APPENDIX 11

American-Russian Investigation of the NEVA Wreck and Survivors' Camp: 200th Anniversary Expedition, Sitka, Alaska NSF Project 1330939

March 2016 Side Scan Sonar Surveys, Sitka, Alaska Report of Investigation

Old Sitka (March 8, 2016)
Redoubt Bay (March 9, 2016)
NEVA Project Area (March 10, 2016

by
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April 7, 2016

Note: The Old Sitka and Ozerskoi sonar surveys were conducted as a contingency when sea conditions prevented work in the NEVA project area. Specific target locations have been redacted to comply with Federal and State legal requirements, and to protect potentially sensitive resources. An unredacted version of the report is available to authorized persons at the Alaska Office of History and Archaeology.

Important Note:

Some of the pages / figures in Appendix 11 (report pages 573-590) contain specific locational information and have been redacted from public distribution copies of the report under federal and state laws. These include Section 304 of the National Historic Preservation Act (PL89-665; 54 U.S.C), Section 9 of the Archaeological Resources Protection Act (PL96–95 as amended), Exemption 3 of the Freedom of Information Act (5 U.S.C. sect. 552, as amended by Public Law No. 104-231, 110 Stat. 3048), and policies of the Alaska DNR Office of History and Archaeology).

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American-Russian Investigation of the NEVA Wreck and Survivors' Camp: 200th Anniversary Expedition, Sitka, Alaska
NSF Project 1330939

March 2016 Side Scan Sonar Surveys

Sitka, Alaska

Prepared for:

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OHA Permit 2016-02

Old Sitka (Starrigavan Bay) and Ozerskoi Redoubt (Redoubt Bay)

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1. INTRODUCTION

Principal Investigator Dave McMahan organized a March 2016 side scan sonar survey as part of NSF Project 1330939. Our survey objective was to locate the 1813 wreck site at a time of year when kelp development would be minimal, given kelp gas bladders act as an acoustical screen that can reduce the effectiveness of side scan sonar. The strategy was to access the site via daily charter boat, from Sitka Alaska.

To conduct the search a Starfish 452F CHIRP side scan sonar was temporarily imported from Canada into the USA. It was used to search three areas near Sitka Alaska (Figures 1-2):

- Old Sitka (March 8, 2016)
- Redoubt Bay (March 9, 2016)
- NEVA Project Area (March 10, 2016

While the Neva Project Area was the primary area of interest, a series of gales and the exposed nature of the Bay necessitated our decision to work on the other two areas first, and wait for the weather to improve. A marginal weather window occurred on the morning of March 10, and the NEVA survey was conducted during a NOAA weather predictions of 15 knot winds and 3-4 m' rollers. However once in the vicinity of Cape Edgecumbe, larger rollers were encountered.

2. METHODOLOGY

The Starfish 452F CHIRP (Compressed High Intensity Radar Pulse) side scan sonar is recognized as one of the smallest professional, high resolution shallow water units that can be either pole mounted or towed on a 20 m cable. Instead of using a single frequency, CHIRP side sonar sends a continuous range of frequencies ranging from low to high. The end result is a higher resolution image.

The Starfish 452F features a mid-band frequency of 450 kHz, a PC-based software operating system - Starfish Scanline v2.1 - and an integrated GPS such that scans are easily geo-referenced and recorded. The unit has an effective swath width of up to 200 m, a 50 m maximum depth rating, and in calm water can image a 10 cm wide upright beam 100 m distant from the sensor. An example of an optimal 452F scan of a barge and railway car lying in 30-35 m of water is shown in Figure 3.

The Starfish 452F is compact, easily portable and requires only a laptop computer (in this case a CF-30 Panasonic Toughbook equipped with an SSD drive) and a power source (Figure 4). Scanline v2.1 is the operating system, and the software is free on-line. It is used to record and view individual .logdoc files.

Generally poor weather and sea conditions dictated cable towing using a 2 m boom offset to starboard, at the stern of the 28' welded-aluminum vessel ***Esther B,*** powered by two 150 hp Yamaha outboards and captained by Davey Lubin. The cable pulley in the Neva Project Area was attached to the boom with bungee cords. Cable tending was handled by Travis Shinabarger, and John Pollack managed the electronics and surveys. Observers included Principal Investigator Dave McMahan, NPS staffer Brinnen Carter, and Sitka Historical Society staffer Hal Spackman
(Redoubt Bay only).

Post-processing utilized Scanline and Sonar TRX software to produce track mosaics. The sequence of data handling was;

- Each sonar track was recorded on Scanline as a .logdoc file.
- All .logdoc files were converted to .xtf (eXtended Triton Format) within Scanline.
- The .xtf files were imported into Sonar TRX and processed to create individual mosaic tiles and a gps track.
- The mosaic tiles are assembled for each sonar track, and exported as a single .kml file for display in Google Earth Pro. Note when multiple .kml mosaics are portrayed in a single Google Earth Image, nadir coverage becomes complicated and misleading. The user should review individual .kml files vs. composite Google Earth images showing multiple tracks.

All track files (.logdoc), mosaic files (.xtf, .kml) and images of specific targets (.jpg) for the project will be conveyed to the Principal Investigator.

3. SURVEY RESULTS:

3.1 Old Sitka:

The survey area was located in protected waters NNW of the Sitka public wharves (Figure 2).

On March 7, 2016 three tracks were recorded (20160307 prefix). Sea and wind conditions were good with waves <1 m and high resolution scans were possible. Geology was common in the scans, but is less frequent than at Redoubt and the NEVA project area. A composite mosaic of all .kml tracks is shown on Google Earth Pro as Figure 5. Individual tracks may be displayed by importing separate .kml files into Google Earth Pro.

Four targets were noted and their distribution is shown on Google Earth Pro as Figure 6. The OS-1 image appears to be a cluster of debris or wreckage, OS-2 is diagnostic of a modern shipping container, and OS-4 is diagnostic of a long cable or anchor chain. Given the proximity of OS-1 and OS-4 this location is worth a dive or drop camera examination.

Target No.	Description	Track	Figure	UTM Co-ordinates
OS-1	Distinct cluster of three man-made objects (likely debris or wreckage) up to 12 m long >30 m deep. One object displays lattice-work.	20160307_134312	7	[redacted]
OS-2	Large rectangular object, 3x12 m (likely standard shipping container from nearby terminal) 35 m depth	20160307_135936	8	[redacted]
OS-3	Small rectangular object, 1x4 m (likely small container, box or log) >30 m depth	20160307_135936	9	[redacted]
OS-4	Linear object (likely cable or anchor chain) >25 m depth	20160307_135936	10	[redacted]

3.2 Redoubt Bay:

The survey area was located in semi-protected waters S of the Sitka public wharves (Figure 2).

On March 8, 2016 six tracks were recorded (20160308 prefix). Sea conditions were excellent with waves of approximately 1 m however a strong cross-wind made the boat "crab" and created a diagonal tow of the sonar fish at times. Imaging was possible but resolution was less than achieved at Old Sitka. Exposed rock strata are abundant in the scans. A composite mosaic of all .kml tracks as shown on Google Earth Pro is Figure 11. Individual tracks may be displayed by importing separate .kml files into Google Earth Pro.

Four targets were noted and their distribution is shown on Google Earth Pro as Figure 12. None were diagnostic of wreck debris or ballast piles.

Target No.	Description	Track	Figure	UTM Co-ordinates
RB-1	Indistinct target 8 m long (likely geology) 25 m deep	20160308_121648	13	[redacted]
RB-2	Structure 12 m long at base of creek (likely dam footing or geology), <3 m deep, possibly exposed at low tide.	20160308_133013	14	[redacted]
RB-3	2 rectangular targets, 2 m x 5 m (likely geology or pier footings) <4 m depth	20160308_133726	15	[redacted]
RB-4	2 small unknown targets <1m square, < 10 m depth	20160308_133726	16	[redacted]

3.3 NEVA Project Area:

The survey area was located in exposed waters [redacted] during a small craft warning, approximately [redacted] W of the Sitka public wharves (Figure 2).

On March 10, 2016 six tracks were recorded (20160310 prefix) as .logdoc files. Wave height (3 m) and wind conditions exceeded the limits for high resolution work and scan quality was below that required to image mid-sized objects. A reef and breaking waves immediately south of the NEVA Project Area required the captain to steer sharply west at that point. Here the tow fish was pulled, thus creating a data gap at one promising location. The sea bed consisted largely of jagged and irregular volcanic lava flows.

A composite mosaic of all .kml tracks is shown on Google Earth Pro as Figure 17. Individual tracks may be displayed by importing separate .kml files into Google Earth Pro.

Four targets were noted and their distribution is shown on Google Earth Pro as Figure 18. None were diagnostic of wreck debris or ballast piles. Given the poor conditions, this work should be repeated during calm weather.

Target No.	Description	Track	Figure	UTM Co-ordinates
NB-1	Indistinct target, rectangular, 8x2 m (likely geology) 10 m depth	20160310_105847	19	[redacted]
NB-2	Indistinct target, rectangular, 3x1 m (likely geology) 10 m depth	20160310_105847	19	[redacted]
NB-3	Broad oval, 40 m x 20 m (likely geology) at north of the NEVA Proj. Area, 12 m depth	20160310_105847	20	[redacted]
NB-4	Indistinct stack of linear features , 15 m x 15 m (likely geology) 10 m depth	20160310_105847	21	[redacted]

4. CONCLUSIONS

The March 2016 side scan products are examples of the dramatic impact of weather and sea state on scan quality. Resolution invariably drops as seas build and winds increase. A small number of targets were located at Old Sitka, including the interesting OS-1 and OS-4 sites, and Redoubt Bay was less successful as conditions changed.

The conditions in exposed [redacted] area were a different matter, and on the day we worked in the NEVA Project Area, there were small craft warnings. While three tracks were run, the scans were degraded due to our inability to tow at a consistent speed, or to hold a straight course, or to keep the fish at a consistent altitude above the seabed. Additionally, the sea bed is dominated by chaotic lava flows that complicate interpretation. Hence although some indistinct targets were noted, the scans were of less than acceptable quality, and the targets are likely geological features.

There will be another opportunity during the upcoming July 2016 excavation project. A good strategy would be to assess conditions every morning, and be prepared to scan on short notice with the Achilles inflatable and a 3-person team. With a bit of luck with the weather, we should be able to capture high resolution scans to the south of [redacted] in a single morning.

Figure 1. General Location of Study Area. .

Figure 2. Specific Location of Search Areas near Sitka, Alaska.

Figure 3. Starfish 452F System (Towfish, Top Box, Toughbook, GPS, Tow Pulley and Cables).

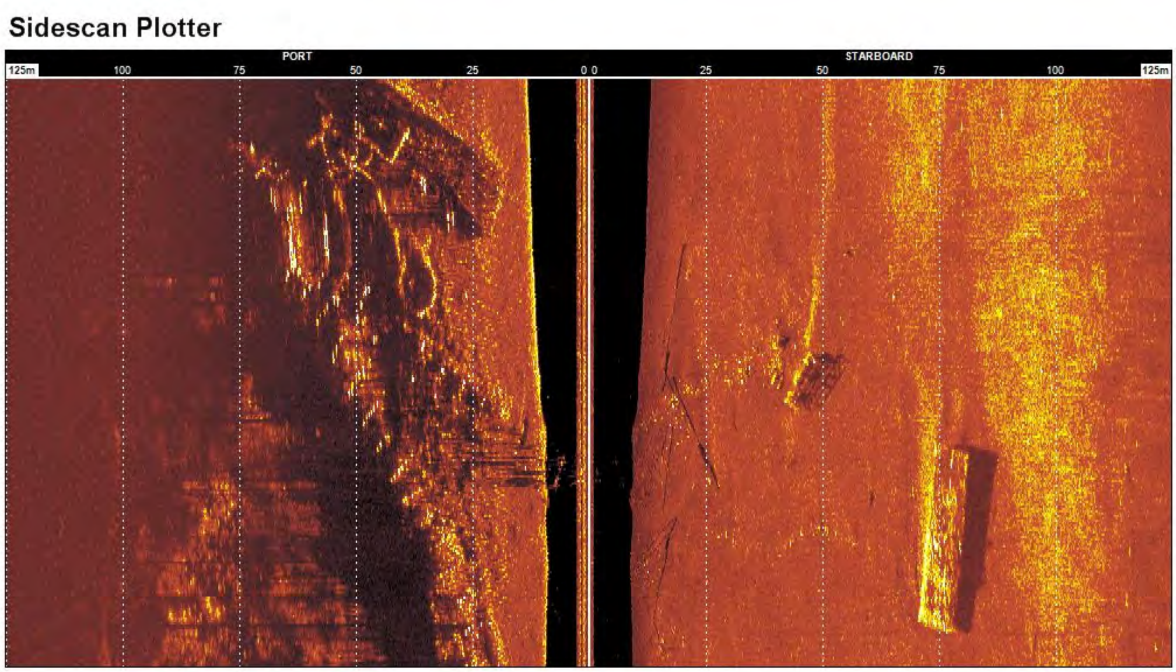


Figure 4. Example of a Starfish 452F High Resolution Side Scan Sonar Image of a Wharf Complex (L) and a 40 m Barge and 12 m Railway Boxcar (R) lying in 30 m of Water on the Nelson, BC Waterfront. © John Pollack 2015.

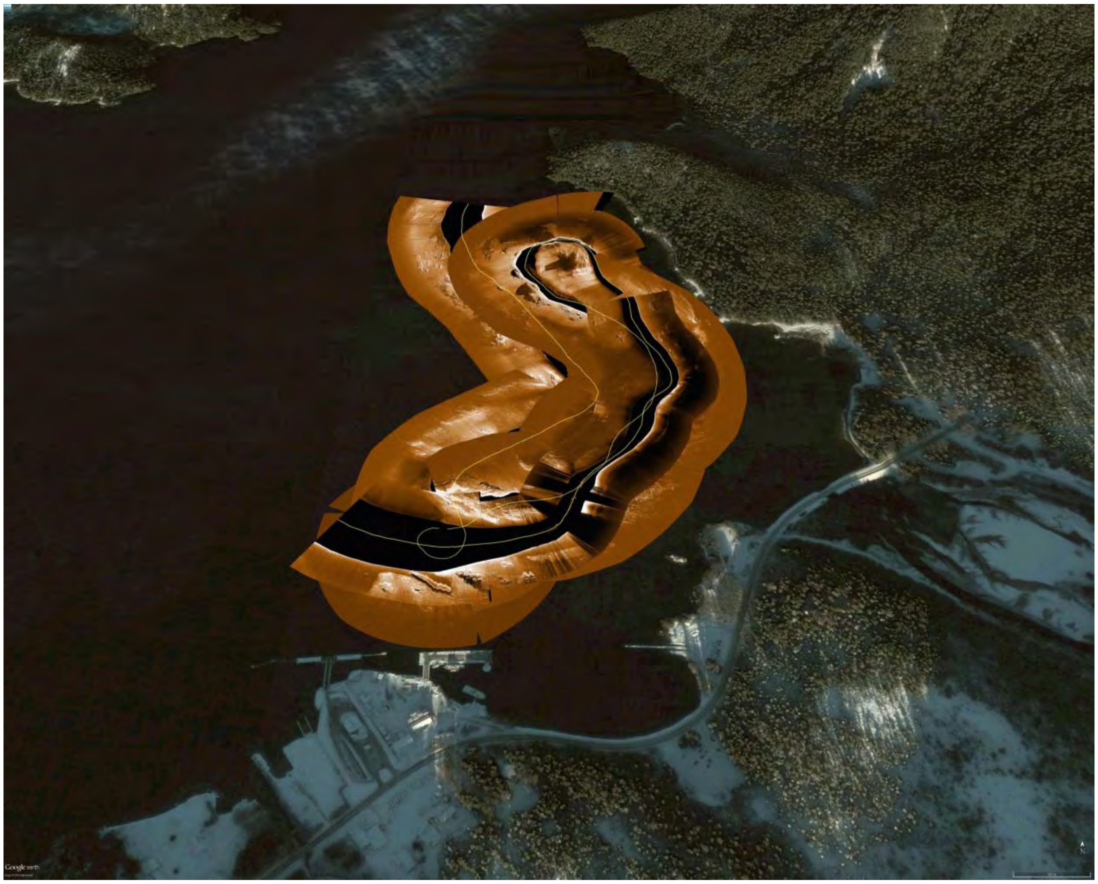


Figure 5. Mosaic of Scan Tracks at Old Sitka, Alaska. Nadir coverage is less than shown.

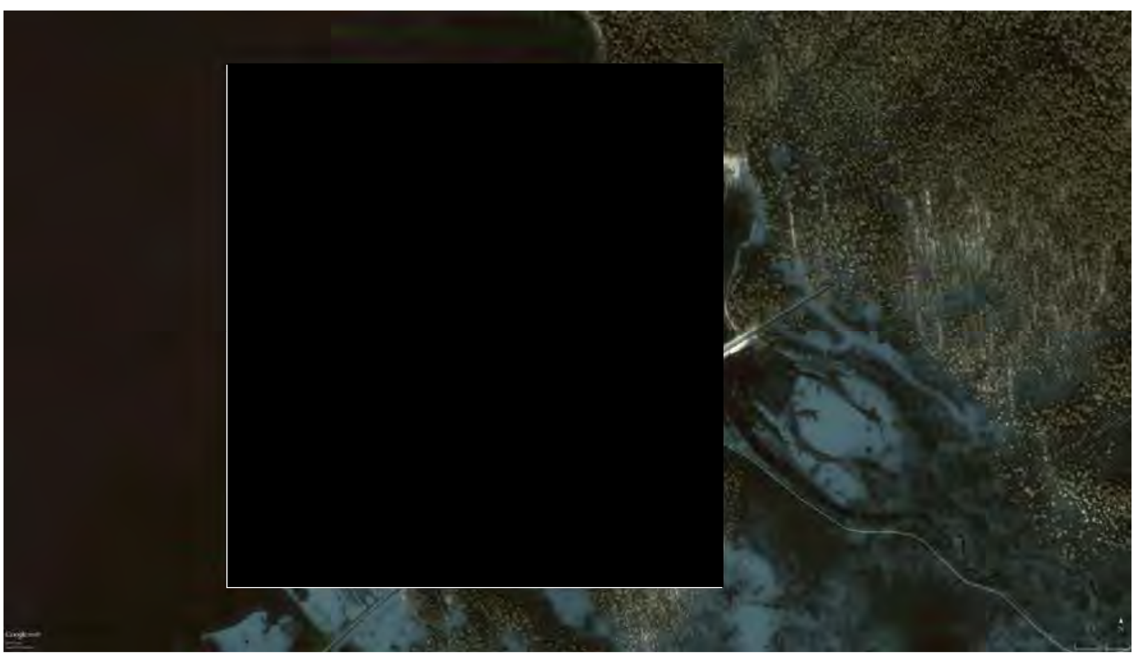


Figure 6. Location of Targets at Old Sitka, Alaska.

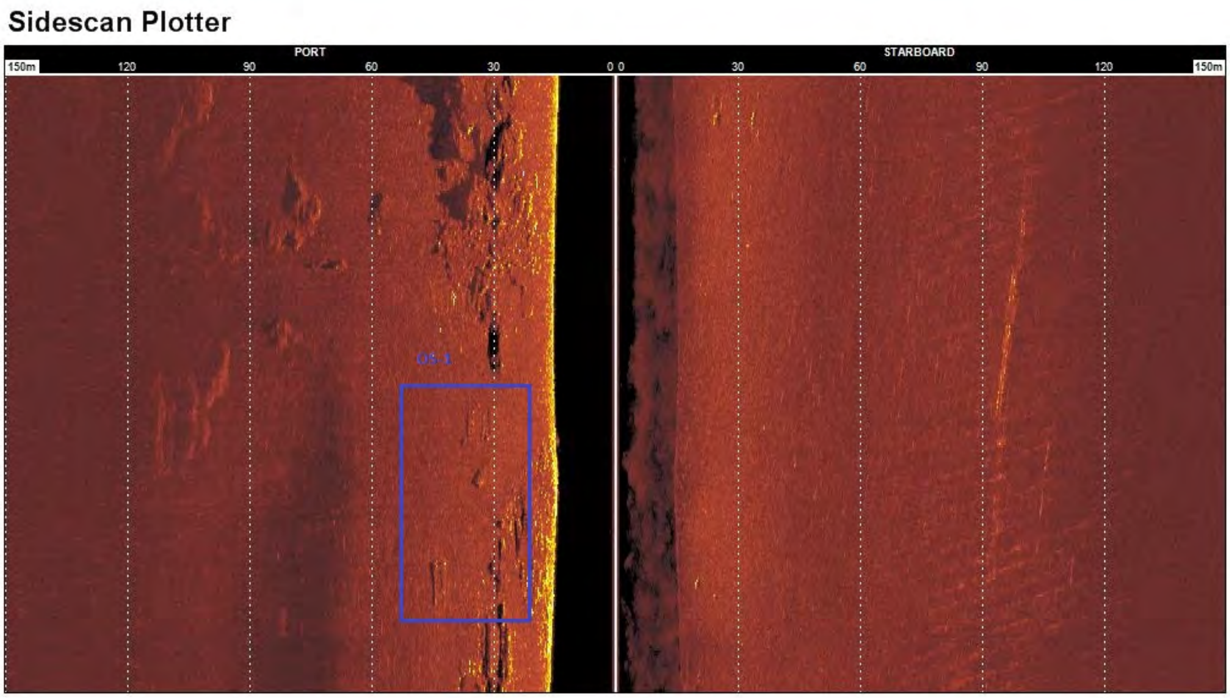


Figure 7. Target OS-1 at Old Sitka, Alaska.

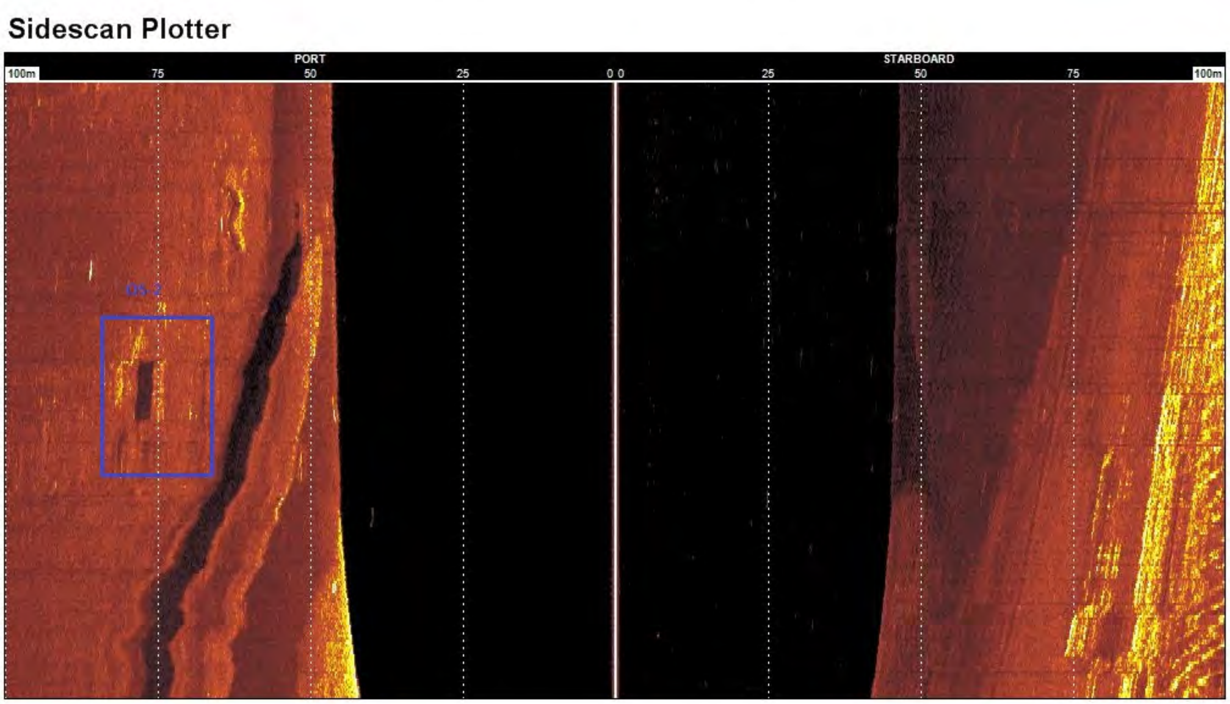


Figure 8. Target OS-2 at Sitka, Alaska.

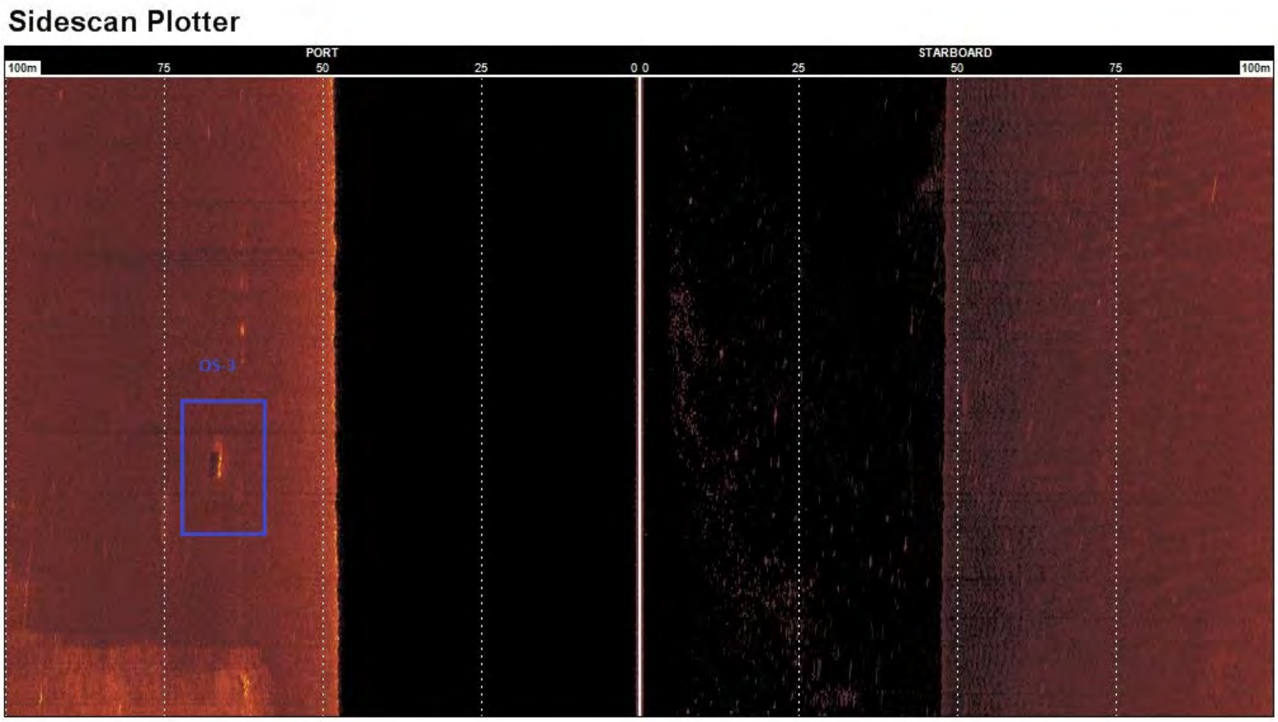


Figure 9. Target OS-3 at Sitka, Alaska.

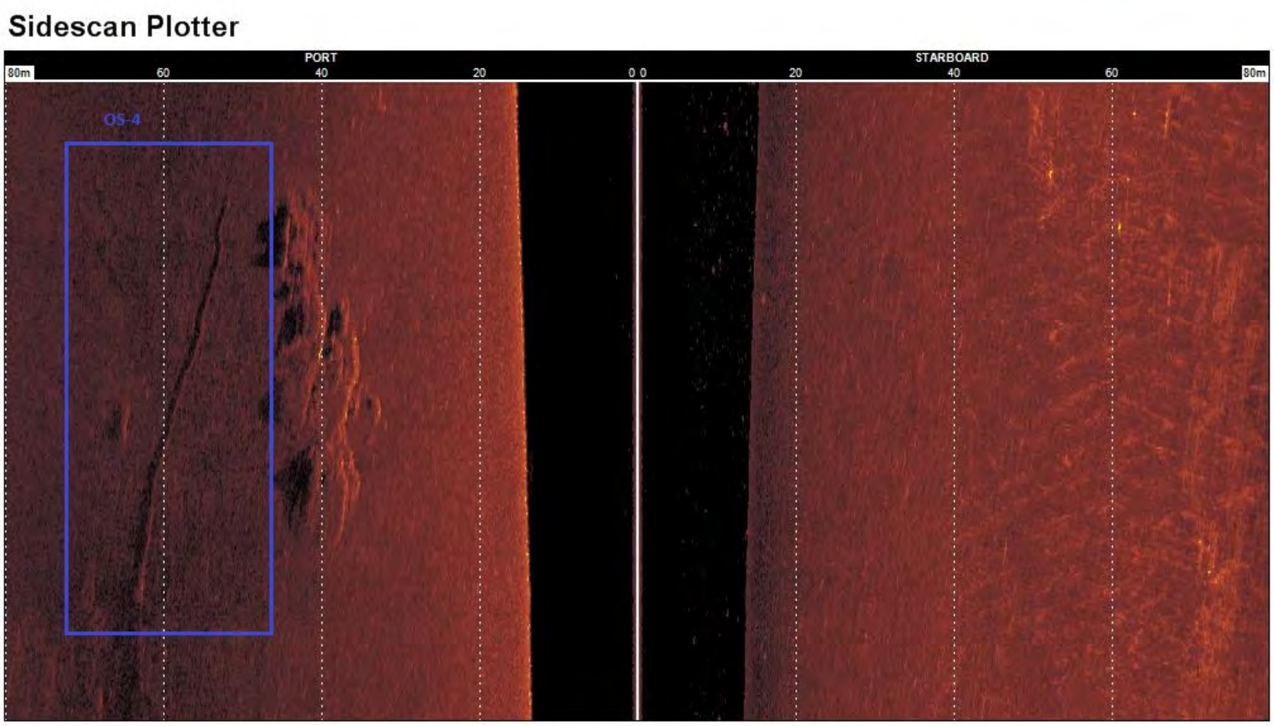


Figure 10. Target OS-4 at Sitka, Alaska.

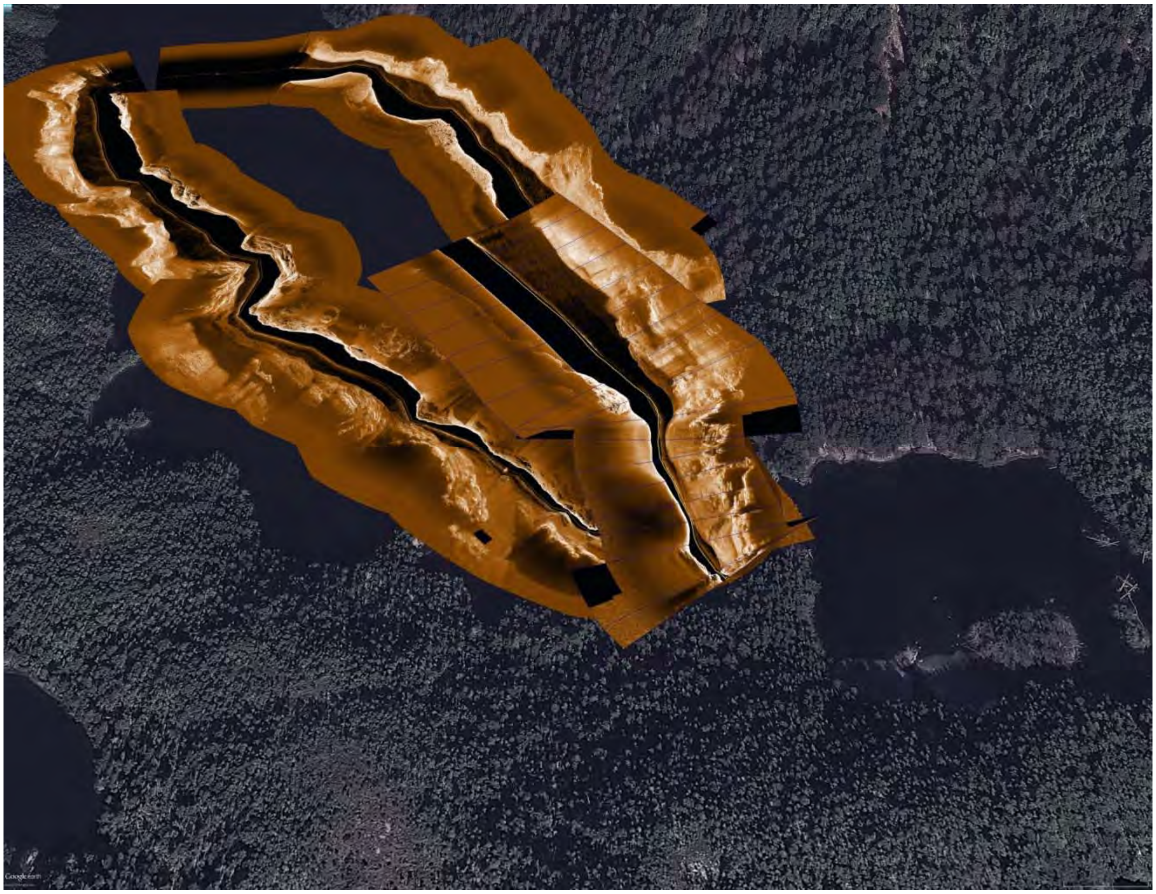


Figure 11. Mosaic of Scan Tracks at Redoubt Bay, Alaska. Nadir coverage is less than shown.

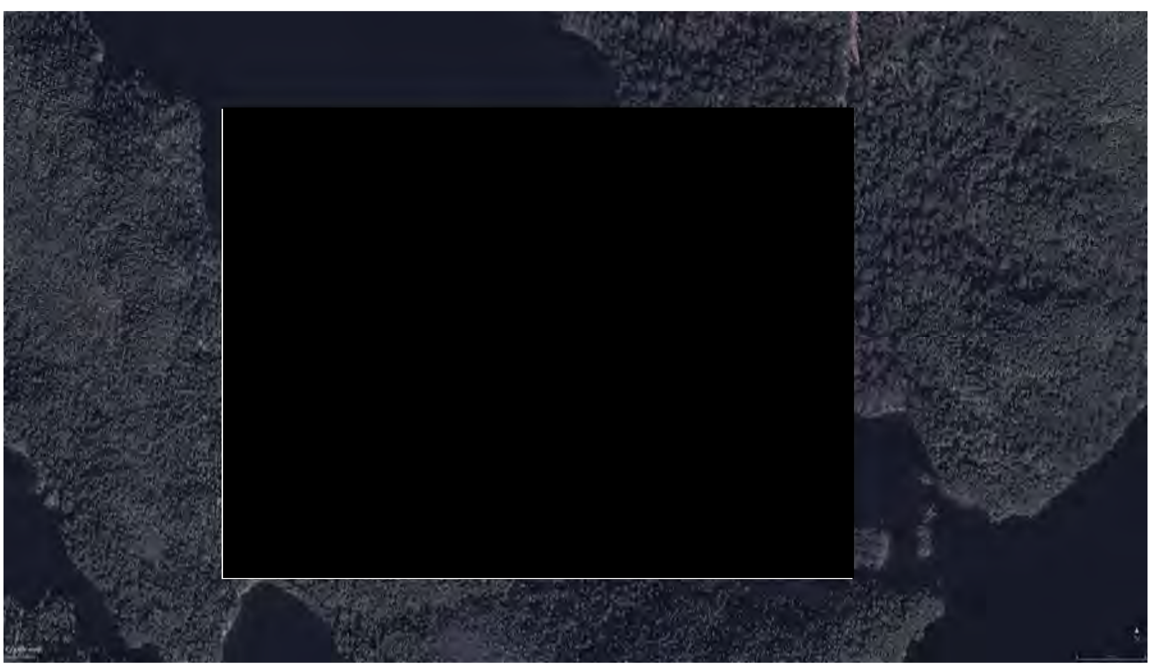


Figure 12. Location of Targets at Redoubt Bay, Alaska.

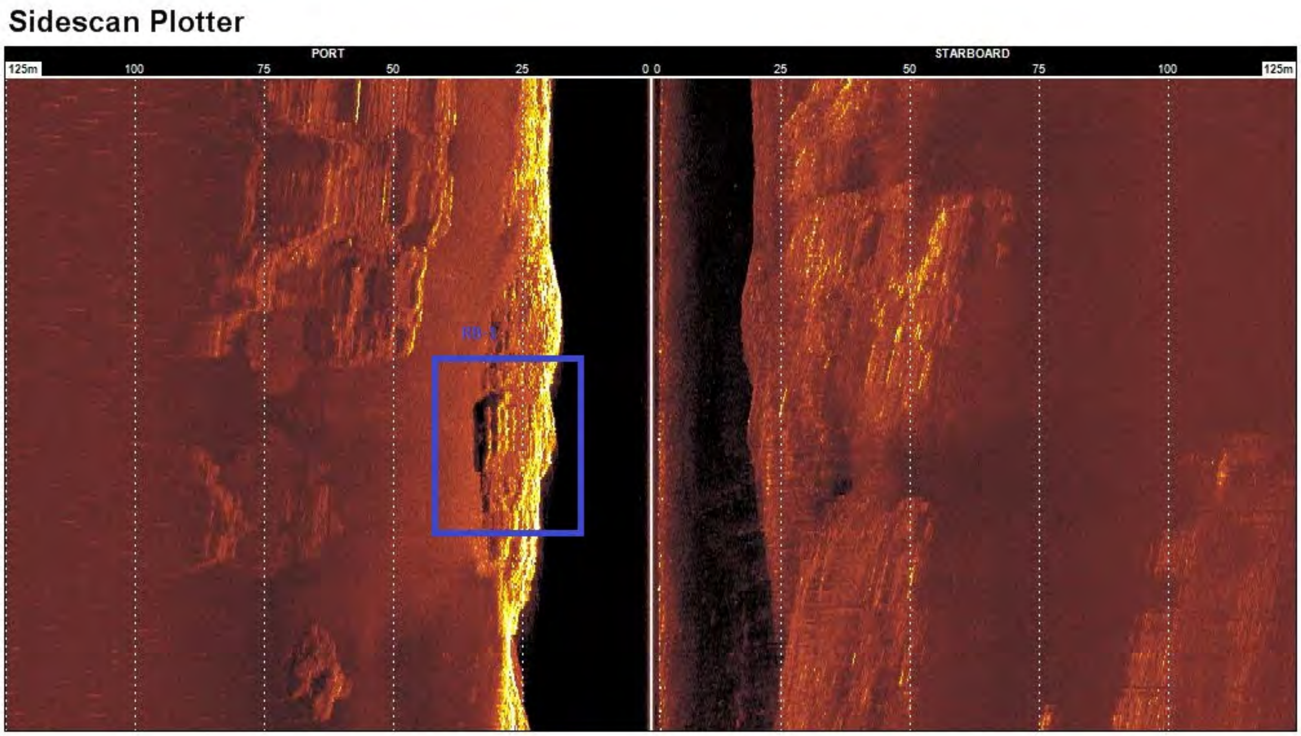


Figure 13. Target RB-1 at Redoubt Bay, Alaska.

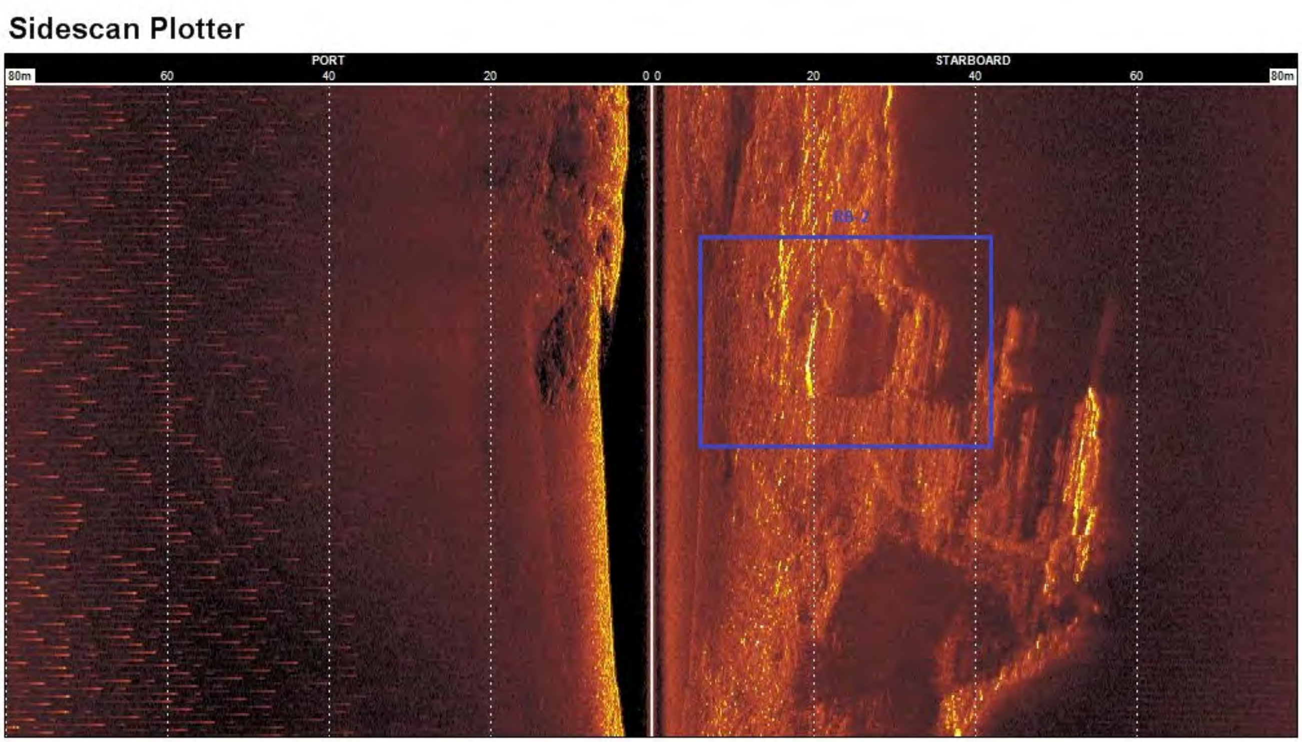


Figure 14. Target RB-2 at Redoubt Bay, Alaska.

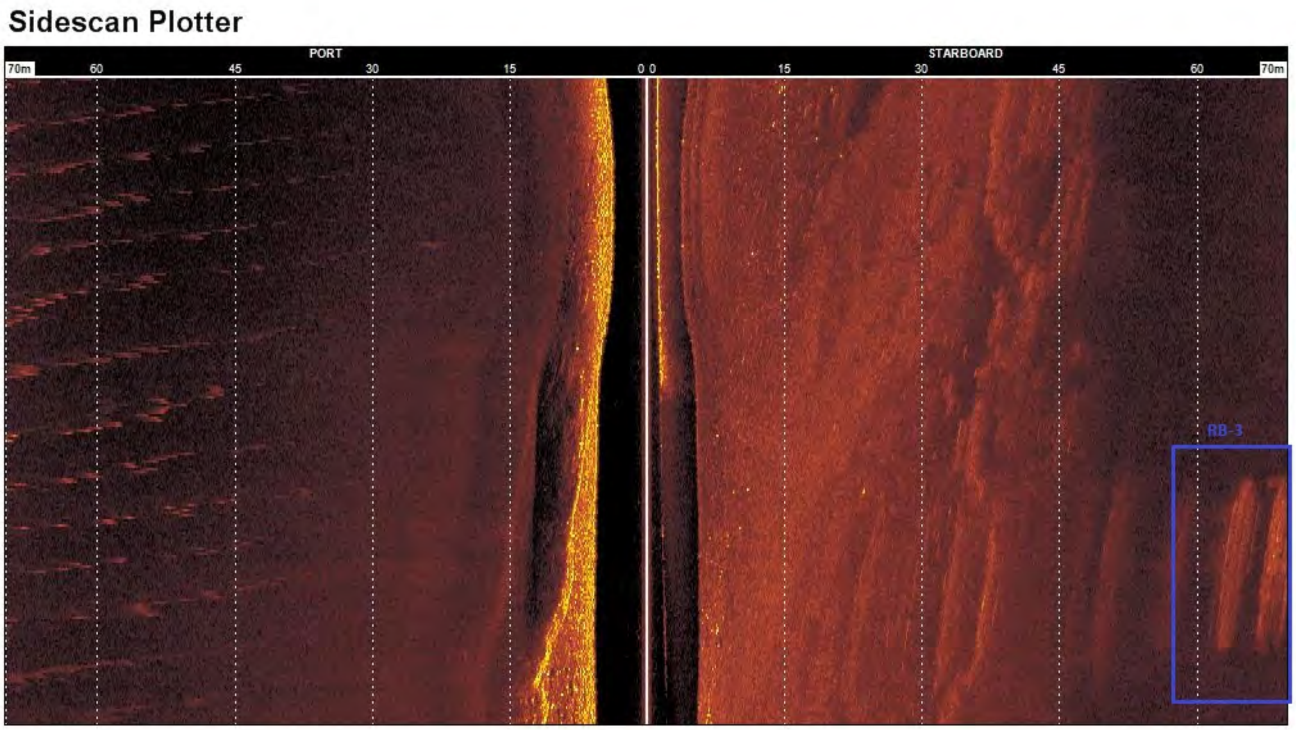


Figure 15. Target RB-3 at Redoubt Bay, Alaska.

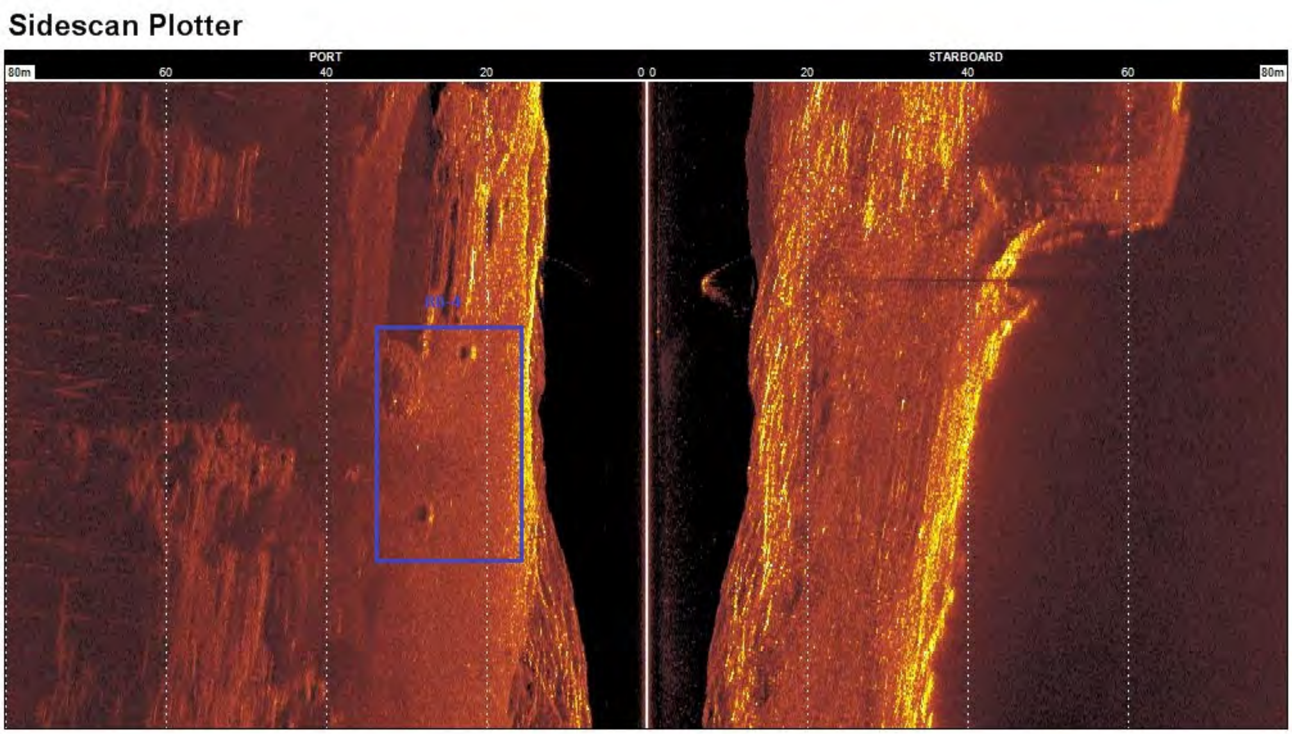
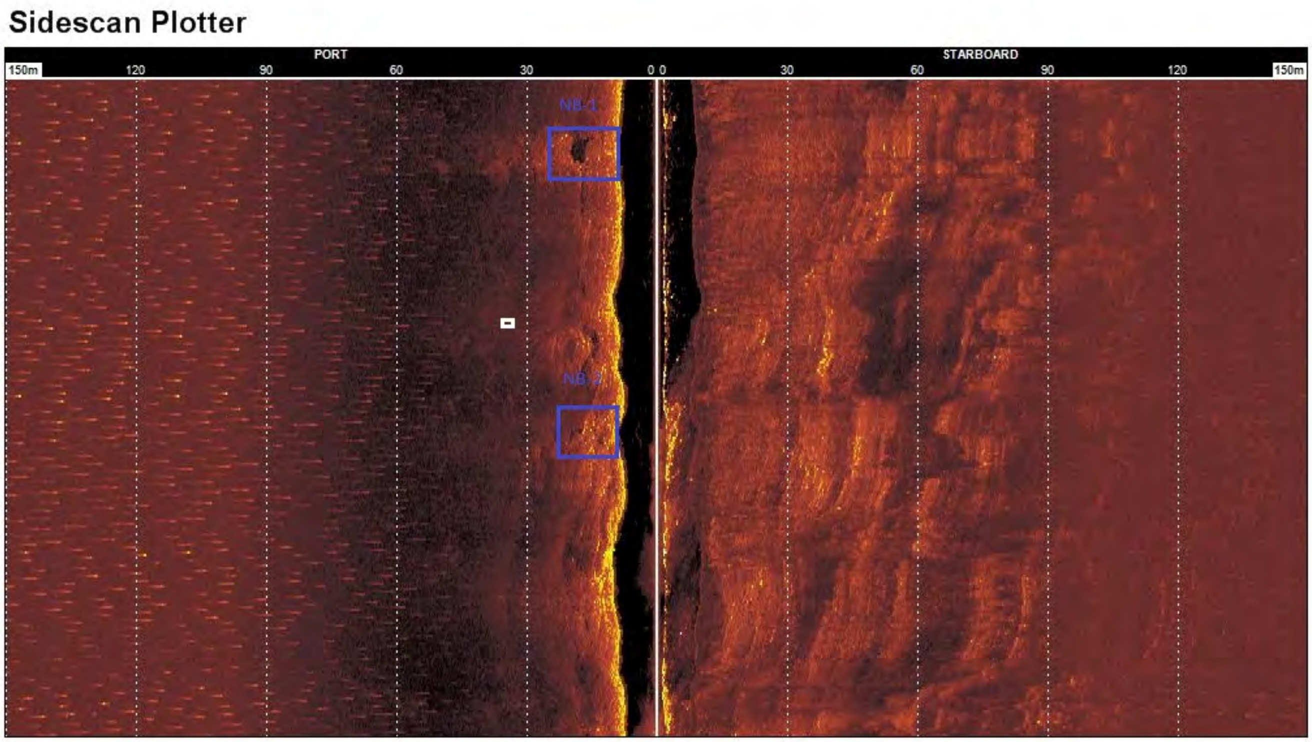


Figure 16. Target RB-4 at Redoubt Bay, Alaska.

[redacted]

[redacted]



[redacted]

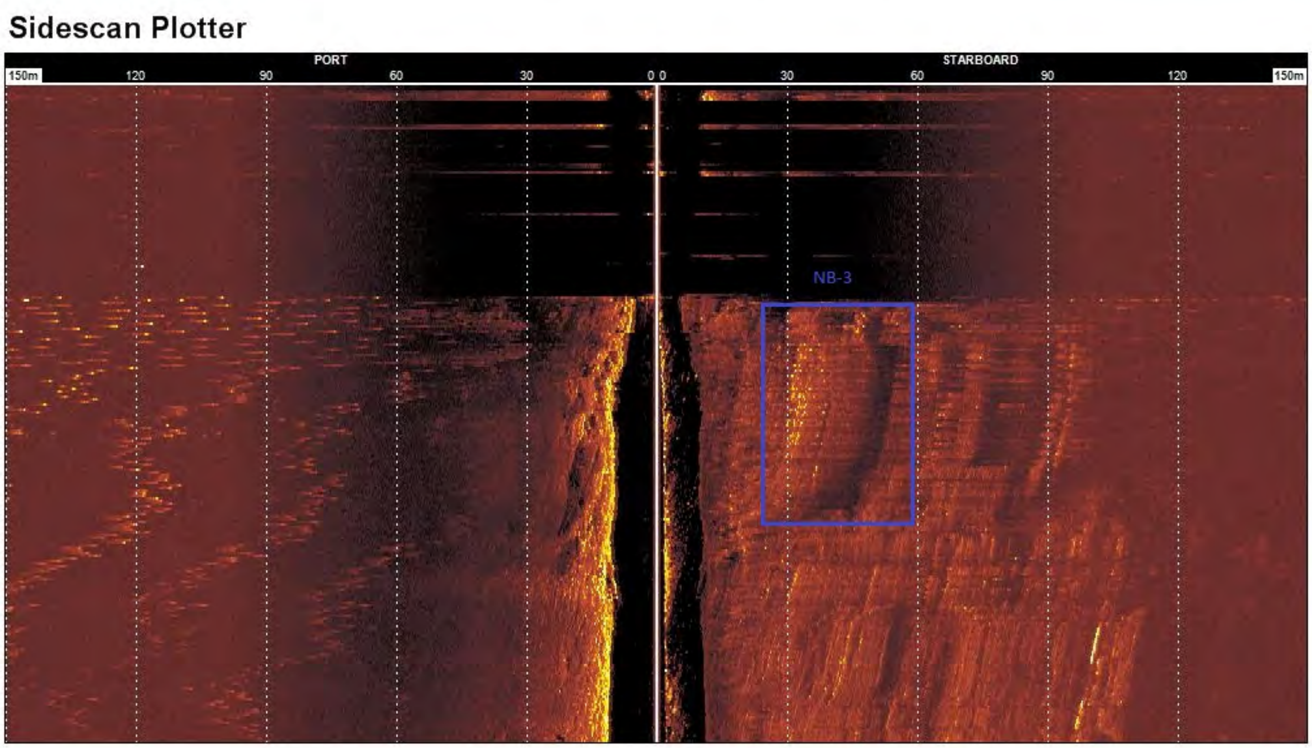


Figure 20. Image of NB-3 [redacted]

[redacted]

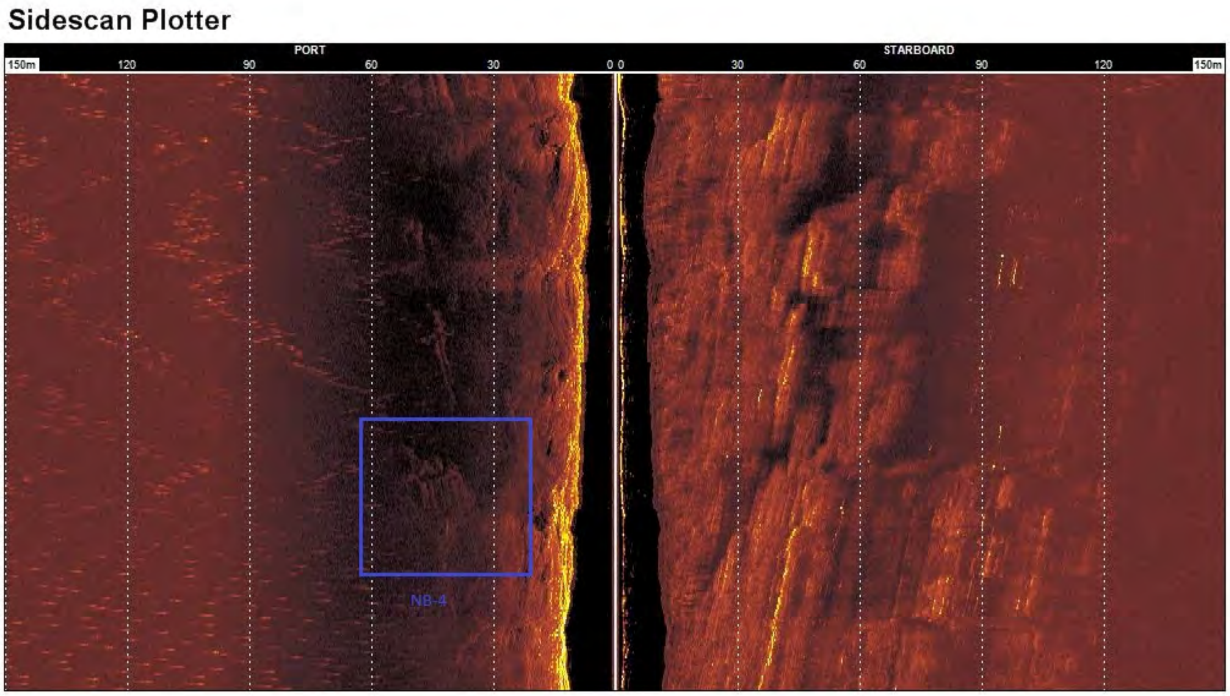


Figure 21. Image of NB-4 at [redacted]