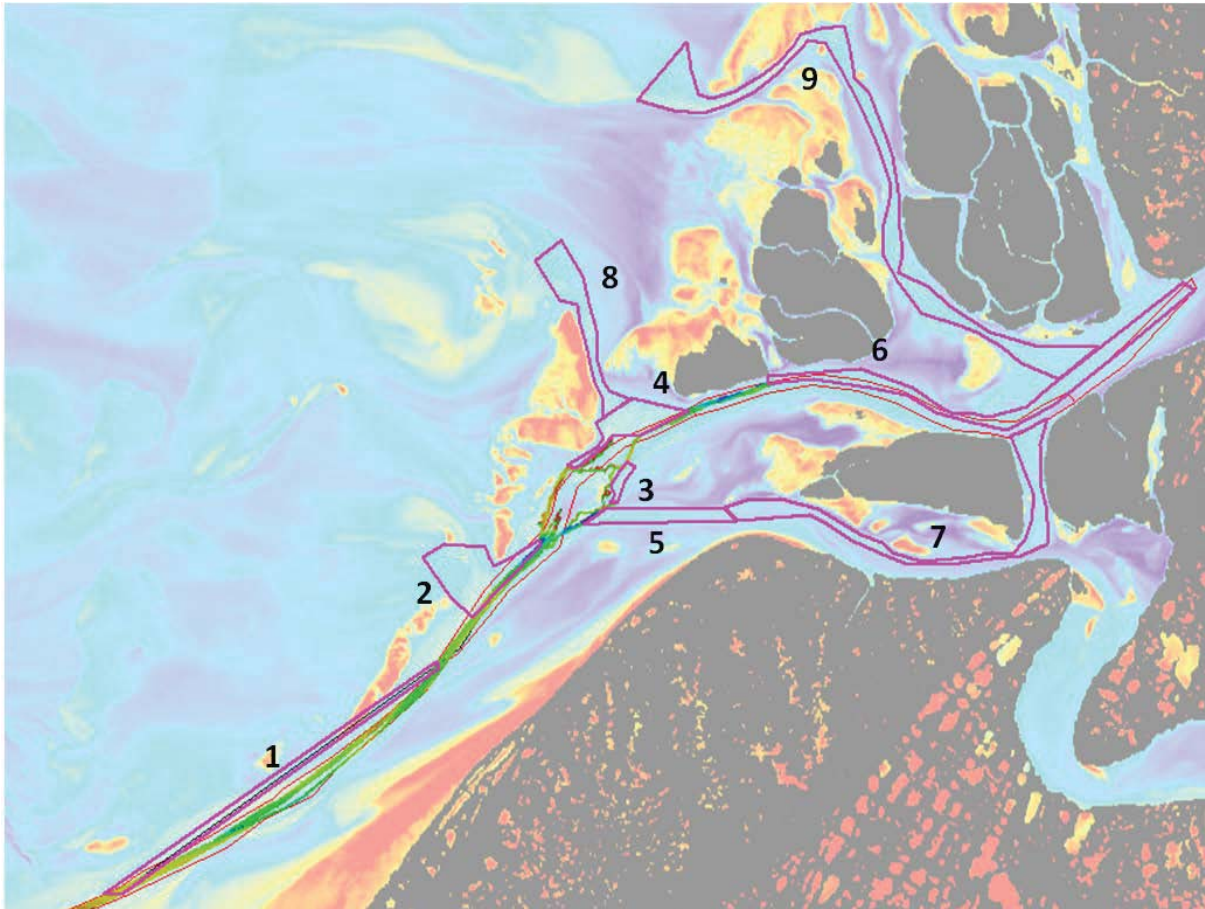


Figure 6: Planned investigation areas for July 12

During the morning transit up the river mouth, 2806 checked out the tug AIS track area (number 1 on in Figure 6). Trying a couple routes in area three, the attempts to find a channel were unsuccessful, so the upper reaches were pursued via the route found the day before. In portions of this, navigation was occasionally over charted land from the RNC 16240, but the channel was found to mostly correspond to the AIS polygon. These land areas that no longer exist are shown in Figure 7. Figure 7 also shows the charted light on both the RNC and ENC, which is now at the edge of an area of land extending to the north and in ruined condition.

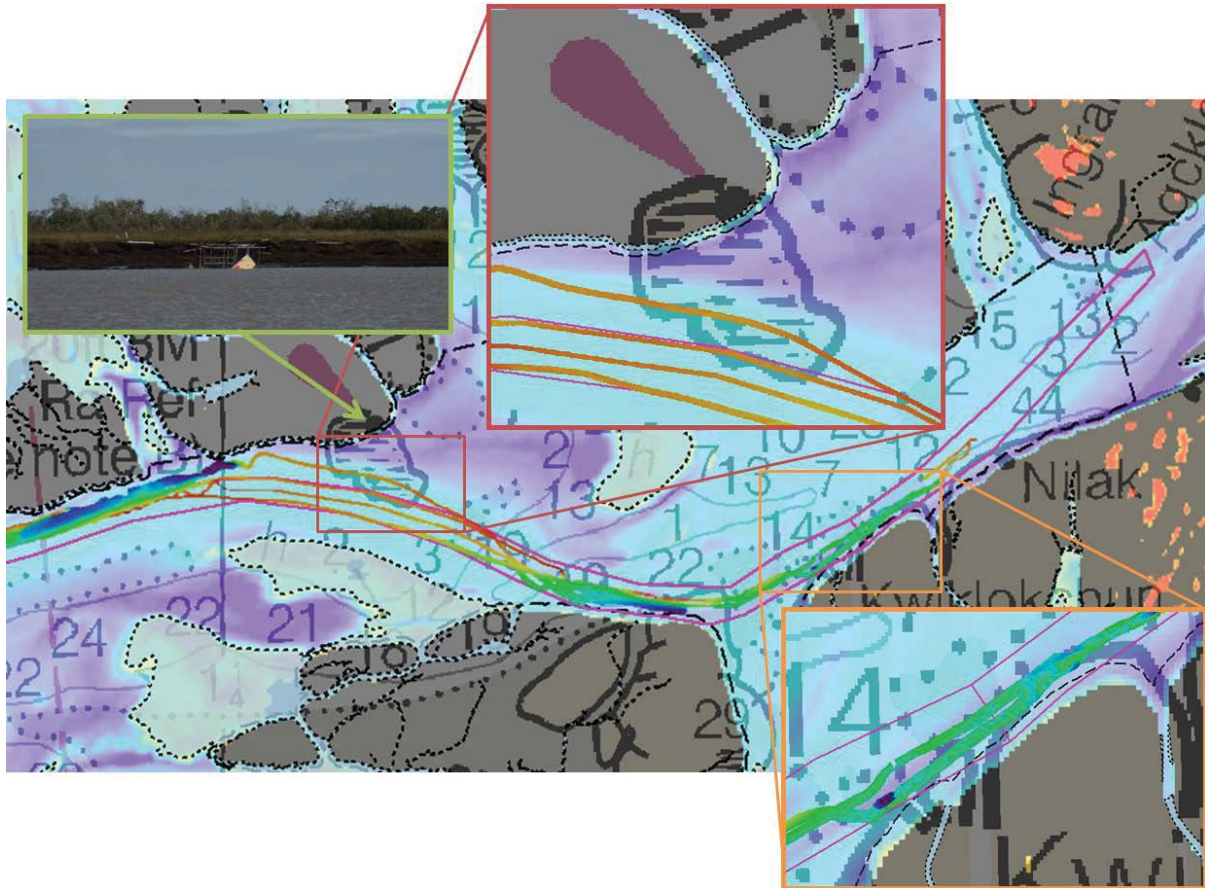


Figure 7: Details of bathymetry over charted land and ruined charted light

While near the head of the channel, 2807 came across a local supply vessel *Alakanuk* (Figure 8) transiting out the river, and asked if they could follow their route out. They agreed and we were able to find a channel in the area that we had previously been stymied.



Figure 8: M/V *Alakanuk*, followed to find channel out of Yukon.

When 2806 completed the upper portion of the channel, they met in this area and used the realtime coverage transfer to develop the channel between the two boats. The coverage from the second day in the area that disagrees with the AIS channel is shown in Figure 9. Note that the channel overlaps an SDB indicated shoal, which is on the ENC generated from the SDB as shown in Figure 10. This is the main reason this area was not investigated on the prior day.

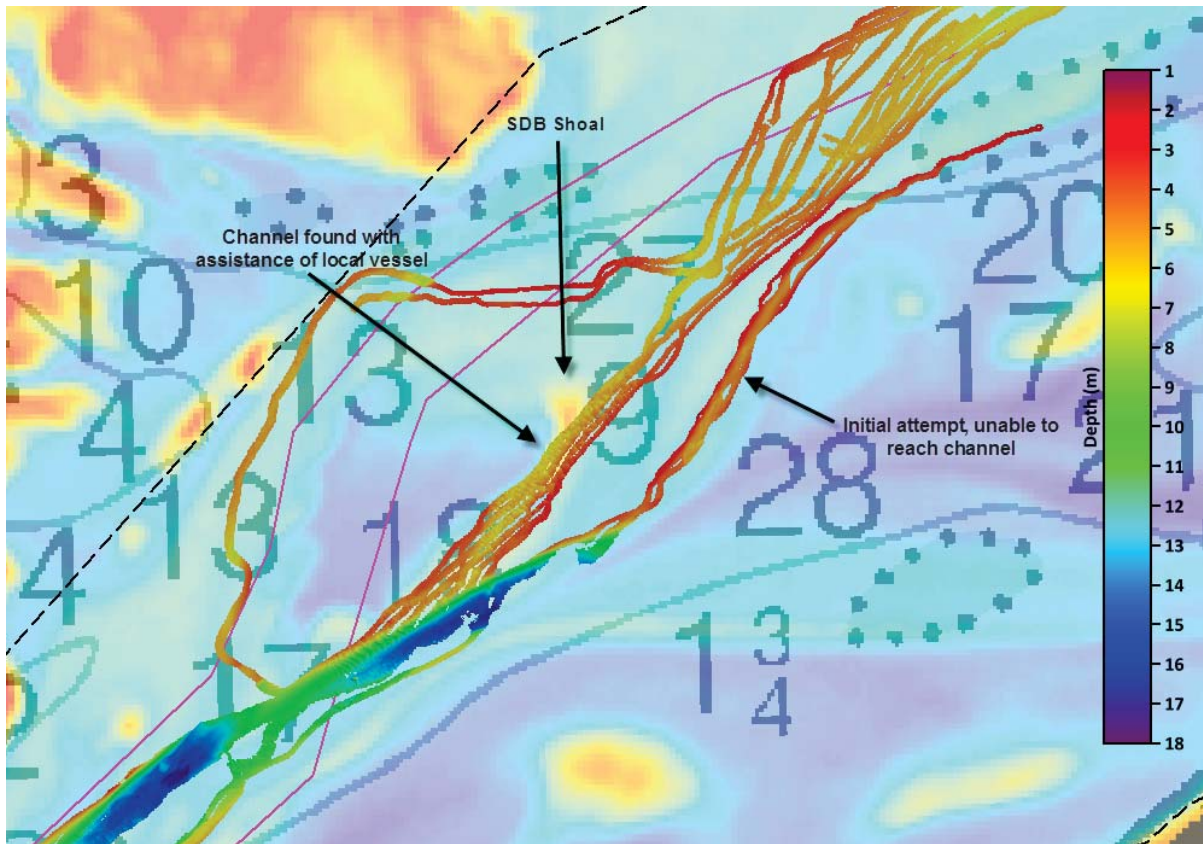


Figure 9: Area where channel conflicts with AIS and SDB

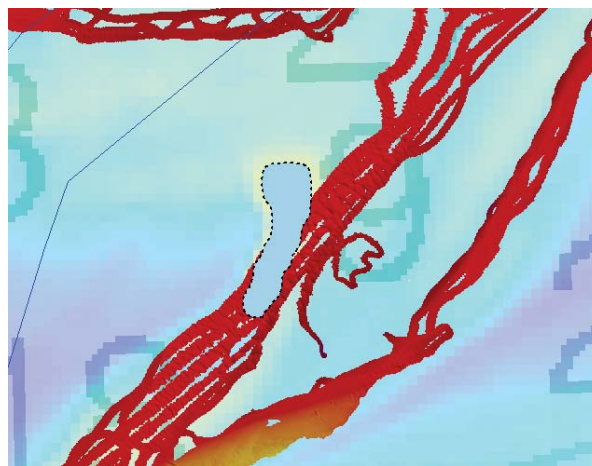


Figure 10: Channel through shoal charted on ENC US4AK98M

After the channel development, areas two and four from Figure 6 were investigated to see if alternate channels to the open ocean could be found. These appeared somewhat promising based on the SDB colors. Both appeared to shoal and the current did not indicate a large outflow of water. At this point, the launches had to return to the ship and no further investigations could be undertaken.

The final survey coverage from both days is provided in Figure 11.

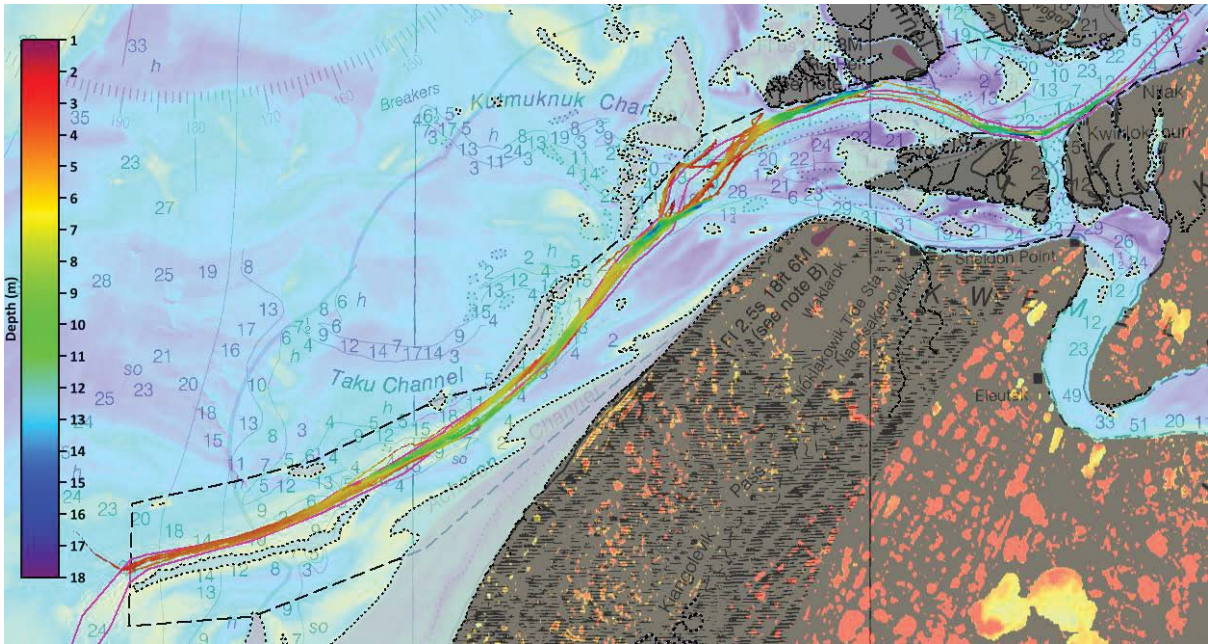


Figure 11: Complete coverage over July 11-12

Additional Investigation

The next day, while a launch surveyed part of the D00206 corridor in preparation for the ship to transit, two tug-and-tow vessels were observed to transit the Yukon River entrance. Using the ECDIS AIS track playback, it can be seen in Figure 12 that they took the northern channel in the split area, following the portion where the cut across was taken on July 11.

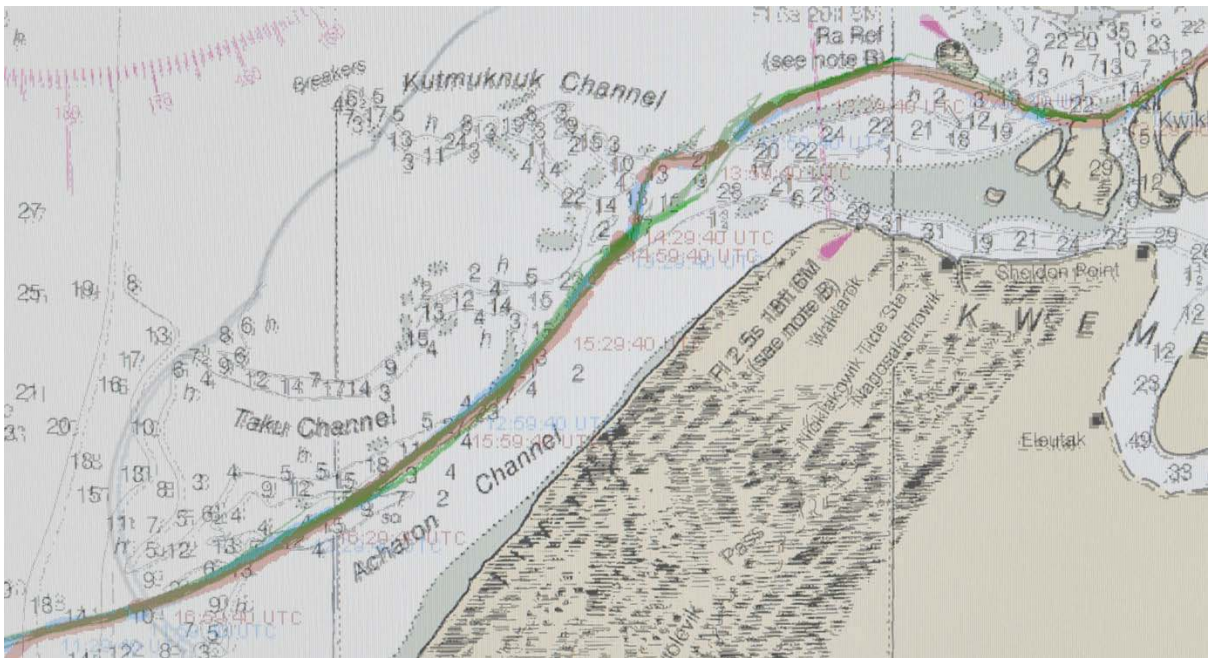


Figure 12: AIS Tracks of two tugs (blue and red) with green bathymetry overlaid

This image is an attempted fitting of a camera image of the ECDIS screen to the chart, so it is not perfectly registered but gives an idea of the current AIS channel, which is shifted relative to the provided 2014 channel.

Conclusions

The survey of Approaches to the Yukon River (F00694) was successful in finding multiple navigable channels from the mouth to about 20 miles upriver. Areas of varying colors on the satellite derived bathymetry were investigated to the extent possible with safe navigation for launches. The rough findings are summarized in Figure 13. There does not appear to be any exact correspondence between color and depth, but it is useful for approximating the channel.

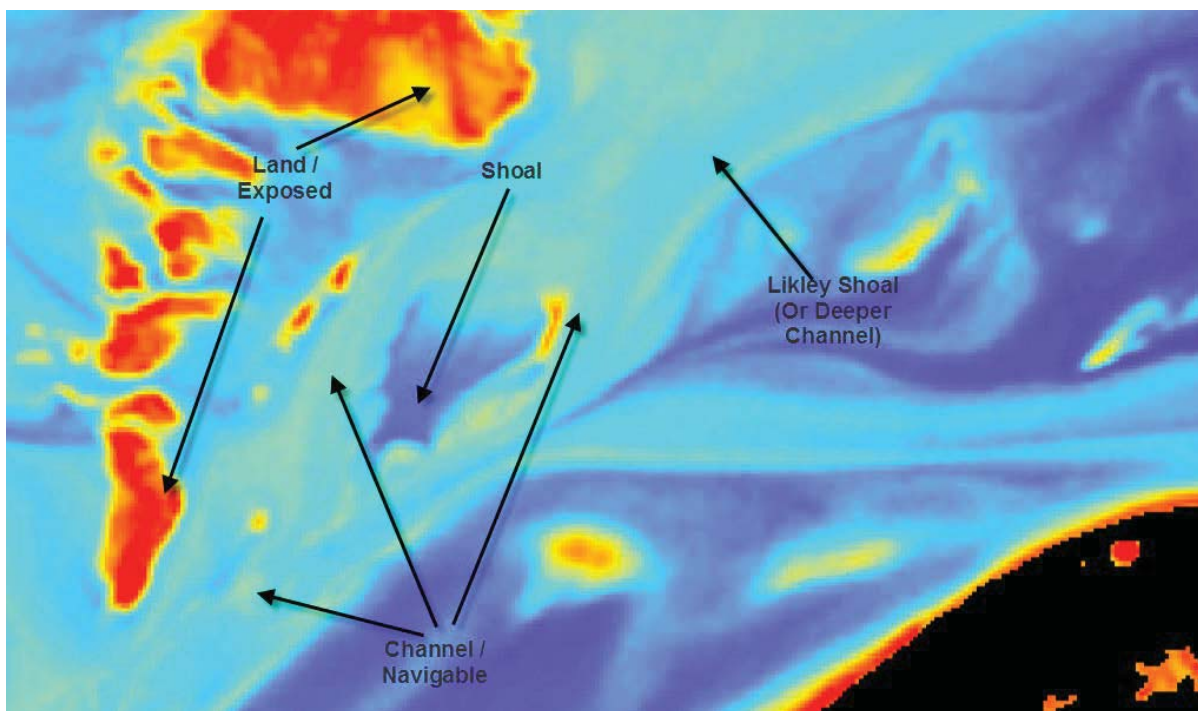


Figure 13: Rough color correspondence from SDB

Water color observed in situ was difficult to differentiate. Throughout the area, the secchi depth is estimated to be 2 ft or less. Currents in the center of the channel reach 3 knots, and sound speed profiles change significantly with the stage of tide (a salt wedge was observed in the outer channel on a rising tide). Significant tidal variation from the TCARI model appear to be present, as seen near the entrance, where a 4.3 m deep line crosses a 3.3 m deep line from the previous day and a 3.5 m deep line from earlier the same day.

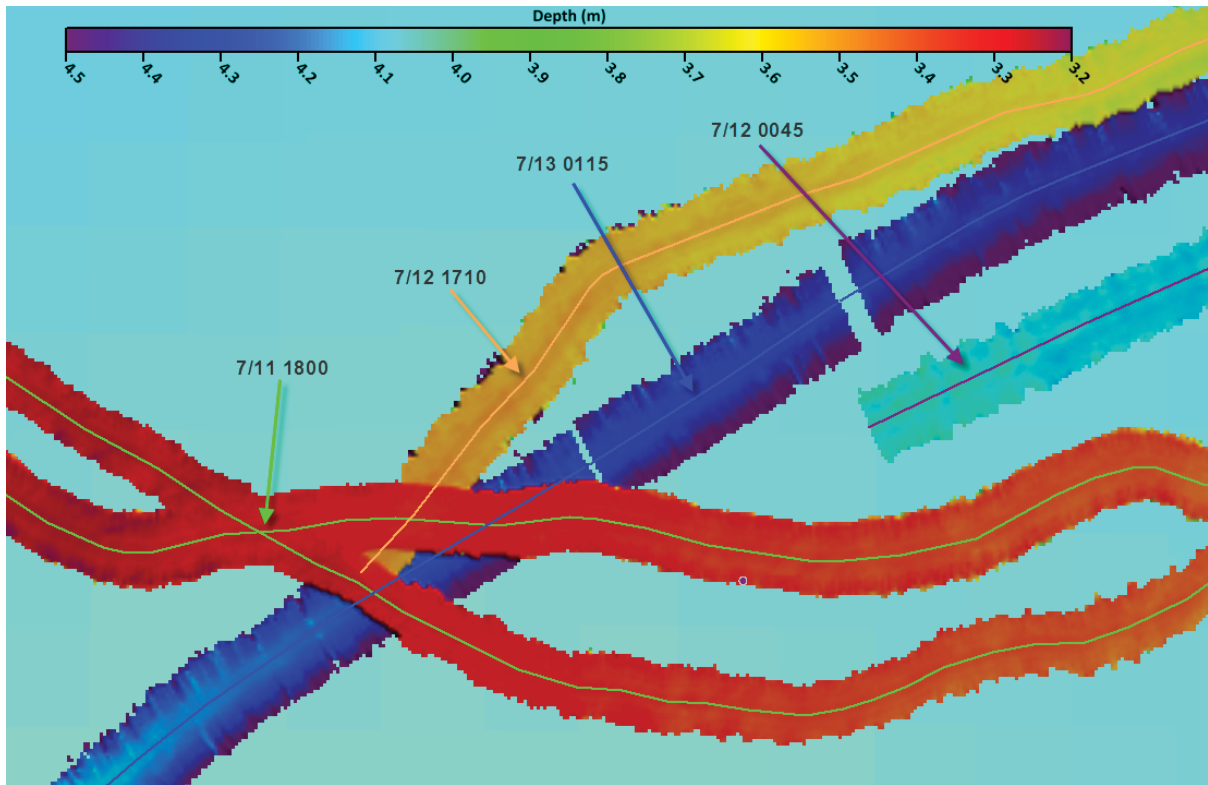


Figure 14: Tidal and river stage differences observed at the mouth of the Yukon River (all times UTC)

APPROVAL PAGE

F00694

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NCEI for archive

- Descriptive Report
- Collection of Bathymetric Attributed Grids (BAGs)
- Collection of backscatter mosaics
- Processed survey data and records
- Bottom samples
- GeoPDF of survey products

The survey evaluation and verification has been conducted according current OCS Specifications, and the survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Approved: _____

Commander Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch