

W00718

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

DESCRIPTIVE REPORT

Type of Survey: Basic Hydrographic Survey

Registry Number: W00718

LOCALITY

State(s): Massachusetts

General Locality: Nantucket Sound

Sub-locality: Horseshoe Shoal

2022

CHIEF OF PARTY
Brian D. Andrews

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

W00718

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(s): **Massachusetts**

General Locality: **Nantucket Sound**

Sub-Locality: **Horseshoe Shoal**

Scale: **20000**

Dates of Survey: **06/03/2022 to 06/21/2022**

Instructions Dated: **N/A**

Project Number: **ESD-AHB-23**

Field Unit: **US Geological Survey**

Chief of Party: **Brian D. Andrews**

Soundings by: **Teledyne RESON SeaBat T20-P (MBES)**

Imagery by: **N/A**

Verification by: **Atlantic Hydrographic Branch**

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

Remarks:

Any revisions to the Descriptive Report (DR) applied during office processing are shown in red italic text. The DR is maintained as a field unit product, therefore all information and recommendations within this report are considered preliminary unless otherwise noted. The final disposition of survey data is represented in the NOAA nautical chart products. All pertinent records for this survey are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via <https://www.ncei.noaa.gov/>. Products created during office processing were generated in NAD83 UTM 19N, MLLw. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.

DESCRIPTIVE REPORT MEMO

July 27, 2023

MEMORANDUM FOR: Atlantic Hydrographic Branch

FROM: Report prepared by AHB on behalf of field unit
Brian D. Andrews
Coastal and Marine Hazards and Resources Program, United States
Geological Survey

SUBJECT: Submission of Survey W00718

In June 2022, the U.S. Geological Survey, in collaboration with the Massachusetts Office of Coastal Zone Management, collected high-resolution geophysical data, in Nantucket Sound to understand the regional geology in the vicinity of Horseshoe Shoal. This effort is part of a long-term collaboration between the USGS and the Commonwealth of Massachusetts to map the State's waters, support research on the Quaternary evolution of coastal Massachusetts, resolve the influence of sea-level change and sediment supply on coastal evolution, and strengthen efforts to understand the type, distribution, and quality of subtidal marine habitats.

Bathymetric grid products in BAG format were created by the Atlantic Hydrographic Branch.

All soundings were reduced to Mean Lower Low Water using Discrete Zoning. The horizontal datum for this project is North American Datum of 1983 (NAD 83). The projection used for this project is Universal Transverse Mercator (UTM) Zone 19.

This survey does not include a data acquisition and processing report.

All data were reviewed for DTONs and none were identified in this survey.

The USGS - Coastal and Marine Hazards and Resources Program acquired the data outlined in this report. Data are available at <https://www.sciencebase.gov/catalog/item/63eb9bf7d34efa0476af1f7a>. Additional documentation from the data provider may be attached to this report.

This survey does meet charting specifications and is adequate to supersede prior data. This survey will be used to update NOAA navigational products.

Multibeam backscatter data collected in Nantucket Sound Massachusetts in the vicinity of Horseshoe Shoal, during USGS Field Activity 2022-001-FA using a Teledyne SeaBat Integrated Dual-Head (IDH) T20-P multibeam echosounder (8-bit GeoTIFF, UTM Zone 19N, WGS 84, 1-m resolution)

Metadata:

- [Identification Information](#)
- [Data Quality Information](#)
- [Spatial Data Organization Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)

Identification Information:

Citation:

Citation Information:

Originator: Brian D. Andrews

Publication Date: 03/09/2023

Title:

Multibeam backscatter data collected in Nantucket Sound Massachusetts in the vicinity of Horseshoe Shoal, during USGS Field Activity 2022-001-FA using a Teledyne SeaBat Integrated Dual-Head (IDH) T20-P multibeam echosounder (8-bit GeoTIFF, UTM Zone 19N, WGS 84, 1-m resolution)

Edition: 1.0

Geospatial Data Presentation Form: raster digital data

Series Information:

Series Name: data release

Issue Identification: DOI:10.5066/P9O5G5OT

Publication Information:

Publication Place: Woods Hole Coastal and Marine Science Center, Woods Hole, Massachusetts

Publisher: U.S. Geological Survey, Coastal and Marine Hazards and Resources Program

Online Linkage: <https://doi.org/10.5066/P9O5G5OT>

Online Linkage: <https://www.sciencebase.gov/catalog/item/63eb9bf7d34efa0476af1f7a>

Larger Work Citation:

Citation Information:

Originator: Brian D. Andrews

Originator: Wayne E. Baldwin

Originator: Charles R. Worley

Originator: Eric M. Moore

Originator: Alex R. Nichols
Originator: William W. Danforth
Originator: David S. Foster
Originator: Seth D. Ackerman
Originator: Laura L. Brothers
Publication Date: 2023

Title:

High-resolution geophysical data collected in Nantucket Sound Massachusetts in the vicinity of Horseshoe Shoal, during USGS Field Activity 2022-001-FA

Edition: 1.0

Series Information:

Series Name: data release

Issue Identification: DOI:10.5066/P9O5G5OT

Publication Information:

Publication Place: Reston, VA

Publisher: U.S. Geological Survey

Other Citation Details:

Suggested citation: Andrews, B.D., Baldwin, W.E., Worley, C.R., Moore, E.M., Nichols, A.R., Danforth, W.W., Foster, D.S., Ackerman, S.D., and Brothers, L.L. 2023, High-resolution geophysical data collected in Nantucket Sound Massachusetts in the vicinity of Horseshoe Shoal, during USGS Field Activity 2022-001-FA: U.S. Geological Survey data release, <https://doi.org/10.5066/P9O5G5OT>

Online Linkage: <https://doi.org/10.5066/P9O5G5OT>

Online Linkage: <https://www.sciencebase.gov/catalog/item/63e3e041d34e9fa19a9bb703>

Description:

Abstract:

In June 2022, the U.S. Geological Survey, in collaboration with the Massachusetts Office of Coastal Zone Management, collected high-resolution geophysical data, in Nantucket Sound to understand the regional geology in the vicinity of Horseshoe Shoal. This effort is part of a long-term collaboration between the USGS and the Commonwealth of Massachusetts to map the State's waters, support research on the Quaternary evolution of coastal Massachusetts, resolve the influence of sea-level change and sediment supply on coastal evolution, and strengthen efforts to understand the type, distribution, and quality of subtidal marine habitats. This collaboration produces high-resolution geologic data that serve the needs of research, management, and the public. Data collected as part of this mapping cooperative continue to be released in a series of USGS Open-File Reports and Data Releases <https://www.usgs.gov/centers/whcmssc/science/geologic-mapping-massachusetts-seafloor>.

Purpose:

The purpose of this backscatter mosaic is to measure the relative acoustic reflectance (backscatter) values of the seafloor. This mosaic provides information on surficial sediments of the seafloor in the vicinity of Horseshoe Shoal.

Supplemental Information:

Support for 2022-001-FA was provided to the USGS from the Massachusetts Office of Coastal Zone Management. Approximately 686 linear kilometers of multibeam echosounder data were collected during 13 survey days along tracklines spaced 87 or 52 meters apart. Data were collected using the R/V Rafael, owned and operated by the USGS Woods Hole Coastal and Marine Science Center. Additional information on the field activity is available from https://cmgds.marine.usgs.gov/fan_info.php?fan=2022-001-FA.

Time Period of Content:

Time Period Information:

Range of Dates/Times:**Beginning Date:** 06/03/2022**Ending Date:** 06/21/2022**Currentness Reference:**

data were collected on the following dates: 20220603-20220607 (Julian day 154-158), 20220610-20220614 (Julian day 161-165), 20220620-20220621 (Julian day 171-172). No usable bathymetry or backscatter data were collected on 20220624 (Julian Day 175).

Status:**Progress:**

Complete

Maintenance and Update Frequency: None planned**Spatial Domain:****Description of Geographic Extent:****Bounding Coordinates:****West Bounding Coordinate:** -70.488456**East Bounding Coordinate:** -70.268961**North Bounding Coordinate:** 41.573616**South Bounding Coordinate:** 41.495383**Keywords:****Theme:****Theme Keyword Thesaurus:** None**Theme Keyword:** U.S. Geological Survey**Theme Keyword:** USGS**Theme Keyword:** Woods Hole Coastal and Marine Science Center**Theme Keyword:** WHCMSC**Theme Keyword:** Coastal and Marine Hazards and Resources Program**Theme Keyword:** CMHRP**Theme Keyword:** Department of the Interior**Theme Keyword:** DOI**Theme Keyword:** Massachusetts Office of Coastal Zone Management**Theme Keyword:** CZM**Theme Keyword:** MassCZM**Theme Keyword:** field activity number 2022-001-FA**Theme Keyword:** R/V Rafael**Theme Keyword:** GeoTIFF**Theme Keyword:** multibeam echosounder**Theme Keyword:** multibeam backscatter**Theme Keyword:** backscatter**Theme Keyword:** time-series**Theme Keyword:** Reson**Theme Keyword:** Teledyne**Theme Keyword:** T20-P**Theme Keyword:** Marine Geology**Theme:****Theme Keyword Thesaurus:** ISO 19115 Topic Category**Theme Keyword:** geoscientificInformation**Theme Keyword:** imageryBaseMapsEarthCover

Theme:

Theme Keyword Thesaurus: USGS Thesaurus

Theme Keyword: multibeam sonar

Theme Keyword: sea-floor acoustic reflectivity

Theme Keyword: marine geophysics

Theme Keyword: marine geology

Theme Keyword: geospatial datasets

Theme:

Theme Keyword Thesaurus: USGS Metadata Identifier

Theme Keyword: USGS:63eb9bf7d34efa0476af1f7a

Place:

Place Keyword Thesaurus: None

Place Keyword: United States of America

Place Keyword: Atlantic Ocean

Place Keyword: Nantucket Sound

Place Keyword: Horseshoe Shoal

Place Keyword: Eldridge Shoal

Place Keyword: Succunneset Shoal

Place Keyword: Wreck Shoal

Place Keyword: Massachusetts

Stratum:

Stratum Keyword Thesaurus: None

Stratum Keyword: sea floor

Stratum Keyword: seafloor

Temporal:

Temporal Keyword Thesaurus: none

Temporal Keyword: 2022

Access Constraints: none

Use Constraints:

Public domain data from the U.S. Government are freely re-distributable with proper metadata and source attribution. Please recognize the U.S. Geological Survey as the originator of the dataset. These data are not to be used for navigation.

Point of Contact:**Contact Information:****Contact Organization Primary:**

Contact Organization: U.S. Geological Survey

Contact Person: Brian Andrews

Contact Position: Geographer

Contact Address:

Address Type: mailing and physical

Address: 384 Woods Hole Road

City: Woods Hole

State or Province: Massachusetts

Postal Code: 02543-1598

Country: USA

Contact Voice Telephone: 508-548-8700 x2348

Contact Facsimile Telephone: 508-457-2310

Contact Electronic Mail Address: bandrews@usgs.gov

Browse Graphic:

Browse Graphic File Name: https://www.sciencebase.gov/catalog/file/get/63eb9bf7d34efa0476af1f7a?name=2022-001-FA_TeledyneT20P_Backscatter_1m_browse.jpg

Browse Graphic File Description:

Thumbnail image of 1-m multibeam echosounder backscatter data collected within Nantucket Sound Massachusetts in the vicinity of Horseshoe Shoal, during USGS Field Activity 2022-001-FA.

Browse Graphic File Type: JPEG

[Back to Top](#)

Data Quality Information:

Logical Consistency Report:

This raster mosaic represents processed dual-head Teledyne SeaBat T20-P multibeam echosounder (MBES) backscatter data gridded at 1-m resolution. Quality control and data processing were conducted to remove spurious points and reduce sound speed artifacts (refraction) using Qimera (v. 2.5) multibeam processing software.

Completeness Report:

Data collected along sonar calibration lines and cross lines used for data quality checks are not included in this mosaic, however, the trackline navigation for all lines are included in the 2022-001-FA_TeledyneT20P_Tracklines.shp shapefile included in this publication.

Positional Accuracy:

Horizontal Positional Accuracy:

Horizontal Positional Accuracy Report:

Navigation data were acquired using the WGS 84 coordinate system with an Applanix POS MV Wavemaster (model 220, V5), which utilizes multiple GNSS satellite and acceleration data from a Motion Reference Unit (MRU) and GNSS azimuthal heading. The POS MV was configured with two AeroAntenna Technologies GNSS antennas located at either end of a 2-m baseline, which was oriented athwartship and mounted atop the after end of the cabin. DGPS positions were obtained from the primary antenna located on the starboard end of the baseline, and the positional offsets between the antenna and the navigational reference point (the POS MV IMU) were accounted for in the Applanix POSView (version 11.00) acquisition software. DGPS positions are horizontally accurate to 0.5 - 2 meters, but accuracy can increase to less than 10 cm after post-processing with Applanix POSpac (version 8.8).

Lineage:

Source Information:

Source Citation:

Citation Information:

Originator: U.S. Geological Survey

Publication Date: Unpublished Material

Title:

raw MBES data in Teledyne .s7k format

Geospatial Data Presentation Form: digital data

Type of Source Media: disc

Source Time Period of Content:

Time Period Information:

Range of Dates/Times:

Beginning Date: 06/03/2022

Ending Date: 06/21/2022

Source Currentness Reference:

ground condition

Source Citation Abbreviation:

RAW Teledyne T20-P MULTIBEAM ECHOSOUNDER FILES

Source Contribution:

Multibeam echosounder (MBES) bathymetry and backscatter data were collected using integrated, dual-head Teledyne T20-P sonars. The pair of mills cross transmit and receive arrays were mounted side-by-side within a bracket that oriented them at opposing 30-degree angles (relative to horizontal). The bracket was pole-mounted on the starboard side of the R/V Rafael so that the sonar arrays were oriented athwart ships (primary and secondary arrays facing outward and down to port and starboard, respectively) and located approximately 1.215 m below the waterline when deployed. Vessel navigation and attitude data were acquired using an Applanix POS MV Wavemaster (model 220, V5) configured with two AeroAntenna Technologies GNSS antennas located at either end of a 2-m baseline, which was oriented athwartship and mounted atop the after end of the cabin, and the wetpod MRU mounted atop the sonar bracket just aft of the pole. An AML Micro X SV mounted on the sonar bracket monitored sound speed near the sonars during acquisition, and AML-3LGR or Minos X CTDSV profilers were used to collect water column sound speed profiles 3 to 7 times each survey day. The Teledyne SeaBat User Interface (version 5.2.0.1) was used to control the sonars, which were operated in intermediate mode at full power (220 dB), with frequency-modulated pulse at 400 kHz. The range of the 1024 across track beams formed by the sonars were adjusted manually depending on water depth and resulted in combined swath widths of 50 to 300 meters or typically 3 to 6 times the water depth. Data were monitored and recorded using the Teledyne SeaBat User Interface (UI) (version 5.2.0.1) and Hypack/Hysweep (v. 2022). The SeaBat User Interface logged the navigation, attitude, bathymetry, time-series backscatter (using the normalized backscatter datagram) , and water column data to s7k format files for each sonar into one, integrated s7k file. The s7k line files were created by the Teledyne UI using the following naming convention: YYYYMMDD_HHMMSS.

Process Step:

Process Description:

PROCESSING STEP 1: QIMERA DATA PROCESSING.

Multibeam bathymetry processing within Qimera multibeam processing software (version 2.5.0) during the survey consisted of the following workflow:

- 1) A new Qimera project was created with projection information set to Universal Transverse Mercator (UTM) Zone 19N, WGS 84. The s7k files for each Julian day were imported to the project using the Source/add raw sonar files menu.
- 2) A Vessel configuration file was created with the linear and angular installation offsets for each T20-P sonar head as well as vendor specified uncertainty values for each of the survey sensors.
- 3) Sound Velocity profiles for each day were imported and converted to Qimera using the Source/import/Caris svp menu. Each profile was reviewed for incorrect records using the SVP editor. Incorrect records near the surface or within the water column were flagged using the "reject selection" context menu.
- 4) Predicted Tides from the Woods Hole, MA tidal station (id 8447930) for the month of June, were downloaded and imported using the Source/Add Tide Files menu. Predicted tides were referenced to Mean Lower Low Water (MLLW) at 6-minute intervals.
- 5) Delayed heave data from the raw POS MV files (.000) were used to update raw sonar lines using the Source/add binary navigation menu function.
- 6) The Processing Settings Editor was used to establish the following:
 - a) Sound velocity Strategy: nearest in time, Use first entry as raytrace profile.
 - b) Position, Motion, and Heading Source Priorities: were set position 1, Motion 1, and Motion 1 respectively.

c) Vertical Referencing was set to the Woods Hole predicted Tide file.

d) Blocking filters were set to Across Track = 0-to-80 meters on each sonar head. Colinearity Fail was also selected.

7) Each raw sonar file was processed using the settings described above.

The contact person for this and all subsequent processing steps below is Brian Andrews.

Process Date: 06/2022

Process Contact:

Contact Information:

Contact Organization Primary:

Contact Organization: U.S. Geological Survey

Contact Person: Brian Andrews

Contact Position: Geographer

Contact Address:

Address Type: mailing and physical address

Address: 384 Woods Hole Rd.

City: Woods Hole

State or Province: MA

Postal Code: 02543-1598

Contact Voice Telephone: 508-548-8700 x2348

Contact Facsimile Telephone: 508-457-2310

Contact Electronic Mail Address: bandrews@usgs.gov

Process Step:

Process Description:

PROCESSING STEP 2: APPLY POST PROCESSED SBET FILES AND EDIT SOUNDINGS.

Post-survey processing within Qimera (version 2.5.0) consisted of the following workflow:

1) Post-processed navigation, vessel attitude, and GNSS height data from POSpac Smoothed Best Estimate of Trajectory (SBET) files, and post-processed RMS attitude error data from POSpac smrmsg files were used to update each Sonar file using the Source/Add Binary Navigation Files function. The SBET files were referenced using the WGS 84 Ellipsoid (meters).

2) Once the sbet and smrmsg files were imported for each raw sonar file, the Processing Settings Editor was used to replace the attitude and tide referencing data using the following settings:

a) Position, Motion, and Heading Source Priorities were superseded by "sbet" file.

b) Vertical Referencing Method was set to "RTK (Accurate Height)" using the "sbet" file.

3) Each processed s7k file was exported to a generic sensor format (gsf) for creating the backscatter mosaic in FMGT software. The Export/Raw Sonar/Export To GSF menu was used with the "Include raw backscatter imagery" and "flag all filtered soundings as manual edits" options selected.

Process Date: 11/2022

Source Produced Citation Abbreviation:

"filename.gsf"

Process Step:

Process Description:

PROCESSING STEP 3: IMPORT GSF FILES INTO QPS FMGT SOFTWARE.

- 1) Create a new QPS FMGT (ver. 7.10.1) Project using the UTM 19, WGS 84 coordinate system. Processing parameters were set to use the "Reson SeaBat T20P Focused MBES".
- 2) Import each of the integrated gsf files containing data from both heads into the project by Julian day folder. All settings were checked for the "adjust" processing section in FMGT.
- 3) Filter settings used a flat Angle Varying Gain (AVG) algorithm and 300 AVG window size.

Process Date: 12/03/2022

Process Step:***Process Description:***

PROCESSING STEP 4: CREATE TIME SERIES BACKSCATTER MOSAIC AND EXPORT AS GEOTIFF.

- 1) Create a 1-meter resolution mosaic using the "Beam Time Series" and "Blend" options.
- 2) The mosaic was exported as an 8-bit grayscale geotiff at 1-m resolution.

Process Date: 12/03/2022

Source Produced Citation Abbreviation:

2022-001-FA_TeledyneT20P_Backscatter_1m.tif

[Back to Top](#)

Spatial Data Organization Information:**Direct Spatial Reference Method:**

Raster

Raster Object Information:

Raster Object Type: Pixel

Row Count: 10242

Column Count: 18434

Vertical Count: 1

[Back to Top](#)

Spatial Reference Information:***Horizontal Coordinate System Definition:******Planar:******Grid Coordinate System:***

Grid Coordinate System Name: Universal Transverse Mercator

Universal Transverse Mercator:

UTM Zone Number: 19N

Transverse Mercator:

Scale Factor at Central Meridian: 0.9996

Longitude of Central Meridian: -69

Latitude of Projection Origin: 0

False Easting: 500000

False Northing: 0

Planar Coordinate Information:

Planar Coordinate Encoding Method: row and column

Coordinate Representation:

Abscissa Resolution: 1.0

Ordinate Resolution: 1.0

Planar Distance Units: meters

Geodetic Model:

Horizontal Datum Name: D_WGS_1984

Ellipsoid Name: WGS_1984

Semi-major Axis: 6378137.000000

Denominator of Flattening Ratio: 298.257224

[Back to Top](#)

Entity and Attribute Information:

Overview Description:

Entity and Attribute Overview:

No data value is 0.

Entity and Attribute Detail Citation:

U.S. Geological Survey

[Back to Top](#)

Distribution Information:

Distributor:

Contact Information:

Contact Organization Primary:

Contact Organization: U.S. Geological Survey - ScienceBase

Contact Address:

Address Type: mailing and physical address

Address: Denver Federal Center

Address: Building 810

Address: Mail Stop 302

City: Denver

State or Province: CO

Postal Code: 80225

Contact Voice Telephone: 1-888-275-8747

Contact Electronic Mail Address: sciencebase@usgs.gov

Resource Description: Multibeam backscatter data collected in Nantucket Sound Massachusetts in the vicinity of Horseshoe Shoal, during USGS Field Activity 2022-001-FA using a dual-head Teledyne T20-P multibeam echosounder:

includes the GeoTIFF image 2022-001-FA_TeledyneT20P_Backscatter_1m.tif, the browse graphic 2022-001-FA_TeledyneT20P_Backscatter_1m_browse.jpg, and Federal Geographic Data Committee (FGDC) Content Standards for Digital Geospatial Metadata (CSDGM) metadata file (2022-001-FA_TeledyneT20P_Backscatter_1m_meta.xml).

Distribution Liability:

Neither the U.S. Government, the Department of the Interior, nor the USGS, nor any of their employees, contractors, or subcontractors, make any warranty, express or implied, nor assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, nor represent that its use would not infringe on privately owned rights. The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the USGS in the use of these data or related materials. Although these data and associated metadata have been reviewed for accuracy and completeness and approved for release by the U.S. Geological Survey (USGS), and have been processed successfully on a computer system at the USGS, no warranty expressed or implied is made regarding the display or utility of the data for other purposes, nor on all computer systems, nor shall the act of distribution constitute any such warranty. The USGS or the U.S. Government shall not be held liable for improper or incorrect use of the data described and/or contained herein. Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Standard Order Process:

Digital Form:

Digital Transfer Information:

Format Name: GeoTIFF

Format Version Number: FMGT (v. 7.10,1)

Format Specification:

8-bit GeoTIFF file

Format Information Content:

GeoTIFF file derived from MBES backscatter data collected by the U.S. Geological Survey - Woods Hole Coastal and Marine Science Center and the associated metadata.

File Decompression Technique: Use any zip decompression utility

Transfer Size: 42

Digital Transfer Option:

Online Option:

Computer Contact Information:

Network Address:

Network Resource

Name:<https://www.sciencebase.gov/catalog/item/63eb9bf7d34efa0476af1f7a>

Network Resource

Name:<https://www.sciencebase.gov/catalog/file/get/63eb9bf7d34efa0476af1f7a>

Network Resource Name:<https://doi.org/10.5066/P9Q5G5OT>

Access Instructions:

The first link is to the page containing the data, the second link downloads all data available from the page as a zip file, and the third link is to the publication landing page.

Digital Form:

Digital Transfer Information:

Format Name: WMS

Format Version Number: v 1.3.0

Format Information Content:

Web Mapping Service (WMS) showing MBES backscatter data collected by the U.S. Geological Survey - Woods Hole Coastal and Marine Science Center and the associated metadata.

Digital Transfer Option:

Online Option:**Computer Contact Information:****Network Address:****Network Resource**

Name: <https://www.sciencebase.gov/catalog/Maps/mapping/ows/63eb9bf7d34efa0476af1f7a?service=wms&request=getcapabilities&version=1.3.0>

Network Resource

Name: <https://www.sciencebase.gov/catalog/file/get/63eb9bf7d34efa0476af1f7a>

Network Resource Name: <https://doi.org/10.5066/P9O5G5OT>

Access Instructions:

The first link in the network resources accesses the data through a web mapping service, the second is to the page containing the data, and the third link is to the publication landing page.

Fees: none

Technical Prerequisites:

To utilize these data, the user must have software capable of viewing GeoTIFF files.

[Back to Top](#)

Metadata Reference Information:

Metadata Date: 03/09/2023

Metadata Contact:

Contact Information:**Contact Organization Primary:**

Contact Organization: U.S. Geological Survey

Contact Person: Brian Andrews

Contact Position: Geographer

Contact Address:

Address Type: mailing and physical

Address: 384 Woods Hole Rd.

City: Woods Hole

State or Province: MA

Postal Code: 02543-1598

Contact Voice Telephone: (508) 548-8700 x2348

Contact Facsimile Telephone: (508) 457-2310

Contact Electronic Mail Address: whsc_data_contact@usgs.gov

Contact Instructions: The metadata contact email address is a generic address in the event the person is no longer with the USGS.

Metadata Standard Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata Standard Version: FGDC-STD-001-1998

Metadata Time Convention: local time

[Back to Top](#)