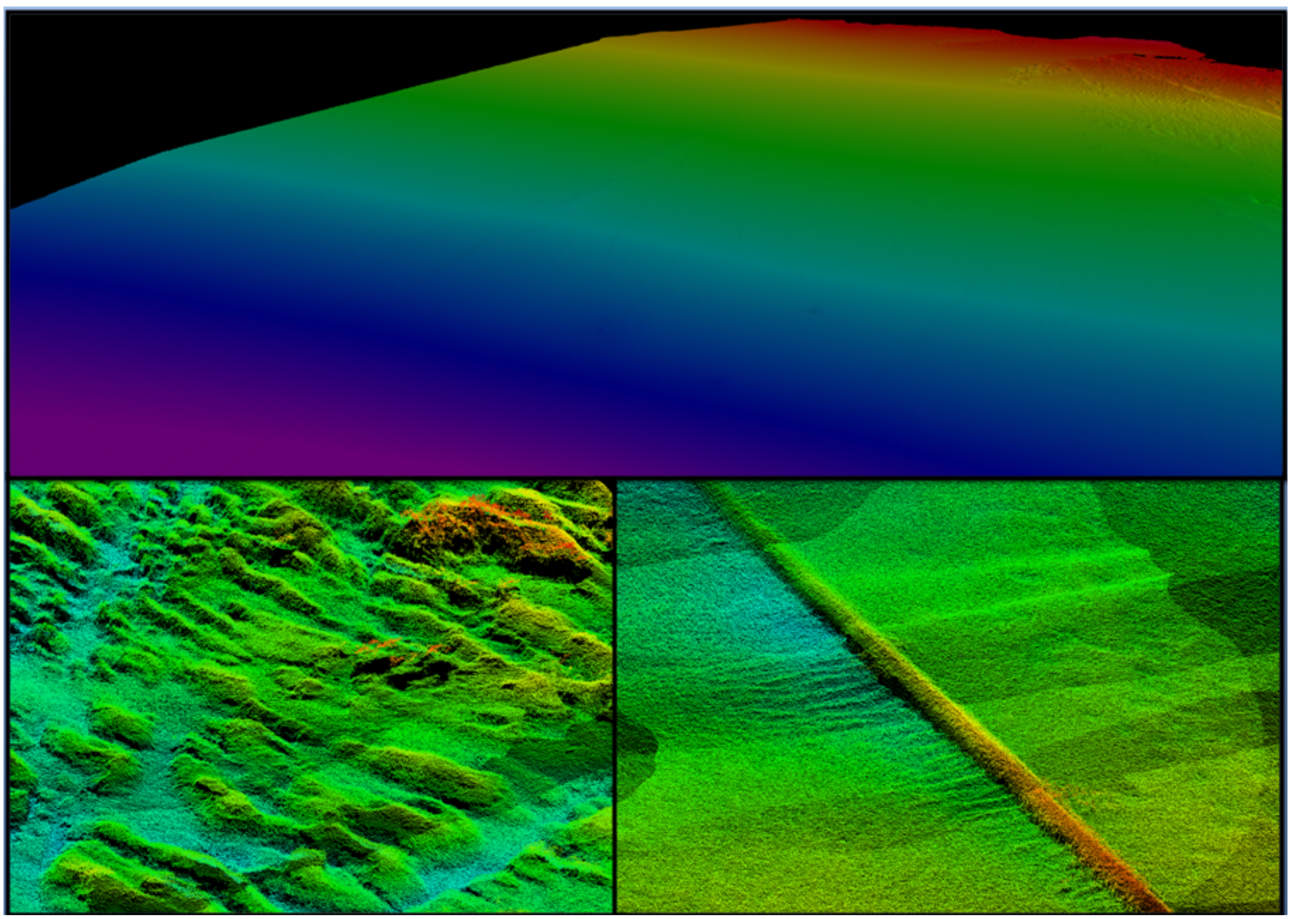
Hydrographic Survey
Encina Marine Oil Terminal
Decommissioning Project
Carlsbad, CA



Report of Survey

September 27th 2018

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ABBREVATIONS

ACSM/THSOA - American Congress on Surveying and Mapping/The Hydrographic Society of America
AML - AML Oceanographic Systems
CMR+ / CMR 94 – Compact Measurement Record
CORS - Continuously Operating Reference Stations
GAMS - GNSS Azimuth Measurement System, GAMS™
GLONASS - Global Navigation Satellite System
GNSS - Global Navigation Satellite System
GPS - Global Positing System (US System)
GRS - Geodetic Reference System
ID - IDentification number
LIDAR - Light Detection and Ranging
MBES - Multibeam Echo Sounder System
MLLW - Mean Lower Low Water
NAD83 - North American Datum 1983
NAVD88 - North America Vertical Datum 1988
NGS - National Geodetic Survey
PPK - Post Processed Kinematic
QINSy - Quality Integrated Navigation System
QC - Quality Control
QPS - Quality Positioning Systems
RTK - Real Time Kinematic
SBET - Smoothed Best Estimate of Trajectory
SVP - Sound Velocity Profile(r)
USM - Universal Sonar Mount
USACE - United State Army Corps of Engineers
WGS84 - World Geodetic System 1984

EXECUTIVE SUMMARY

Between July 9th and 11th 2018 eTrac Inc. completed a hydrographic survey of an area approximately 5,500ft from shore and 3,800ft wide, centered along the NRG, Encina Power Station pipeline in Carlsbad, California. This survey is the pre-decommissioning survey for the Encina Power Station Marine Oil Terminal Decommissioning Project.

The objectives of the survey were as follows:

1) Create a bathymetry grid of seabed depths across the area
2) Position and create pipeline alignment where pipe exposed
3) Locate debris objects on the seabed
4) Determine the extents of rock outcroppings
5) Determine the extents of marine vegetation

Detailed information on the seabed depths were recorded with full coverage multibeam.

The exposed pipeline was clear in the multibeam and the pipeline alignment was well defined. The pipeline was exposed on the seabed for approximately 336ft.

Eleven (11) objects were located on the seabed. These ranged from 4ft in length to 12ft. Forty-nine (49) objects resembling rocks or boulders were also identified. Rock outcroppings were able to be determined in the multibeam data with a clear transition from sand to rock substrate.

The rock outcroppings were located in one large (44 acres) and one smaller (3.3 acres) contiguous areas. Adjacent to these were several smaller (0.05 acres or less) rock outcropping areas. All the rock outcroppings were located in the south eastern part of the survey area.

Kelp beds were identified in the multibeam data. The kelp bed locations correlated with the rock outcroppings. The areas covered by kelp beds ranged from 9.5 acres to 0.04 acres.

1. INTRODUCTION

a. Survey Area

This report is prepared for Longitude 123 by eTrac Inc (eTrac) for the Encina Power Station Marine Oil Terminal Decommissioning Project.

Figure 1 shows the project area. The survey area was designated by Longitude 123. Coverage was obtained up to the border offshore and then along shore as close as possible where maintaining safe survey conditions.

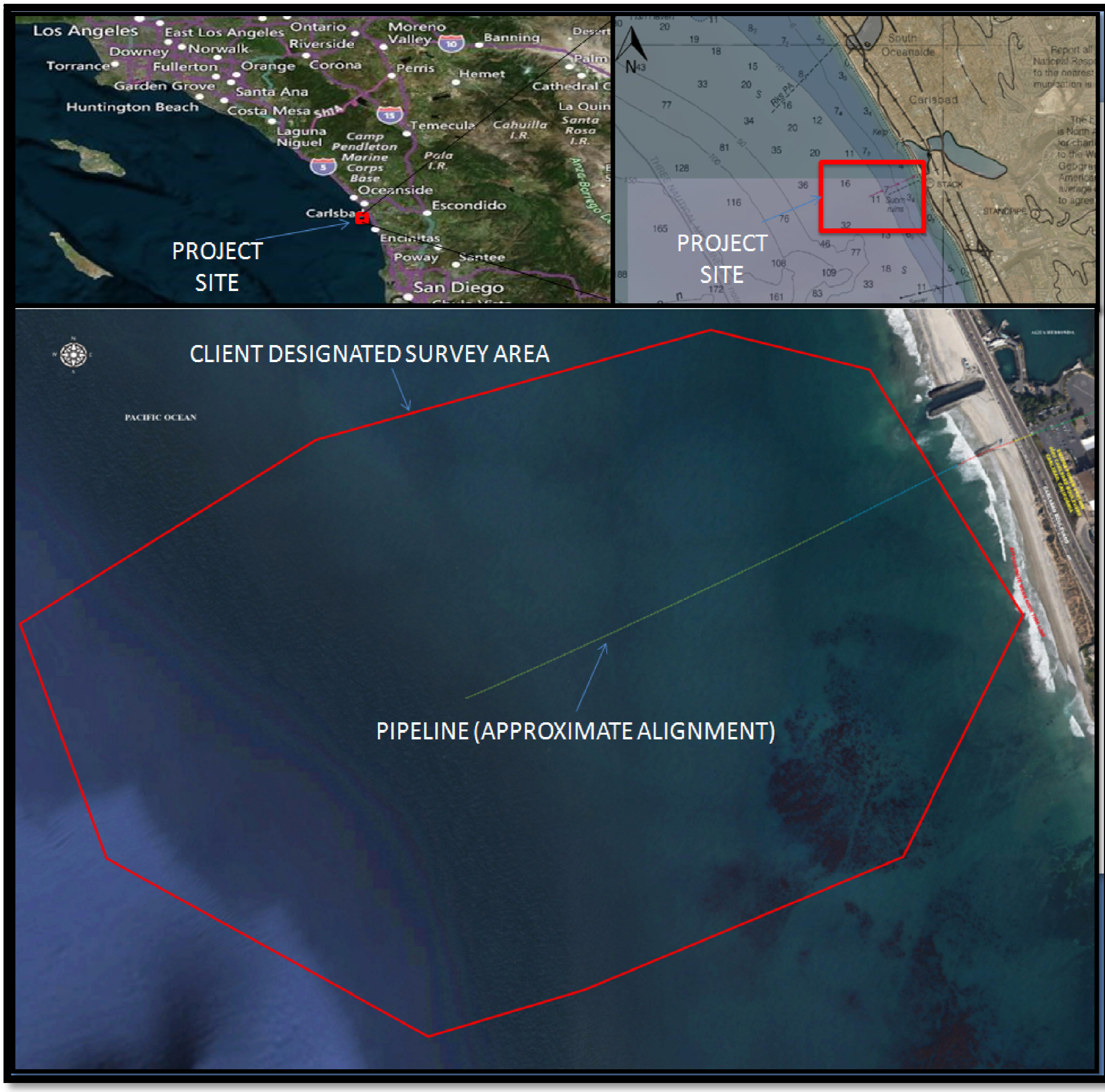


Figure 1 Survey area location

b. Company Overview

eTrac Inc. was established in 2003 as a hydrographic and geophysical surveys, vessel positioning and instrumentation firm. eTrac has several offices along the US West Coast including San Francisco, Seattle and Anchorage. The firm has earned a strong reputation among many sectors of the hydrographic industry, including government agencies and private industry. Its equipment fleet has also grown to include 9 aluminum geophysical survey vessels as well as several ultraportable, shallow water survey craft. eTrac's role has grown over the years to include a strong group of full-time staff as well as several localized vessels to support the work required by USACE, marine construction, engineering firms and petroleum industry contractors on the west coast. eTrac is committed to continual re-investment in industry leading equipment and knowledgeable staff to complete multibeam, singlebeam, sidescan, mobile LiDAR and water-level surveys required by our clients. Staffed with professionally licensed land surveyors and ACSM/THSOA (American Congress on Surveying and Mapping/The Hydrographic Society of America) certified hydrographers, eTrac's projects are performed at the highest level of quality and detail that the industry demands.

2. OBJECTIVES

eTrac completed a hydrographic survey covering the designated survey area. The objectives of the survey were as follows;

1) Create a bathymetry grid of seabed depths across the area
2) Position and create pipeline alignment where pipe exposed
3) Locate obstruction objects on the seabed
4) Determine the extents of rock outcroppings
5) Determine the extents of marine vegetation

3. METHODOLOGY

a. Survey Vessels

All work was completed onboard survey vessel *S/V Tikaani*. *S/V Tikaani* is an aluminum monohull, hydrographic survey vessel of 24ft. *S/V Tikaani* is field proven, having conducted numerous hydrographic and geophysical surveys throughout Southern California with towed and mounted sensors. It is easily transported and can be mobilized for survey rapidly. A positioning and motion detection system was installed on the vessel with a long antenna base allowing maximum heading accuracy and better results in areas with low GNSS coverage. Tikaani had all offsets on the vessel measured while on a trailer to ensure that measurements to and from the positioning equipment are accurate to less than 3cms. The vessel is equipped with a Universal Sonar Mount (USM) for side-mounted multibeam. The multibeam system was mounted on this specially engineered side mount. This mount positions the system with 100% repeatability and allows for surveying in shallow water due to a specifically designed break away block (see Figure 2 for Tikaani specifications)

Figure 2 SV Tikaani specifications

b. Equipment

A base station was set up next to the survey area in Oceanside with a baseline no longer than 20 miles to any point in the survey area. This base was constantly logging and broadcasting correction data. The base position was set up on a known USACE benchmark referenced to Mean Lower Low Water (MLLW) in Oceanside. The system provided corrections for GLONASS and GPS satellites for optimal performance in areas where satellite could be blocked such as under the bridges. Precise positioning and motion systems as well as a high resolution multibeam sonar were installed for this project and are described below.

i. Positioning System

Applanix POS MV V5 Wavemaster

- Position Accuracies PPK: Horizontal: +/- (8 mm + 1 ppm x baseline length)3 Vertical: +/- (15 mm + 1 ppm x baseline length)
- Motion Accuracies, Roll and Pitch: 0.015° in PPK
- Heading Accuracies: 0.03° (2 m baseline)
- Real time Heave 5cms and Trueheave Solutions available increasing to 3cms
- With POSPac Processing allows PPK solution with GLONASS AND GPS satellites.

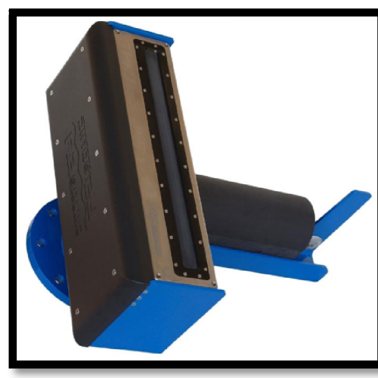
Figure 3 Applanix POS MV Oceanmaster

Trimble 5700

- Broadcasting RTK CMR+ and CMR 94 corrections
- Logging data with NetR5
- GPS and GLONASS

Figure 4 Trimble SP 5700 RTK base station set up for the project

ii. Multibeam Sonar



R2Sonic 2024 Multibeam Echo sounder

- 400 kHz
- 256 discrete 0.5° x 1.0° beams (1024 soundings with ultra high density mode implemented)
- 1 to 500 meter minimum/maximum range
- 1.25 cm range resolution

Figure 5 R2 Sonic 2024 Multibeam Echosounder System

An R2 Sonic 2024 multibeam system was used for all data. The system was run at 400khz in ultra high density mode. This allowed sounding data density to be four times that of the standard R2 sonic 2024 system. The system was run with no gates or filters to enable imagery of all potential objects in the entire water column.

For all multibeam data the sound speed both that the sonar head and through the water column was accounted for with two sound velocity probes. An AML Micro X and AML Base X were used.

c. Geodesy

i. Project Coordinates

The project coordinates used for the survey were NAD83 U.S. State Plane California Zone 6 in US Survey feet.

Spheroid Parameters

Geodetic Datum	NAD 1983 (2011) 2010.00
Ellipsoid	GRS 1980
Semi-major Axis	20925604.474 USft
Inverse Flattening (1/f)	298.257222101

Projection Parameters

Description	US State Plane California Zone 6
Unit	US survey Feet
Projection	Lambert Conic Conformal (Two Standard Parallels)
Latitude of Origin	32° 10 00.00 North
Longitude of Origin	116° 15 00.00 West
Scale Factor	1.0
Grid Easting at Origin	6561666.667
Grid Northing at Origin	1640416.667
Scale Factor at longitude of Origin	1.0

ii. Vertical Datum

The vertical datum for all work was MLLW.

iii. Horizontal and Vertical Control

The horizontal and vertical control for the project is the NGS Benchmark "Fallbrook CS_2004" NGS CORS Station P474 (see Figure 6 for location and Figure 7 for coordinates). The base station and benchmark are 18 miles from the furthest extent of the survey area. Corrections from the CORS station were applied to logged vessel data to compute a Post Processed Kinematic position and motion for the vessel. Data was reduced from ellipsoidal to orthometric height NAVD88 using Geoid 2012A. To further reduce the data from NAVD88 to MLLW a comparison between Vdatum calculations and the USACE benchmark in Oceanside labeled OS-4. The comparisons showed the Vdatum reduction from NAVD88 to MLLW was in line with a reduction of NAVD88 to MLLW at the USACE benchmark. Vdatum showed a nominal difference (less than 0.07ft) between MLLW and NAVD88 within the survey area.

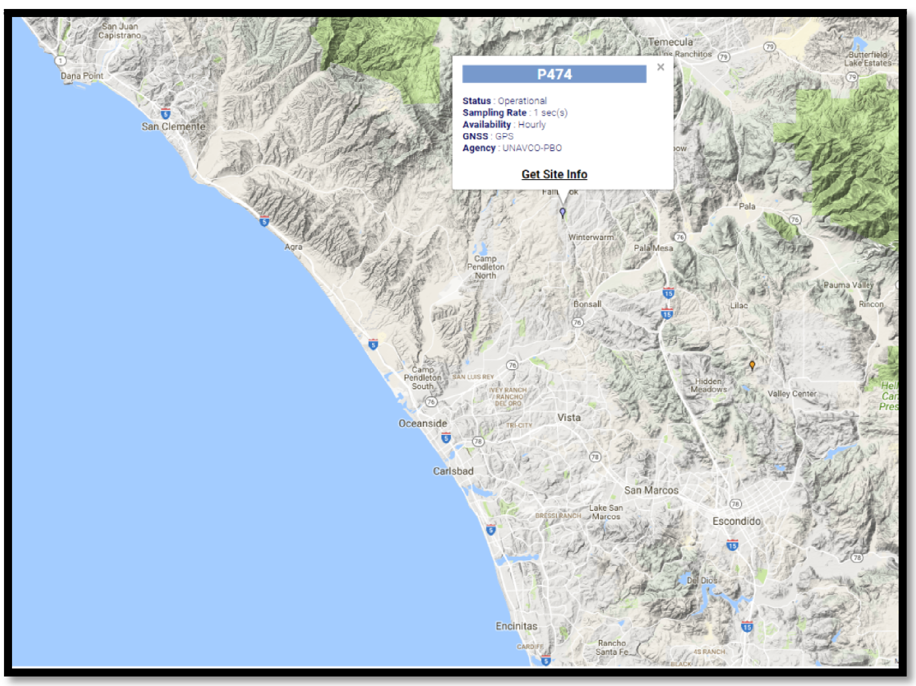


Figure 6 CORS Station P474 location

```
                          ***IGS 08***
              FALLBROOK_CS2004 (P474),  CALIFORNIA

Created on 31Aug2011 at 09:40:52.

         Antenna Reference Point(ARP): FALLBROOK_CS2004 CORS ARP
         -------------------------------------------------------
                             PID = DG9734


 IGS08 POSITION (EPOCH 2005.0)
 Computed in Aug 2011 using data through gpswk 1631.
     X =  -2441765.277 m     latitude     =  33 21 18.69108 N
     Y =  -4741246.525 m     longitude    = 117 14 55.28448 W
     Z =   3487030.660 m     ellipsoid height =  182.909    m

 IGS08 VELOCITY
 Computed in Aug 2011 using data through gpswk 1631.
     VX =   -0.0291 m/yr     northward =   0.0167 m/yr
     VY =    0.0247 m/yr     eastward  =  -0.0372 m/yr
     VZ =    0.0143 m/yr     upward    =   0.0006 m/yr


 NAD_83 (2011) POSITION (EPOCH 2010.0)
 Transformed from IGS08 (epoch 2005.0) position in Aug 2011.
     X =  -2441764.664 m     latitude     =  33 21 18.68099 N
     Y =  -4741247.732 m     longitude    = 117 14 55.24202 W
     Z =   3487030.810 m     ellipsoid height =  183.653    m

 NAD_83 (2011) VELOCITY
 Transformed from IGS08 velocity in Aug 2011.
     VX =   -0.0141 m/yr     northward =   0.0280 m/yr
     VY =    0.0251 m/yr     eastward  =  -0.0240 m/yr
     VZ =    0.0231 m/yr     upward    =  -0.0005 m/yr
```

Figure 7 Details of point Fallbrook_CS2004 CORS Station P474

d. Acquisition and Safety

All data was collected from July 9th to 11th 2018. Data was collected in a safe and efficient manner. Data was collected in daylight hours and in calm conditions. All personnel involved with the project are OSHA certified and at the start of the day and before any activity change a full toolbox talk was completed. The main risk involved was deploying and retrieving the sonar head. Two people were always on deck during these operations and retrieval and it was always done at periods during which ample time could be allowed for the process to be done in a safe manner. Where the conditions were optimal the survey was run to shore up to the point where there was only 0.6m (~2.0ft) clearance below the sonar head. Where there were rock outcroppings and boulders noted or in areas of surf, 1m (~3.2ft) clearance below the sonar was considered the shallowest depths the vessel would work in. The minimum depth achieved was 2ft below MLLW. The shoreline was defined to at least 4ft below MLLW.

e. Processing & Software

All multibeam data acquisition was completed in QPS QINSy hydrographic data acquisition, navigation and processing software package. Change in the sound speed environment were monitored and appropriate actions in terms of further measuring of the water column sound speed were taken. Position data was post processed in Applanix POS Pac Inertial post position processing software. This allowed the creation of a more accurate and robust Smoothed Best Estimate of Trajectory (SBET) solution. This was especially useful under the bridge during periods of GNSS outage. This refined, highly accurate post processed position and motion was applied to the multibeam data in QPS QIMERA software. Data was then analyzed, further processed for positional errors and cleaned in QIMERA.

f. Analysis

The multibeam data was analyzed as both 3D gridded surfaces and 3D point cloud visualization environments. This allowed a detailed understanding of the feature geometries. This data was interpreted in order to determine the existence of debris objects, rocks, rock outcroppings, and kelp beds.

Debris objects were determined as features that were anomalous to the surrounding seabed. Anything that protruded from the seabed or created a relief that was not in common with the prevailing bathymetry in the area. A further distinction of being a debris object as opposed to a rock or boulder was made based on the geometry of the feature. A rounded, smaller (less than 5ft wide or long), singular feature was considered a rock or boulder. An irregular shaped feature (a linear feature, non circular or rectangular feature) was considered a debris object. The image below in Figure 8 shows the detail from the high resolution multibeam, that allows objects to be discerned.

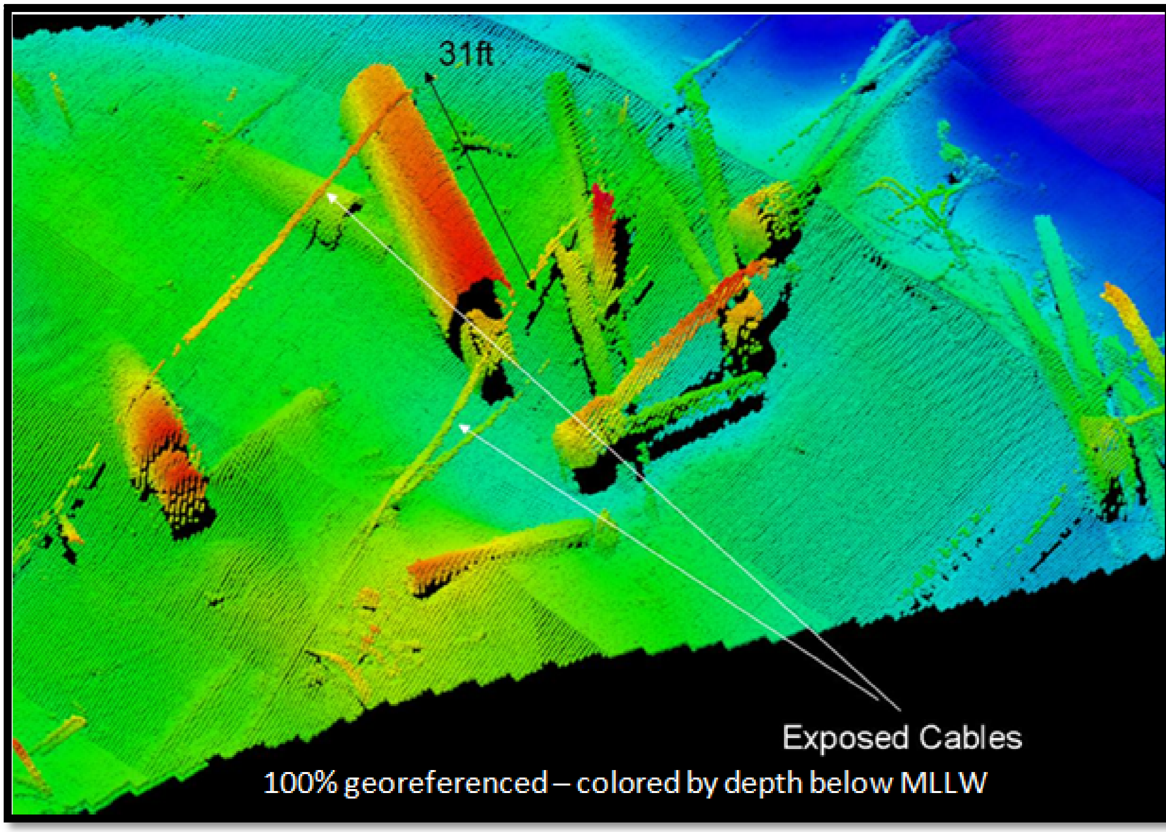


Figure 8 3D point cloud of multibeam data showing objects clearly and able to be determined based on geometry

The extents of rock outcroppings were determined by looking for a change in rugosity as compared to the surrounding sand or mud environment. A rock outcropping was assumed to be an area with high rugosity distinct from smooth sand or mud. The intensity or the acoustic reflectance was also analyzed to confirm the delineation of rock outcroppings. An example of rock outcropping detection using multibeam data is shown below in Figure 9.

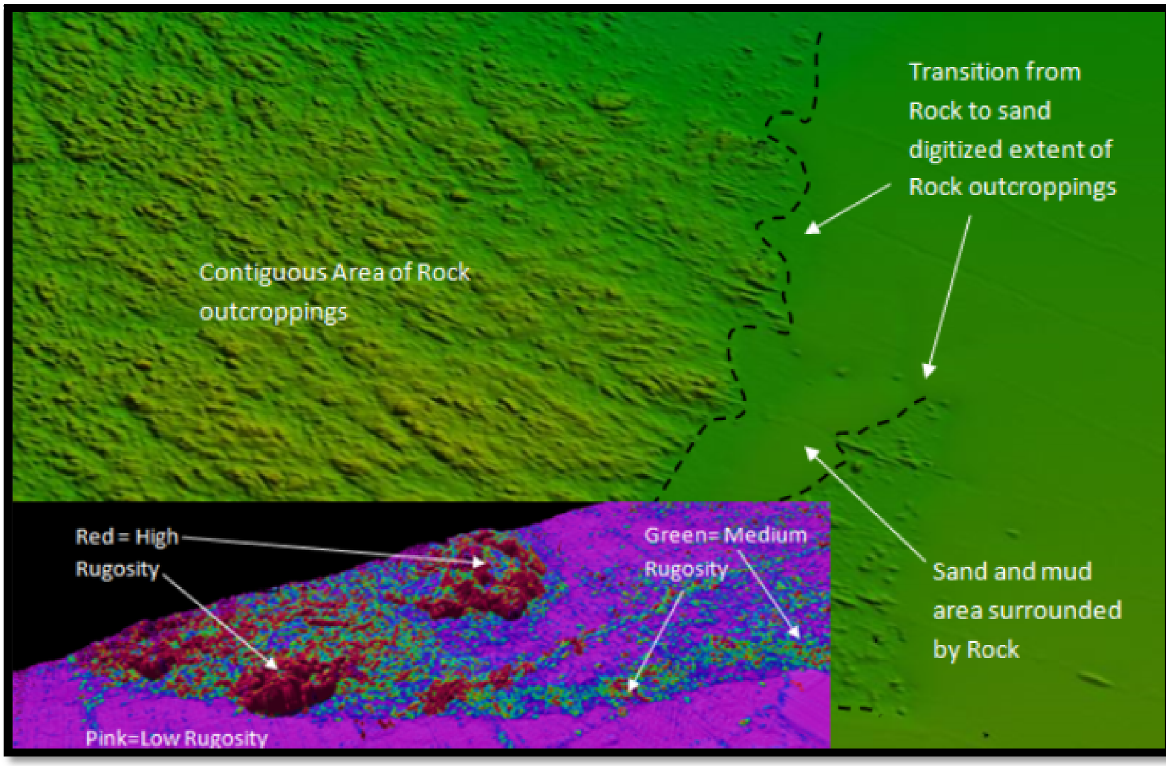


Figure 9 Analysis of extents of rock outcroppings using multibeam data gridding techniques

Marine vegetation was determined by the existence of disturbance in the sonar data. eTrac has experience mapping vegetation along the California coast using multibeam echosounders. eTrac analyze both the 3D point cloud data of the multibeam as well as the surface created by the soundings. This allows in depth analysis of the data to be performed to determine the existence of vegetation. Marine vegetation that can be identified includes, kelp, eel grass, surf grass and large algae.

The point cloud data can be analyzed for disturbance and geometry to determine the existence of marine vegetation. The image in Figure 10 shows the marine vegetation as imaged in the multibeam and analyzed in the 3D point cloud environment.

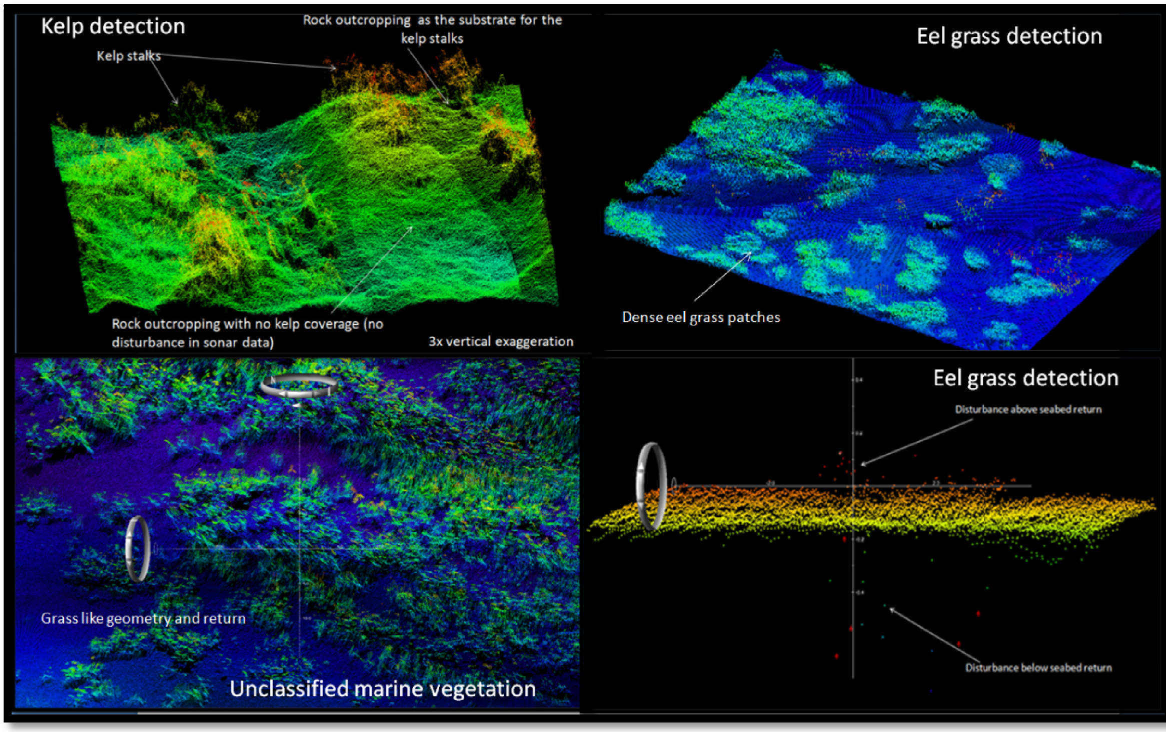


Figure 10 3D point cloud analysis for detection of marine vegetation

The image below in Figure 11 shows the use of gridding techniques and coloring to determine the extents of marine vegetation.

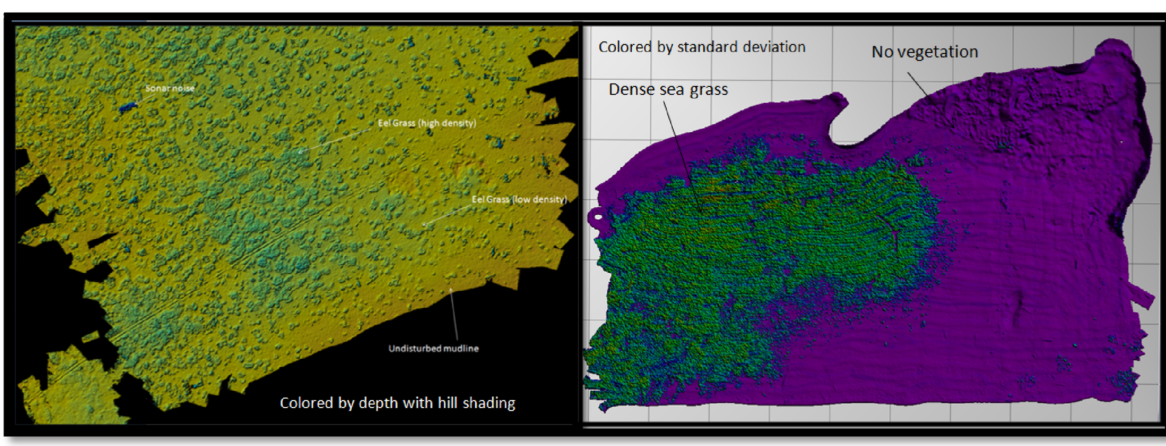


Figure 11 Multibeam data gridding techniques to analyze for the present and extents of marine vegetation. Left: Data colored by depth with hill shading Right: Data colored by standard deviation of each cell

Kelp beds were determined by the existence of kelp stalks which cause large amounts of disturbance in the sonar data in the water column. Generally kelp areas were not able to be navigated into it gets caught in the motors. Therefore, the extents of this disturbance and thus the stalks was marked as the kelp bed border. The data from the sonar is considered the extents of a contiguous area or kelp or a kelp forest.

The pipeline alignment was analyzed by using a shallow gridded surface and 3D point cloud. The top of the pipe was considered the shallowest point across the pipeline as detected in the multibeam sonar data.

g. Geodatabase

A geodatabase was made to store all the findings. These are referenced by year and type of object or cable found in order that if there are any further developments change can be noted. Each feature is given a unique id code. Where the cable or pipe name was used this was included with the year of survey and client surveyed for see Figure 12.

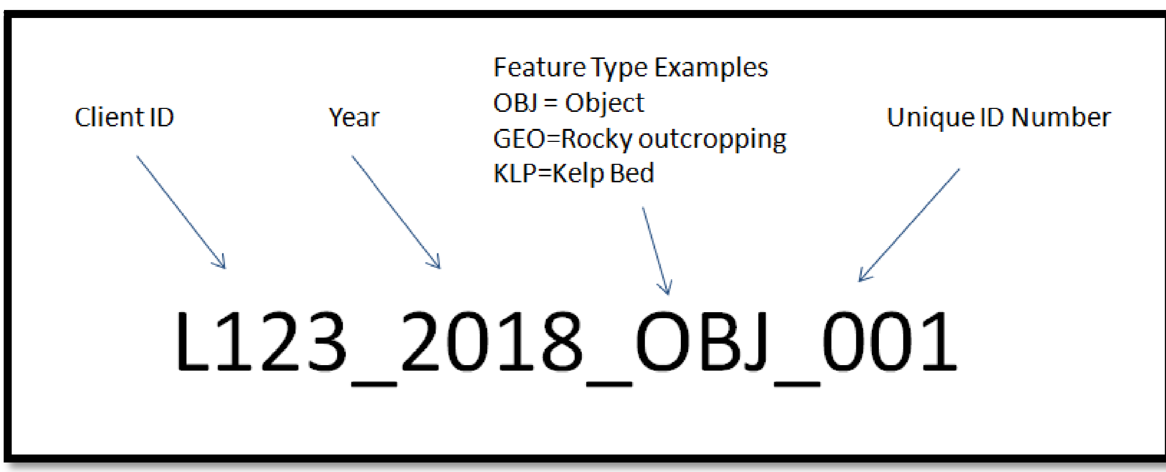


Figure 12 Geodatabase Unique IDs

4. RESULTS

a. Multibeam

Multibeam coverage was achieved in entire survey area. All the position data was successfully post processed so that up to 100% of the data was post processed kinematic where accuracies of 0.1ft were achieved.

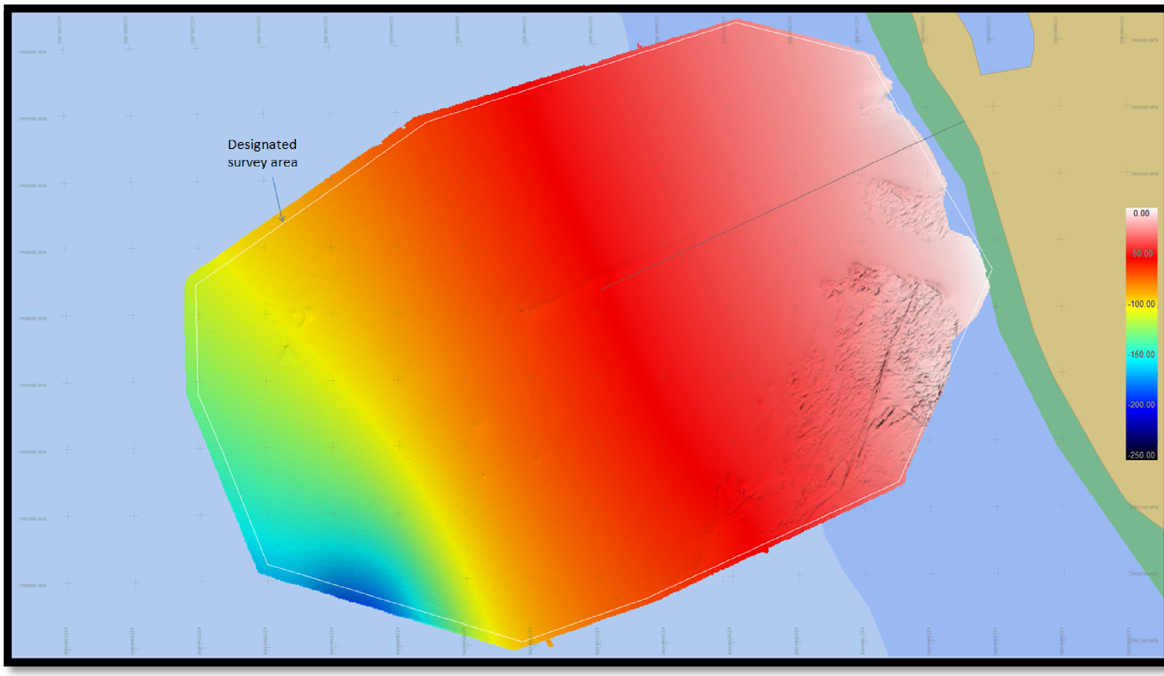


Figure 13 Multibeam coverage

b. Overview

The pipeline was clearly able to be identified when exposed above the seabed. The point definition on the pipeline was such that the top of the pipe was able to be determined for an accurate determination of alignment. Figure 14 shows the pipeline in the sounding data and the gridded data.

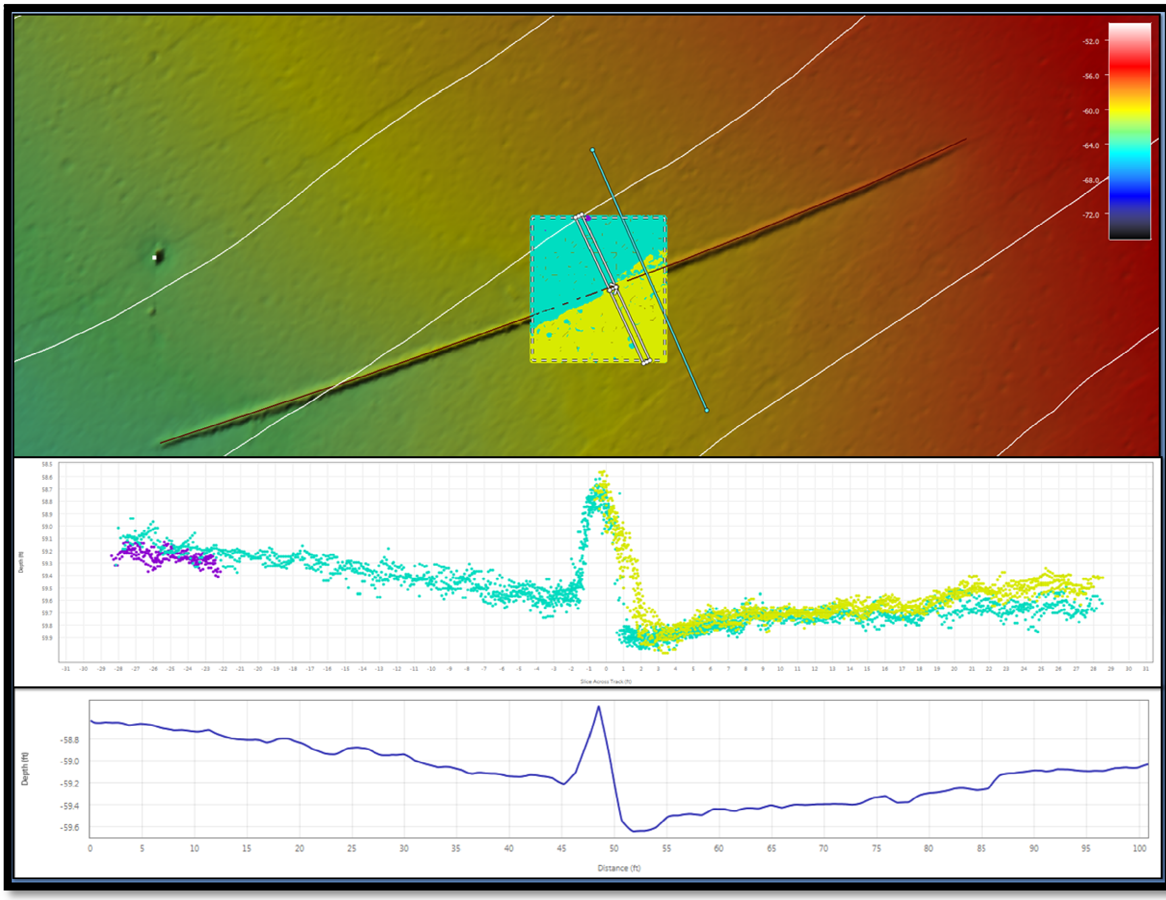


Figure 14 Pipeline as visible in the gridded multibeam data, profile data and 2D slide of sounding data

Data resolution and density was such that objects 6ft wide were detected past 100ft. The smallest note worthy object detected was 4x3x1ft. Rocks with diameters of 3ft were detected down to 170ft (see Figure 15).

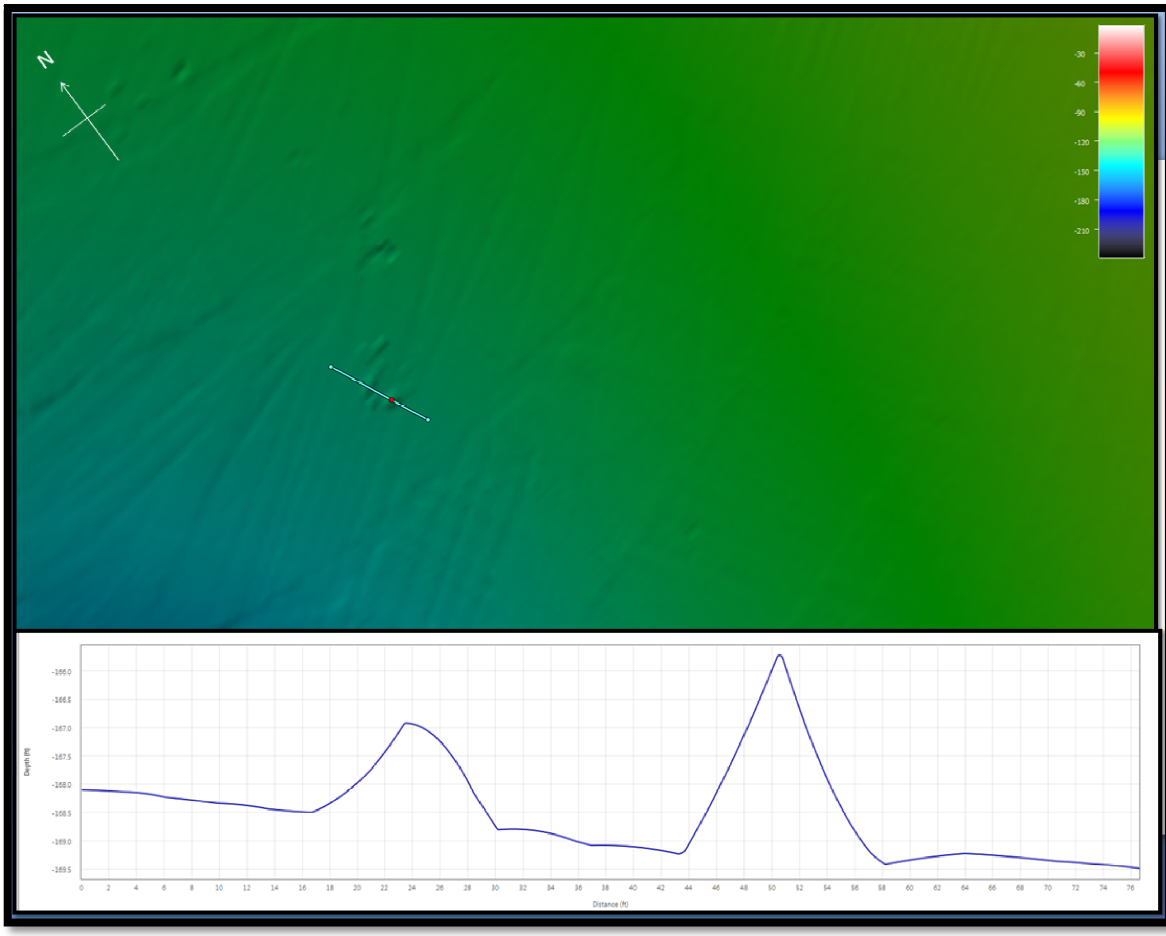


Figure 15 Rock objects at 168ft depth

Rock outcroppings were well defined in the multibeam data and evident and distinctly different to the surrounding sand. This allowed extents to be accurately located. Rock outcroppings viewed in a 3D gridded surface colored by depth and colored by rugosity is shown below in Figure 16.

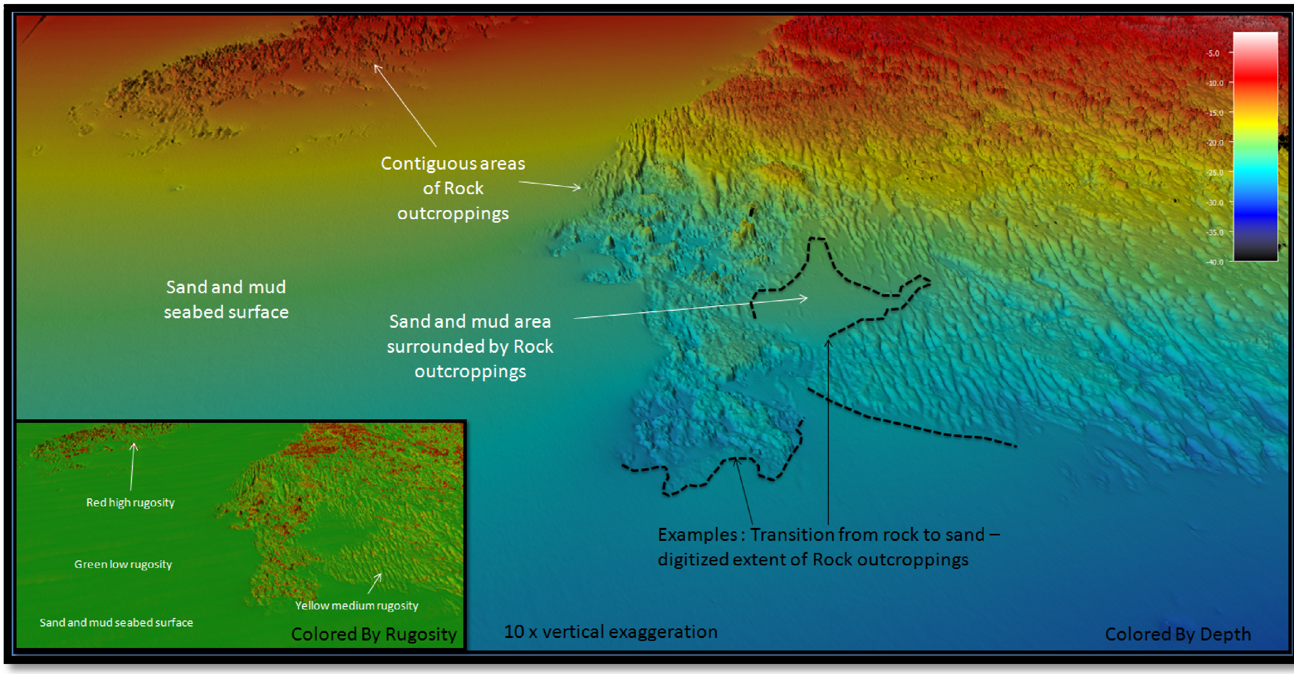


Figure 16 Rock outcroppings in 3D gridded surface colored by depth and colored by rugosity

The disturbance of kelp stalks was clear in the sonar data allowing accurate depiction of the kelp bed extents. The kelp stalks as detected in sonar data above rock outcroppings is shown below in Figure 17.

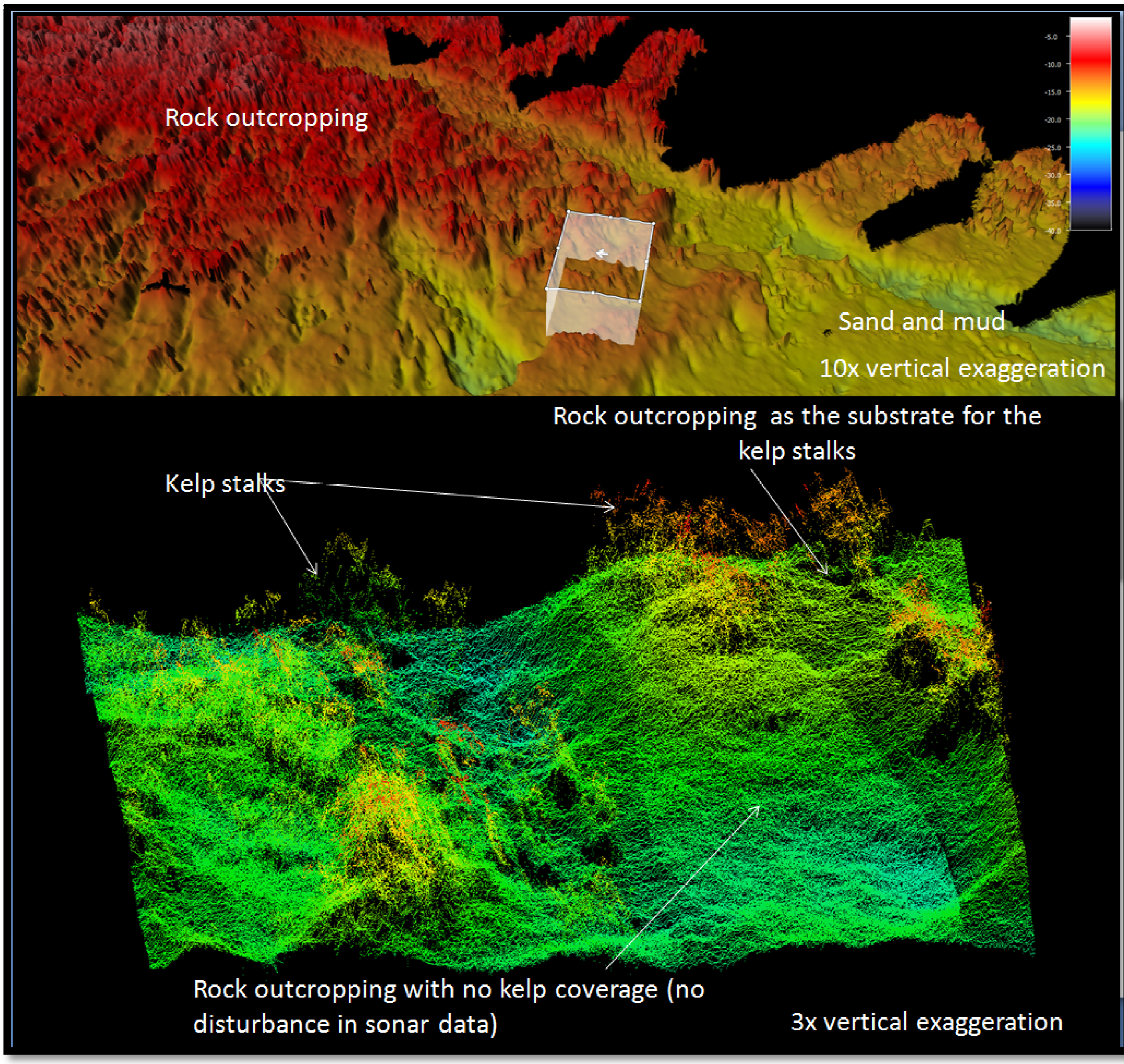


Figure 17 Kelp stalks as detected in the sonar data as disturbance above rock outcroppings

5. ANALYSIS

This section will describe the as surveyed position of the pipeline, surface objects and marine vegetation. eTrac were given permission to use survey data acquired in September 2017 in the same area for NRG in order to better understand the current conditions of area.

a. Pipeline Alignment

The pipeline was observed as being exposed for a total of 336ft. There are 3 exposure sections ranging from 51ft to 172ft. As the pipeline transitions from sea to land the pipe was mapped to the point at which it becomes buried nearshore at 5ft MLLW. The pipeline was not identified further inshore where coverage was achieved up to 3ft MLLW. It is therefore assumed that the pipe is buried during the transition from water to land. These sections are shown below in Figure 18.

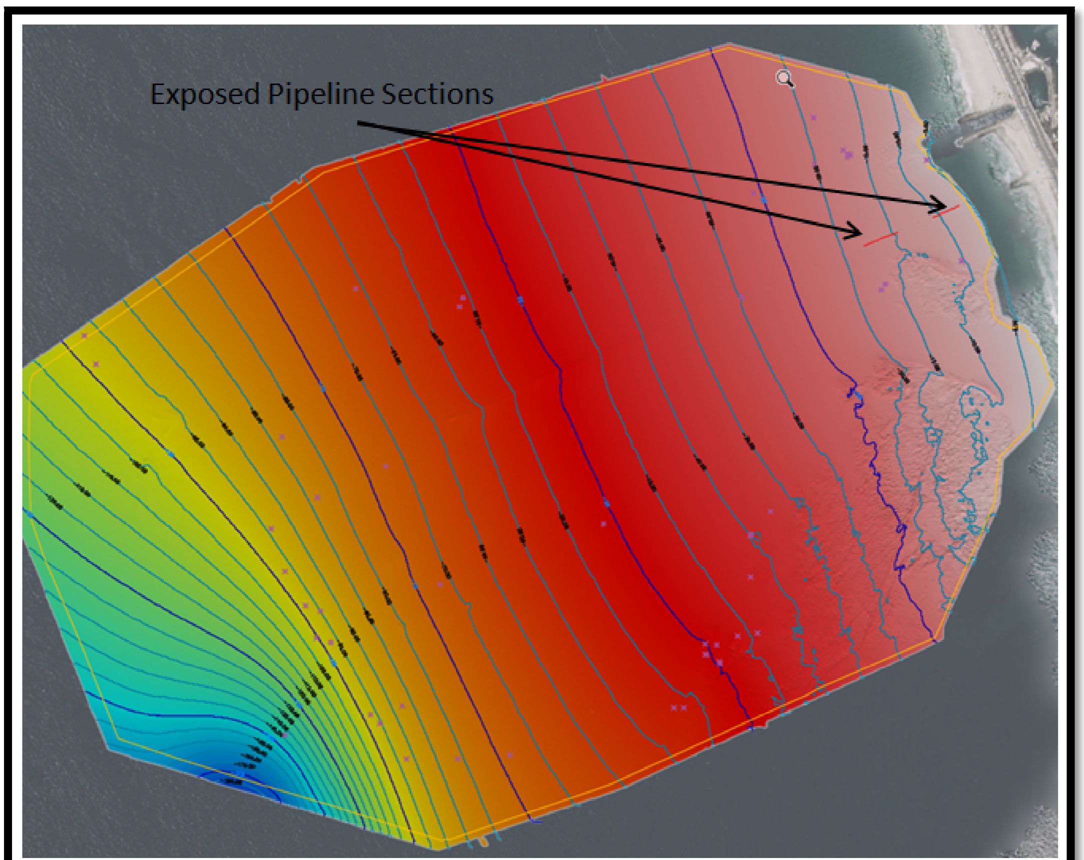


Figure 18 Pipeline exposure sections

The pipeline as seen in the multibeam 3D point cloud data in Figure 19 (exposure section) below. The curved geometry of the pipeline is evident which allows the determination that the pipeline is not fully exposed.

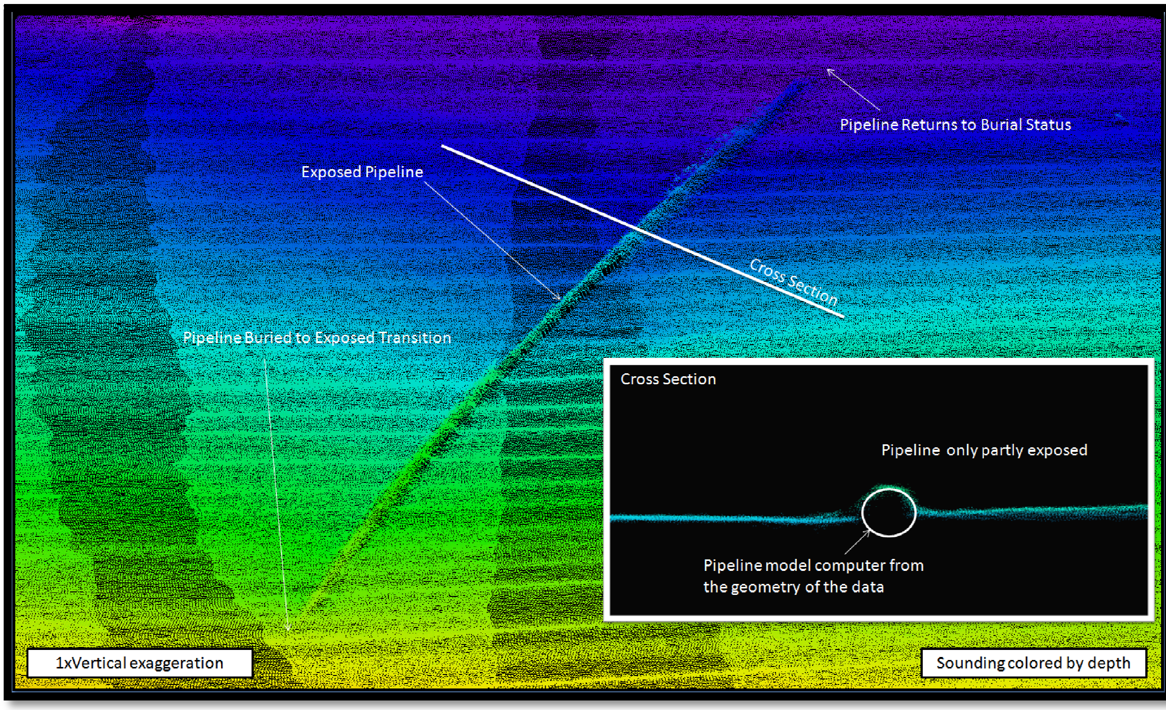


Figure 19 The pipeline in 3D point cloud data

The pipeline in the transition zone is shown below in Figure 20.

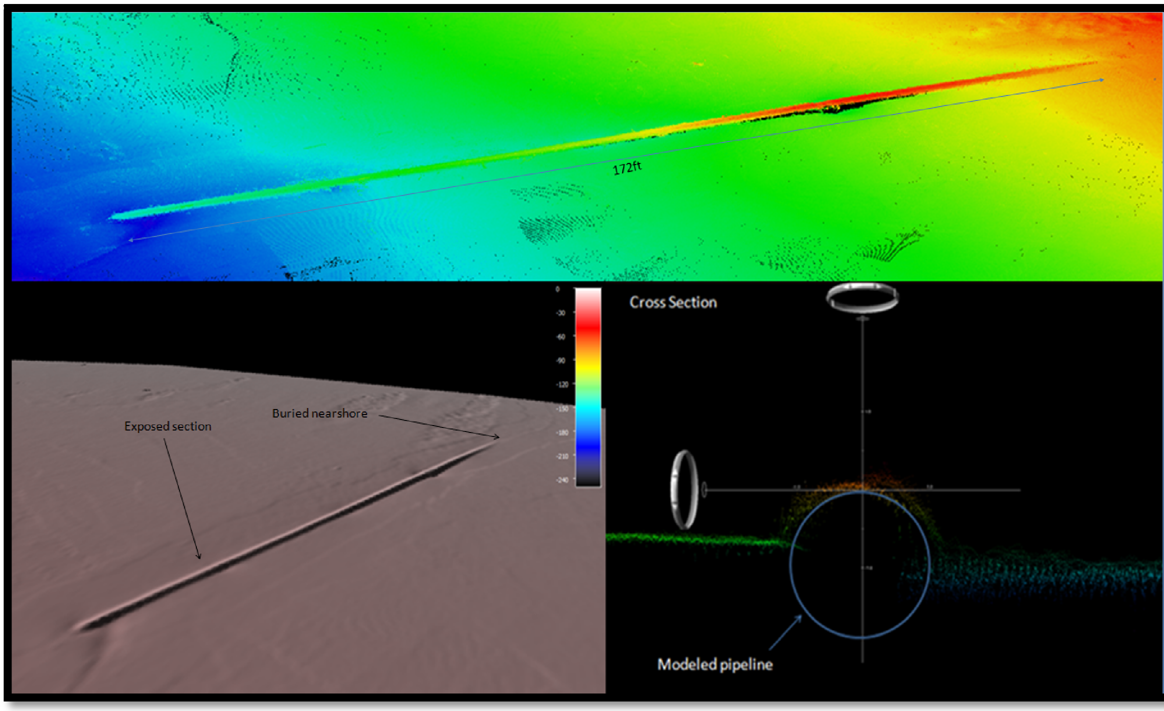


Figure 20 Pipeline in transition zone from water to land

The termination point as defined in 2018 were closer to shore than 2017. Exposure sections identified in the 2017 data were not evident in 2018. The image below in Figure 21 shows the termination point in 2018 as compared to 2017 as well as the exposure lengths in 2017 which were not evident in the 2018 data. The 2018 termination point in the 3D point cloud shows the pipe as extending out of the seabed (see Figure 22).

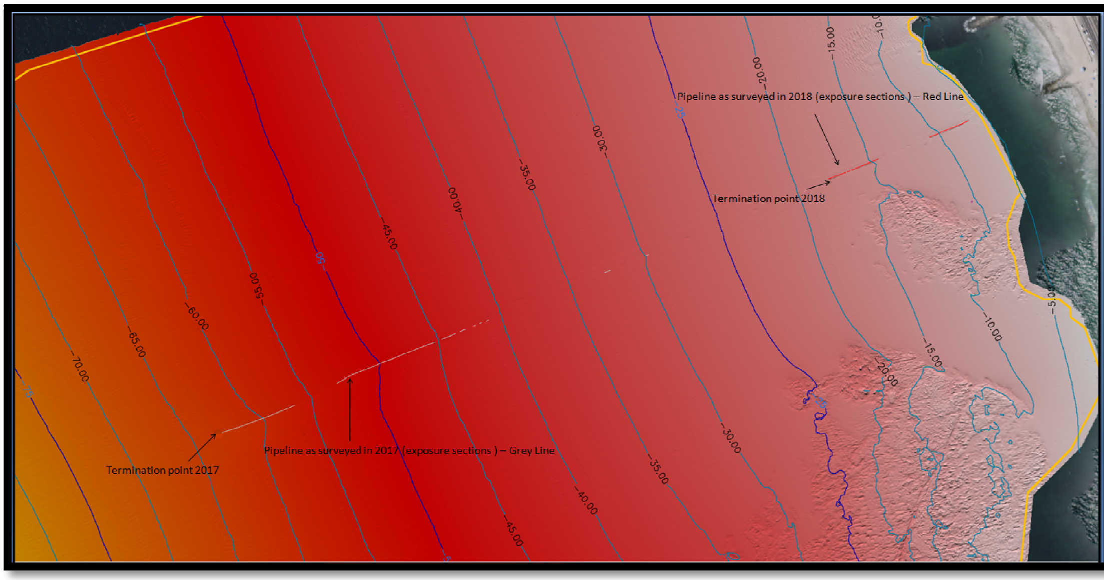


Figure 21 Map showing 2017 exposure sections and the current 2018 exposure sections and termination points

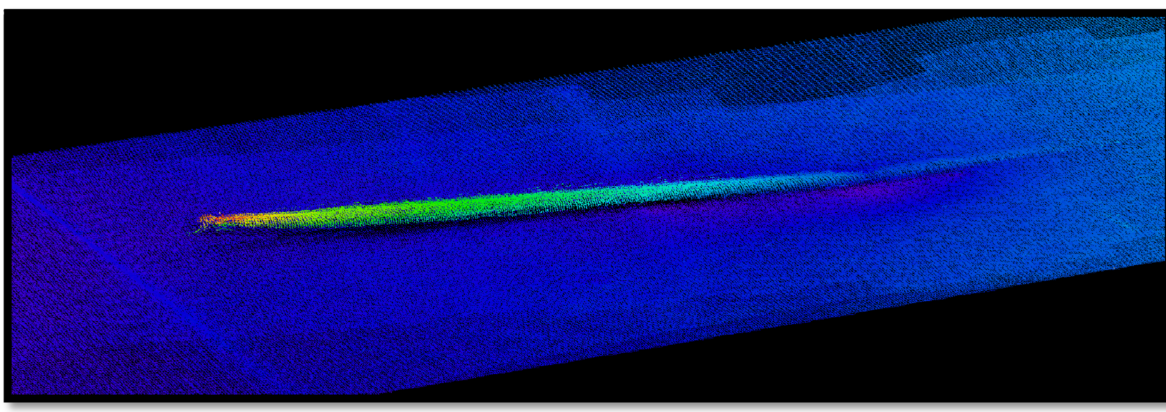


Figure 22 As surveyed Termination Point

b. Objects

Eleven (11) objects were located within the survey area. These objects range from 20ft to only 4ft long in size. An object listing is below in Table 1 and a map in Figure 23 shows the object locations.

Table 1 Debris Objects in survey area

Unique ID	Description	Easting	Northing	Longitude	Latitude	Minimum Depth	Dimentions
L123_2018_OBJ_001	Unknown spherical object/Possible Single Point Mooring	6223153.4	1993966.8	117° 21' 20.8934" W	33° 08' 00.3111" N	-97.6	4x3x1.5
L123_2018_OBJ_002	Submarine pipeline end anchor	6224967.8	1993908.1	117° 20' 59.5506" W	33° 07' 59.9197" N	-63.0	6x4x1
L123_2018_OBJ_003	Debris along Pipeline route	6225058.4	1994025.3	117° 20' 58.4997" W	33° 08' 01.0889" N	-59.7	7x4x1
L123_2018_OBJ_004	Frame Consisting of parallel supports	6226551.9	1994655.9	117° 20' 41.0151" W	33° 08' 07.4840" N	-29.9	7.5x3.5x1.5
L123_2018_OBJ_005	Unknown spherical object/Possible Single Point Mooring	6223063.0	1993934.1	117° 21' 21.9520" W	33° 07' 59.9785" N	-99.8	6x5x2
L123_2018_OBJ_006	Submarine pipeline end anchor	6224950.4	1994061.1	117° 20' 59.7741" W	33° 08' 01.4321" N	-61.9	6x4x.5
L123_2018_OBJ_007	Debris along Pipeline route	6225051.4	1994029.8	117° 20' 58.5824" W	33° 08' 01.1328" N	-59.7	20x3.5X1
L123_2018_OBJ_008	Mound with debris along Pipeline route	6226162.2	1994499.0	117° 20' 45.5780" W	33° 08' 05.8904" N	-37.2	6x4.5x1
L123_2018_OBJ_009	Frame Consisting of parallel supports	6226798.4	1994761.4	117° 20' 38.1294" W	33° 08' 08.5533" N	-26.0	5.5x3.5x1.5
L123_2018_OBJ_010	Frame Consisting of parallel supports	6227069.3	1994869.5	117° 20' 34.9568" W	33° 08' 09.6508" N	-21.9	10x4x1.5
L123_2018_OBJ_011	Debris along Pipeline route	6227174.0	1994914.8	117° 20' 33.7320" W	33° 08' 10.1097" N	-20.4	3x2x1

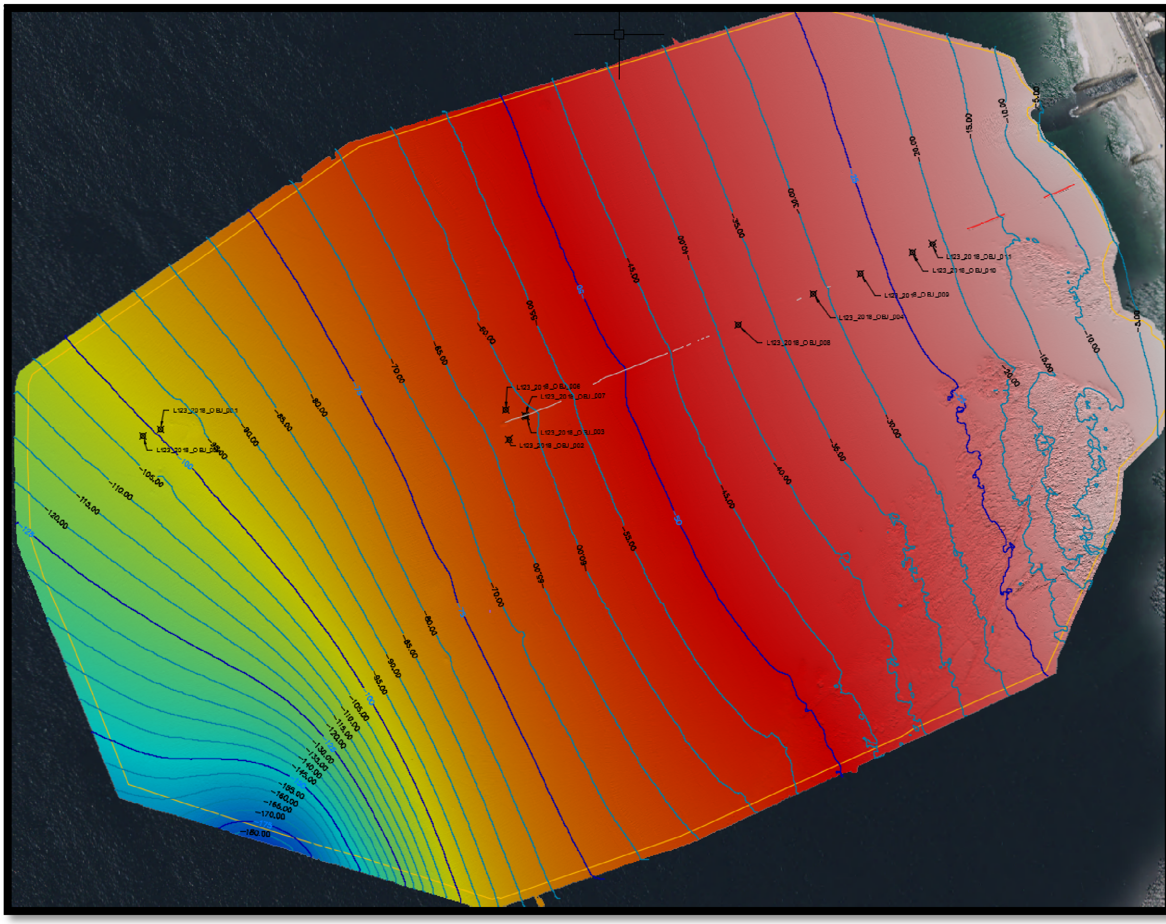


Figure 23 Location of debris objects in the survey area

In order to attempt to classify each debris object, previous datasets were analyzed and compared to. In September 2017, eTrac completed a survey of the same area as part of the decommissioning efforts that took place in 2017. In addition, mooring anchor locations and pipeline anchors were noted in a drawing 12-011-D-01 rev 4. The location of the features from these drawing can be seen below in Figure 24 and Figure 25.

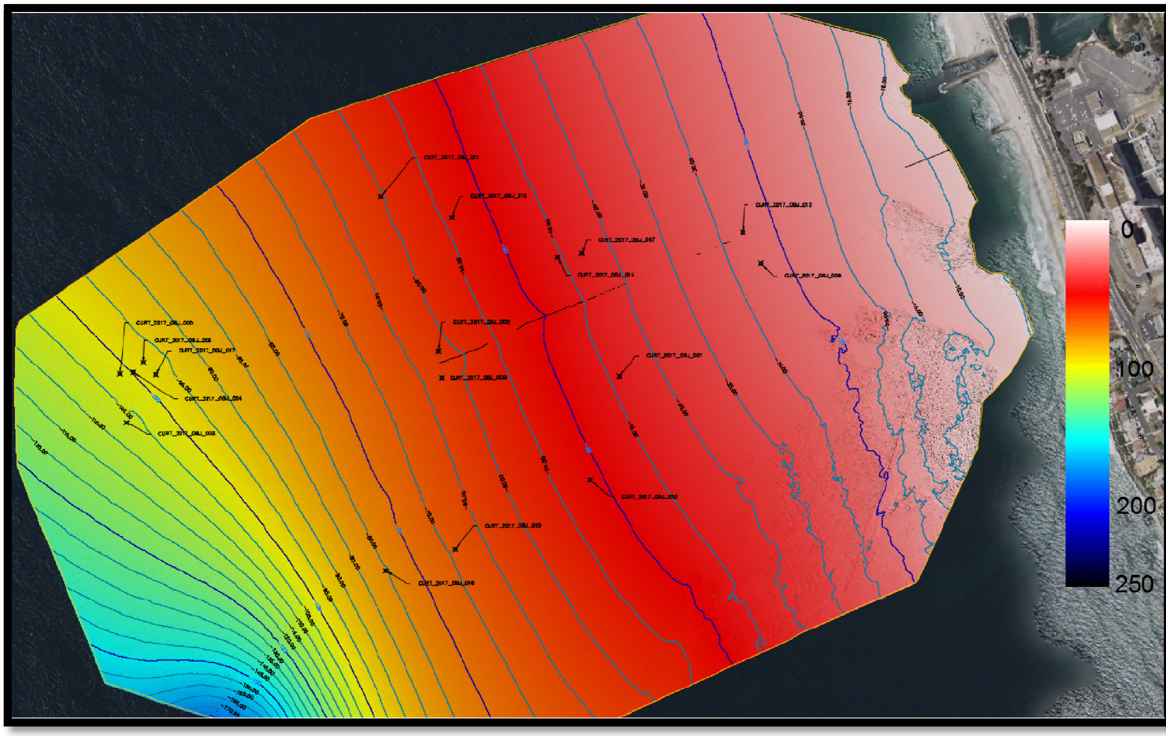


Figure 24 Location of debris objects in the September 2017 survey

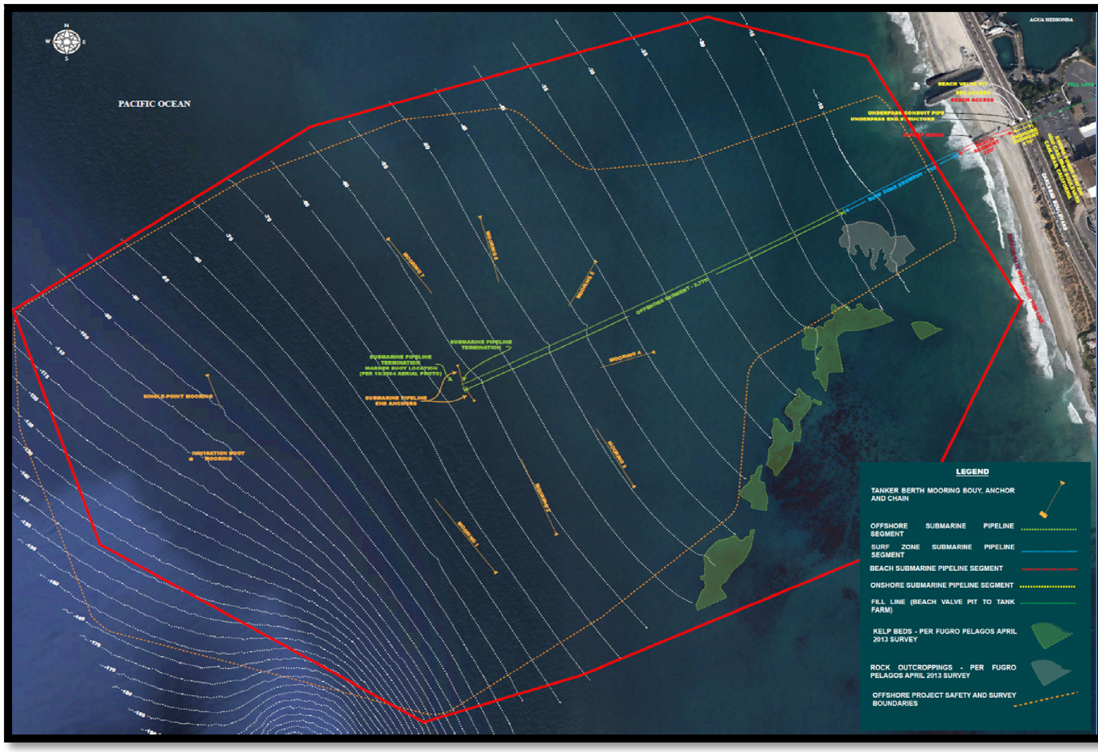


Figure 25 Drawing 12-011-D-01 rev 4 with Mooring locations

I. Debris Objects new since 2017

Seven (7) objects identified in this 2018 survey were not identified in 2017 (L123_2018_003,004 and 007-11). All of these objects are directly in line with or immediately adjacent to, the locations of the exposure sections of the pipeline as identified in 2017. These can therefore be assumed to be the result of the previous decommissioning efforts. The location of these seven objects can be seen below in Figure 26.

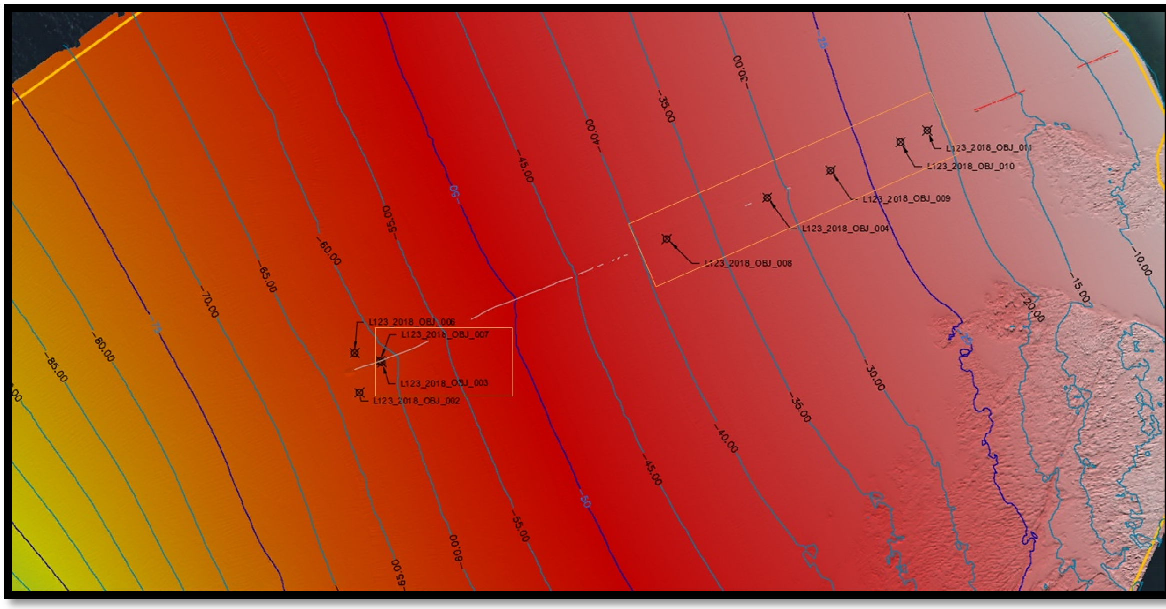


Figure 26 Debris objects along the pipeline route that were identified in 2018 but not apparent in the 2017 data

Objects L123_2018_OBJ_007 and L123_2018_OBJ_003 are a pair of objects in close proximity to each other. They are 100ft towards shore from the 2017 determined pipeline termination point. These objects are irregular shapes and anomalous to the surrounding undulating seabed. The objects, as seen in the multibeam data are below in Figure 27.

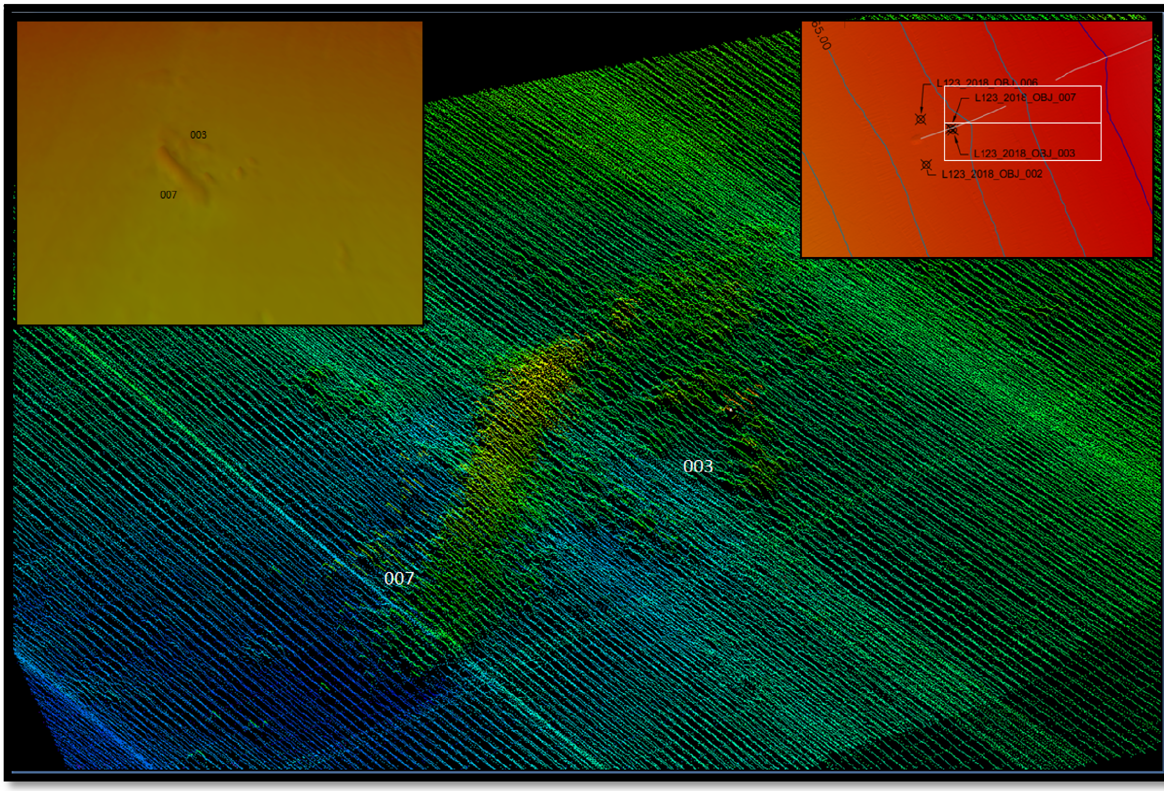


Figure 27 L123_2018_OBJ_007 and L123_2018_OBJ_003 debris along pipeline route, pipeline not visible

Several mounds were evident in areas where pipeline, debris objects or anchors were located in the 2017 dataset. Object L123_2018_008 is similar to these mounds but was considered a significant object due to some debris apparent within the mound. Similar the objects above these was in line with the previously determined pipeline alignment

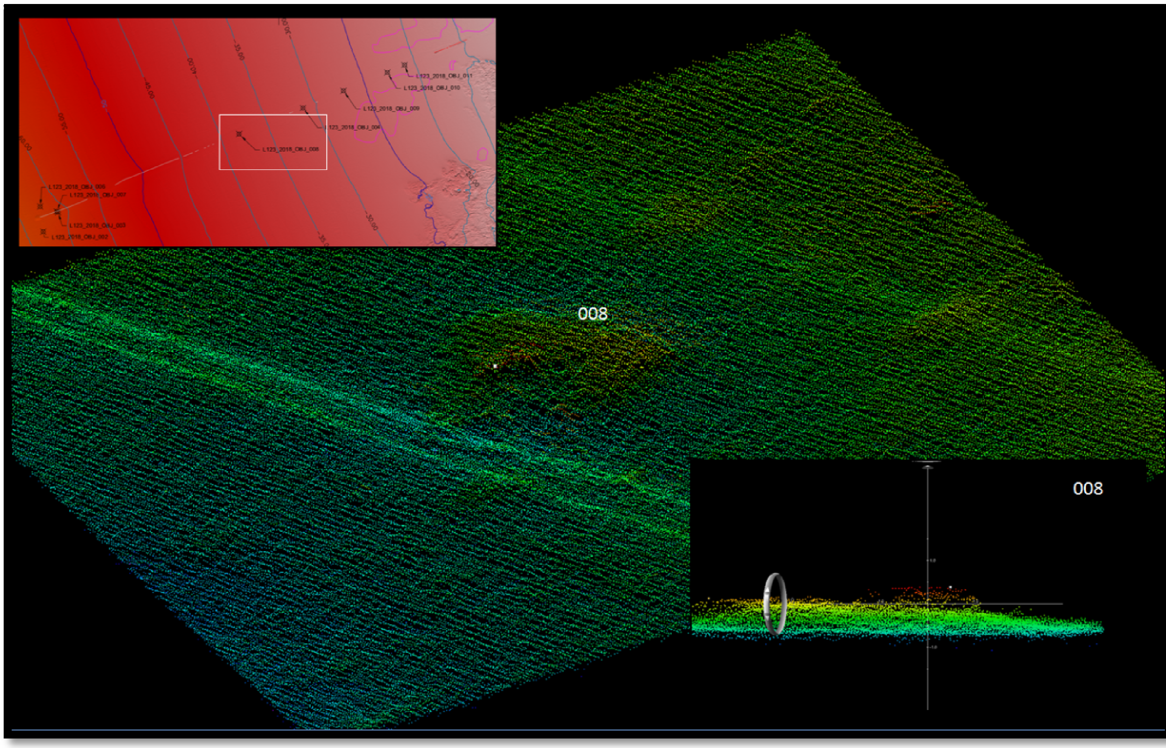


Figure 28 L123_2018_008 a mound with debris apparent

Three (3) of the objects along the previously determined pipeline route were similar in shape and size. These objects are between 800ft and 250ft from the current pipeline termination point. The objects are parallel frame like structures between 5 and 10ft long and shown below in Figure 29.

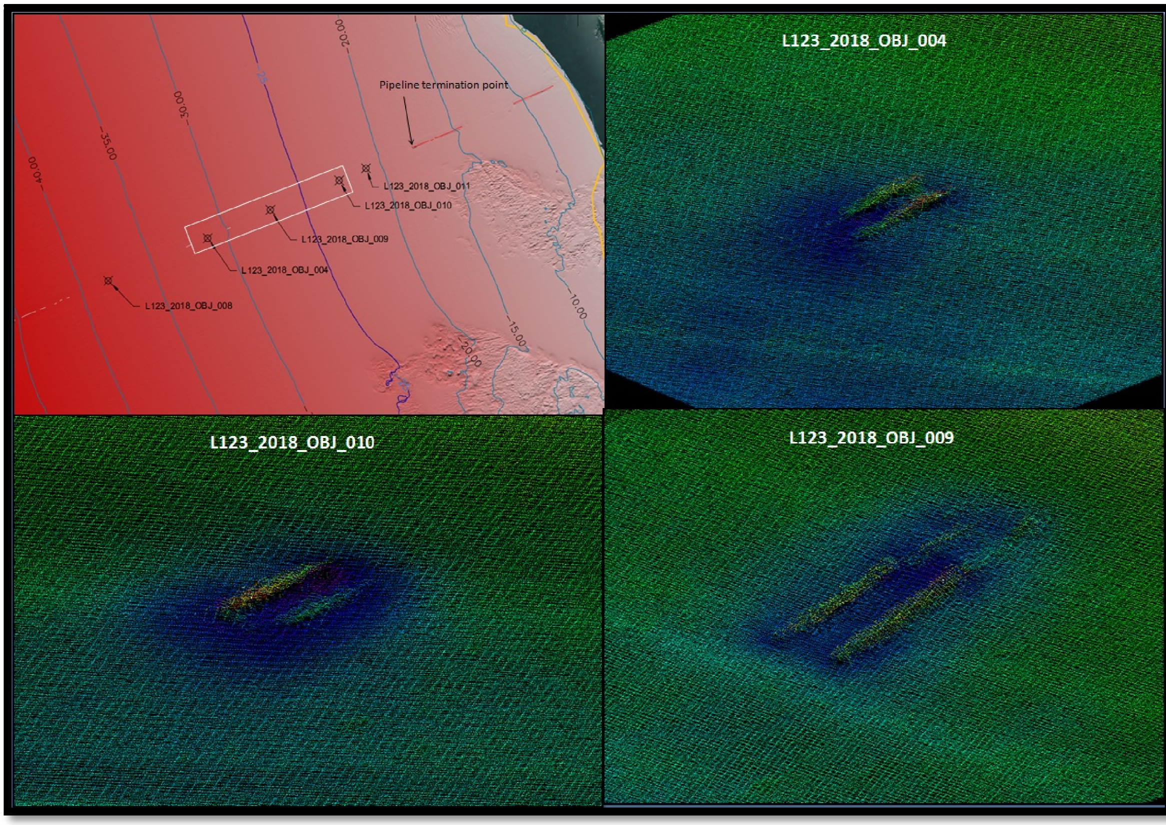


Figure 29 Parallel frame like structure objects along the pipeline route - Objects 004, 005 and 009

Of the seven new objects along the pipeline route, object L123_2018_OBJ_011 is closest to shore and in addition, the termination point for the pipeline as surveyed in 2018. This object is similar to objects 004,005 and 009 in terms of it appearing like a frame, but it is smaller and less well defined. This object is show below in Figure 30.

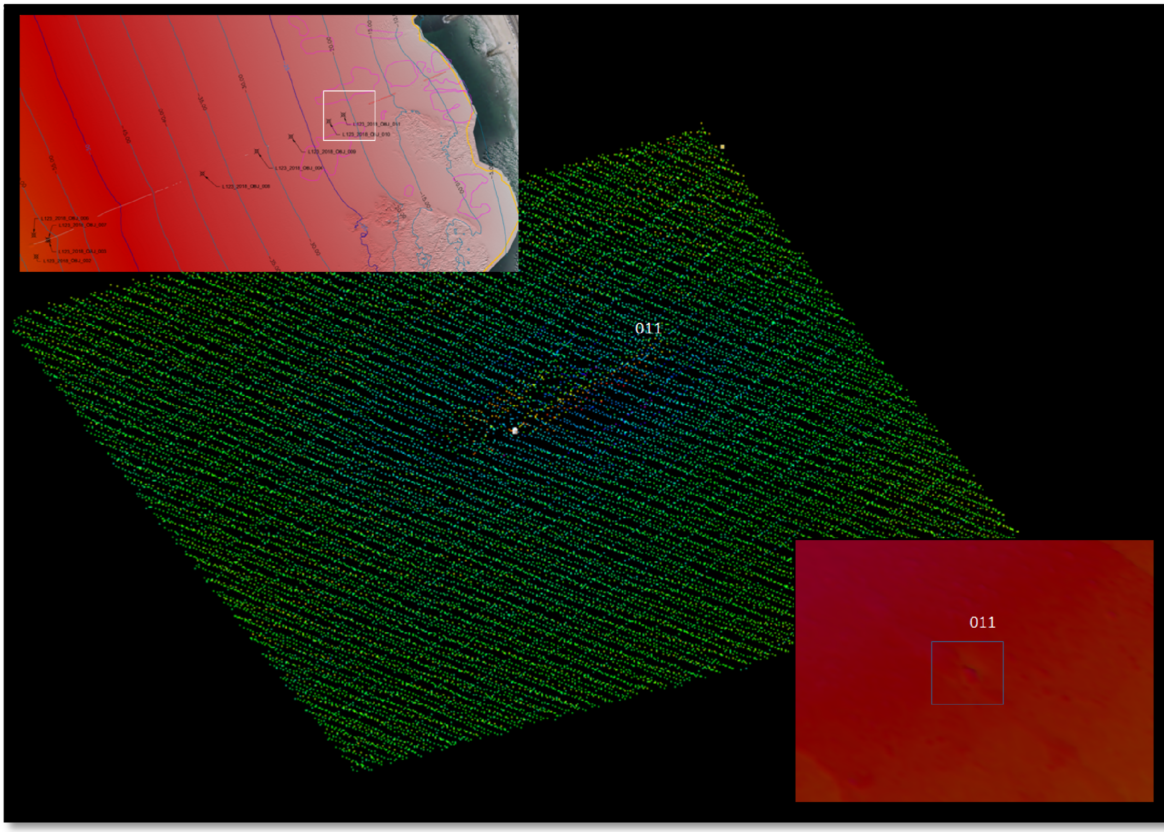


Figure 30 L123_2018_OBJ_011 a small debris object with parallel structure

II. Debris Objects identified in 2017 and 2018

Four (4) objects were common to both the 2017 and 2018 datasets (L123_2018_OBJ_001,002, 005 and 006). The locations of these four objects is shown below in Figure 31.

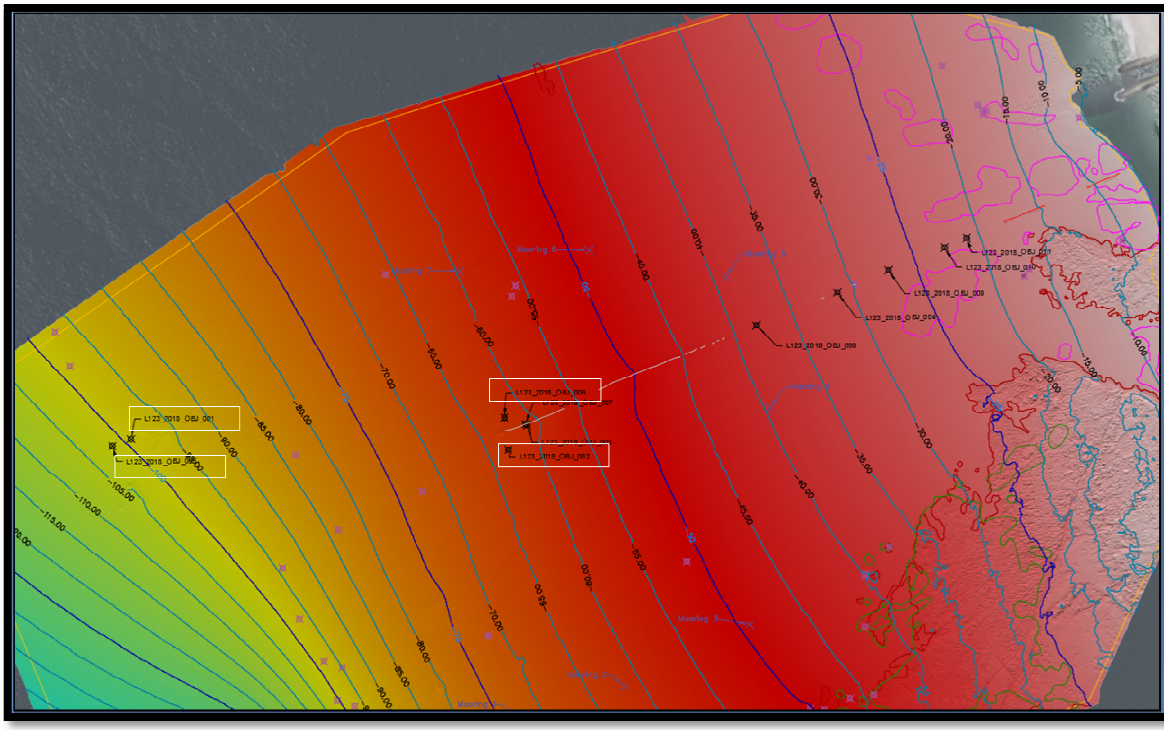
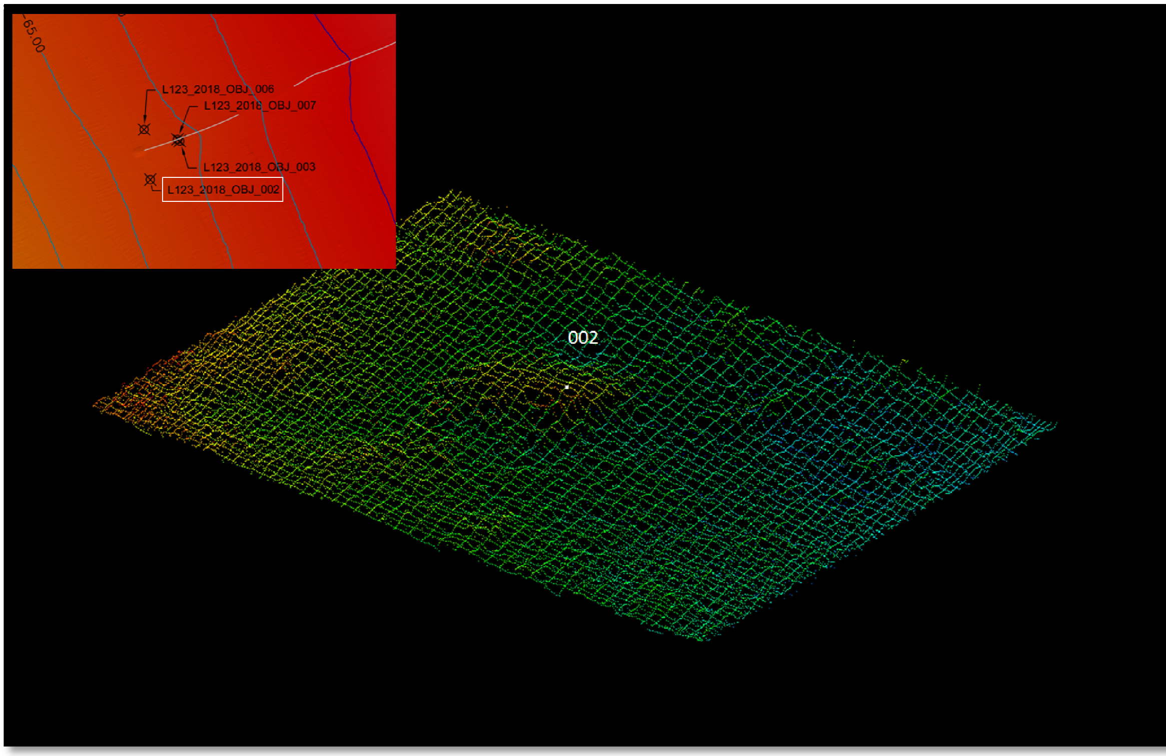


Figure 31 Location of four objects identified in 2017 and 2018 (L123_2018_OBJ_001,002, 005 and 006)

Two (2) debris objects (L123_2018_OBJ_002 and 006), due to their position at the previous termination point of the pipeline, were assumed to be the submarine pipeline anchors (as described in document 12-011-D-01 rev 4). These objects are both a similar size with dimensions 6ft width, 4ft width and 1ft height above the seabed and were identified in 2017 as well as 2018. In 2017 the objects appear to be slightly larger and higher above the seabed, however there still appears to be debris in the location. The images below show the objects as imaged in the 2018 data (Figure 32) and 2017 data (Figure 33).



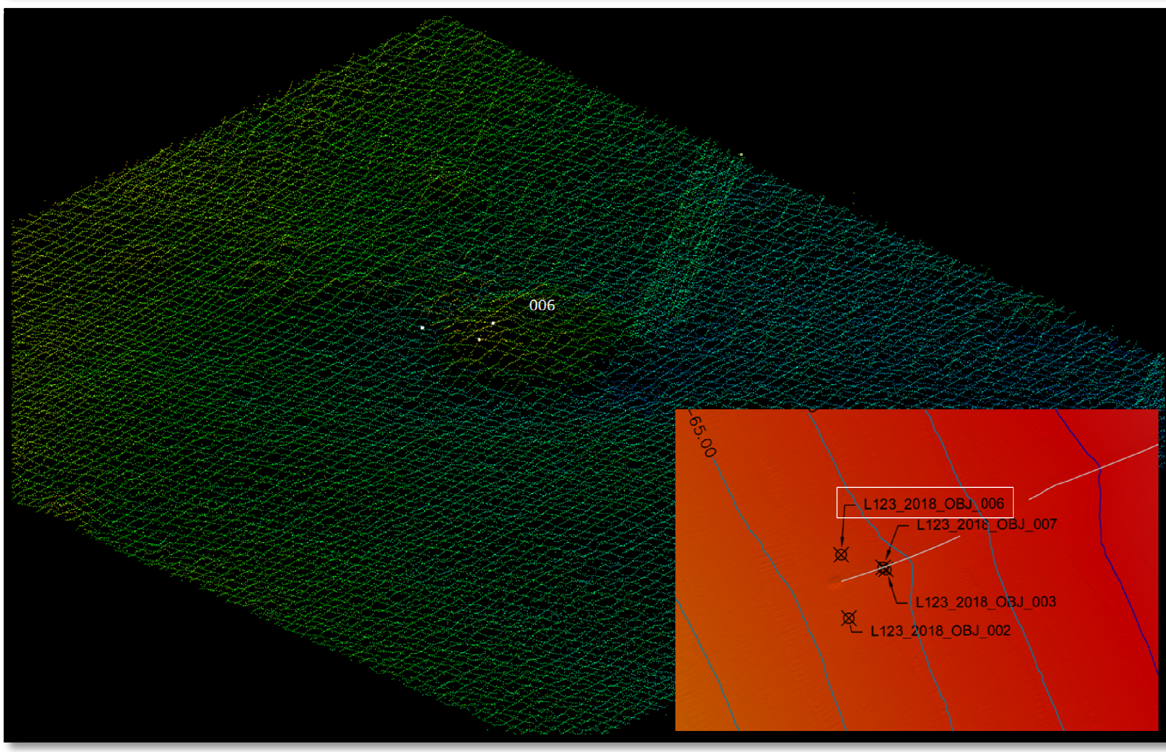


Figure 32Object L123_2018_002 and 006, submarine pipeline end anchors as imaged in 2018 data

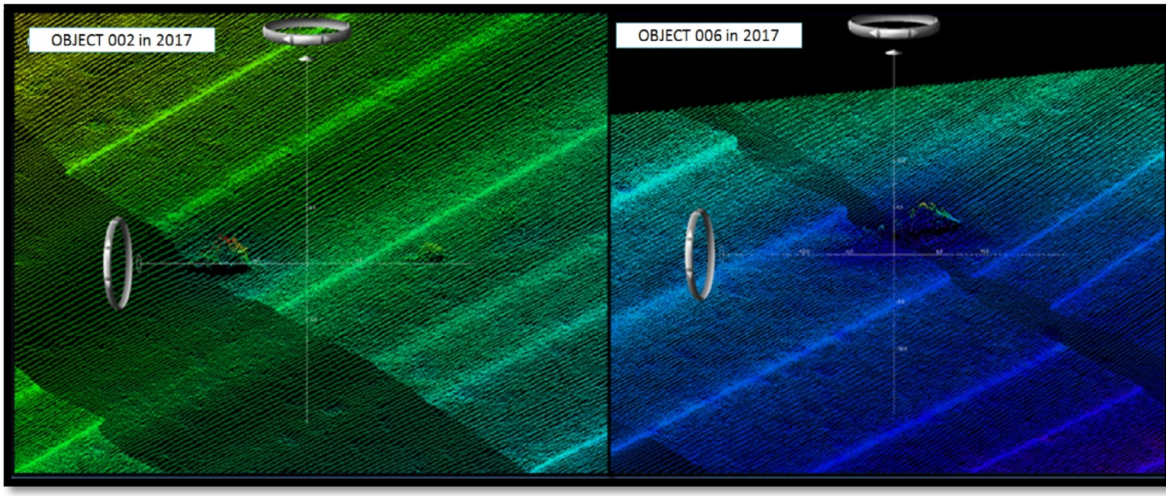
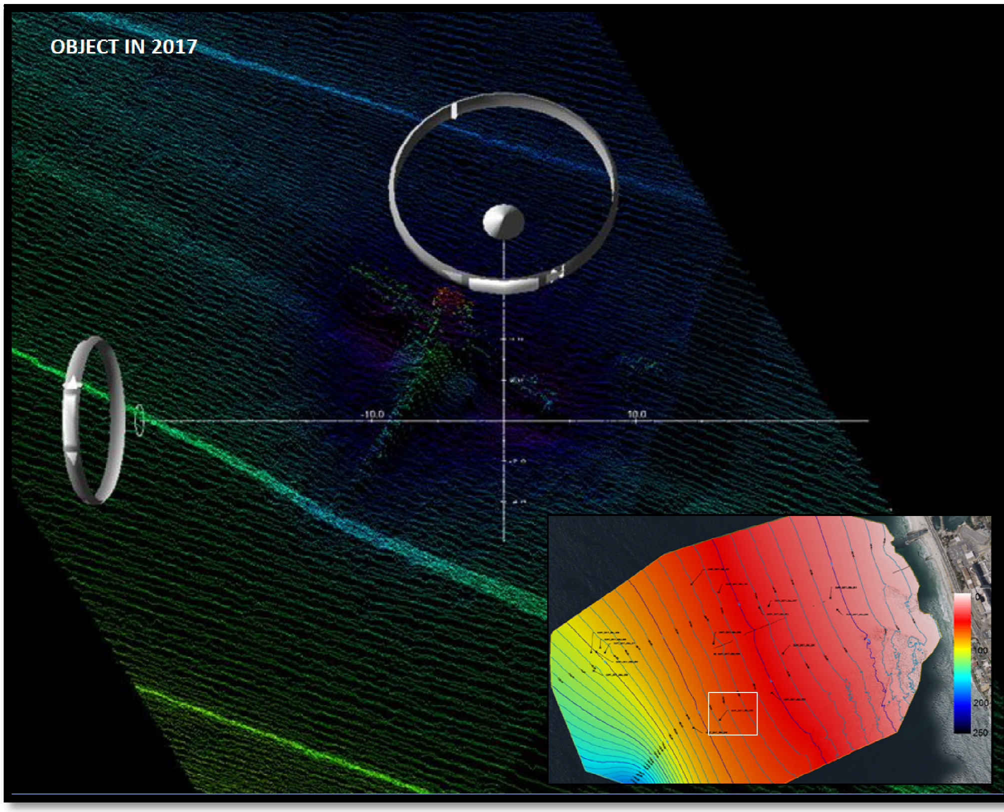


Figure 33 Objects 002 and 006, possible submarine pipeline end anchors as seen in the 2017 data

III. Objects confirmed as removed since 2017

Two (2) large anchors were confirmed as removed in the 2017 decommissioning effort. These anchors were clear in the 2017 data. However, in 2018, a full search was done in the area and only a small mound or indentation was visible at each site.

The two objects as seen in the 2017 data and removed before the 2018 survey dataset are below in Figure 34 and Figure 35.



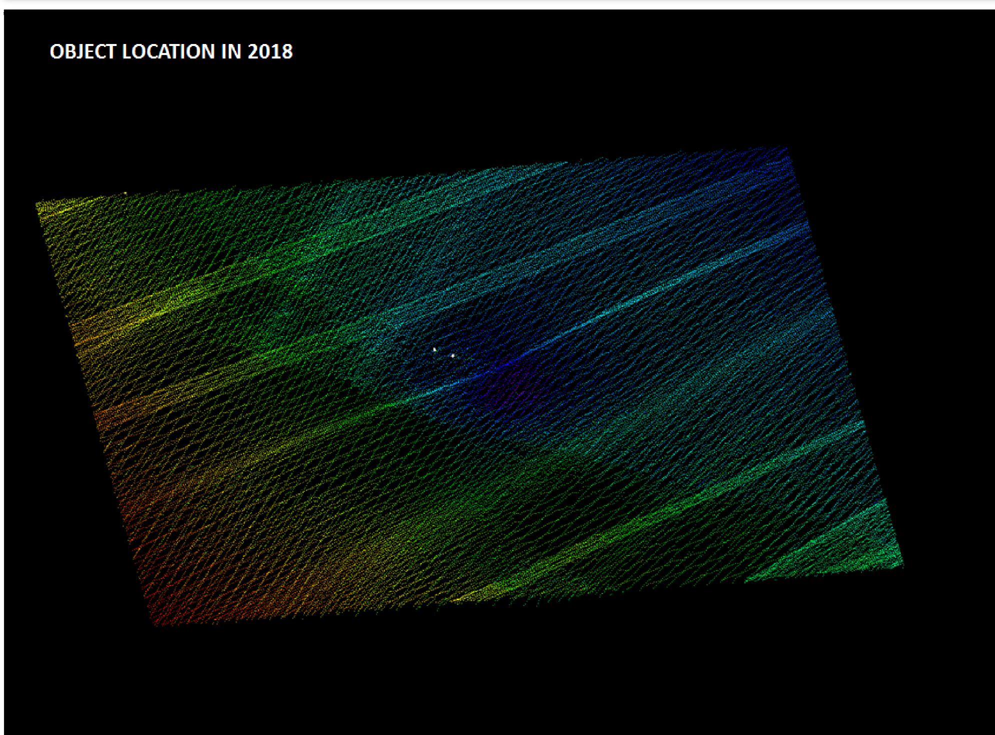


Figure 34 Anchor objects removed between the 2017 and 2018 surveys

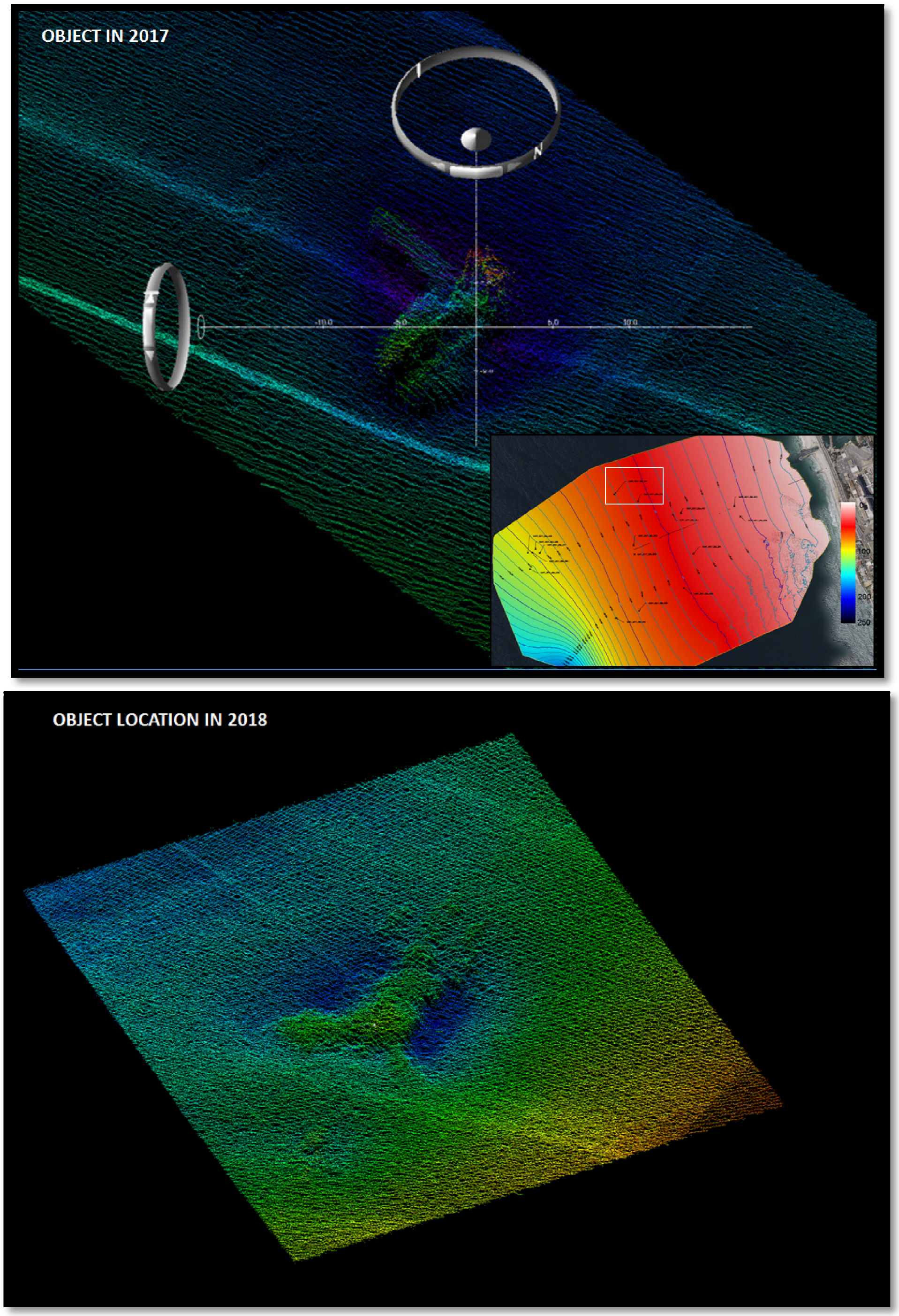


Figure 35 Anchor objects removed between the 2017 and 2018 surveys

c. Rocks/Boulders

Forty-nine (49) rocks or boulders were located across the survey area. These are listed with unique IDs in

Table 2. Sporadic, isolated rocks were located across the survey area. Several rocks were adjacent to the rock outcroppings in the south east of the survey area. The map in Figure 36 shows the location of the rocks across the survey area.

Table 2 Rock/Boulder objects in survey area

	US State Plane Califorina Zone 6 Usft		NAD 83 (2011) 2010.00	
Unique ID	Easting	Northing	Latitude	Longitude
L123_2018_ROCK_001	6222789	1994481	33° 08' 05.3629" N	117° 21' 25.2404" W
L123_2018_ROCK_002	6222860	1994317	33° 08' 03.7402" N	117° 21' 24.3894" W
L123_2018_ROCK_003	6223878	1993344	33° 07' 54.2206" N	117° 21' 12.2983" W
L123_2018_ROCK_004	6223943	1993887	33° 07' 59.5998" N	117° 21' 11.5945" W
L123_2018_ROCK_005	6223950	1992135	33° 07' 42.2749" N	117° 21' 11.2976" W
L123_2018_ROCK_006	6223958	1993098	33° 07' 51.8003" N	117° 21' 11.3261" W
L123_2018_ROCK_007	6224075	1992895	33° 07' 49.8048" N	117° 21' 09.9257" W
L123_2018_ROCK_008	6224138	1992705	33° 07' 47.9328" N	117° 21' 09.1554" W
L123_2018_ROCK_009	6224147	1993526	33° 07' 56.0512" N	117° 21' 09.1599" W
L123_2018_ROCK_010	6224163	1992864	33° 07' 49.5064" N	117° 21' 08.8871" W
L123_2018_ROCK_011	6224221	1992679	33° 07' 47.6842" N	117° 21' 08.1772" W
L123_2018_ROCK_012	6224380	1994751	33° 08' 08.1981" N	117° 21' 06.5619" W
L123_2018_ROCK_013	6224455	1992253	33° 07' 43.4961" N	117° 21' 05.3734" W
L123_2018_ROCK_014	6224509	1992202	33° 07' 42.9937" N	117° 21' 04.7314" W
L123_2018_ROCK_015	6224553	1993709	33° 07' 57.9097" N	117° 21' 04.4020" W
L123_2018_ROCK_016	6224641	1992305	33° 07' 44.0242" N	117° 21' 03.1987" W
L123_2018_ROCK_017	6224666	1991995	33° 07' 40.9595" N	117° 21' 02.8562" W
L123_2018_ROCK_018	6224866	1993015	33° 07' 51.0770" N	117° 21' 00.6336" W
L123_2018_ROCK_019	6224965	1991996	33° 07' 41.0003" N	117° 20' 59.3430" W
L123_2018_ROCK_020	6224988	1994643	33° 08' 07.1923" N	117° 20' 59.4074" W
L123_2018_ROCK_021	6225006	1994695	33° 08' 07.7054" N	117° 20' 59.1983" W
L123_2018_ROCK_022	6225266	1992015	33° 07' 41.2225" N	117° 20' 55.8036" W
L123_2018_ROCK_023	6225823	1993367	33° 07' 54.6552" N	117° 20' 49.4310" W
L123_2018_ROCK_024	6226230	1992287	33° 07' 44.0166" N	117° 20' 44.5063" W
L123_2018_ROCK_025	6226288	1992289	33° 07' 44.0345" N	117° 20' 43.8259" W
L123_2018_ROCK_026	6226413	1992659	33° 07' 47.7096" N	117° 20' 42.3981" W
L123_2018_ROCK_027	6226416	1992597	33° 07' 47.0973" N	117° 20' 42.3618" W
L123_2018_ROCK_028	6226419	1992601	33° 07' 47.1368" N	117° 20' 42.3218" W
L123_2018_ROCK_029	6226482	1992653	33° 07' 47.6601" N	117° 20' 41.5937" W
L123_2018_ROCK_030	6226493	1992556	33° 07' 46.7026" N	117° 20' 41.4428" W
L123_2018_ROCK_031	6226499	1992545	33° 07' 46.5897" N	117° 20' 41.3708" W
L123_2018_ROCK_032	6226605	1992706	33° 07' 48.1946" N	117° 20' 40.1536" W
L123_2018_ROCK_033	6226636	1994692	33° 08' 07.8521" N	117° 20' 40.0361" W
L123_2018_ROCK_034	6226679	1993050	33° 07' 51.6099" N	117° 20' 39.3220" W
L123_2018_ROCK_035	6226679	1993292	33° 07' 54.0063" N	117° 20' 39.3516" W
L123_2018_ROCK_036	6226685	1993301	33° 07' 54.0966" N	117° 20' 39.2823" W
L123_2018_ROCK_037	6226709	1995299	33° 08' 13.8599" N	117° 20' 39.2467" W
L123_2018_ROCK_038	6226719	1992722	33° 07' 48.3659" N	117° 20' 38.8121" W
L123_2018_ROCK_039	6226798	1993435	33° 07' 55.4316" N	117° 20' 37.9761" W
L123_2018_ROCK_040	6227060	1995741	33° 08' 18.2740" N	117° 20' 35.1759" W
L123_2018_ROCK_041	6227066	1995473	33° 08' 15.6188" N	117° 20' 35.0753" W
L123_2018_ROCK_042	6227230	1995552	33° 08' 16.4240" N	117° 20' 33.1489" W
L123_2018_ROCK_043	6227258	1995511	33° 08' 16.0148" N	117° 20' 32.8228" W
L123_2018_ROCK_044	6227260	1995527	33° 08' 16.1738" N	117° 20' 32.7948" W
L123_2018_ROCK_045	6227275	1995523	33° 08' 16.1347" N	117° 20' 32.6191" W
L123_2018_ROCK_046	6227452	1994730	33° 08' 08.3069" N	117° 20' 30.4344" W
L123_2018_ROCK_047	6227477	1994765	33° 08' 08.6545" N	117° 20' 30.1495" W
L123_2018_ROCK_048	6227720	1995489	33° 08' 15.8494" N	117° 20' 27.3772" W
L123_2018_ROCK_049	6227924	1994900	33° 08' 10.0361" N	117° 20' 24.9044" W

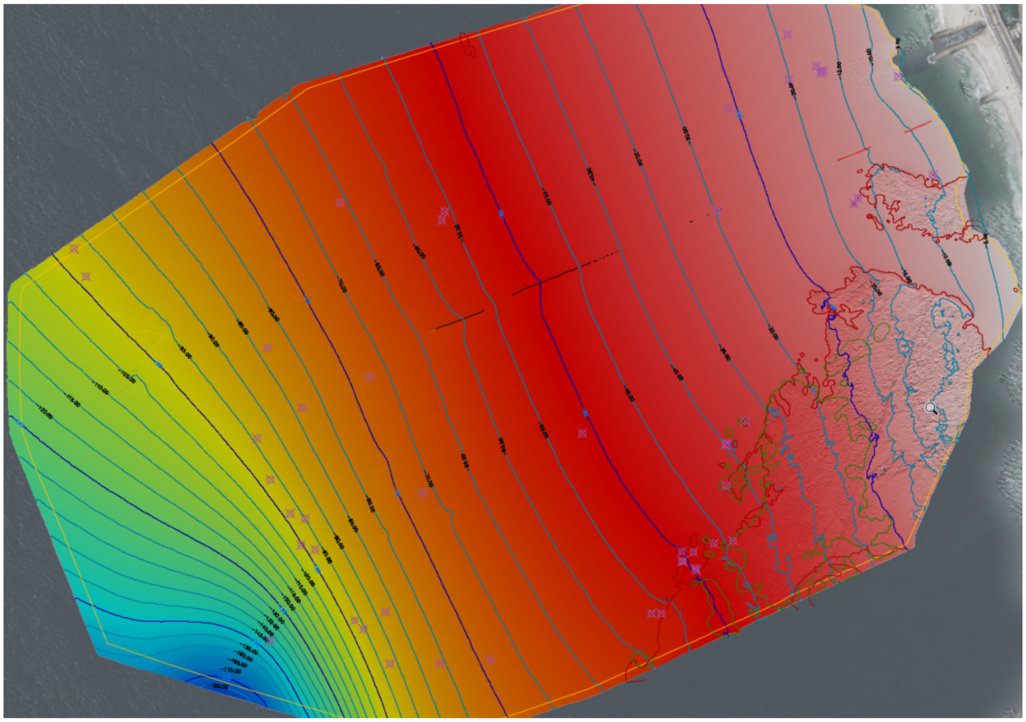


Figure 36 Location of the 32 rocks in the survey area

The rock objects were all similar dimensions (4-6ft diameter). An example of a rock in the survey area is below.

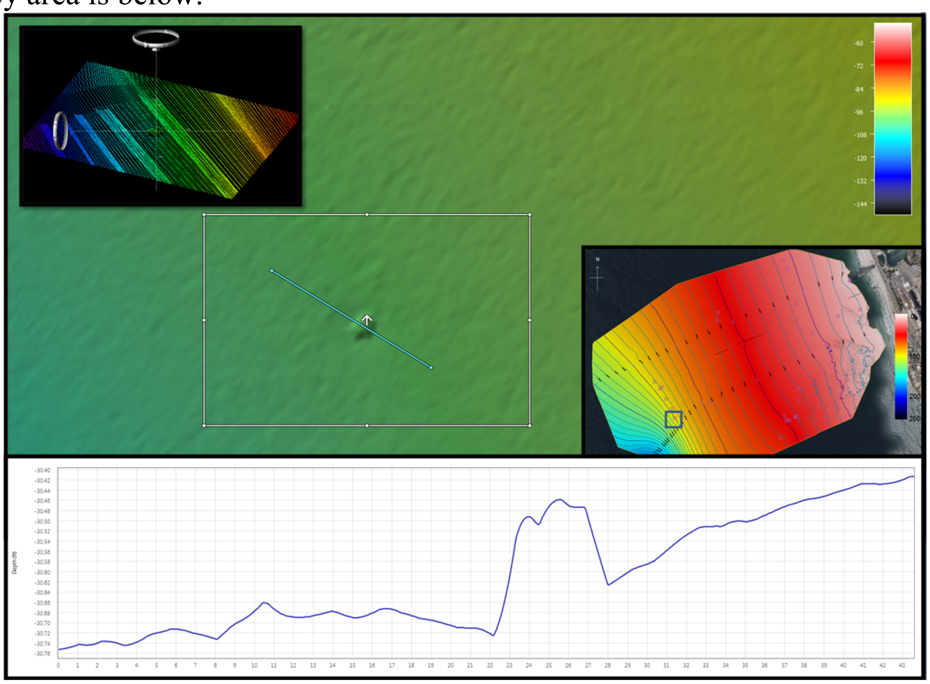


Figure 37 Rock objects

d. Rock Outcropping

Rock outcroppings are located in two main areas. There is one large contiguous area of rock outcropping to the south and south west. This area covers 44 acres up to survey boundary (The area could extend further outside the survey boundary and to shore). Then there is a smaller area to the west. This is 3.3 acres in the survey area (The area could extend further outside the survey boundary and to shore). Smaller rock outcropping areas were identified adjacent to and less than 250ft from the larger areas. These were between 0.01 acres and 0.05 acres. The map below in Figure 38 shows these rock outcropping areas.

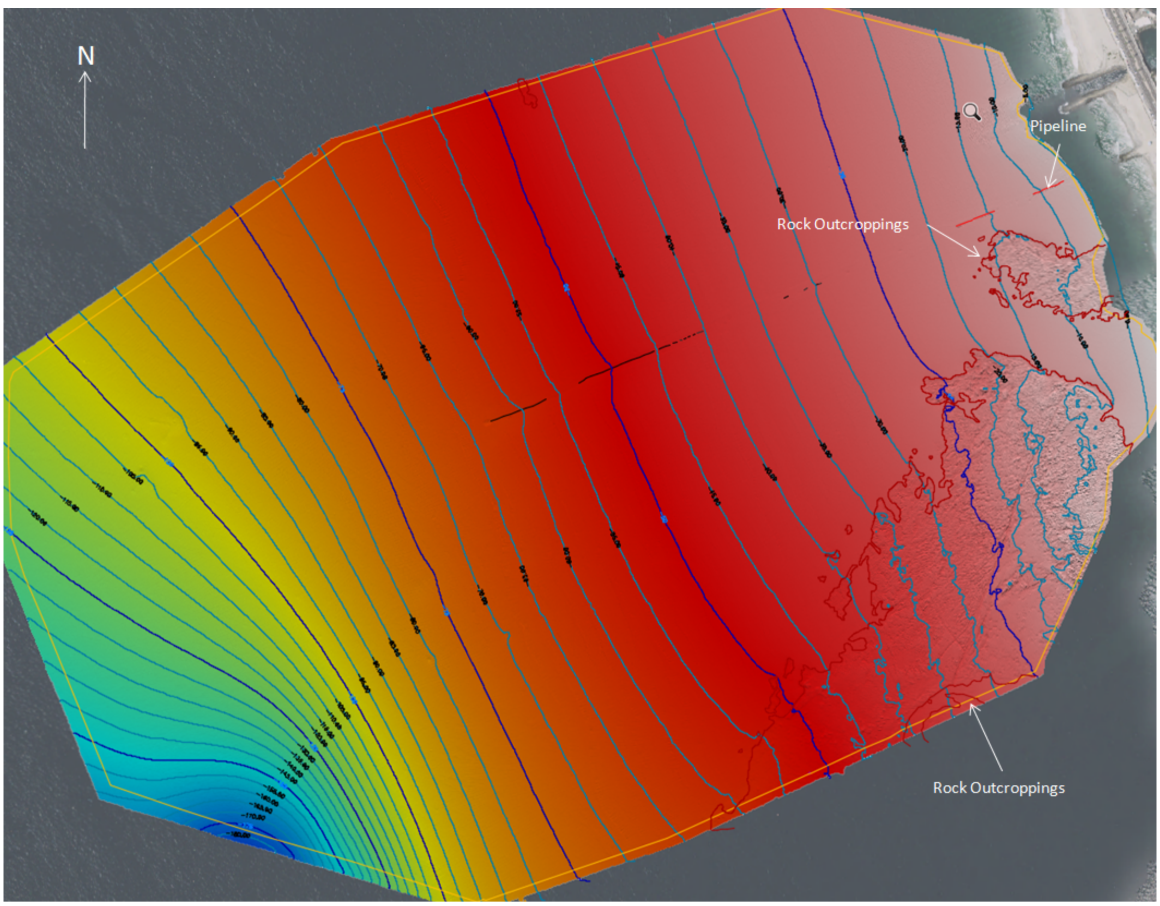


Figure 38 Rock outcroppings in the survey area

e. Kelp Beds

The kelp beds detected correlated with the rock outcropping locations. While not all rock outcroppings were covered in kelp, all kelp beds were detected in rock outcropping areas. Kelp beds were detected on the larger rock outcropping area at depths of 15 to 50ft. No kelp beds were noted on the smaller, western rock outcropping area. The largest area of kelp was 9.5acres. Smaller kelp beds around 0.05 acres were also identified on adjacent smaller rock outcropping areas. The map below shows the location of the kelp beds in Figure 39.

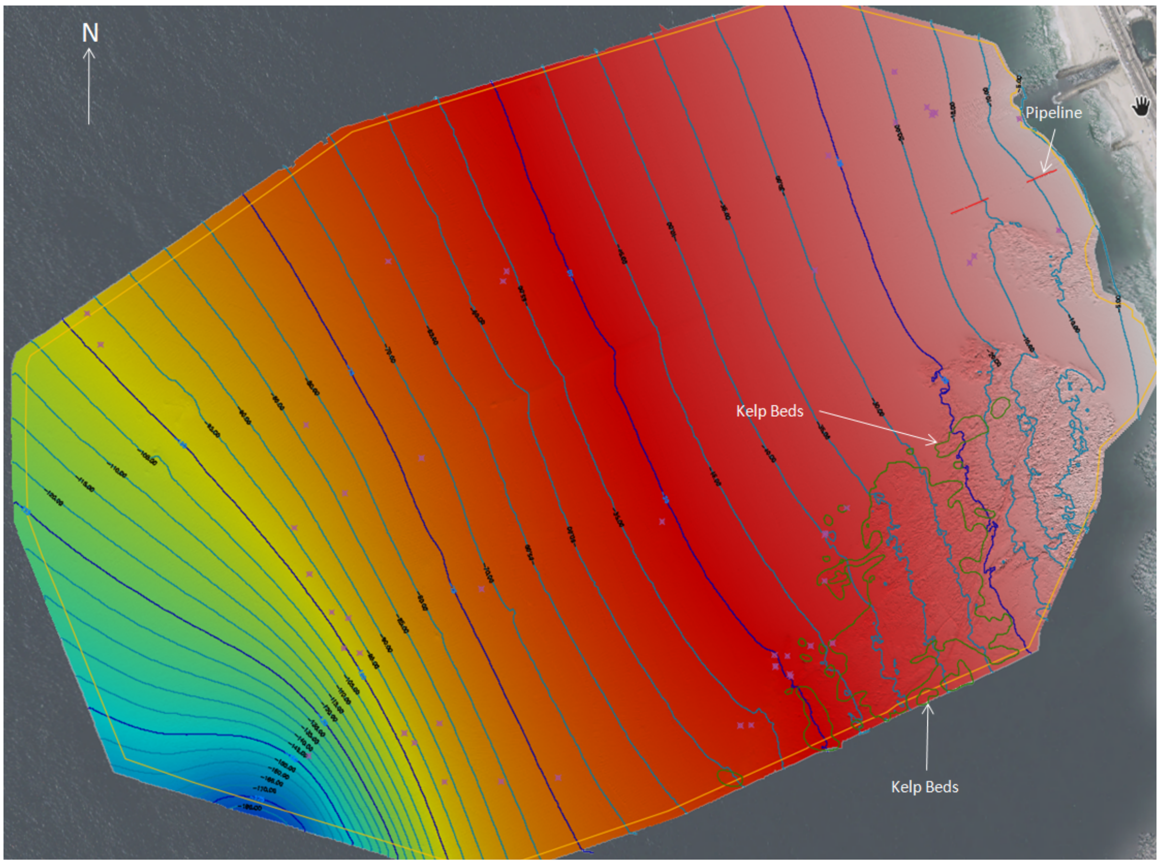


Figure 39 Kelp Beds in the survey area

A comparison to the 2013, dataset in drawing 12-011-D-011 rev 4 shows good agreement between the identification of rock outcropping and kelp beds. Figure 40 and Figure 41 compare the kelp bed extents and rock outcropping extents respectively as identified in 2013, 2017 and in 2018. A smaller area was surveyed in 2013, but the kelp beds and rock outcropping locations appear to be similar.

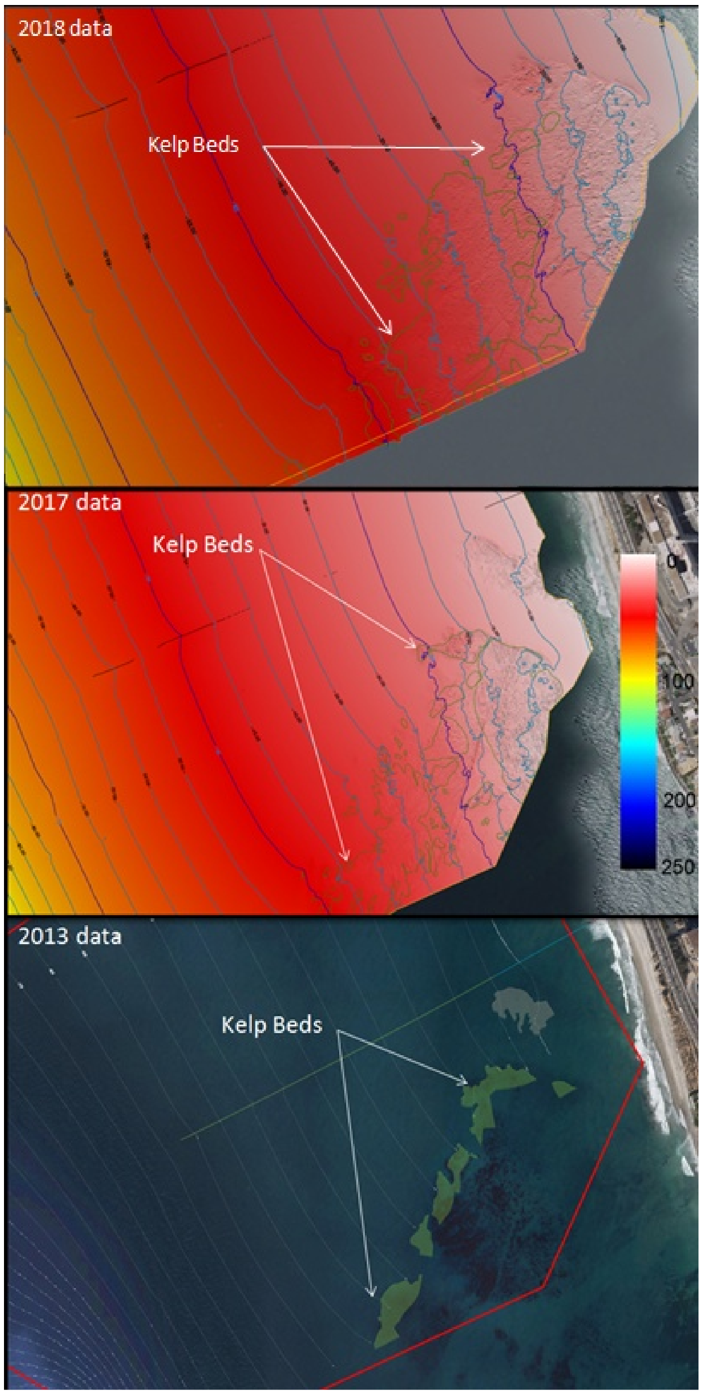


Figure 40 Comparison of the extents of Kelp Beds in 2013, 2017 and 2018

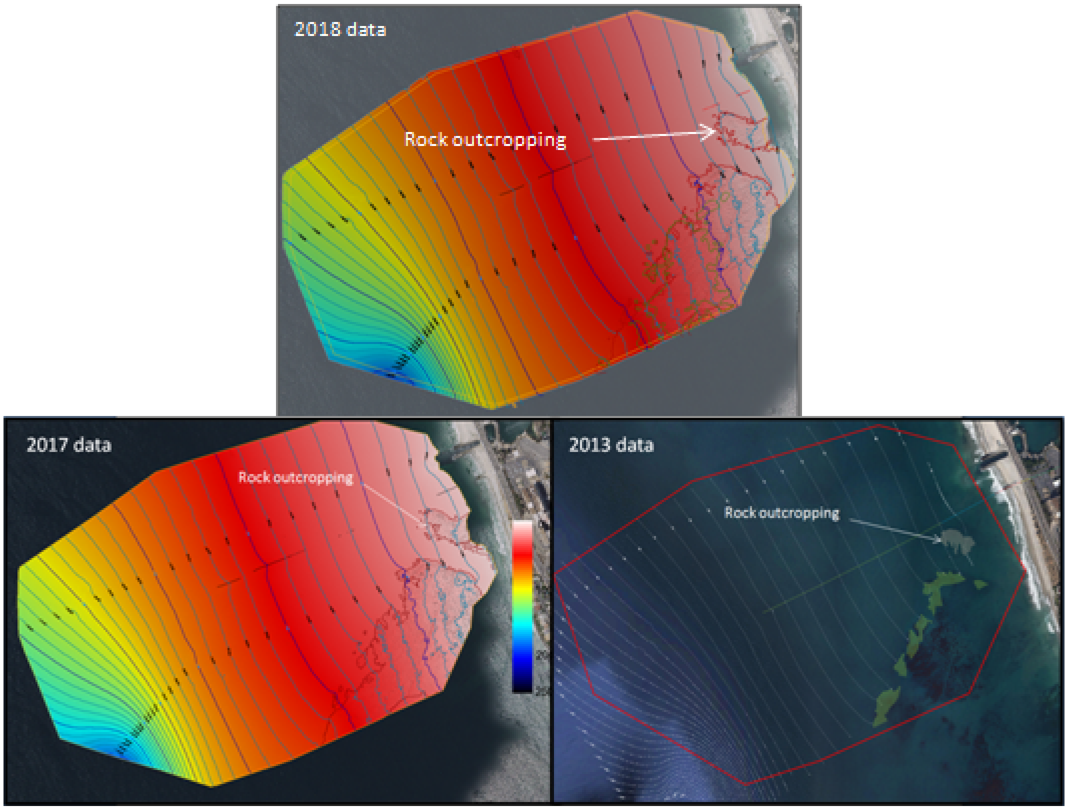


Figure 41 Comparison of the extents of Rock Outcroppings in 2013, 2017 and 2018

The rock outcroppings identified in 2018 also correlated with the darker areas in the aerial photography dated 11/2/2012 in drawing 12-011-D-011 rev 4, and with the analyzed data from 2018. This is shown below in Figure 42.

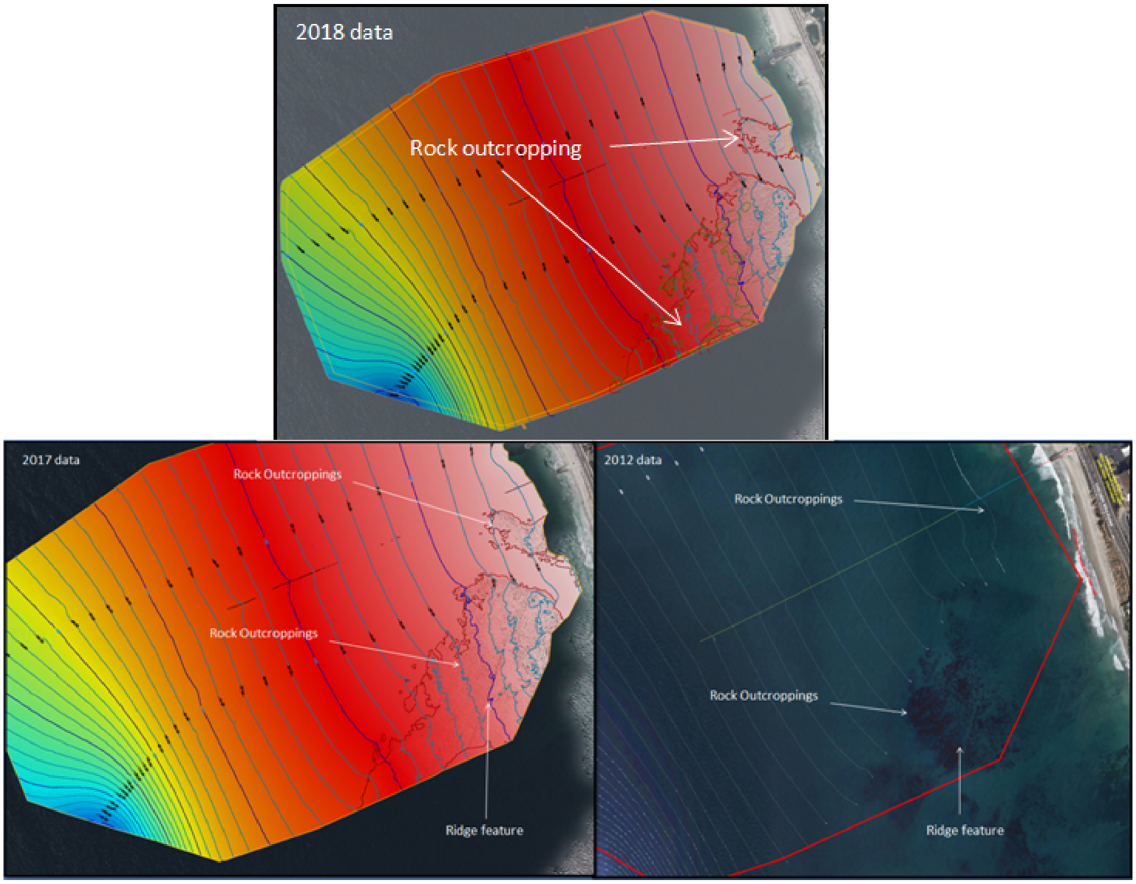


Figure 42 Comparison of rock outcroppings in 2018 and 2017 data to aerial photography from 2012

A ridge feature was evident in the 2018 and 2017 multibeam data and the aerial photography from 2012. The ridge feature is in the middle of the larger rock outcropping in the south west of the survey area. It is on average 1ft deep and 6ft wide and runs the entire length of the rock outcropping (1600ft). The ridge as seen in the multibeam data and aerial photography are shown below in Figure 43.

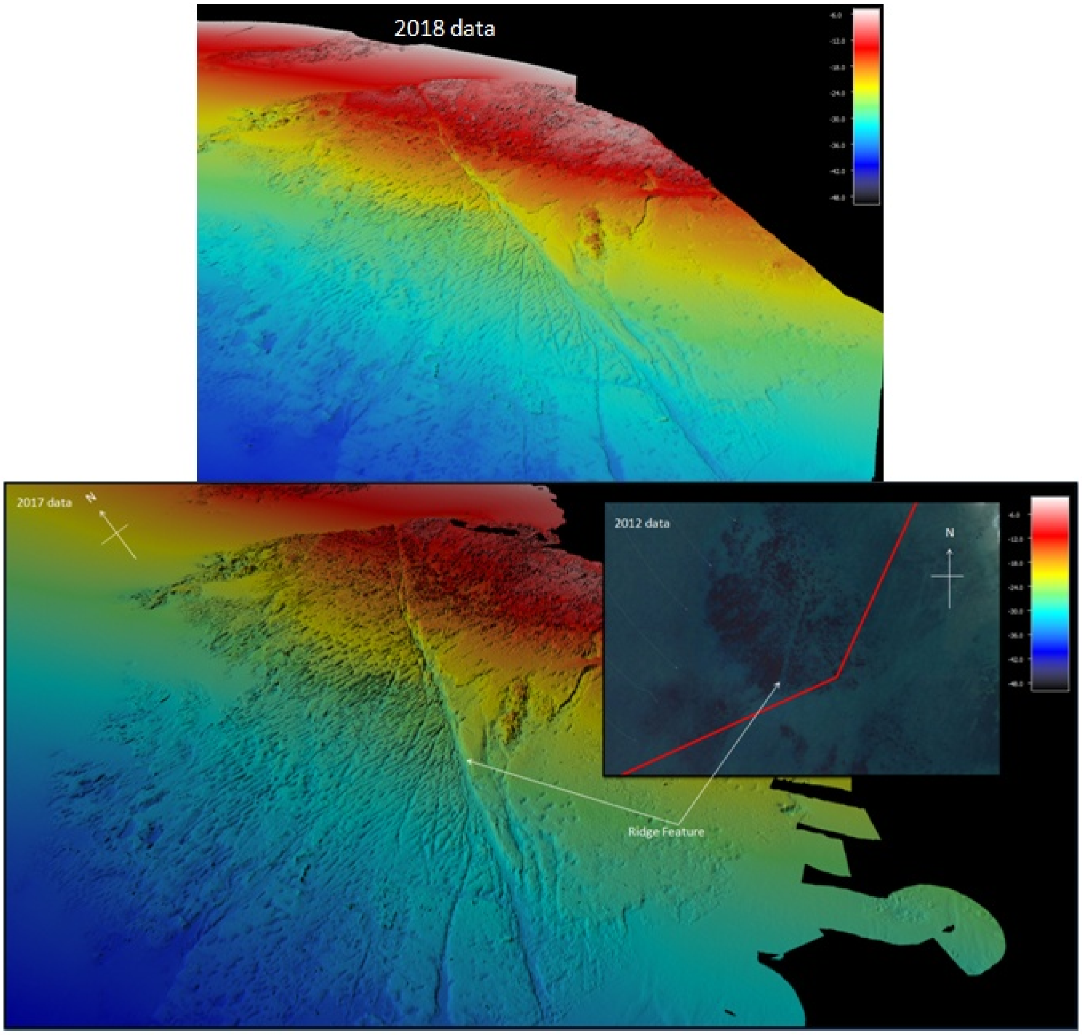


Figure 43 Ridge feature as detected in the 2018, 2017 data and evident in the aerial photography in 2012

6. CONCLUSIONS

The conclusions for the pre-decommissioning survey are as follows

- All data was acquired in a safe manner with no incidents
- Multibeam coverage was achieved across the entire survey area apart from to shore where data was acquired up to a safe point (up to 3ft MLLW)

- Data acquired achieved all the objectives required.
  - Creating accurate and detailed bathymetry
  - Indentifying rock outcrops, kelp beds and other marine vegetation
  - Locating the pipeline
  - Locating debris object

- The pipeline was exposed for approximately 340ft

- 11 Debris objects were noted

- 49 Rock objects were noted

- Large rock outcropping areas of up to 44 acres were identified

- The rock outcropping areas were to the south of the pipeline and in the south and south western part of the survey area

- Kelp beds above some of the rock outcroppings were identified

Disclaimer

All data analysis, interpretations, conclusions, and recommendations in this document are based upon sound scientific principles, using appropriate technology, and have been completed by qualified and experienced hydrographers and marine scientists. It does not constitute a warranty or guarantee, expressed or implied, nor does it relieve any other party of its responsibility to abide by contract documents, applicable codes, standards, regulations, or ordinances. eTrac inc. cannot be held liable or responsible for consequences arising from the use of the information presented in this report. All bathymetry data is valid for the time in which the survey was conducted.