



U.S. Army Corps of Engineers
Charleston District

APPENDIX H

**CHARLESTON HARBOR POST 45
BENEFICIAL USE OF DREDGED MATERIAL
SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT
*CHARLESTON, SOUTH CAROLINA***

Side Scan Sonar Results for Additional Hardbottom Habitat Identification in Charleston Entrance Channel

30 September 2016

Geophysical Survey of Area C; Charleston Harbor Entrance Channel

Provided for:



**US Army Corps
of Engineers®**

USACE Wilmington District
Attn: Trevor Lancaster
69 Darlington Ave
Wilmington, NC 28403

Provided by:

geodynamics

COMPLEX COASTAL CHANGE MADE CLEAR

310 A Greenfield Dr.
Newport, NC 28570

**As part of a requested preliminary data product per SOW Section 9.5,
provided on: June 9, 2016**

Data Summary

Project Information

Project	Charleston Harbor Entrance Channel – Geophysical Survey
Contract	W912PM-16-D-0002
Survey Location	Section EC13 – EC14; Area C
Survey Dates	May 24, 2016
Surveyors	Ben Sumners, Kristin Hughes
Captain	Kurt Baker

Equipment

Survey Vessel	RV Benthos: 30 ft Armstrong Catamaran, Twin Yamaha 300 Motors
Sonar	Edgetech 4200 300/600 kHz, EM2040c-D
Frequency/Range	600 kHz / 50 m Range (100 m swath)
Positioning	Trimble SPS DGPS
Layback Calculation	Manual Corrected Layback – HYPACK Driver
Acquisition Software	Discover (JSF format), SIS
Processing Software	SonarWiz 6 v6.04.0008, ESRI ArcGIS 10.3, FMGeocoder Toolbox 7.5.1

Products Delivered

Delivery Format	ESRI ArcGIS 10.3
Spatial Reference	NAD83 2011 South Carolina Int. Ft.
Ecology_reef_habitat_area	SDSFIE polyline feature class indicating areas of potential hard bottom
SeabedArea	SDSFIE feature class polygonal area of the “bottom of water body”, in this instance indicating areas of high/medium/low reflectance
C_sss.tif	8-bit 1-band GeoTIFF of side scan sonar intensity translated in 0 – 255 pixels, 0.2 ft resolution
C_bkstr	Raster grid of normalized backscatter from EM2040c-D
Layer Files	Layer files displaying optimized views for respective datasets
Images	Basic maps for viewing and presentation

Synopsis

Abstract

This hydrographic survey was conducted roughly 12 nautical miles (NM) from the inlet to Charleston Harbor at a ~0.43 NM area between channel sections EC-13 and EC-14, referred to as “Area C”. Within this Task Order, “Area C” was the only site to have side scan sonar (SSS) data collected. SSS data was collected at 125 ft spaced lines at a 160 ft range using the 600 kHz frequency from an Edgetech 4200 sonar. Per SOW, this dataset was dictated to be processed and delivered as soon as possible. To provide the most thorough interpretations within a timely manner, multibeam bathymetry, backscatter reflectivity, and sub-bottom profiles were processed to a preliminary phase to provide reference material to delineate areas of “potential hardbottom”. As processing continues and correlations progress, these delineations may be subject to change.

Digitization

The areas initially digitized as potential hardbottoms, or reef_habitat_area per SDSFIE Feature Class (v2.6), represent features interpreted as outcrops, rock ledges, or exposed substrate. While these areas represent specific sites of potential hardbottoms, other portions of the surficial geology may present semi-indurated areas of seafloor, as noted by trawl/dredge scar features imprinted upon bedform features, mostly in the NW third of the survey area. This leaves question to the mobility vs. induration of the observed bedform features, and whether these areas that appear to be indurated or semi-indurated should be classified as “potential hardbottom”. To address the generally high reflectivity of these areas, an interpretation of the reflectivity for the area was generated from SSS imagery, with assistance from backscatter reflectivity. A SeabedArea SDSFIE Feature Class was generated to denote areas of high, medium and low reflectivity. While areas of low reflectivity (lower dB/darker) are expected to have a (potentially thin) sediment veneer, areas of high reflectivity (higher dB/brighter) should be considered as potentially indurated to semi-indurated substrate. Further research and investigation of the current hydrographic datasets and CORPS provided information should improve the understanding of observed features and may cause reason to adjust these initial assessments. In the event that changes are made, USACE will be contacted as soon as possible. ***It should also be noted additional ground truth***

data at specific areas based upon these datasets would be critical for a full seabed interpretation.

PRELIMINARY

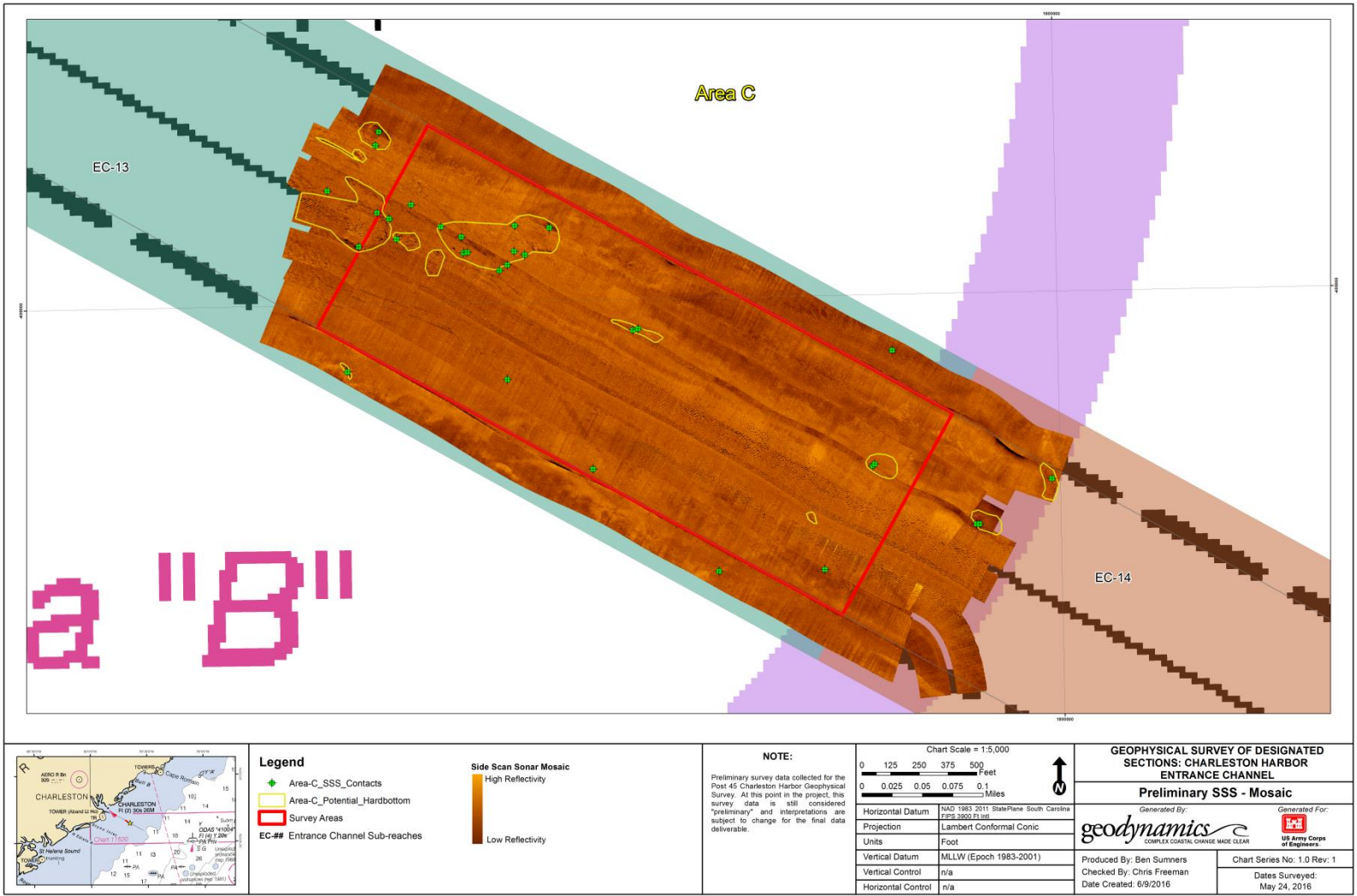


Figure 1. Mosaic of SSS with contacts/targets and areas of potential hardbottom digitized.

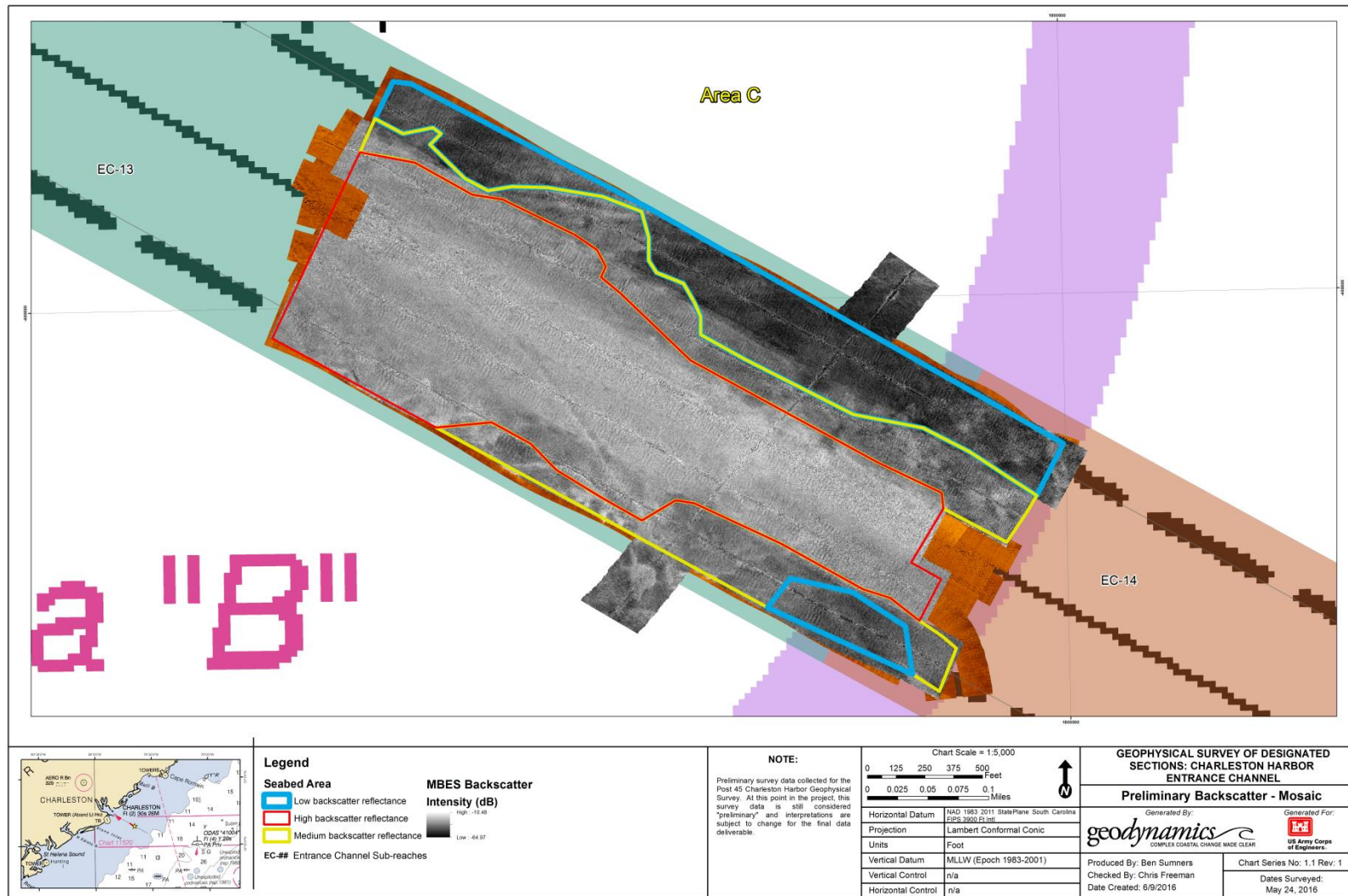
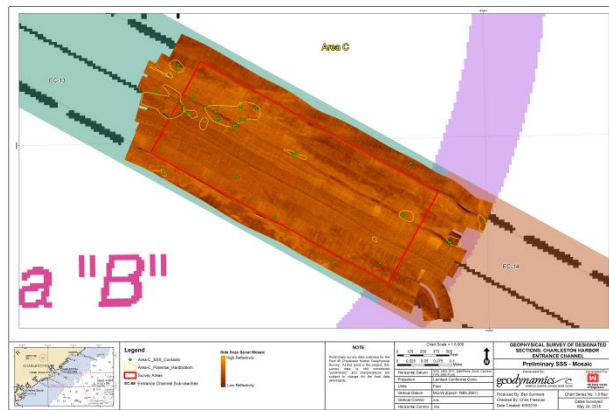


Figure 2. Mosaic of backscatter intensity showing reflectance (white is higher reflectance, i.e., more coarse than darker areas).

Report Area C-SSS Target Report



Generated on 6/9/2016 20:09:34

Report file: Area C-SSS Target Report.docx

Contacts in the report:

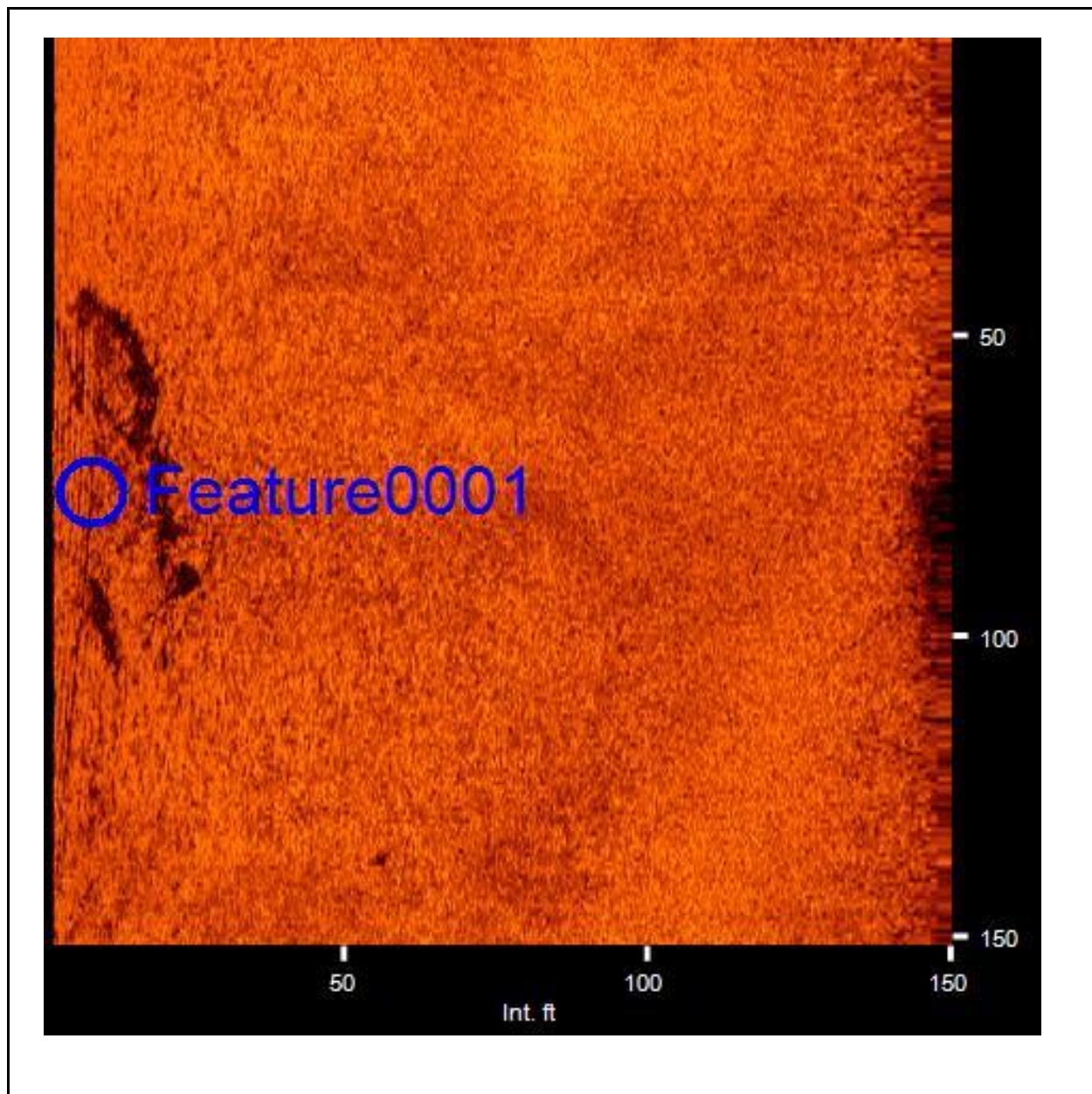
Feature0001	5/24/2016 19:26:19	32.6503163946	-79.6563405699
Feature0002	5/24/2016 19:27:46	32.6514876725	-79.6587363525
Feature0003	5/24/2016 19:10:55	32.6513270935	-79.6587830108
Feature0005	5/24/2016 19:10:01	32.6502196435	-79.6575855265
Feature0006	5/24/2016 19:08:32	32.6490813605	-79.6551751980
Feature0007	5/24/2016 19:06:28	32.6474220898	-79.6518087409
Feature0008	5/24/2016 19:05:34	32.6467114690	-79.6503530308
Feature0009	5/24/2016 18:43:30	32.6504498622	-79.6586040816
Feature0010	5/24/2016 18:44:06	32.6500304044	-79.6575580536
Feature0011	5/24/2016 18:44:07	32.6500353205	-79.6575037954
Feature0013	5/24/2016 19:23:36	32.6488005855	-79.6515142619
Feature0014	5/24/2016 19:10:29	32.6506130784	-79.6582919198
Feature0016	5/24/2016 18:58:23	32.6507890799	-79.6594735434
Feature0017	5/24/2016 19:09:38	32.6500411966	-79.6568444488

Pre-Deliverable Item

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report

Feature0018	5/24/2016 19:10:11	32.6503455950	-79.6578729511
Feature0019	5/24/2016 19:08:31	32.6490954624	-79.6551020471
Feature0020	5/24/2016 19:06:28	32.6474430763	-79.6517809922
Feature0021	5/24/2016 19:05:33	32.6467109691	-79.6503130864
Feature0022	5/24/2016 18:58:57	32.6502039920	-79.6585033897
Feature0023	5/24/2016 19:46:36	32.6485083403	-79.6569604372
Feature0024	5/24/2016 19:47:32	32.6474271844	-79.6557652959
Feature0025	5/24/2016 19:17:55	32.6461898575	-79.6525058487
Feature0026	5/24/2016 19:13:32	32.6501164819	-79.6590368656
Feature0027	5/24/2016 19:41:14	32.6499969975	-79.6566911610
Feature0028	5/24/2016 19:42:19	32.6505195878	-79.6587728057
Feature0029	5/24/2016 19:34:02	32.6461867320	-79.6540018142
Feature0030	5/24/2016 19:30:49	32.6486227665	-79.6592233801
Feature0031	5/24/2016 19:22:04	32.6472436143	-79.6492773456
Feature0032	5/24/2016 18:55:21	32.6503468368	-79.6568292048
Feature0034	5/24/2016 18:44:23	32.6498134095	-79.6570529191
Feature0035	5/24/2016 18:44:25	32.6498793701	-79.6569435322

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



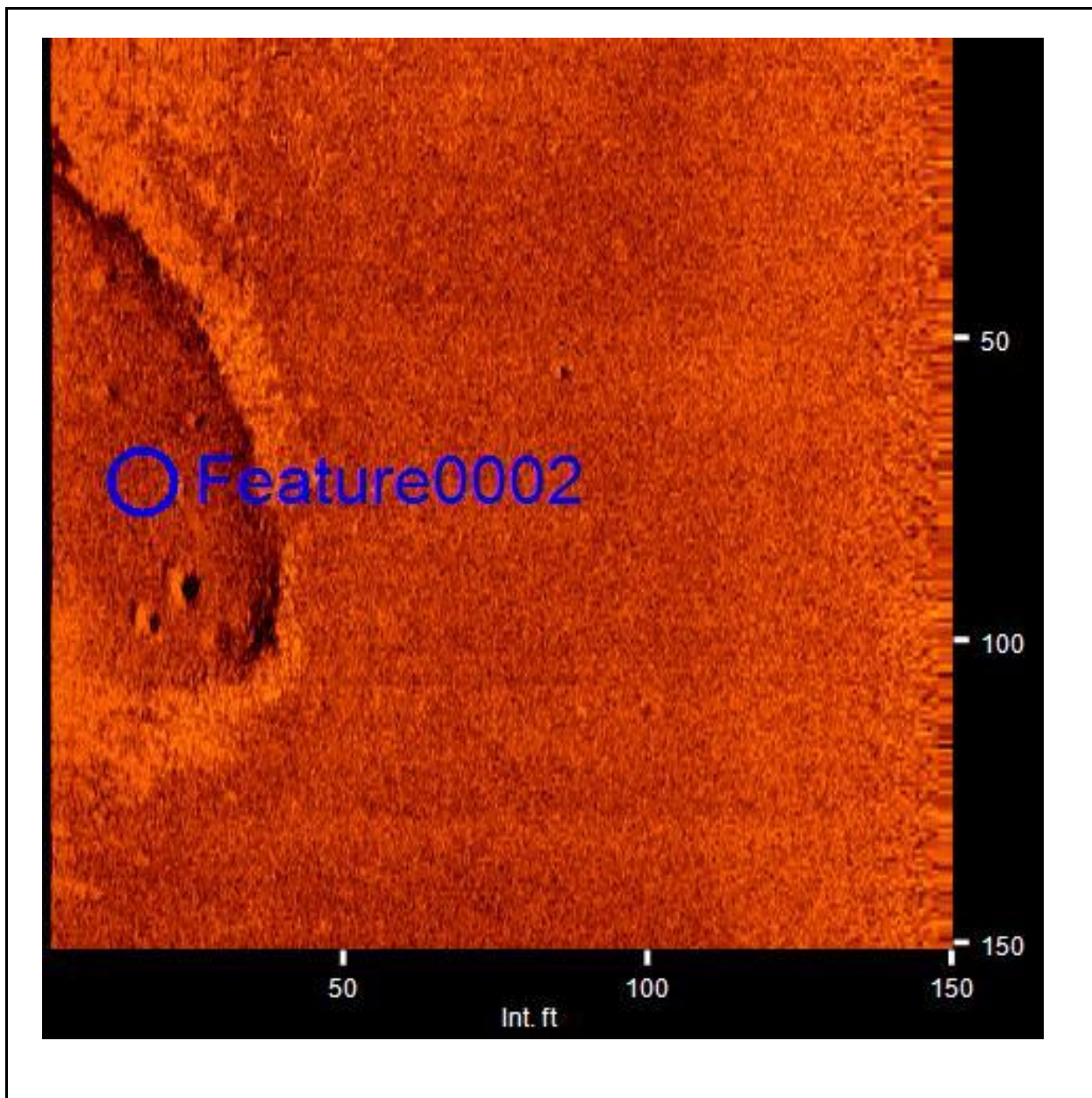
Feature0001

- Sonar Time at Target: 5/24/2016 19:26:19
- Click Position
32.6503163946 -79.6563405699 (WGS84)
(X) 2413558.03 (Y) 299952.26 (Projected Coordinates)
- Map Projection: SC83IF
- Range to target: 141.65 Int. ft
- Fish Height: 21.49 Int. ft
- Heading: 313.690 Degrees
- Line Name: 20160524192136

Dimensions and attributes

- Target Width: 17.28 Int. ft
- Target Height: 0.26 Int. ft
- Target Length: 52.12 Int. ft
- Target Shadow: 1.76 Int. ft
- Description: dredge scars

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



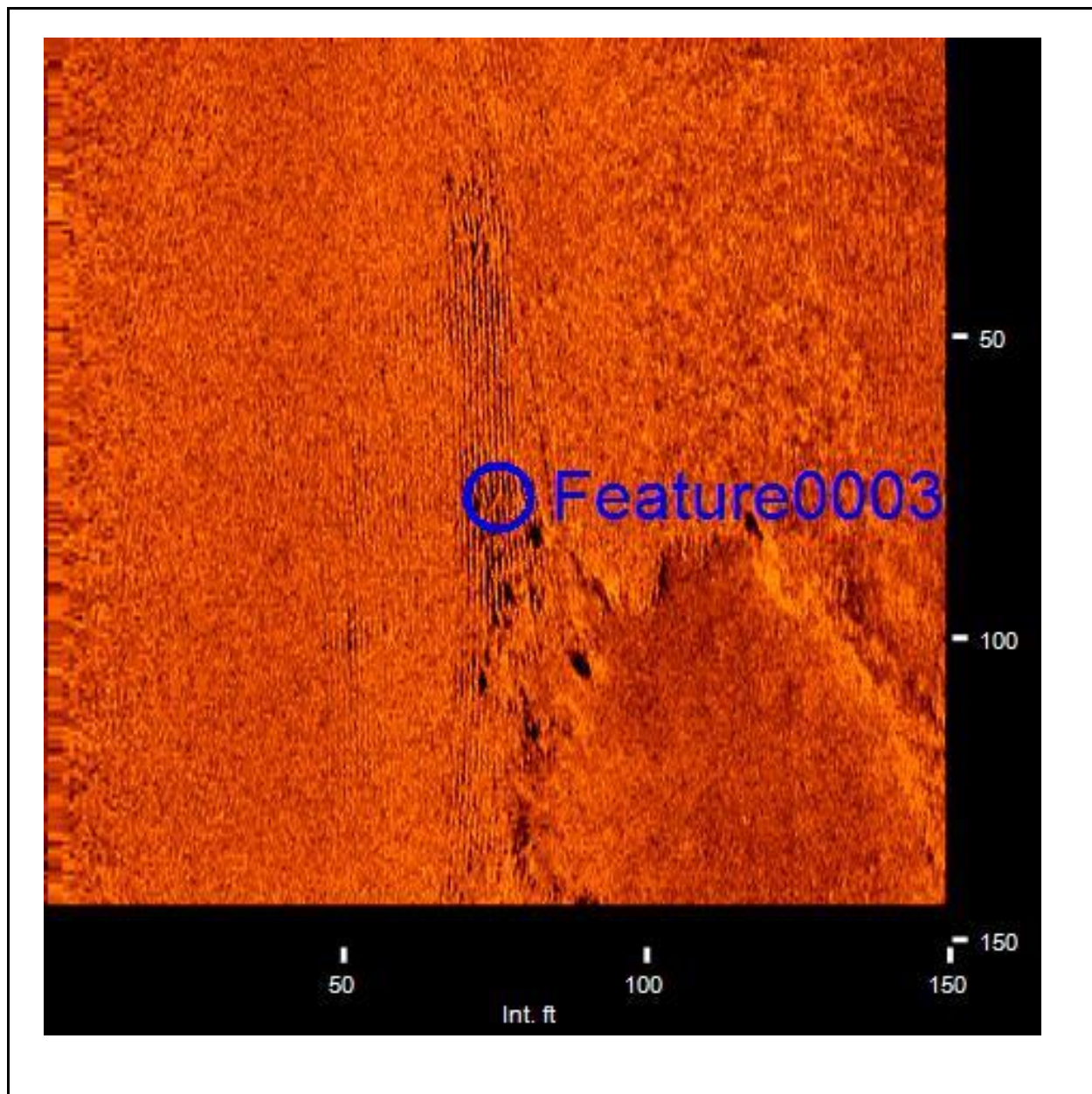
Feature0002

- Sonar Time at Target: 5/24/2016 19:27:46
- Click Position
32.6514876725 -79.6587363525 (WGS84)
(X) 2412815.15 (Y) 300368.78 (Projected Coordinates)
- Map Projection: SC83IF
- Range to target: 133.04 Int. ft
- Fish Height: 21.64 Int. ft
- Heading: 317.890 Degrees
- Line Name: 20160524192136

Dimensions and attributes

- Target Width: 38.42 Int. ft
- Target Height: 0.00 Int. ft
- Target Length: 89.73 Int. ft
- Target Shadow: 0.00 Int. ft
- Description: depression with pockmarks inside and dredge scars surrounding

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



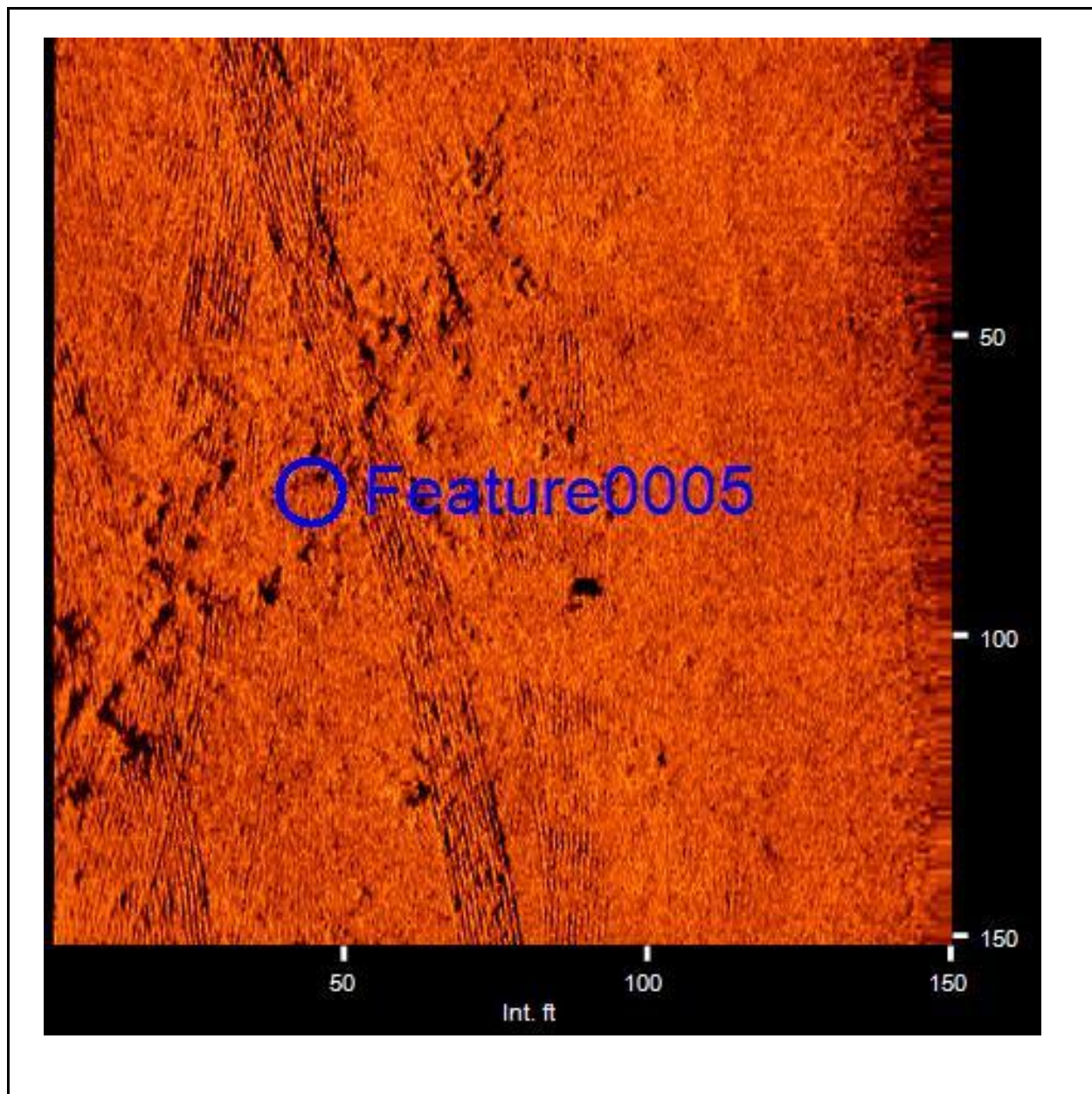
Feature0003

- Sonar Time at Target: 5/24/2016 19:10:55
- Click Position
32.6513270935 -79.6587830108 (WGS84)
(X) 2412801.55 (Y) 300310.18 (Projected Coordinates)
- Map Projection: SC83IF
- Range to target: 74.18 Int. ft
- Fish Height: 22.37 Int. ft
- Heading: 318.800 Degrees
- Line Name: 20160524190527

Dimensions and attributes

- Target Width: 9.89 Int. ft
- Target Height: 0.00 Int. ft
- Target Length: 0.00 Int. ft
- Target Shadow: 0.00 Int. ft
- Description: dredge scars

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



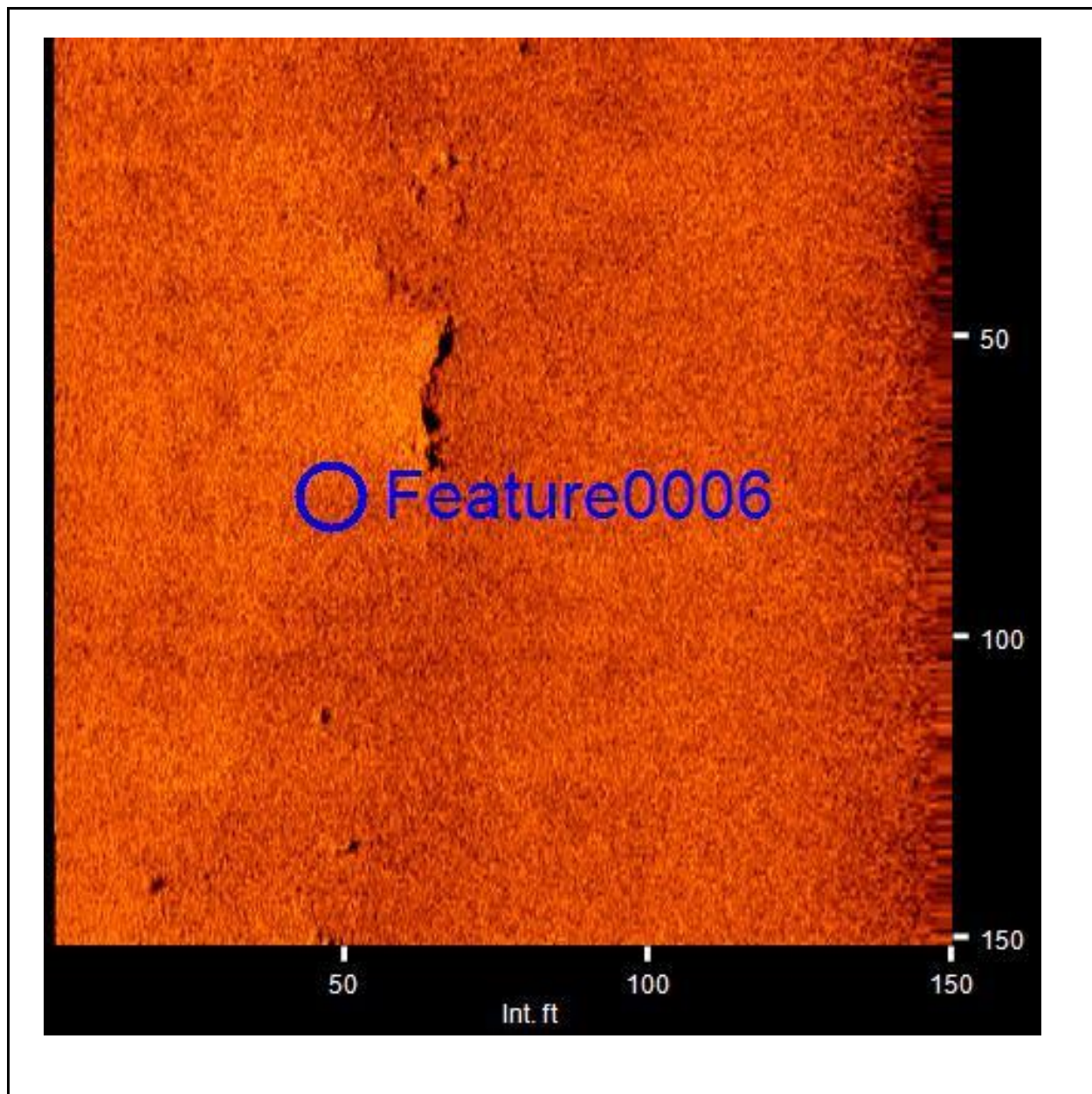
Feature0005

- Sonar Time at Target: 5/24/2016 19:10:01
- Click Position
32.6502196435 -79.6575855265 (WGS84)
(X) 2413175.33 (Y) 299912.08 (Projected Coordinates)
- Map Projection: SC83IF
- Range to target: 105.48 Int. ft
- Fish Height: 22.66 Int. ft
- Heading: 318.500 Degrees
- Line Name: 20160524190527

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.29 Int. ft
- Target Length: 865.06 Int. ft
- Target Shadow: 1.41 Int. ft
- Description: likely low relief hard outcrops

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



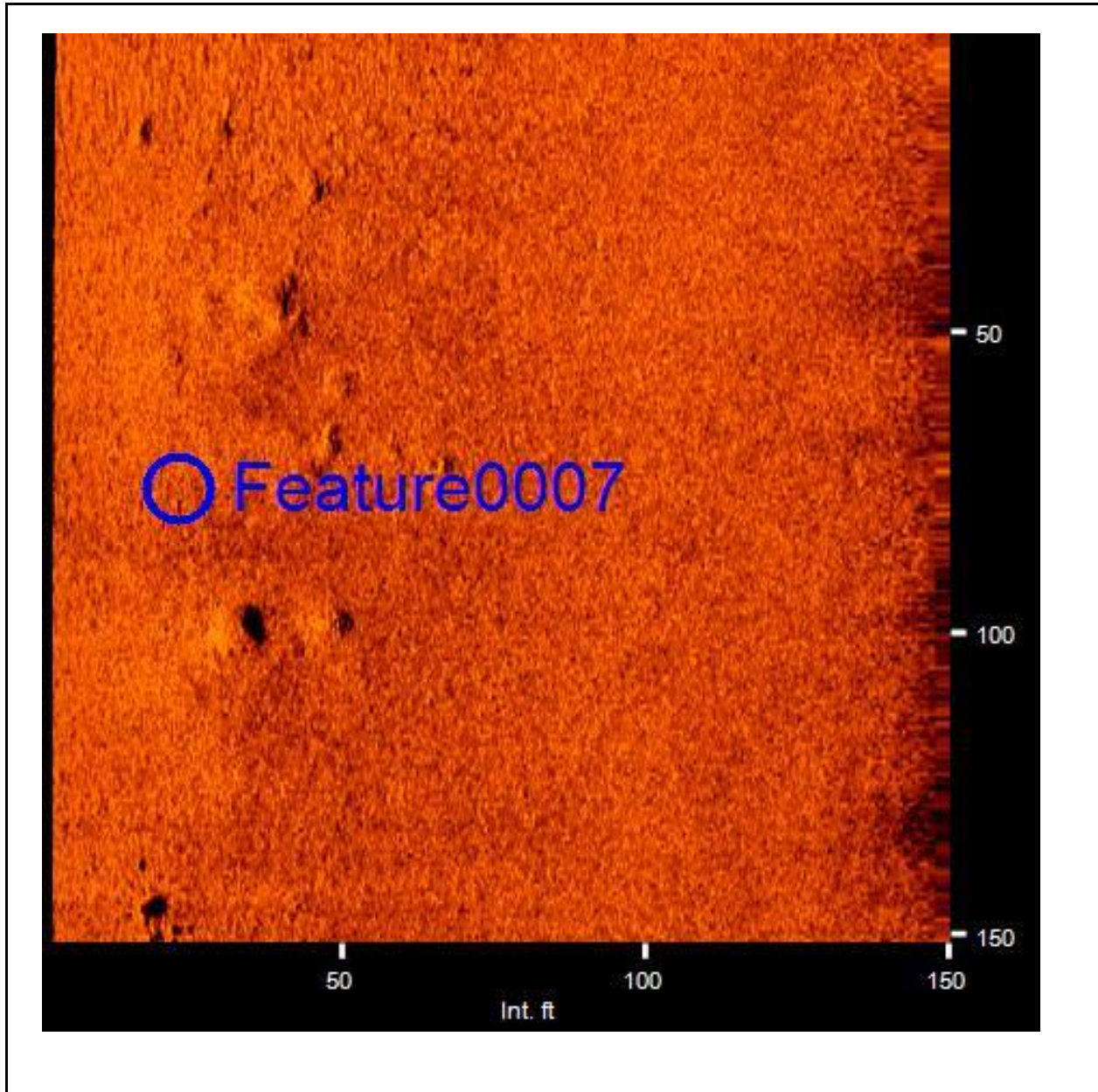
Feature0006

- Sonar Time at Target: 5/24/2016 19:08:32
- Click Position
32.6490813605 -79.6551751980 (WGS84)
(X) 2413922.54 (Y) 299507.63 (Projected Coordinates)
- Map Projection: SC831F
- Range to target: 102.16 Int. ft
- Fish Height: 22.81 Int. ft
- Heading: 321.000 Degrees
- Line Name: 20160524190527

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.37 Int. ft
- Target Length: 481.06 Int. ft
- Target Shadow: 1.75 Int. ft
- Description: potential rock outcrops

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



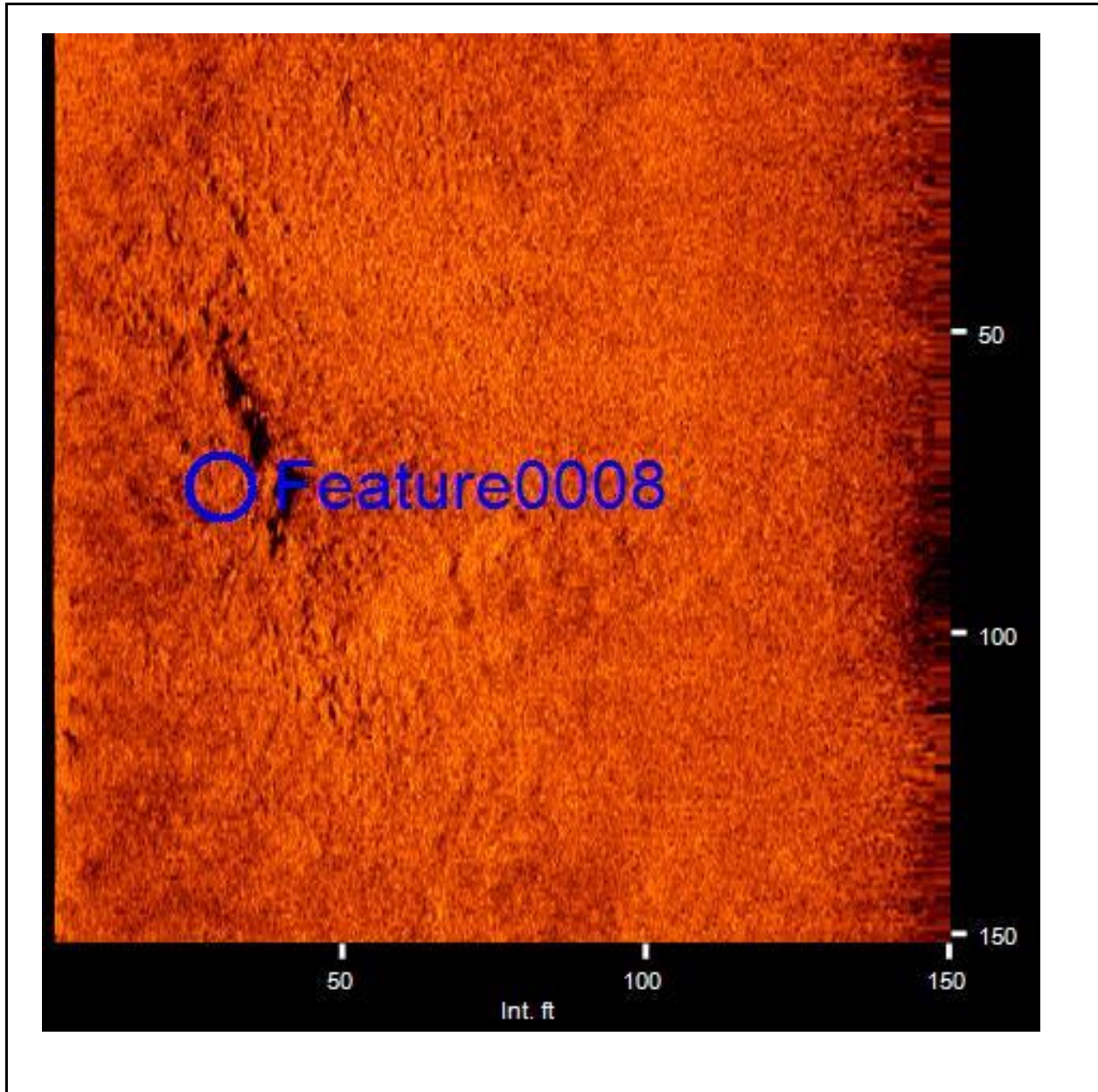
Feature0007

- Sonar Time at Target: 5/24/2016 19:06:28
- Click Position
32.6474220898 -79.6518087409 (WGS84)
(X) 2414966.51 (Y) 298917.50 (Projected Coordinates)
- Map Projection: SC83IF
- Range to target: 127.02 Int. ft
- Fish Height: 23.83 Int. ft
- Heading: 315.600 Degrees
- Line Name: 20160524190527

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.51 Int. ft
- Target Length: 372.73 Int. ft
- Target Shadow: 2.84 Int. ft
- Description: potential rock outcrops and pockmarks

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



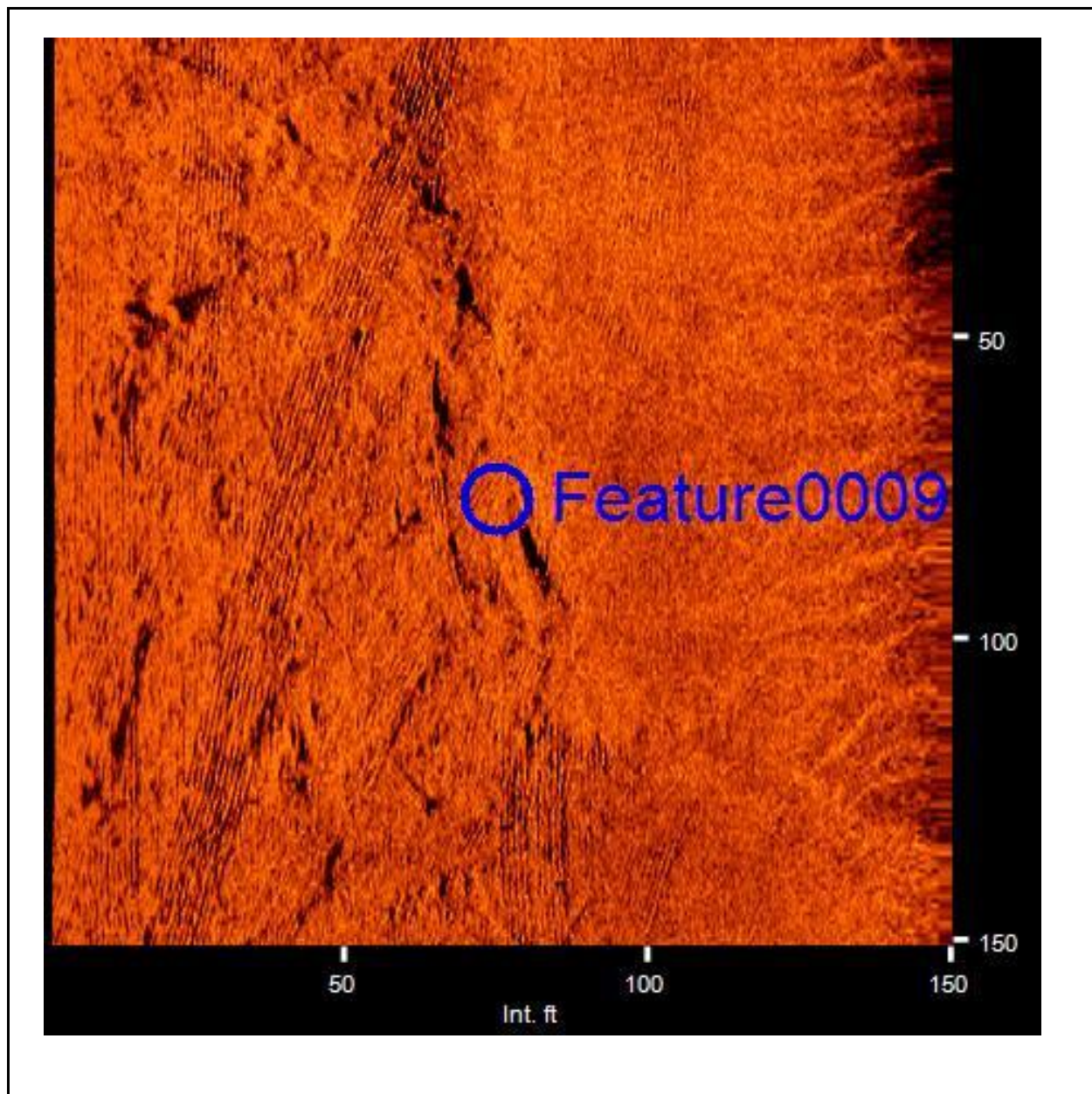
Feature0008

- Sonar Time at Target: 5/24/2016 19:05:34
- Click Position
32.6467114690 -79.6503530308 (WGS84)
(X) 2415417.92 (Y) 298664.83 (Projected Coordinates)
- Map Projection: SC831F
- Range to target: 120.11 Int. ft
- Fish Height: 24.12 Int. ft
- Heading: 319.190 Degrees
- Line Name: 20160524190527

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.61 Int. ft
- Target Length: 112.12 Int. ft
- Target Shadow: 3.18 Int. ft
- Description: ledge - potential outcrop

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



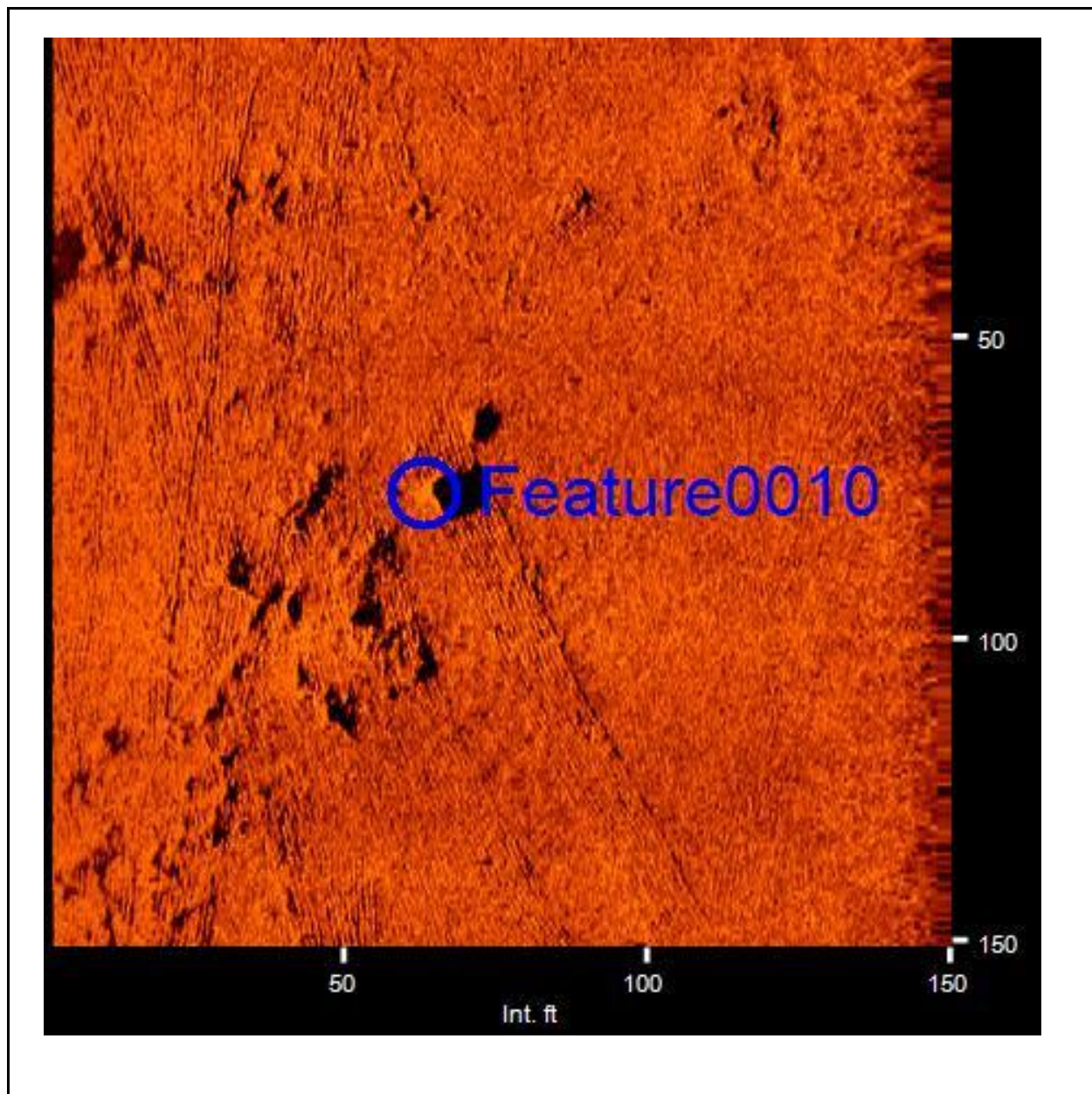
Feature0009

- Sonar Time at Target: 5/24/2016 18:43:30
- Click Position
32.6504498622 -79.6586040816 (WGS84)
(X) 2412860.76 (Y) 299991.76 (Projected Coordinates)
- Map Projection: SC83IF
- Range to target: 75.14 Int. ft
- Fish Height: 23.68 Int. ft
- Heading: 117.700 Degrees
- Line Name: 20160524184323

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.42 Int. ft
- Target Length: 0.00 Int. ft
- Target Shadow: 1.43 Int. ft
- Description: potential outcrop area

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



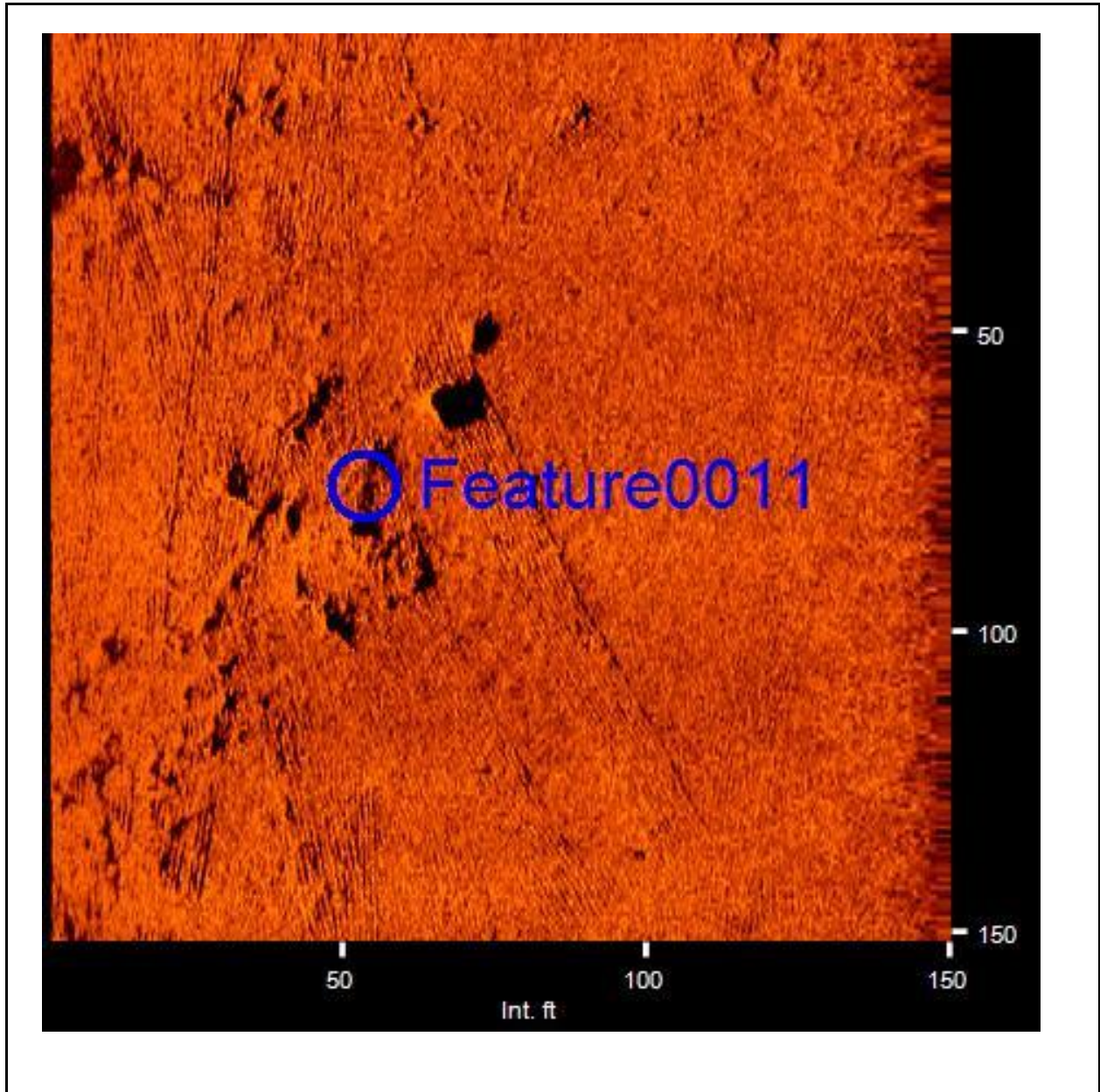
Feature0010

- Sonar Time at Target: 5/24/2016 18:44:06
- Click Position
32.6500304044 -79.6575580536 (WGS84)
(X) 2413184.68 (Y) 299843.35 (Projected Coordinates)
- Map Projection: SC83IF
- Range to target: 87.13 Int. ft
- Fish Height: 21.34 Int. ft
- Heading: 109.390 Degrees
- Line Name: 20160524184323

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.42 Int. ft
- Target Length: 0.00 Int. ft
- Target Shadow: 1.81 Int. ft
- Description: potential outcropping area

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



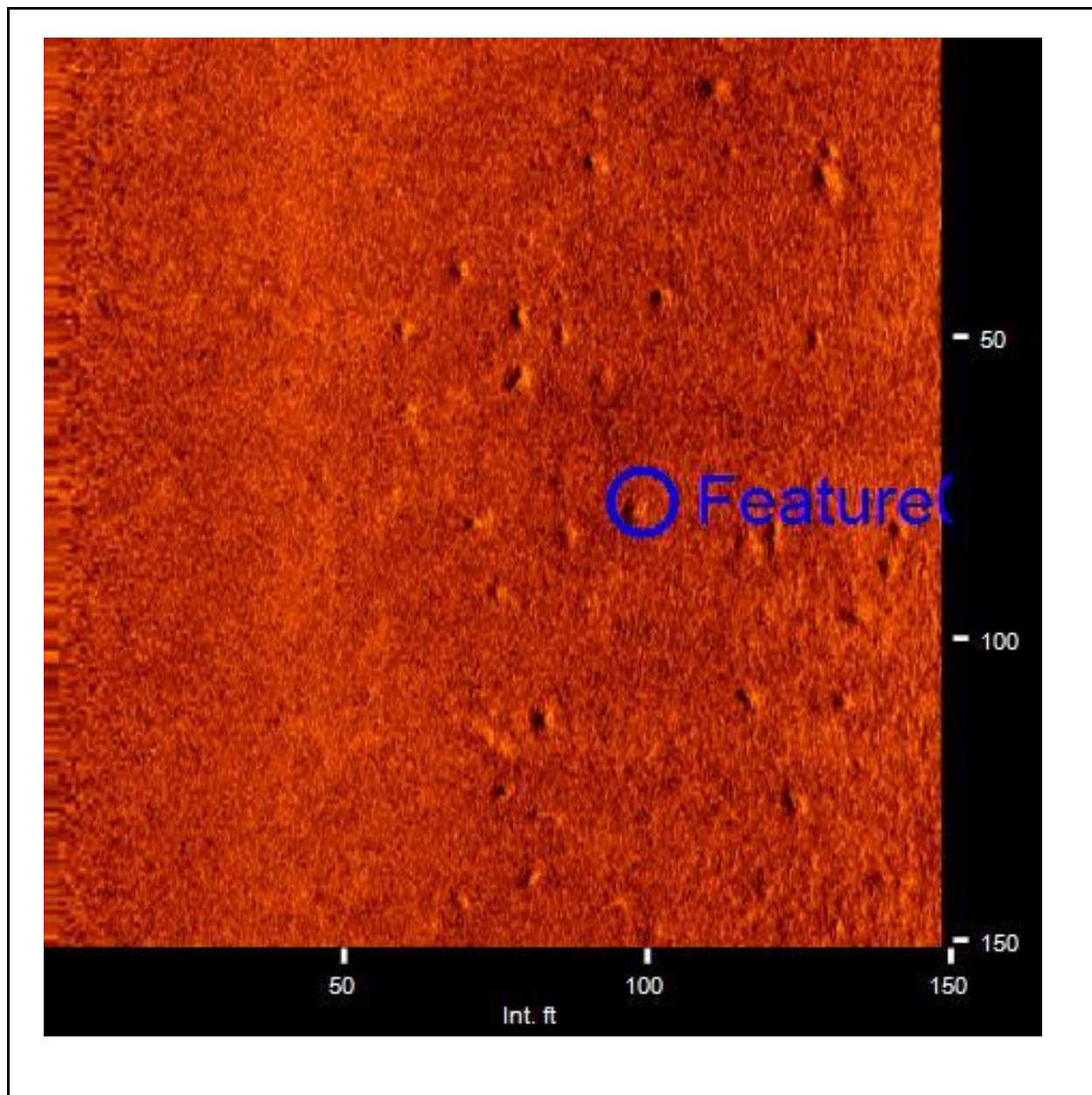
Feature0011

- Sonar Time at Target: 5/24/2016 18:44:07
- Click Position
32.6500353205 -79.6575037954 (WGS84)
(X) 2413201.35 (Y) 299845.35 (Projected Coordinates)
- Map Projection: SC83IF
- Range to target: 96.49 Int. ft
- Fish Height: 21.20 Int. ft
- Heading: 113.100 Degrees
- Line Name: 20160524184323

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.00 Int. ft
- Target Length: 0.00 Int. ft
- Target Shadow: 0.00 Int. ft
- Description: potential outcrops

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



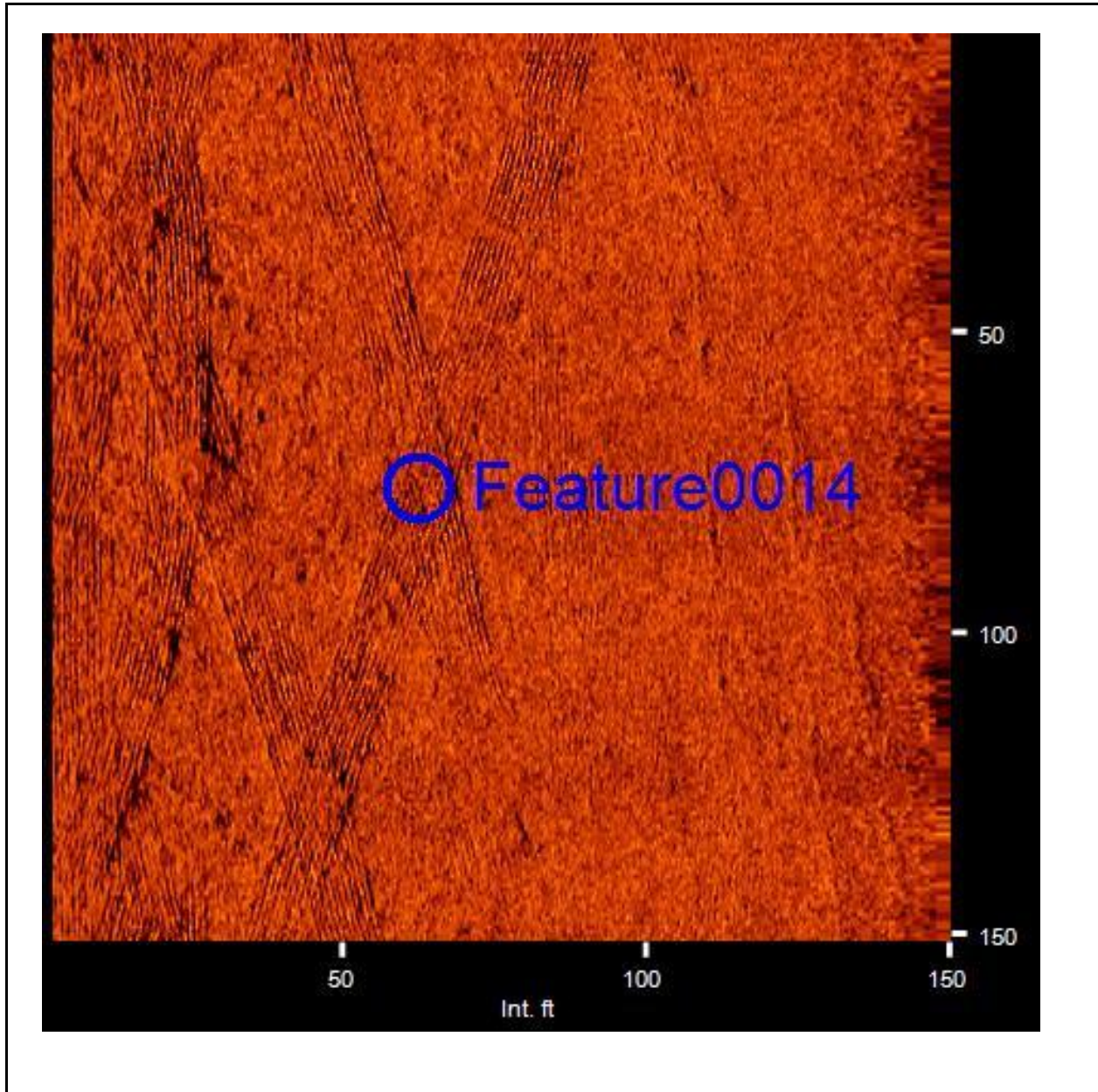
Feature0013

- Sonar Time at Target: 5/24/2016 19:23:36
- Click Position
32.6488005855 -79.6515142619 (WGS84)
(X) 2415050.60 (Y) 299420.17 (Projected Coordinates)
- Map Projection: SC831F
- Range to target: 98.69 Int. ft
- Fish Height: 23.54 Int. ft
- Heading: 317.100 Degrees
- Line Name: 20160524192136

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.00 Int. ft
- Target Length: 0.00 Int. ft
- Target Shadow: 0.00 Int. ft
- Description: pockmarks

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



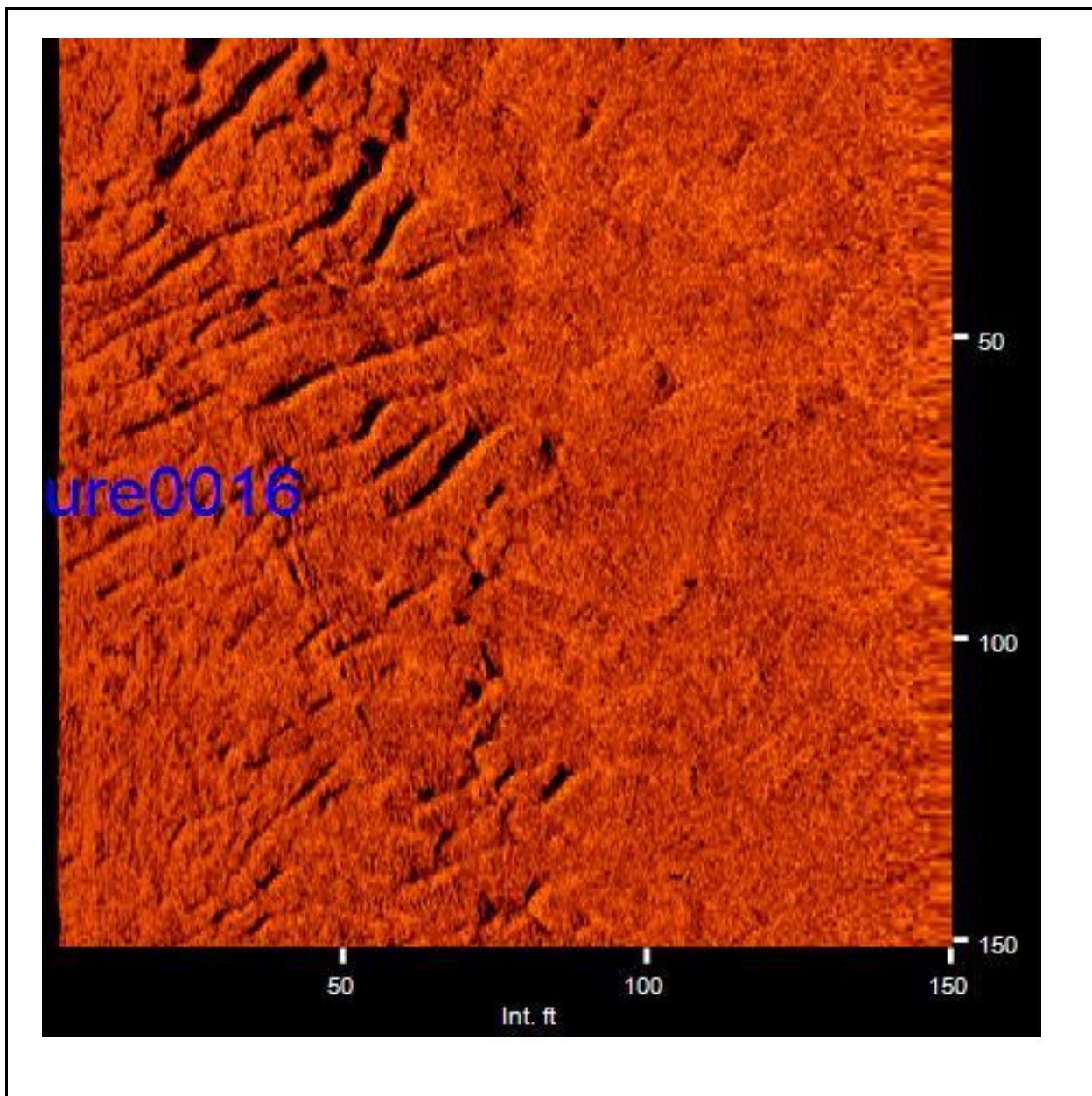
Feature0014

- Sonar Time at Target: 5/24/2016 19:10:29
- Click Position
32.6506130784 -79.6582919198 (WGS84)
(X) 2412956.06 (Y) 300052.39 (Projected Coordinates)
- Map Projection: SC831F
- Range to target: 87.72 Int. ft
- Fish Height: 22.37 Int. ft
- Heading: 318.690 Degrees
- Line Name: 20160524190527

Dimensions and attributes

- Target Width: 11.31 Int. ft
- Target Height: 0.00 Int. ft
- Target Length: 0.00 Int. ft
- Target Shadow: 0.00 Int. ft
- Description: trawl/dredge scars

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



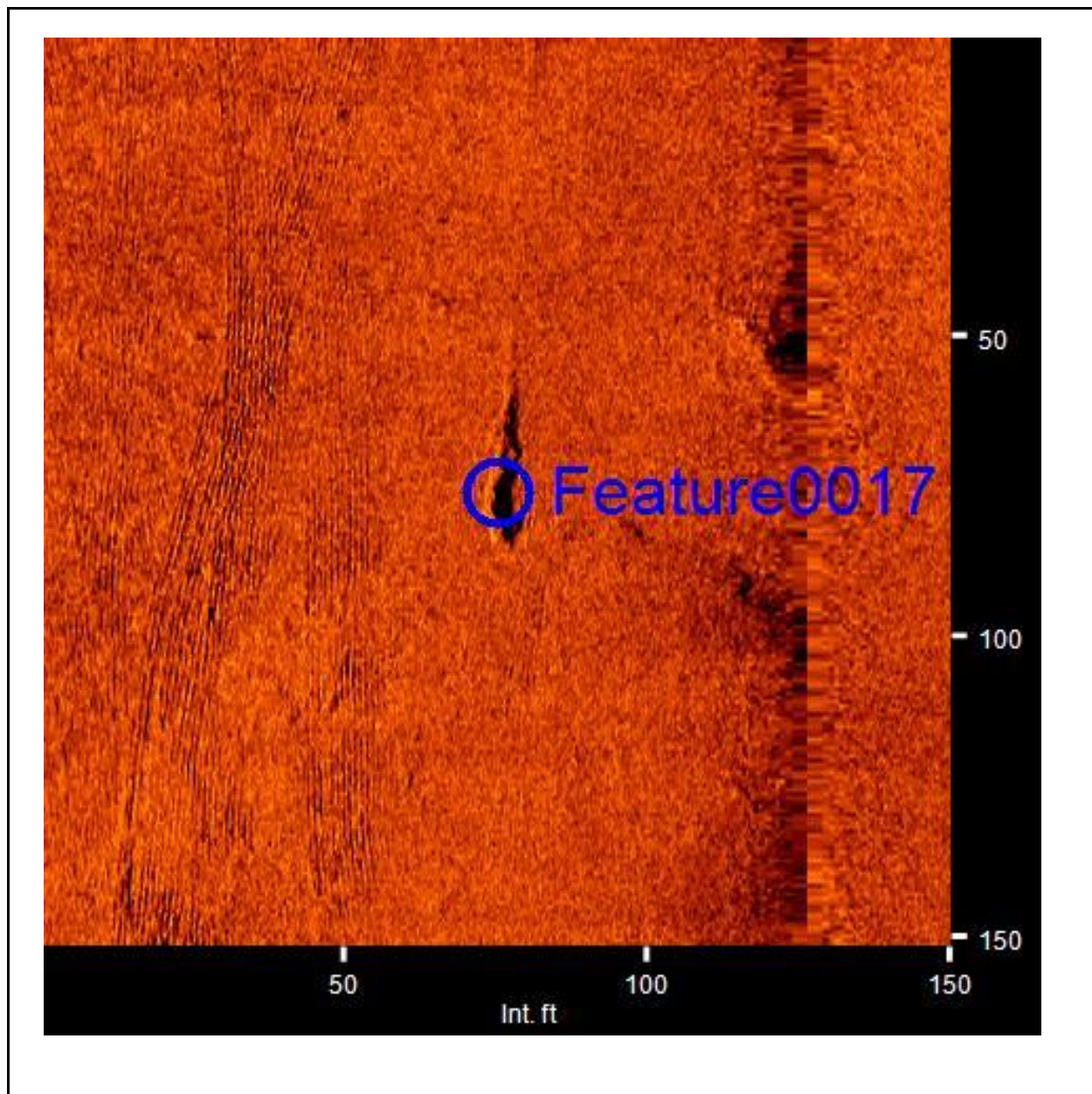
Feature0016

- Sonar Time at Target: 5/24/2016 18:58:23
- Click Position
32.6507890799 -79.6594735434 (WGS84)
(X) 2412591.57 (Y) 300111.69 (Projected Coordinates)
- Map Projection: SC83IF
- Range to target: 181.86 Int. ft
- Fish Height: 21.78 Int. ft
- Heading: 101.890 Degrees
- Line Name: 20160524185813

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.00 Int. ft
- Target Length: 0.00 Int. ft
- Target Shadow: 0.00 Int. ft
- Description: bedform features of unkown induration

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



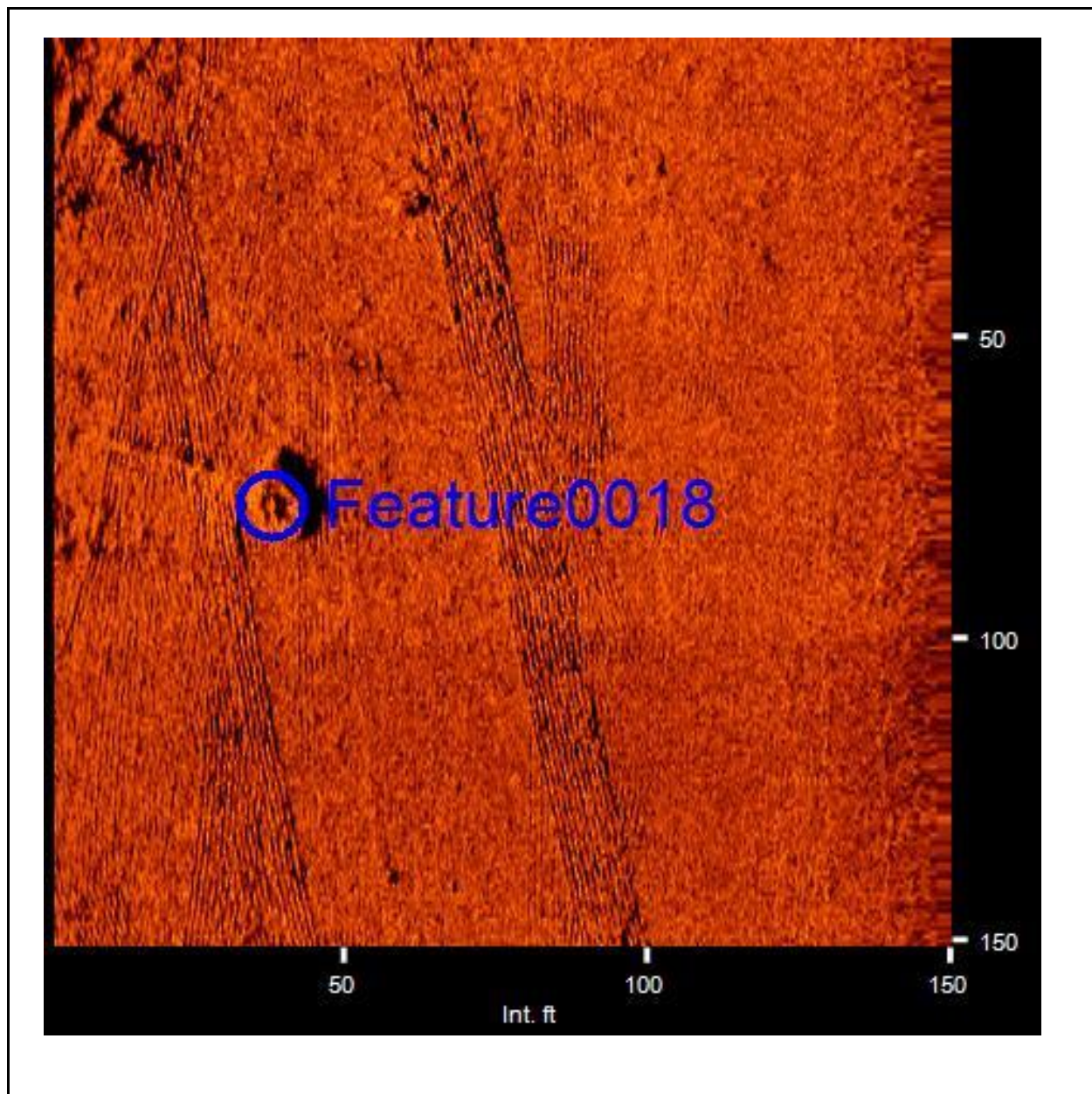
Feature0017

- Sonar Time at Target: 5/24/2016 19:09:38
- Click Position
32.6500411966 -79.6568444488 (WGS84)
(X) 2413404.25 (Y) 299850.13 (Projected Coordinates)
- Map Projection: SC831F
- Range to target: 51.17 Int. ft
- Fish Height: 22.95 Int. ft
- Heading: 323.890 Degrees
- Line Name: 20160524190527

Dimensions and attributes

- Target Width: 3.13 Int. ft
- Target Height: 0.56 Int. ft
- Target Length: 32.38 Int. ft
- Target Shadow: 1.39 Int. ft
- Description: depression, potential outcrop

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



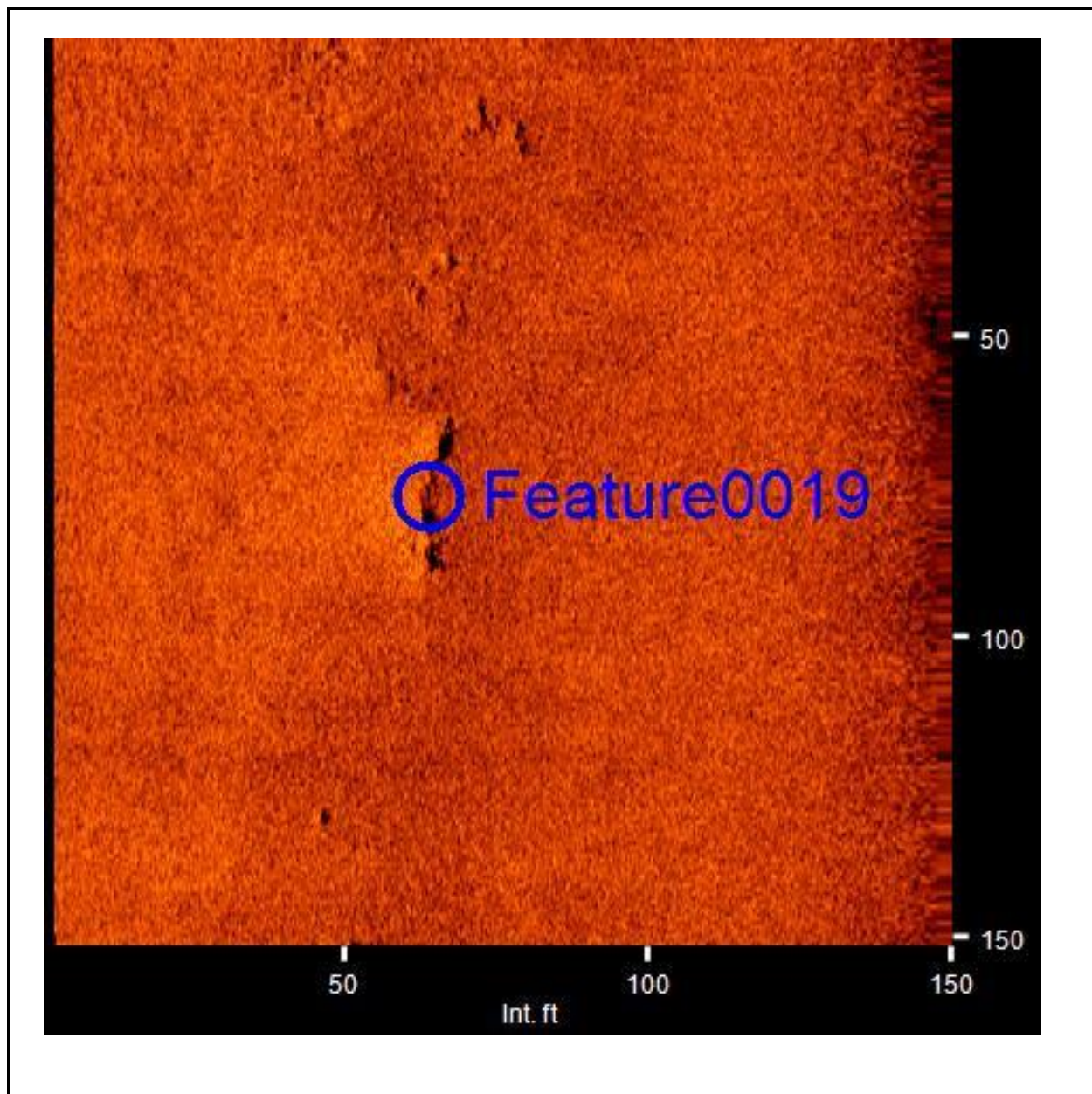
Feature0018

- Sonar Time at Target: 5/24/2016 19:10:11
- Click Position
32.6503455950 -79.6578729511 (WGS84)
(X) 2413086.27 (Y) 299956.75 (Projected Coordinates)
- Map Projection: SC831F
- Range to target: 112.28 Int. ft
- Fish Height: 22.51 Int. ft
- Heading: 320.600 Degrees
- Line Name: 20160524190527

Dimensions and attributes

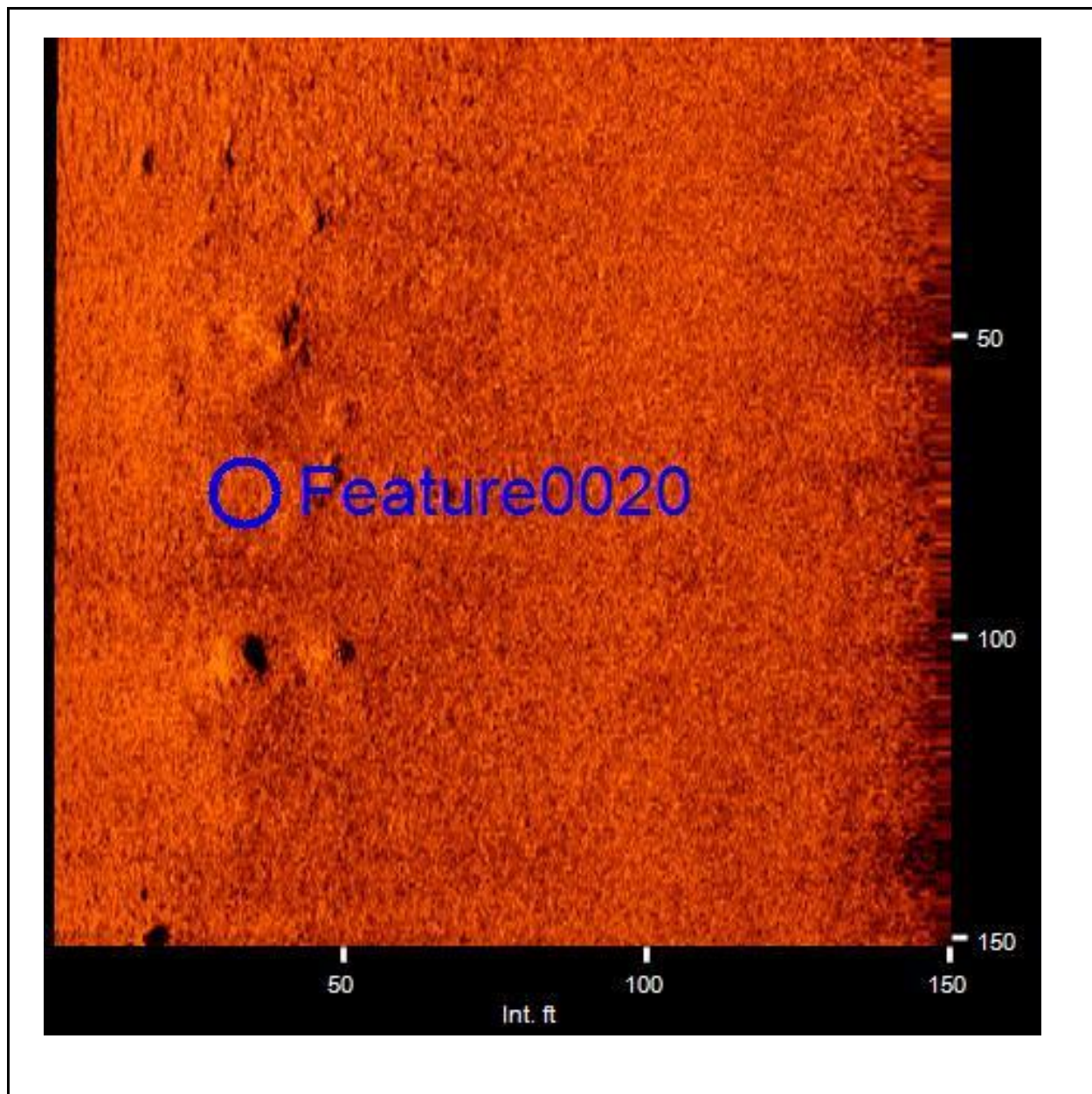
- Target Width: 0.00 Int. ft
- Target Height: 0.00 Int. ft
- Target Length: 0.00 Int. ft
- Target Shadow: 0.00 Int. ft
- Description: depression and feature and trawl/dredge scars

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



<p>Feature0019</p> <ul style="list-style-type: none">• Sonar Time at Target: 5/24/2016 19:08:31• Click Position 32.6490954624 -79.6551020471 (WGS84) (X) 2413944.98 (Y) 299513.05 (Projected Coordinates)• Map Projection: SC831F• Range to target: 86.25 Int. ft• Fish Height: 22.95 Int. ft• Heading: 320.690 Degrees• Line Name: 20160524190527	<p>Dimensions and attributes</p> <ul style="list-style-type: none">• Target Width: 0.00 Int. ft• Target Height: 0.61 Int. ft• Target Length: 27.48 Int. ft• Target Shadow: 2.45 Int. ft• Description: ledge feature
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CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



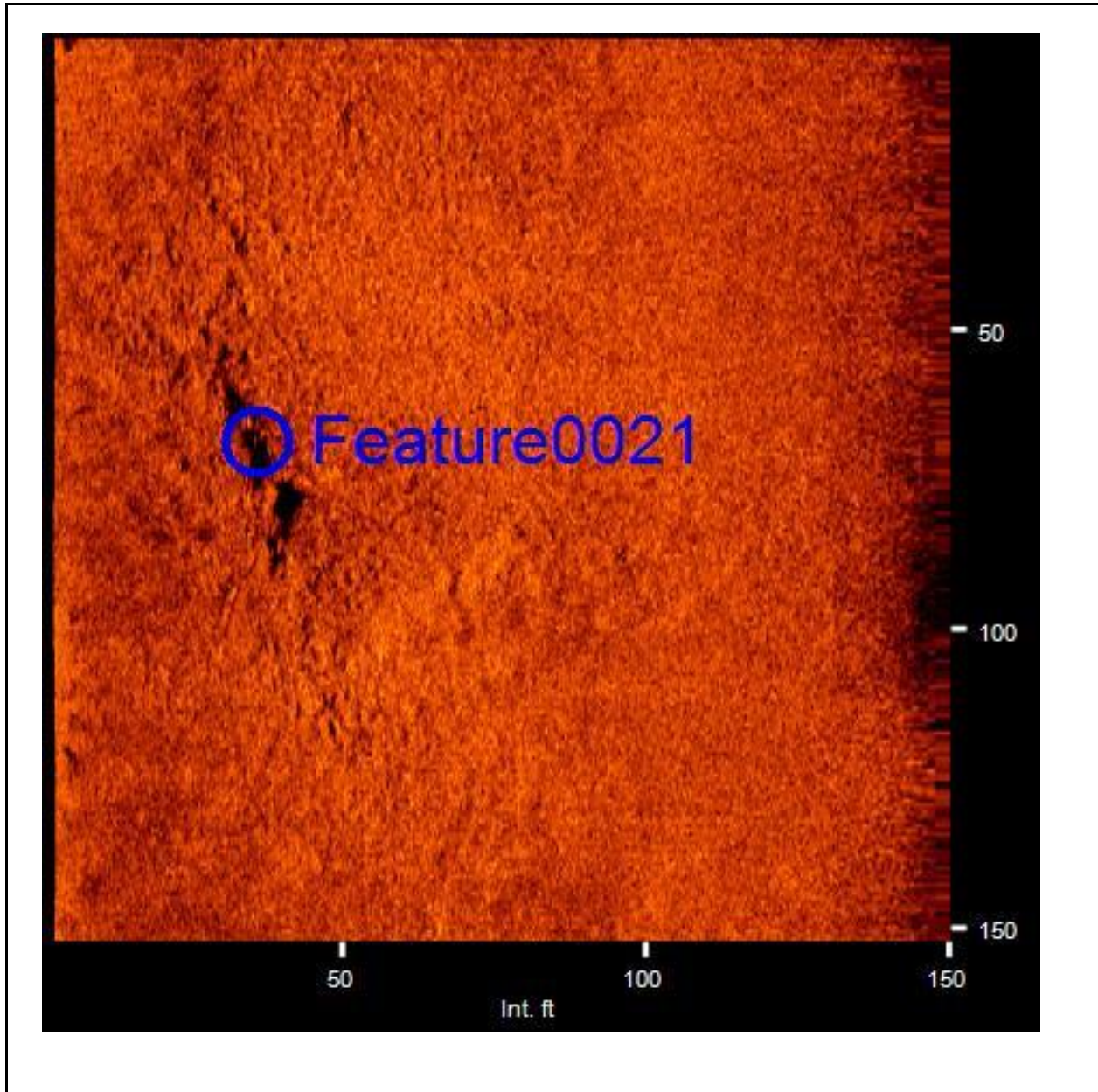
Feature0020

- Sonar Time at Target: 5/24/2016 19:06:28
- Click Position
32.6474430763 -79.6517809922 (WGS84)
(X) 2414974.95 (Y) 298925.25 (Projected Coordinates)
- Map Projection: SC831F
- Range to target: 116.37 Int. ft
- Fish Height: 23.83 Int. ft
- Heading: 314.690 Degrees
- Line Name: 20160524190527

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.00 Int. ft
- Target Length: 0.00 Int. ft
- Target Shadow: 0.00 Int. ft
- Description: group of depressions

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



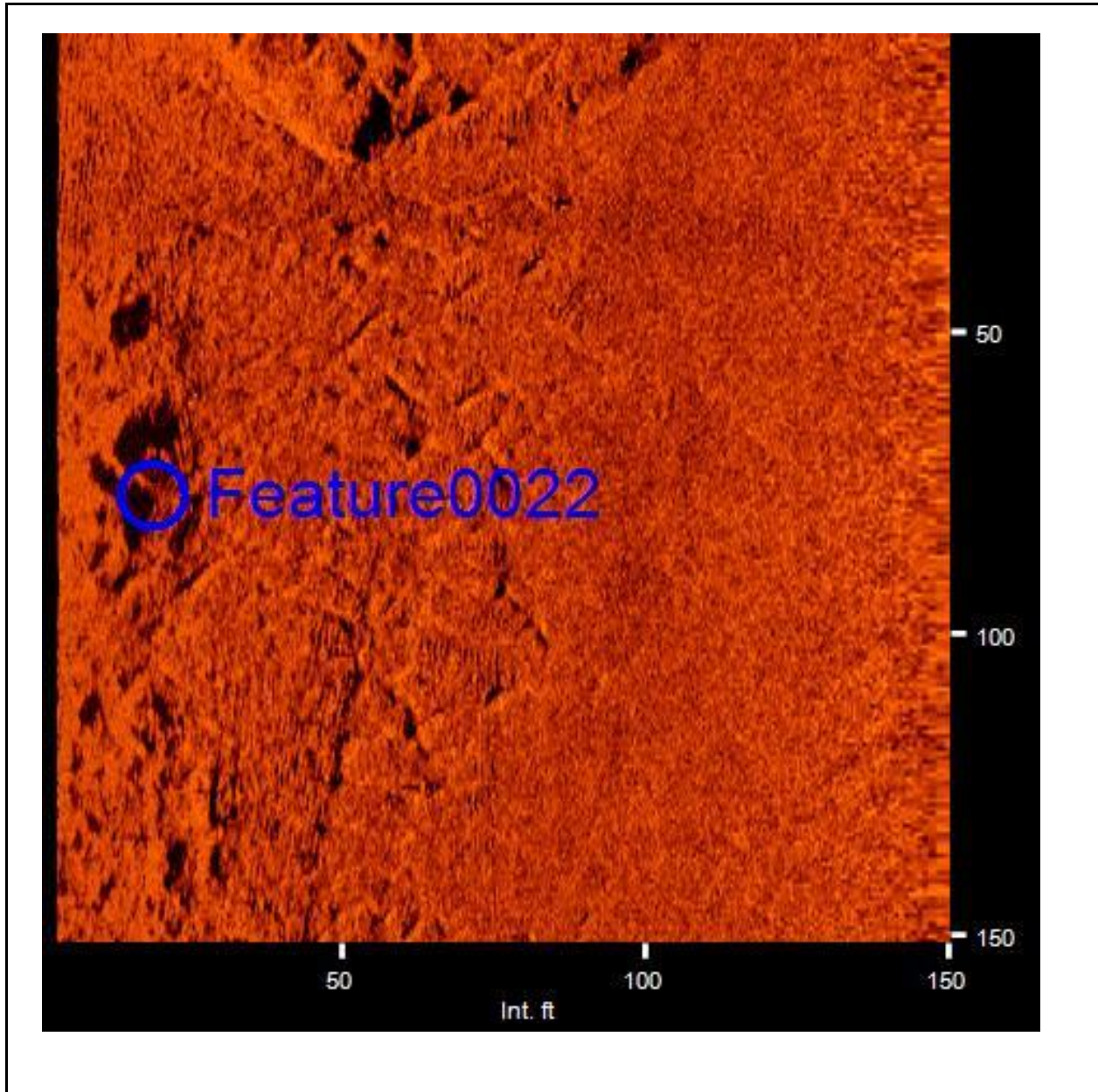
Feature0021

- Sonar Time at Target: 5/24/2016 19:05:33
- Click Position
32.6467109691 -79.6503130864 (WGS84)
(X) 2415430.22 (Y) 298664.81 (Projected Coordinates)
- Map Projection: SC83IF
- Range to target: 114.32 Int. ft
- Fish Height: 25.29 Int. ft
- Heading: 319.190 Degrees
- Line Name: 20160524190527

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.67 Int. ft
- Target Length: 39.40 Int. ft
- Target Shadow: 3.18 Int. ft
- Description: ledge feature

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



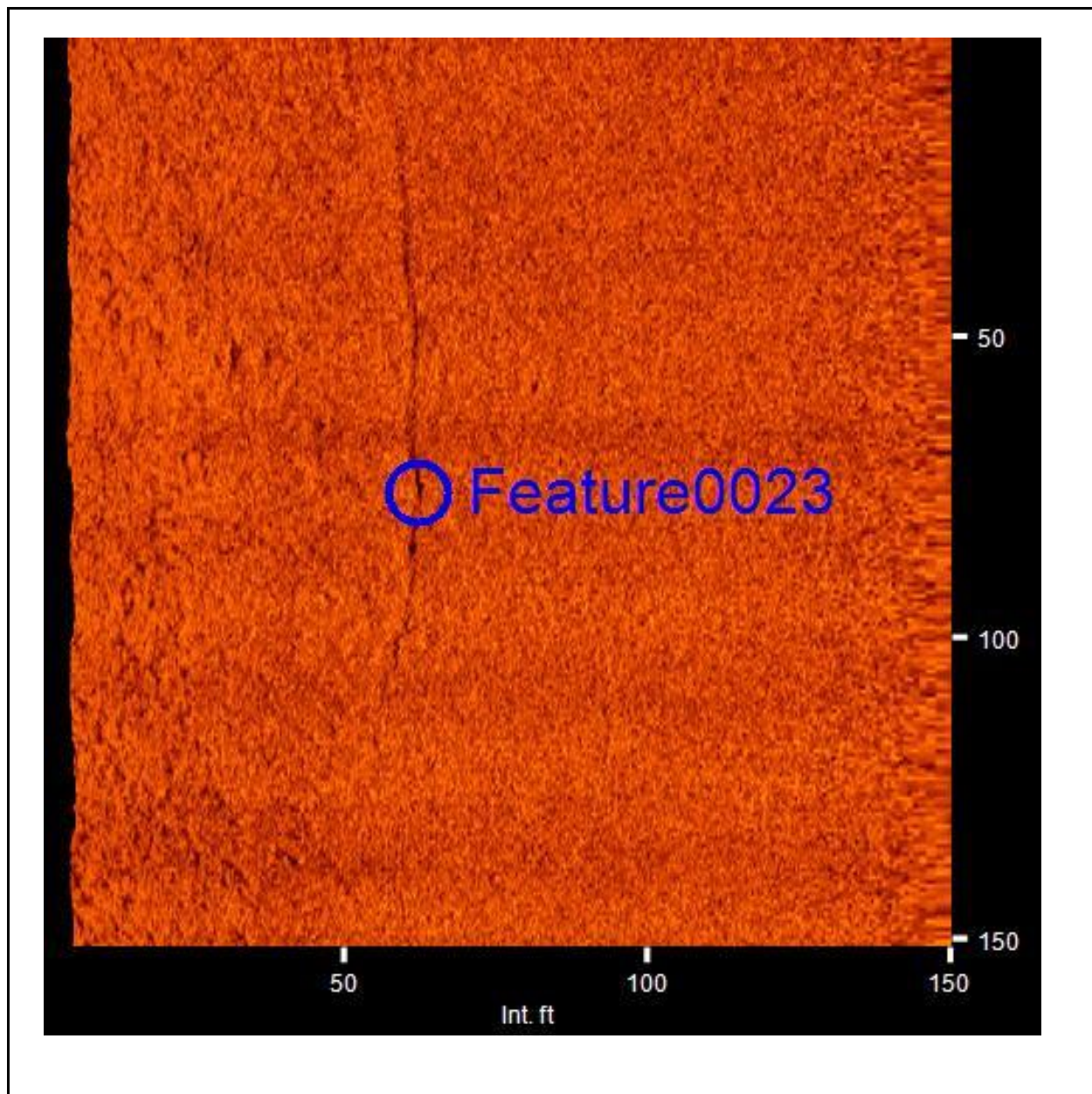
Feature0022

- Sonar Time at Target: 5/24/2016 18:58:57
- Click Position
32.6502039920 -79.6585033897 (WGS84)
(X) 2412892.91 (Y) 299902.72 (Projected Coordinates)
- Map Projection: SC831F
- Range to target: 131.28 Int. ft
- Fish Height: 21.78 Int. ft
- Heading: 118.000 Degrees
- Line Name: 20160524185813

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.73 Int. ft
- Target Length: 12.28 Int. ft
- Target Shadow: 4.61 Int. ft
- Description: hole feature and trawl/dredge scars over bedform features

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



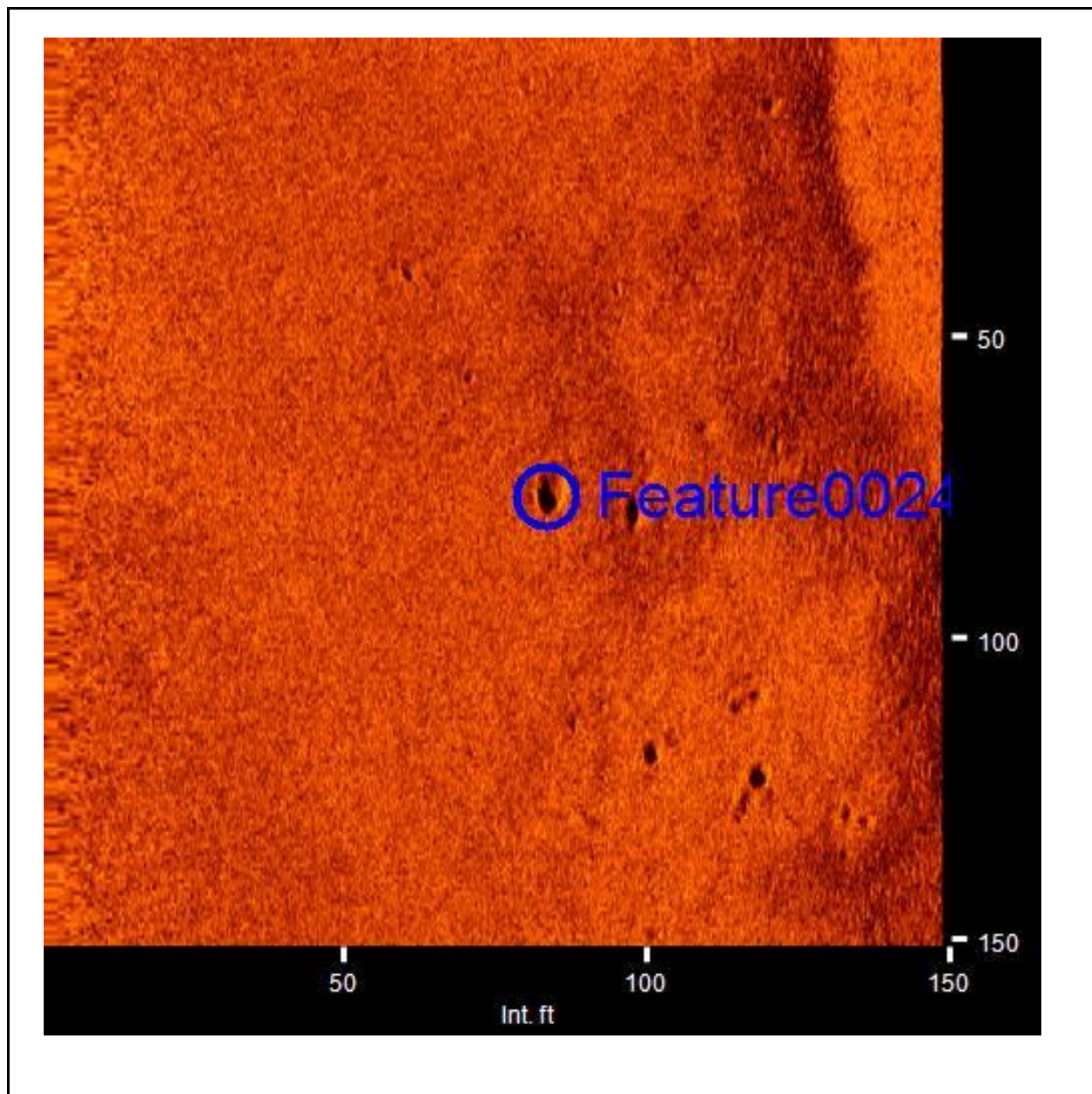
Feature0023

- Sonar Time at Target: 5/24/2016 19:46:36
- Click Position
32.6485083403 -79.6569604372 (WGS84)
(X) 2413375.80 (Y) 299292.02 (Projected Coordinates)
- Map Projection: SC831F
- Range to target: 87.72 Int. ft
- Fish Height: 22.22 Int. ft
- Heading: 110.500 Degrees
- Line Name: 20160524194433

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.16 Int. ft
- Target Length: 0.00 Int. ft
- Target Shadow: 0.66 Int. ft
- Description: small ledge feature

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



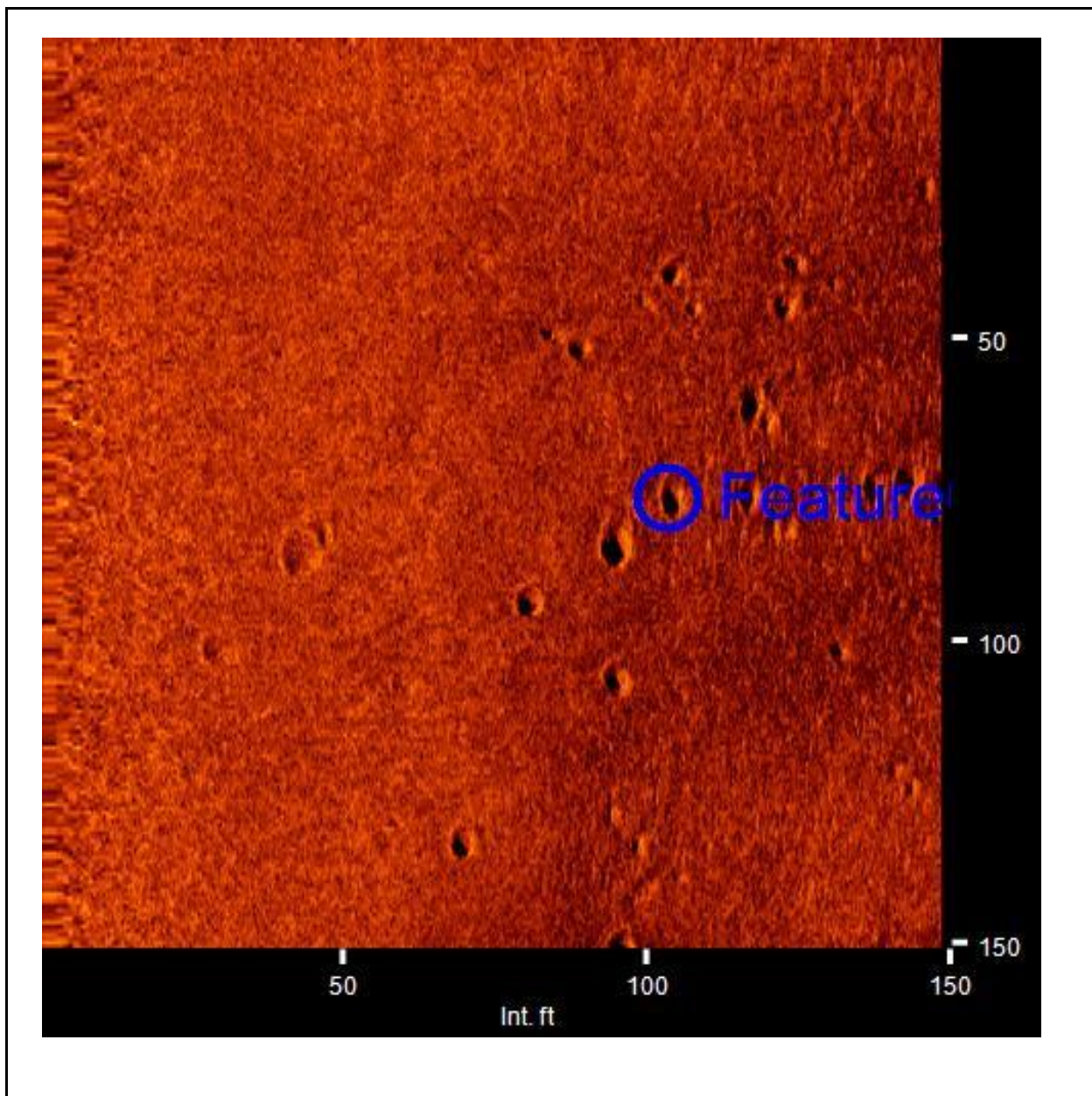
Feature0024

- Sonar Time at Target: 5/24/2016 19:47:32
- Click Position
32.6474271844 -79.6557652959 (WGS84)
(X) 2413748.75 (Y) 298903.49 (Projected Coordinates)
- Map Projection: SC83IF
- Range to target: 83.04 Int. ft
- Fish Height: 21.78 Int. ft
- Heading: 110.000 Degrees
- Line Name: 20160524194433

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.00 Int. ft
- Target Length: 0.00 Int. ft
- Target Shadow: 0.00 Int. ft
- Description: group of depressions/holes

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



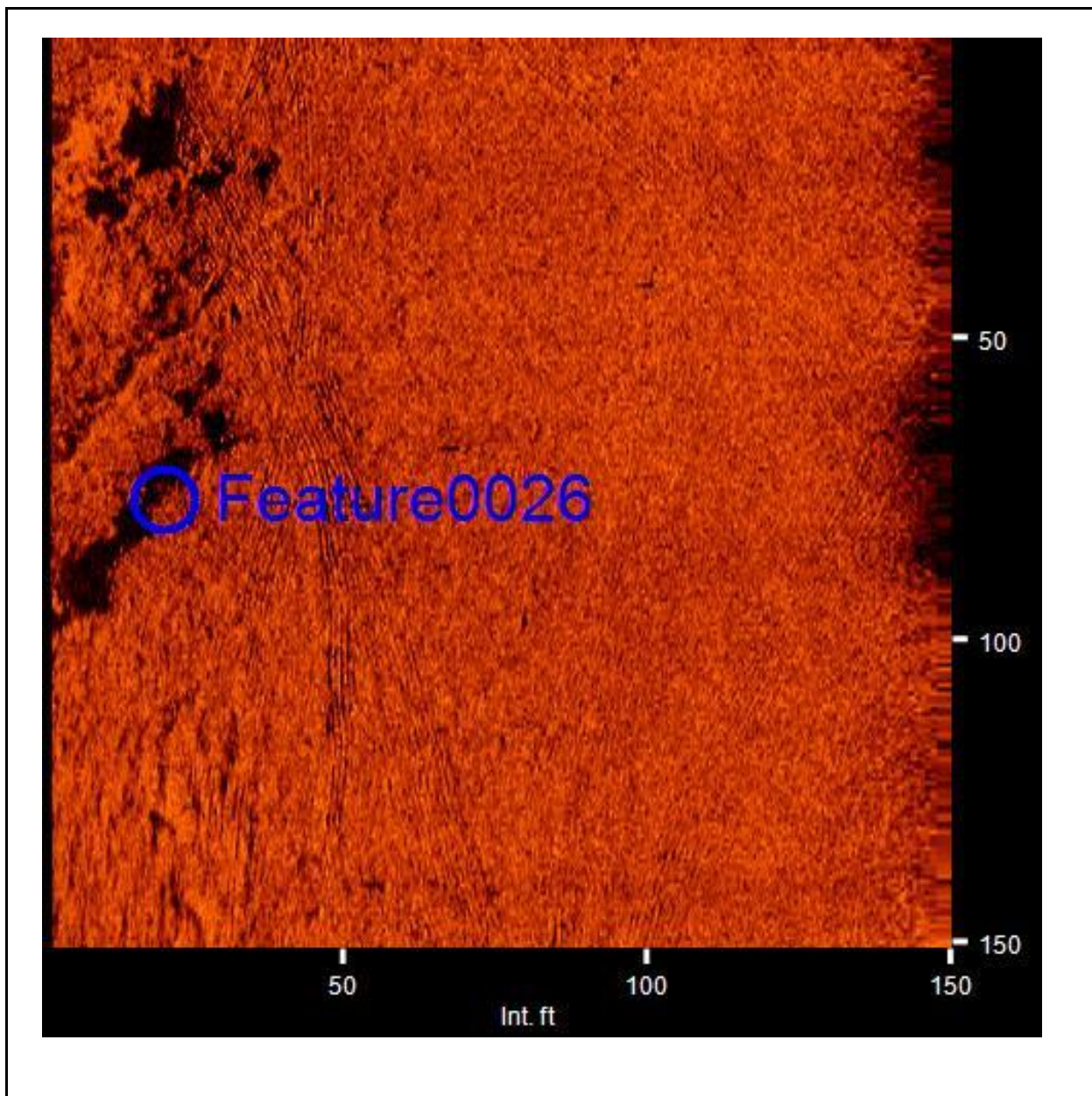
Feature0025

- Sonar Time at Target: 5/24/2016 19:17:55
- Click Position
32.6461898575 -79.6525058487 (WGS84)
(X) 2414757.80 (Y) 298466.43 (Projected Coordinates)
- Map Projection: SC831F
- Range to target: 102.92 Int. ft
- Fish Height: 22.08 Int. ft
- Heading: 114.000 Degrees
- Line Name: 20160524191247

Dimensions and attributes

- Target Width: 4.73 Int. ft
- Target Height: 0.62 Int. ft
- Target Length: 5.04 Int. ft
- Target Shadow: 3.03 Int. ft
- Description: group of depressions/holes

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



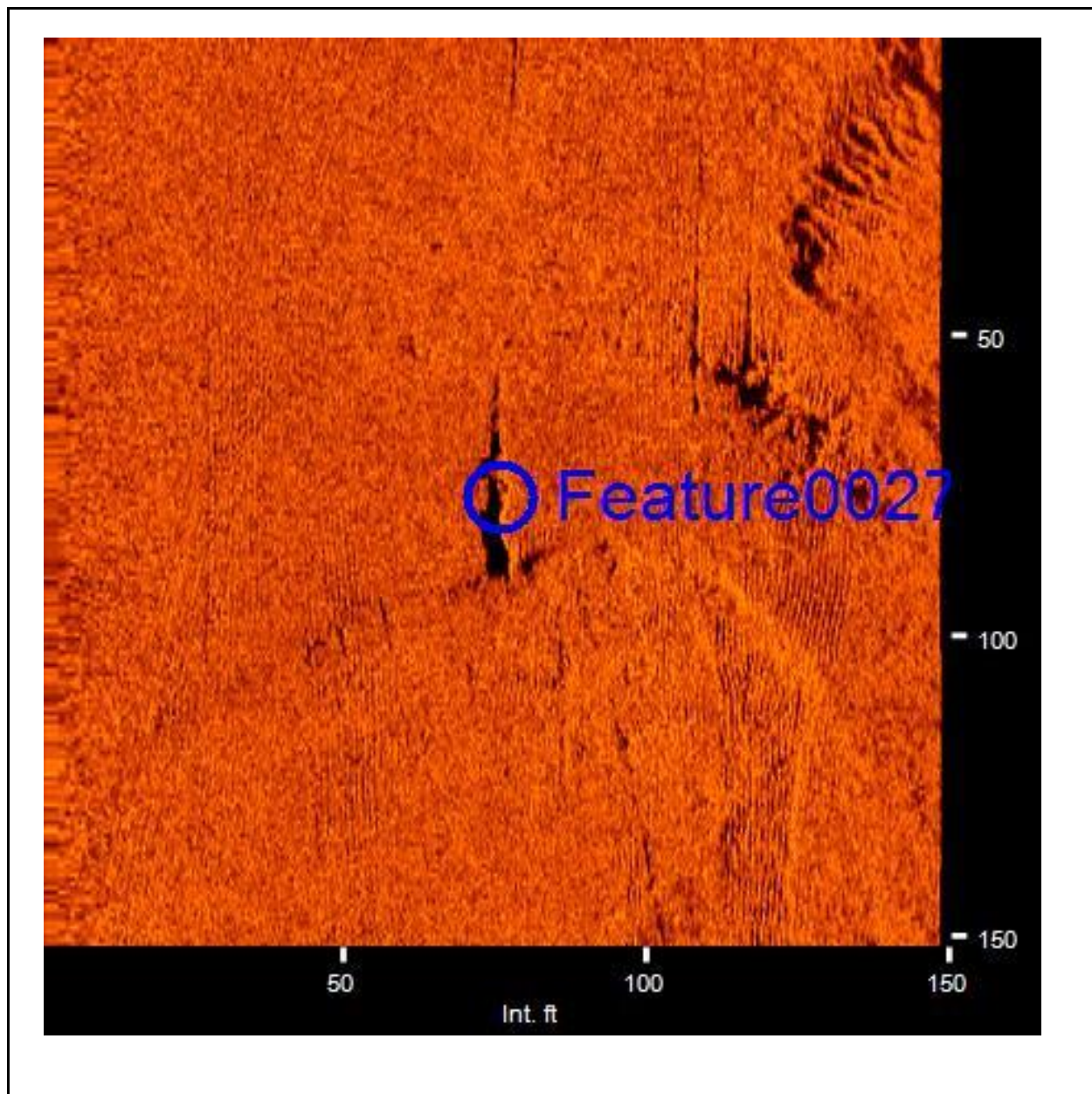
Feature0026

- Sonar Time at Target: 5/24/2016 19:13:32
- Click Position
32.6501164819 -79.6590368656 (WGS84)
(X) 2412729.14 (Y) 299868.75 (Projected Coordinates)
- Map Projection: SC831F
- Range to target: 129.53 Int. ft
- Fish Height: 21.34 Int. ft
- Heading: 119.890 Degrees
- Line Name: 20160524191247

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.85 Int. ft
- Target Length: 35.29 Int. ft
- Target Shadow: 5.42 Int. ft
- Description: ledge feature

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



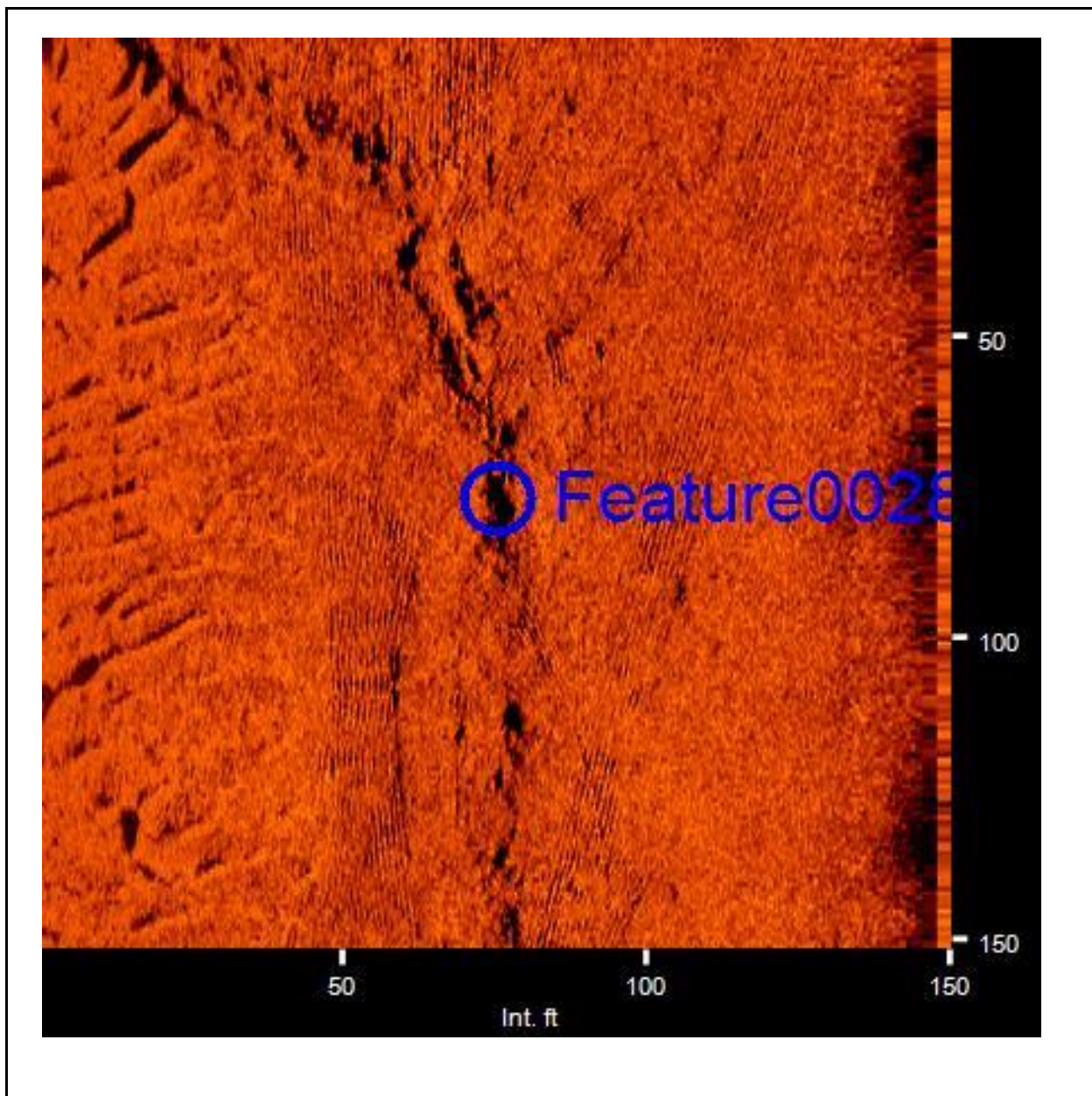
Feature0027

- Sonar Time at Target: 5/24/2016 19:41:14
- Click Position
32.6499969975 -79.6566911610 (WGS84)
(X) 2413451.64 (Y) 299834.66 (Projected Coordinates)
- Map Projection: SC83IF
- Range to target: 75.44 Int. ft
- Fish Height: 22.51 Int. ft
- Heading: 322.600 Degrees
- Line Name: 20160524193005-SS-PU

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.71 Int. ft
- Target Length: 27.65 Int. ft
- Target Shadow: 2.56 Int. ft
- Description: ledge feature

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



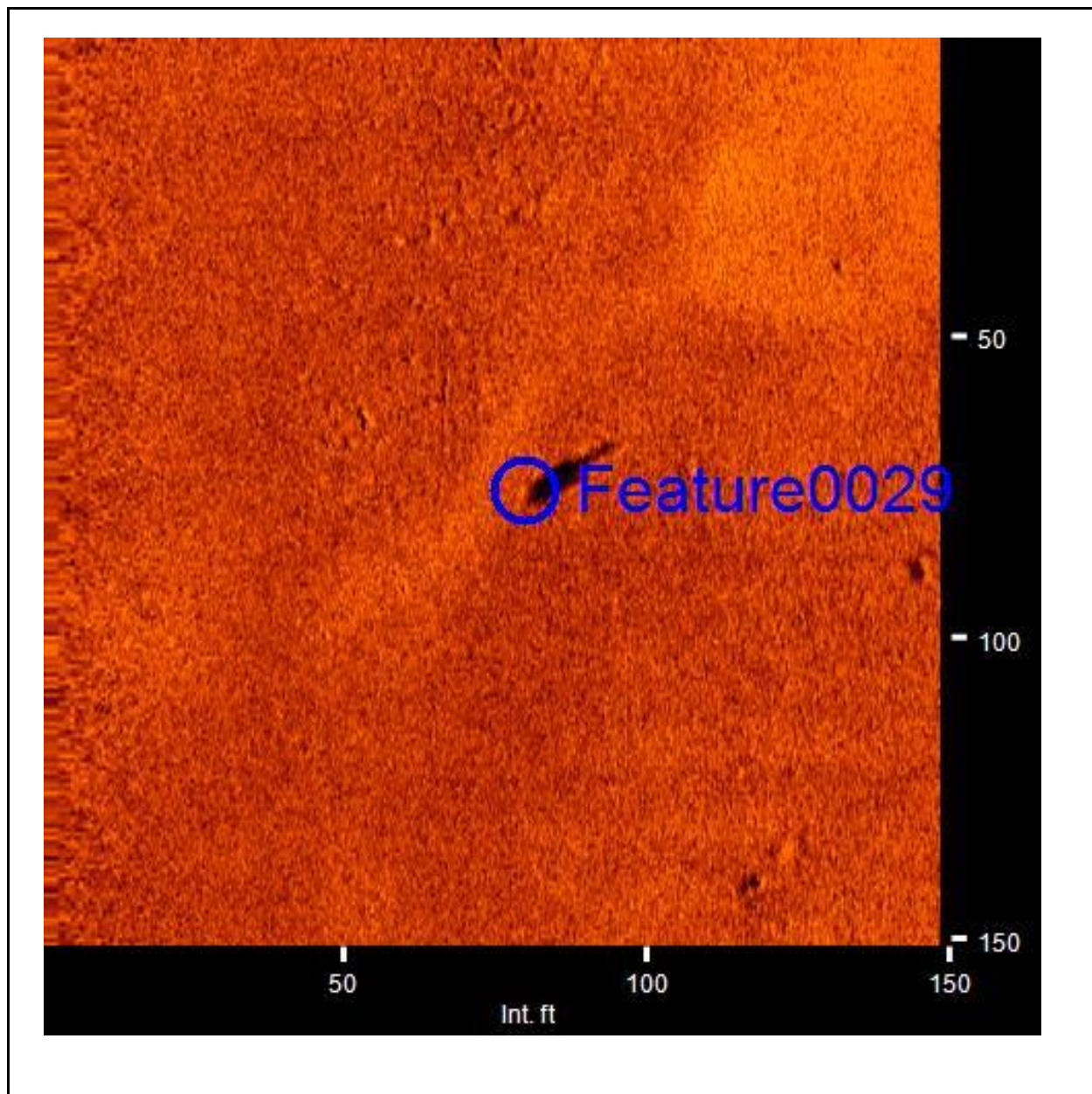
Feature0028

- Sonar Time at Target: 5/24/2016 19:42:19
- Click Position
32.6505195878 -79.6587728057 (WGS84)
(X) 2412808.50 (Y) 300016.45 (Projected Coordinates)
- Map Projection: SC831F
- Range to target: 72.51 Int. ft
- Fish Height: 22.22 Int. ft
- Heading: 318.390 Degrees
- Line Name: 20160524193005-SS-PU

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.73 Int. ft
- Target Length: 142.26 Int. ft
- Target Shadow: 2.59 Int. ft
- Description: scalloped ledge feature

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



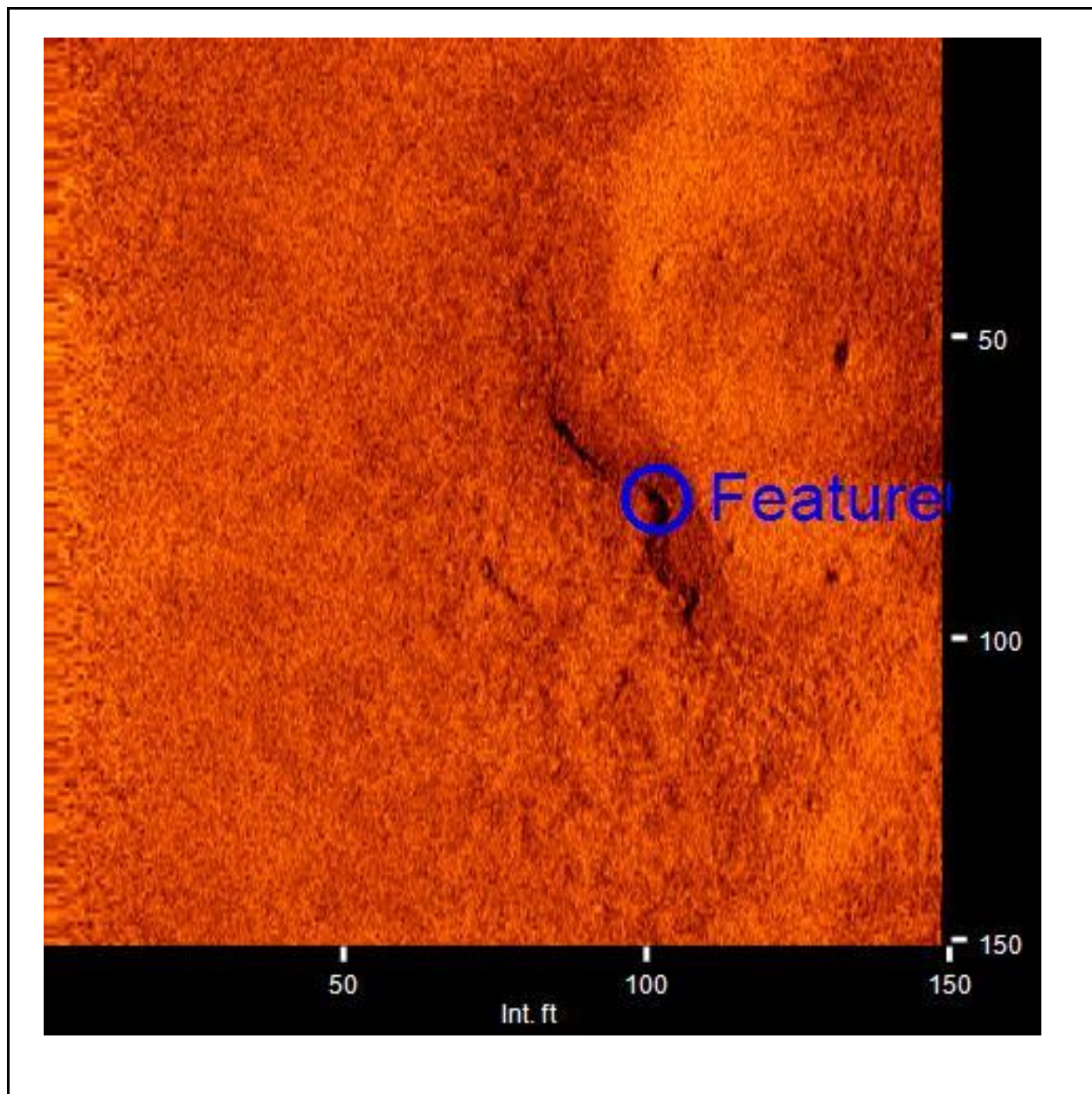
Feature0029

- Sonar Time at Target: 5/24/2016 19:34:02
- Click Position
32.6461867320 -79.6540018142 (WGS84)
(X) 2414297.39 (Y) 298459.29 (Projected Coordinates)
- Map Projection: SC831F
- Range to target: 79.53 Int. ft
- Fish Height: 23.10 Int. ft
- Heading: 113.290 Degrees
- Line Name: 20160524193005-SS-PU

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.00 Int. ft
- Target Length: 0.00 Int. ft
- Target Shadow: 0.00 Int. ft
- Description: shadow, appears to be a hole/depression

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



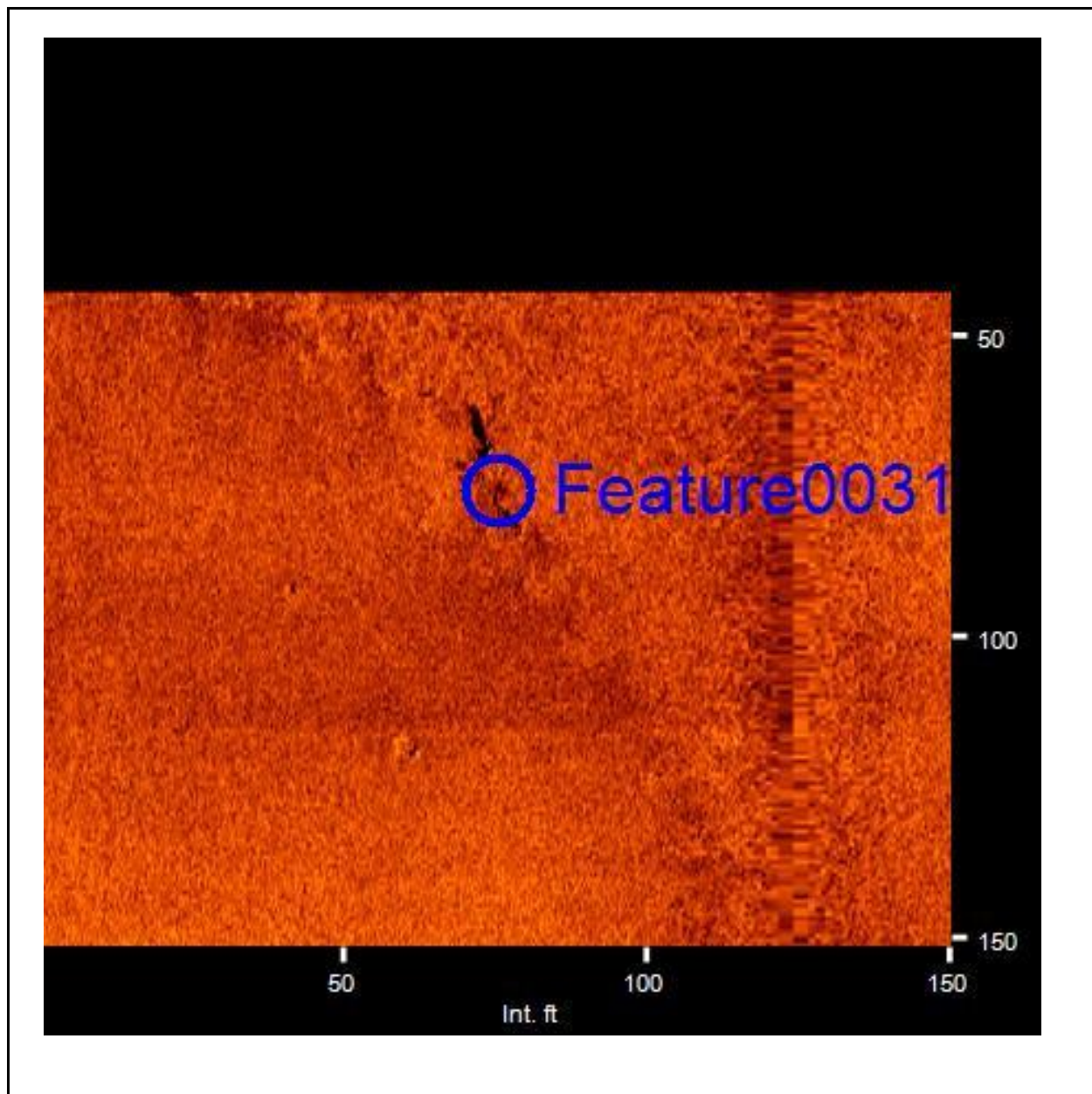
Feature0030

- Sonar Time at Target: 5/24/2016 19:30:49
- Click Position
32.6486227665 -79.6592233801 (WGS84)
(X) 2412678.78 (Y) 299324.61 (Projected Coordinates)
- Map Projection: SC831F
- Range to target: 101.17 Int. ft
- Fish Height: 20.47 Int. ft
- Heading: 113.200 Degrees
- Line Name: 20160524193005-SS-PU

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.47 Int. ft
- Target Length: 46.71 Int. ft
- Target Shadow: 2.44 Int. ft
- Description: ledge feature

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



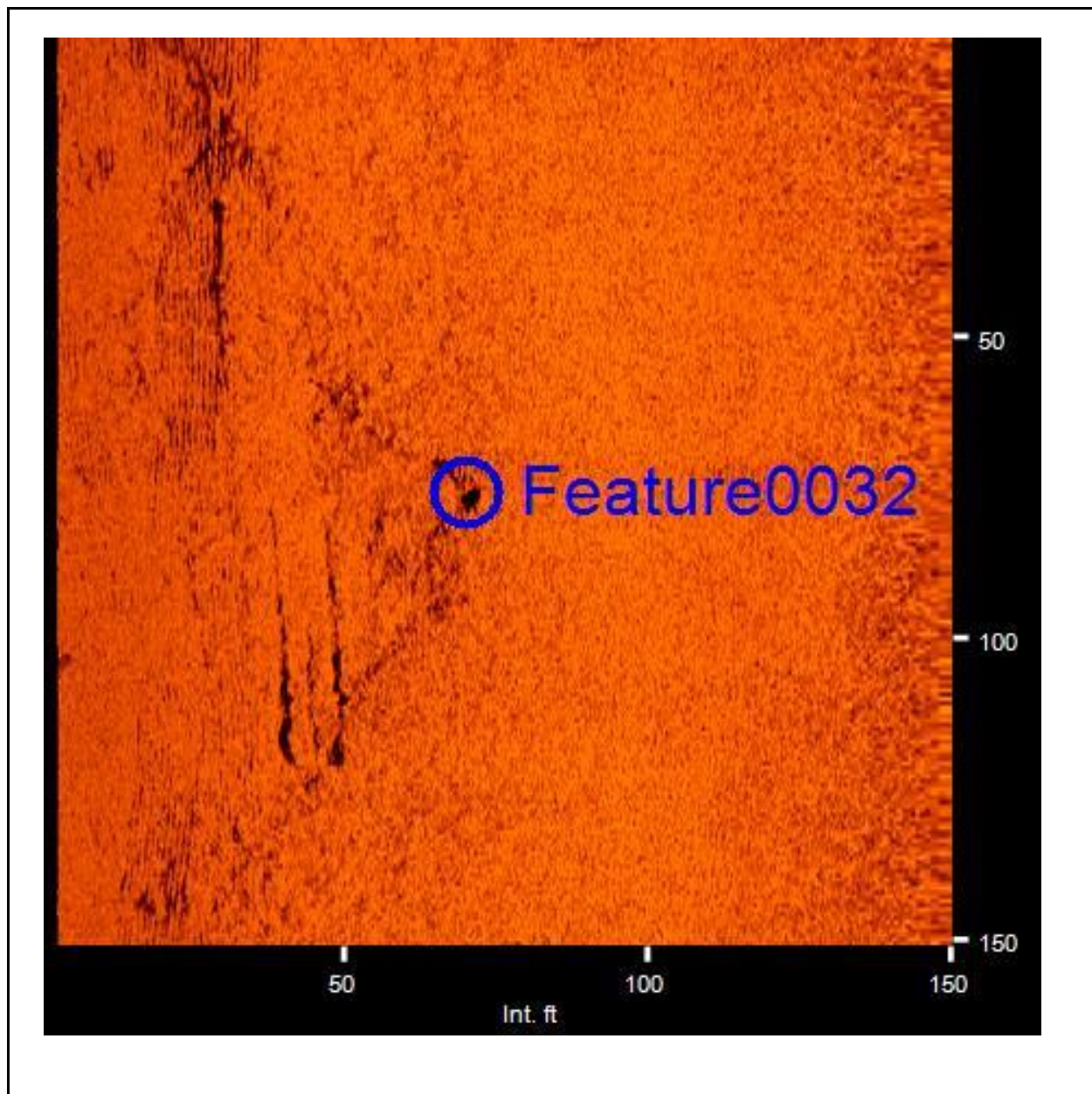
Feature0031

- Sonar Time at Target: 5/24/2016 19:22:04
- Click Position
32.6472436143 -79.6492773456 (WGS84)
(X) 2415746.47 (Y) 298862.75 (Projected Coordinates)
- Map Projection: SC83IF
- Range to target: 48.83 Int. ft
- Fish Height: 23.98 Int. ft
- Heading: 315.800 Degrees
- Line Name: 20160524192136

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.77 Int. ft
- Target Length: 15.67 Int. ft
- Target Shadow: 1.82 Int. ft
- Description: small ledge feature

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



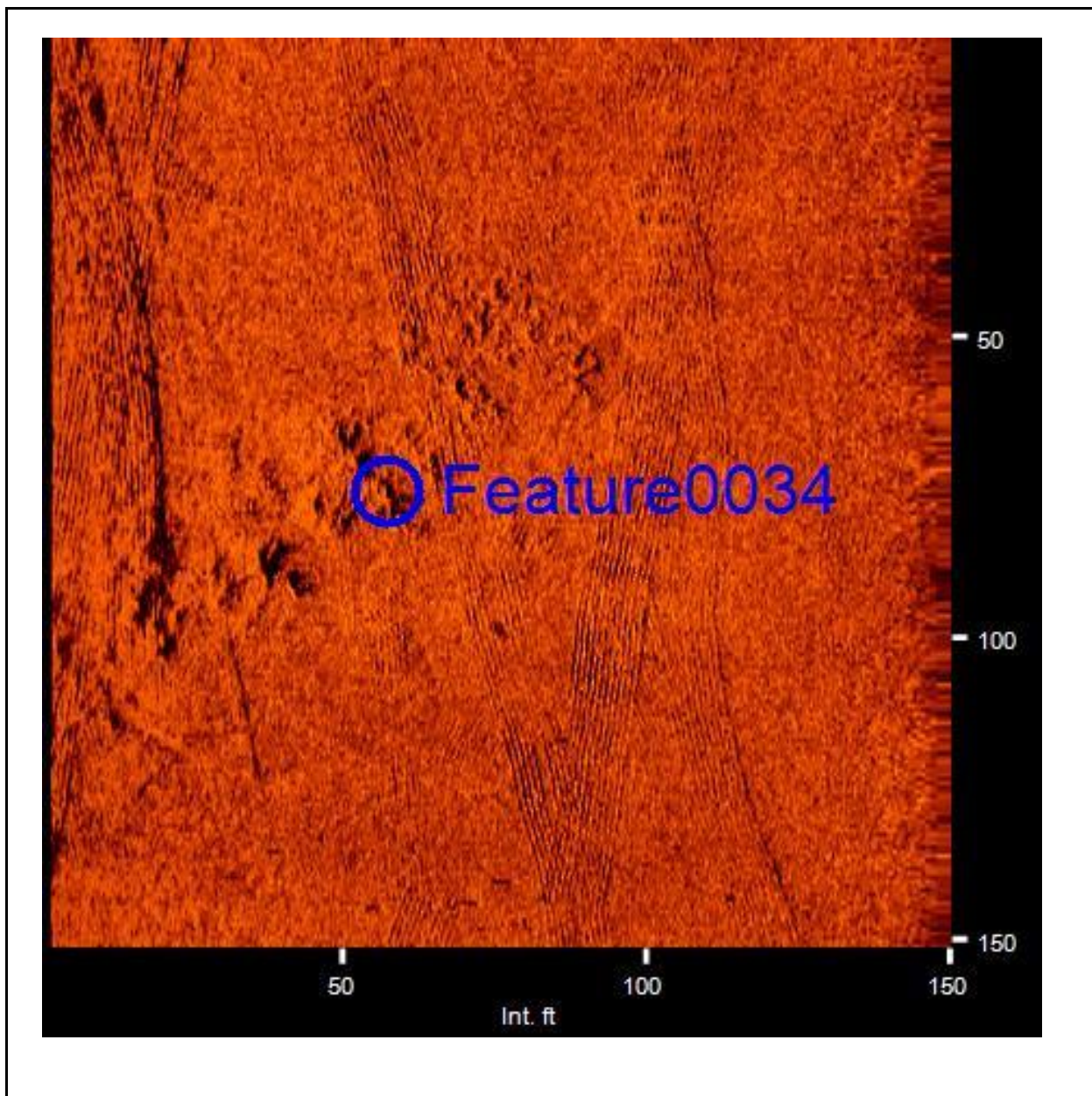
Feature0032

- Sonar Time at Target: 5/24/2016 18:55:21
- Click Position
32.6503468368 -79.6568292048 (WGS84)
(X) 2413407.50 (Y) 299961.38 (Projected Coordinates)
- Map Projection: SC83IF
- Range to target: 80.11 Int. ft
- Fish Height: 22.66 Int. ft
- Heading: 316.600 Degrees
- Line Name: 20160524185124

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.10 Int. ft
- Target Length: 58.16 Int. ft
- Target Shadow: 0.36 Int. ft
- Description: hole and shallow ledge

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



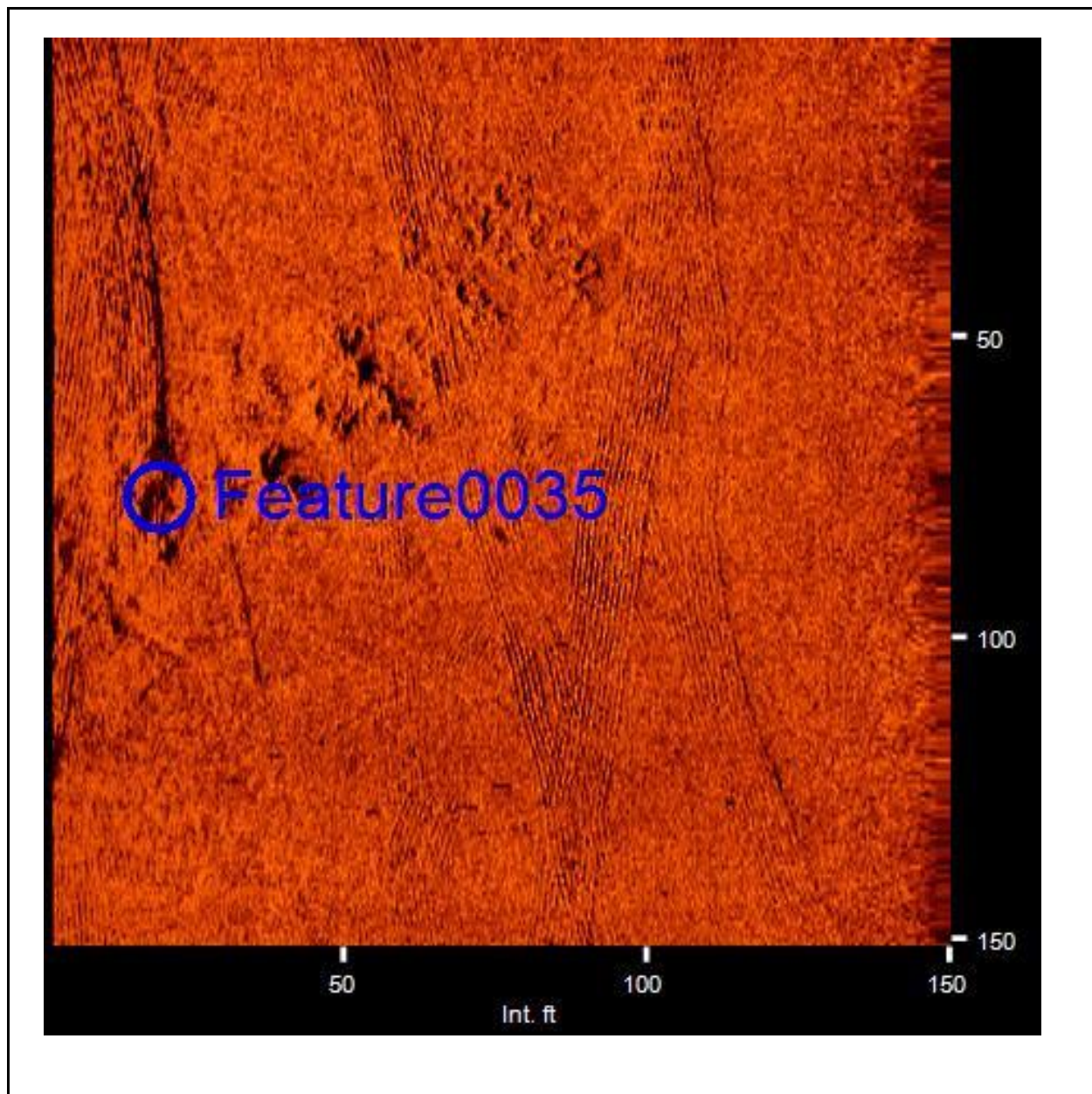
Feature0034

- Sonar Time at Target: 5/24/2016 18:44:23
- Click Position
32.6498134095 -79.6570529191 (WGS84)
(X) 2413341.17 (Y) 299766.43 (Projected Coordinates)
- Map Projection: SC831F
- Range to target: 92.98 Int. ft
- Fish Height: 22.66 Int. ft
- Heading: 114.200 Degrees
- Line Name: 20160524184323

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.50 Int. ft
- Target Length: 0.00 Int. ft
- Target Shadow: 2.14 Int. ft
- Description: outcrop-ledge feature

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report



Feature0035

- Sonar Time at Target: 5/24/2016 18:44:25
- Click Position
32.6498793701 -79.6569435322 (WGS84)
(X) 2413374.52 (Y) 299790.86 (Projected Coordinates)
- Map Projection: SC83IF
- Range to target: 130.70 Int. ft
- Fish Height: 21.93 Int. ft
- Heading: 114.100 Degrees
- Line Name: 20160524184323

Dimensions and attributes

- Target Width: 0.00 Int. ft
- Target Height: 0.18 Int. ft
- Target Length: 72.34 Int. ft
- Target Shadow: 1.07 Int. ft
- Description: outcrop-ledge feature

CH45 - Area C - Side Scan Sonar Survey - Contact/Target Report

Pre-Deliverable Item