



Okeanos Explorer ROV Dive Summary

Dive Information

| | |
|--------------------------------|--|
| <p>General Location Map</p> | |
| <p>General Area Descriptor</p> | <p>U.S. Southeast, Offshore NC</p> |
| <p>Site Name</p> | <p>Bodie Island Seep</p> |
| <p>Science Team Leads</p> | <p>Amy Wagner (CSUS) and Alexis Weinnig (Temple)</p> |
| <p>Expedition Coordinator</p> | <p>Kasey Cantwell (NOAA-OER)</p> |
| <p>ROV Dive Supervisor</p> | <p>Chris Ritter (GFOE)</p> |
| <p>Mapping Lead</p> | <p>Shannon Hoy (NOAA-OER)</p> |

ROV Dive Name

| | |
|--------------------|-----------------|
| <p>Cruise</p> | <p>EX1903L2</p> |
| <p>Dive Number</p> | <p>Dive 14</p> |

Scientists Involved (provide name, affiliation, email)

| First Name | Last Name | Affiliation | Email |
|------------|-------------|---|---|
| Amanda | Demopoulos | ademopoulos@usgs.gov | USGS |
| Nancy | Prouty | | USGS |
| Bernard | Ball | bernie.ball.ucd@gmail.com | University College Dublin |
| Lisa | Levin | llevin@ucsd.edu | Scripps Institution of Oceanography |
| Santiago | Herrera | sherrera@alum.mit.edu; sah516@lehigh.edu | Lehigh University |
| Upasana | Ganguly | upasana.ganguly1@gmail.com | University of Louisiana at Lafayette |
| Carolyn | Ruppel | cruppel@usgs.gov | USGS |
| Adam | Skarke | adam.skarke@msstate.edu | Mississippi State University |
| Asako | Matsumoto | amatsu@gorgonian.jp | Chiba Institute of Technology |
| Scott | France | france@louisiana.edu | University of Louisiana at Lafayette |
| Robert | Carney | rcarne1@lsu.edu | LSU, Oceanography, emeritus |
| Tara | Harmer Luke | luket@stockton.edu; tara.luke@stockton.edu | Stockton University |
| Alexis | Weinnig | aweinnig@temple.edu | Temple University |
| Amy | Wagner | amy.wagner@csus.edu; amywagner98@gmail.com | California State University, Sacramento |
| Danielle | Power | danielle.l.power@noaa.gov | NOAA Ship Okeanos Explorer |
| J | Dunn | christopher.dunn@noaa.gov | NOAA OER |
| Kevin | Jerram | kjerram@ccom.unh.edu | UNH |
| Shannon | Hoy | shannon.hoy@noaa.gov | NOAA OER |
| Estefania | Rodriguez | erodriguez@amnh.org | American Museum of Natural History |

| | |
|--------------|--|
| Dive Purpose | The primary objective of this dive was to explore and characterize a small canyon that has the potential to be suitable habitat for deep-water coral, sponges, and associated fauna. |
|--------------|--|

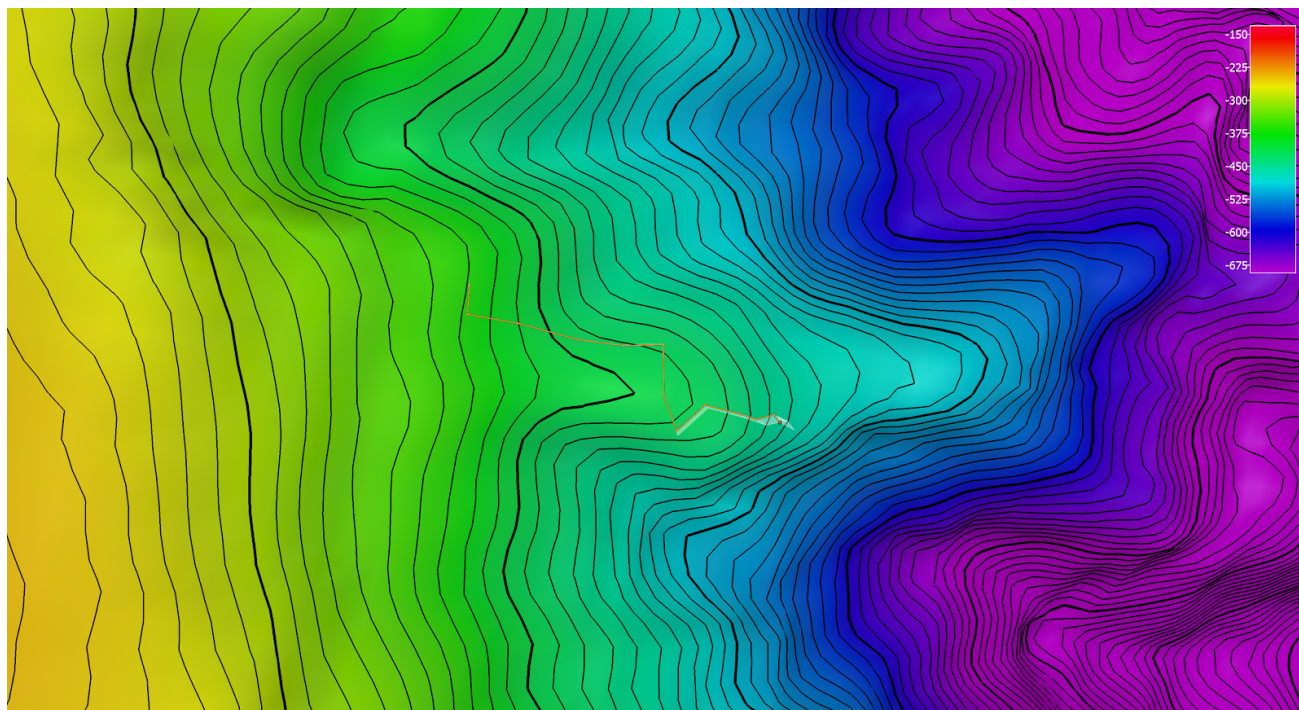


| | |
|---|---|
| Dive Description | <p>This dive on Bodie Island Seep (named for the closest land based area), was a target provided by Adam Skarke (Mississippi State) and Carolyn Ruppel (USGS) that had a high potential of being an area with methane seeps. Overnight multibeam mapping during the current expedition confirmed active bubble plumes in the water column. We reached the bottom 12:59 UTC at 439 meters among a very dense midwater community with shrimp and fish swarming around the ROV. This site proved to be very interesting and we found multiple areas with methane bubbles present as well as bacterial mats. In addition, we observed a sizable mussel bed (thought to be <i>Bathymodiolus childressi</i>) and live mussels growing on and around carbonate rocks; some of the mussels had bacteria growing on them as well. In addition to the mussels there was a number of other organisms around the mussel beds and other seepage areas including spider crabs, quill worms, blackbelly rosefish, eelpouts, seastars, anemones, and more. We also encountered an area of large carbonate boulders with a few colonies of <i>Lophelia pertusa</i> growing at the top. We ended the dive with a transect through the deep scattering layer and ended the transect surrounded by small lanternfish. One geological sample of an authigenic carbonate rock and one biological sample of a mussel (<i>Bathymodiolus childressi</i>) were collected. Additionally, three fish and two shrimp were “self-sampled” in the suction sampler canisters and on the ROV platform.</p> <p>Interestingly, the seeps on the southeastern side of the ridge had a much higher diversity of fauna associated with the sites, including mussels and crabs, and larger authigenic carbonate outcrops. The seeps on the northwestern side of the ridge were in mostly soft sediment covered with bacterial mats and only a few small ledges of outcropped carbonate. Notably, the mussels were not present at these seeps.</p> <p>We conducted an exploration of the midwater on this dive. The midwater region of the Earth’s oceans is the largest biome on the planet by an order of magnitude. As Deep Discoverer moved through the water column, taxa were identified along a 300m transect for 1 hour 7 minutes. We encountered several squid (<i>Illex argentinas</i>). The dive might be marked by the very dense aggregation of mesopelagic fishes from the genus <i>Cyclothone</i> and Family Myctophidae (and perhaps other groups). These aggregations, perhaps schools, were following the motion of Deep Discoverer and at times were observed at abundances of 100 or more fishes per field of view. Sea water temperature at the time and location of these observations was near 10 C.</p> |
| Notable Observations | Mussel bed of <i>Bathymodiolus childressi</i> - area of large carbonate rocks with evidence of active seepage (mussels and bacterial mat) around the base and live <i>Lophelia pertusa</i> on the top - numerous sites of active methane bubbles. We also observed a large authigenic carbonate outcrops. |
| Community Presence/ Absence (community is defined as more than two species) | <ul style="list-style-type: none"> ✓ Corals and Sponges ✓ Chemosynthetic Community ✓ High biodiversity Community ✓ Active Seep or Vent ✓ Extinct Seep or Vent ✓ Hydrates |

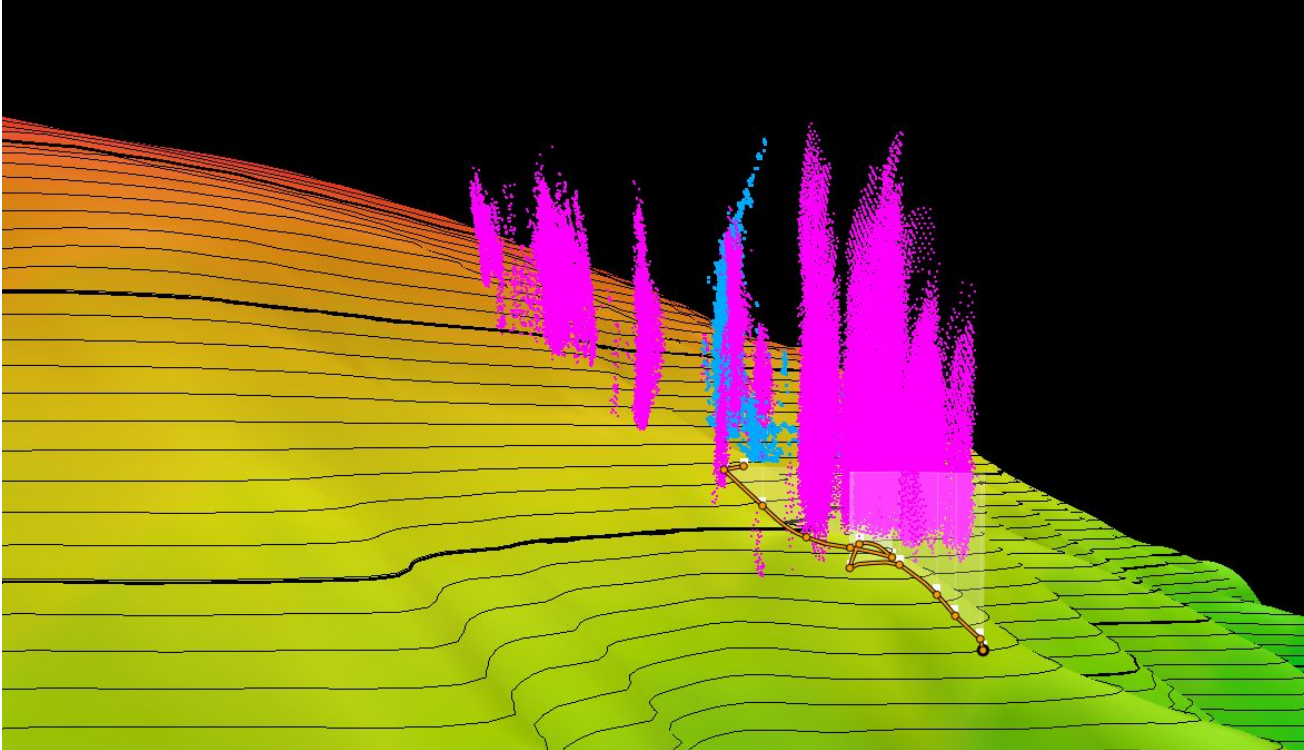


| | |
|--|---|
| Feature Type | Cold-water methane seep, Scarp/Wall, Authigenic Carbonate Outcrop |
| SeaTube Link (science annotation system) | https://data.oceannetworks.ca/SeaTubeV2?resourceTypeid=1000&resourceId=23621&divId=1473 |

Overall Map of the ROV Dive Area

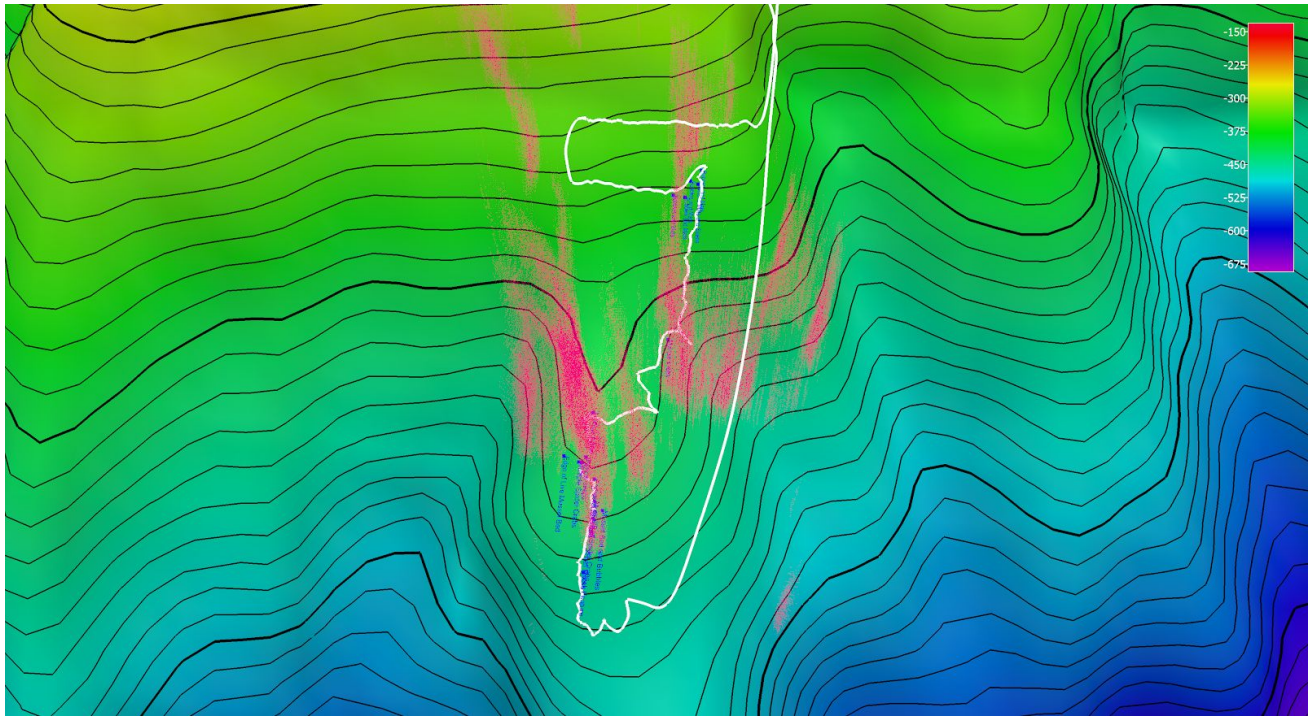


Close-up Map of Main Dive Site



Pink and blue dots are bubble plumes as detected in overnight mapping and waypoints provided by Carolyn Ruppel (USGS) and Adam Skarke (Mississippi State).





Representative Photos of the Dive



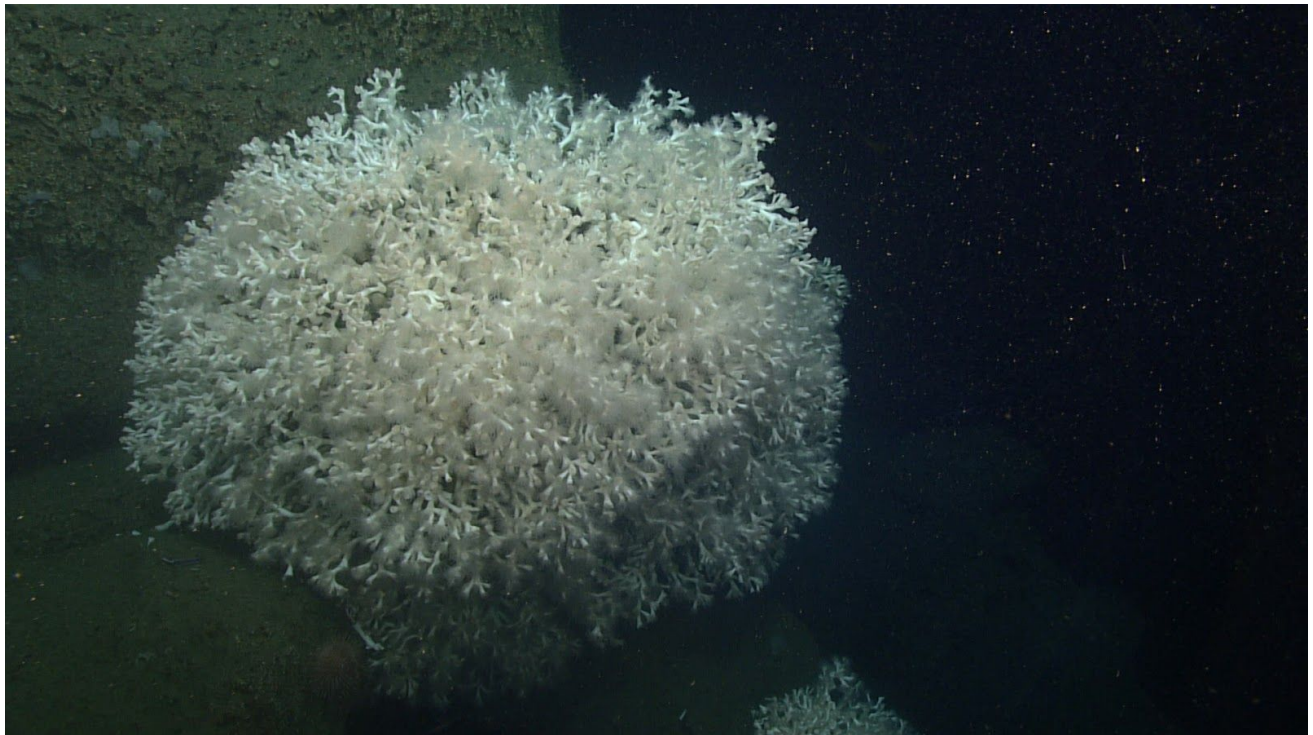
Many small shrimp and short-finned squid seen at the seafloor



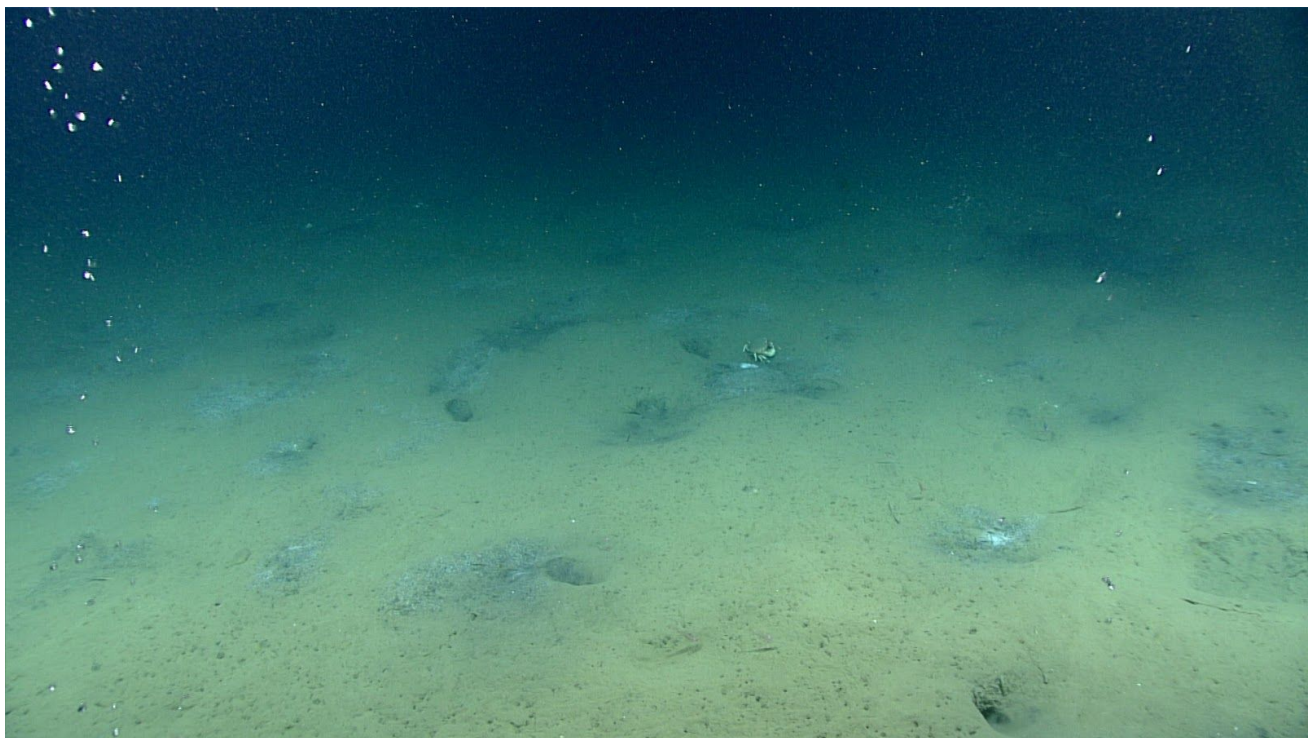
Mussel bed with spider crab and blackbelly rosefish. Bacterial mat growing on and around live mussels.



Another view of mussel bed with spider crabs, blackbelly rosefish, and bacterial mat.



Very large *Lophelia pertusa* colony on large authigenic carbonate outcrop.



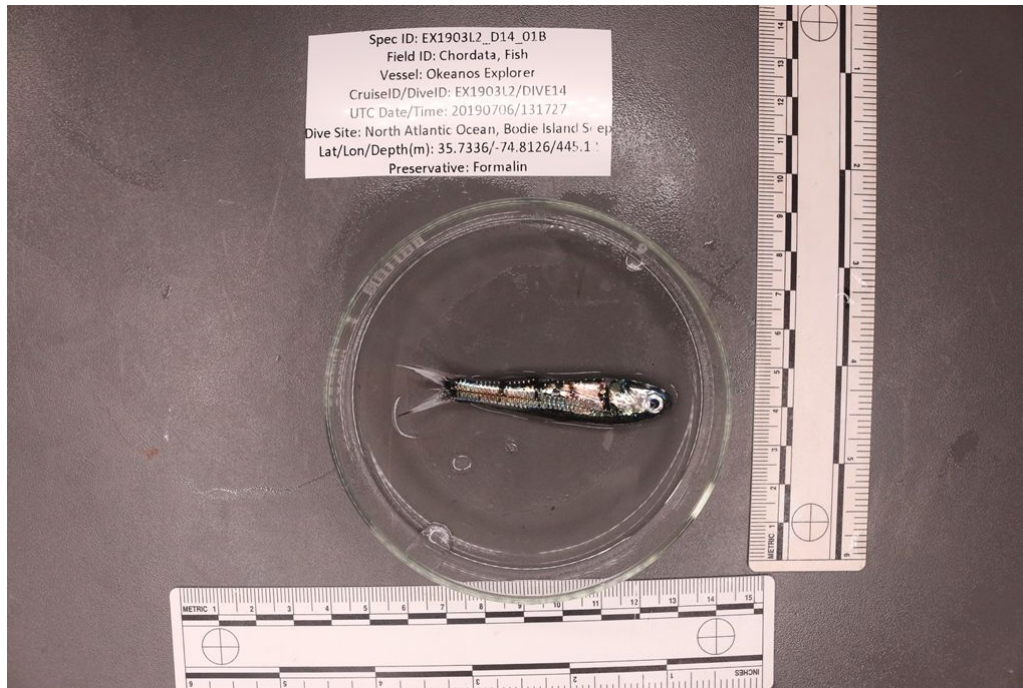
Example of seep site without high abundance of mussels. More typical of seep sites in this region (per Carolyn Ruppel).



Large number of lanternfish seen during mid-water transect at 300 m.



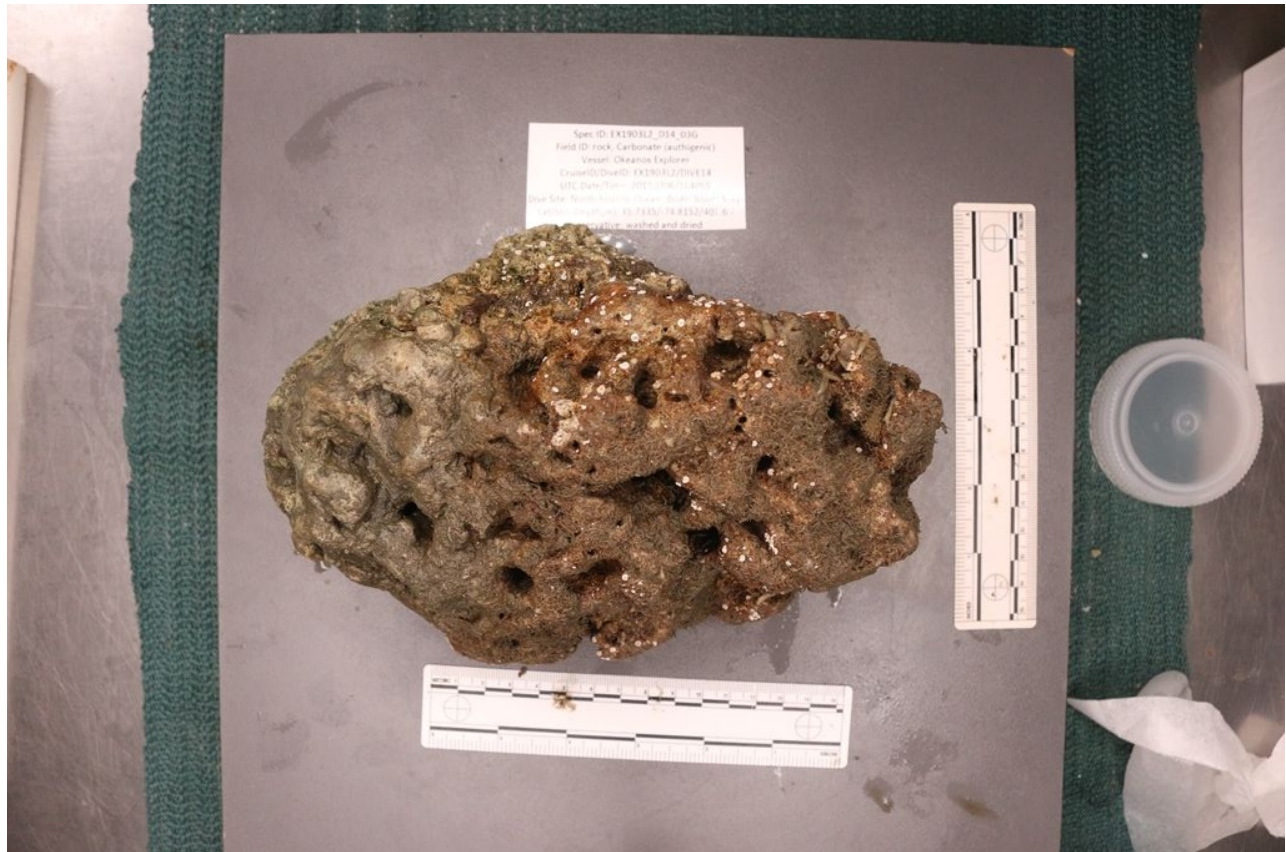
Samples Collected



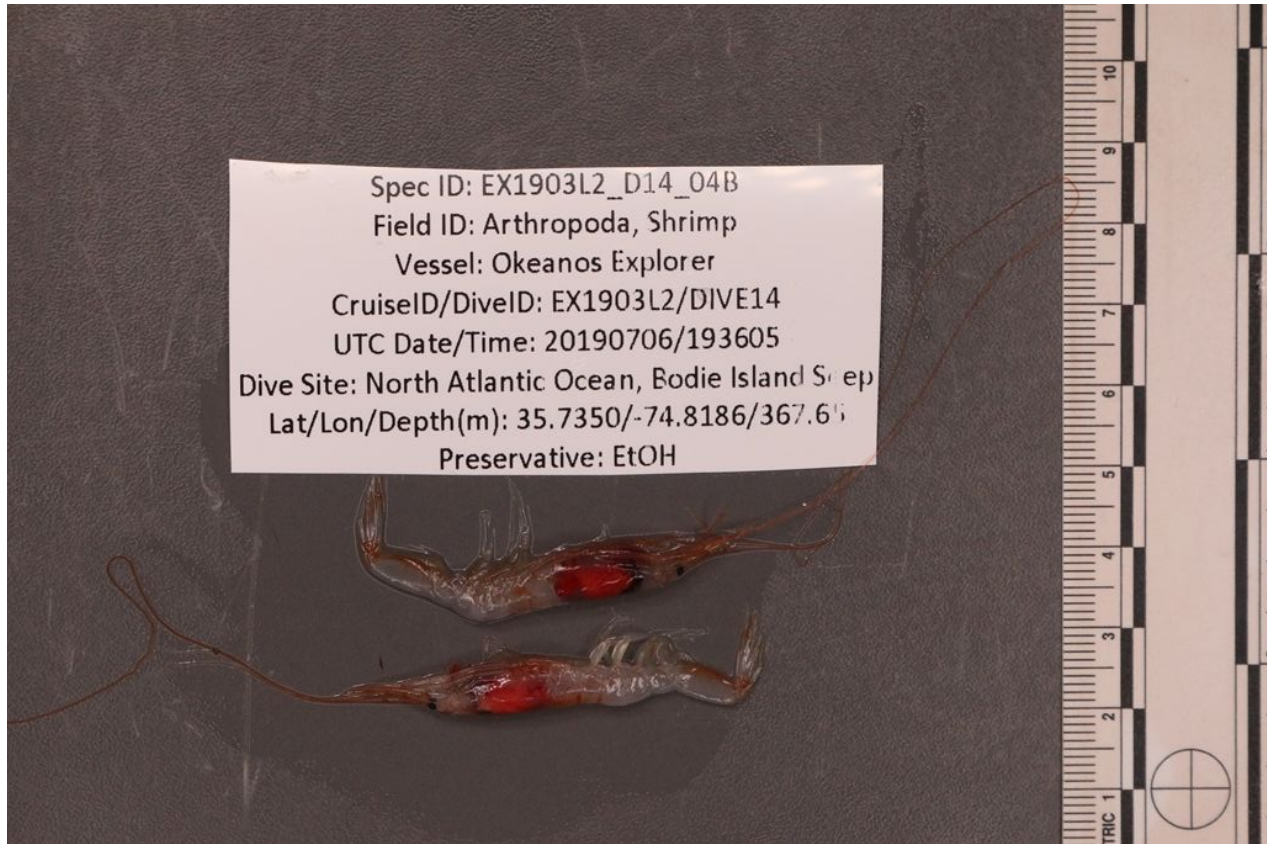
| | | |
|-------------|----------------------|----------------------|
| Sample ID | EX1903L2_D14_01B | |
| Date (UTC) | 20190706 | |
| Time (UTC) | 131727 | |
| Depth (m) | 445.1 | |
| Temp. (°C) | 6.152 | |
| Field ID(s) | Fish (Osteichthyes) | |
| Associates | Associates Sample ID | Field Identification |
| | No associates | |
| | | |
| Comments | | |



| | | |
|-------------|---|-----------------------------------|
| Sample ID | EX1903L2_D14_02B | |
| Date (UTC) | 20190706 | |
| Time (UTC) | 143536 | |
| Depth (m) | 413.2 | |
| Temp. (°C) | 7.092 | |
| Field ID(s) | Mussel (Bathymodiolus childressi) | |
| Associates | Associates Sample ID | Field Identification |
| | EX1903L2_D14_02B_A01 | Mussel (Bathymodiolus childressi) |
| | EX1903L2_D14_02B_A02 | Caprellidae |
| | EX1903L2_D14_02B_A03 | Mussel (Bathymodiolus childressi) |
| Comments | Subsamples were taken and frozen for isotope analysis | |

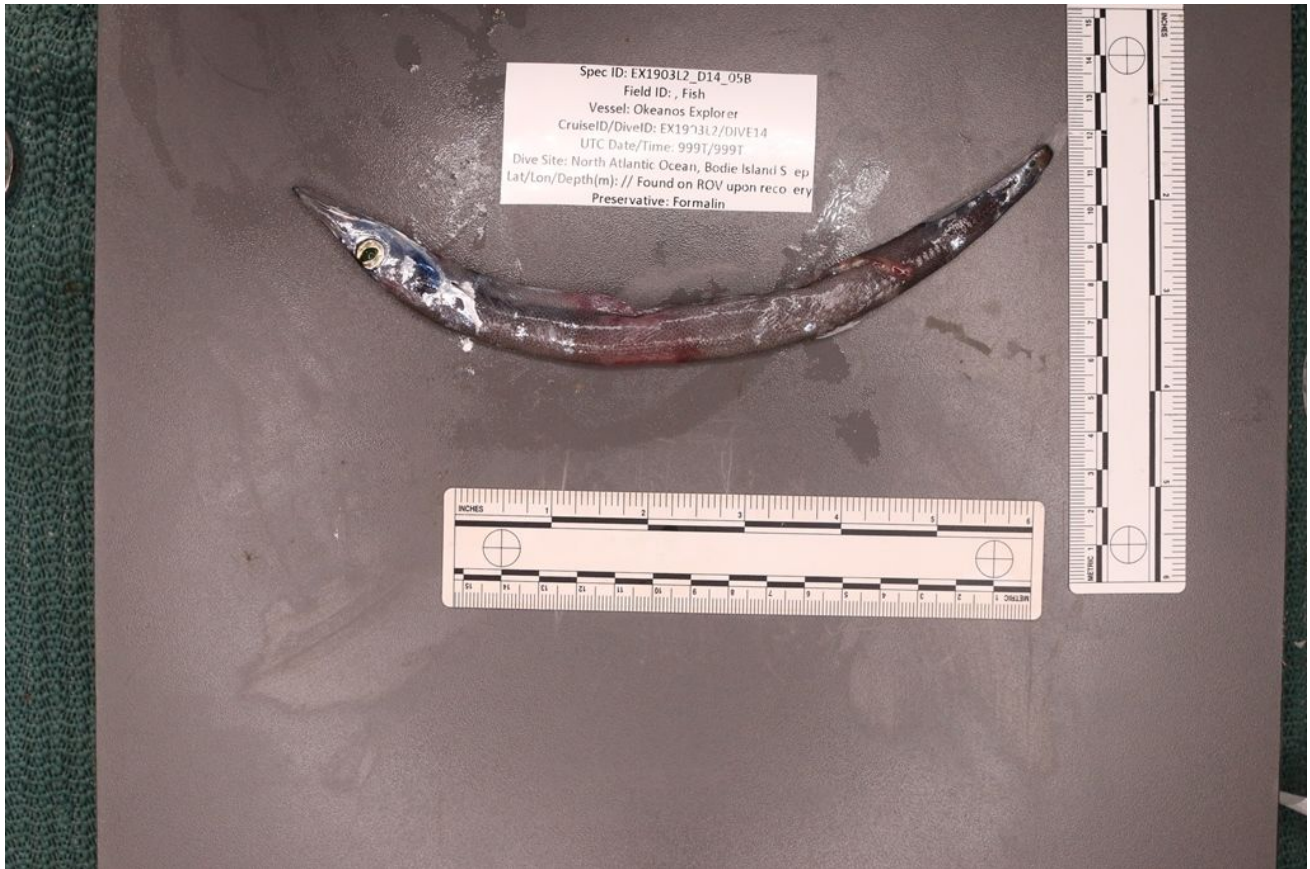


| Sample ID | EX1903L2_D14_03G | | | | | |
|-------------|---|----------------------|----------------------|----------------------|----------------------|----------|
| Date (UTC) | 20190706 | | | | | |
| Time (UTC) | 164055 | | | | | |
| Depth (m) | 401.7 | | | | | |
| Temp. (°C) | 7.148 | | | | | |
| Field ID(s) | Carbonate (authigenic) | | | | | |
| Associates | <table border="1"> <thead> <tr> <th>Associates Sample ID</th> <th>Field Identification</th> </tr> </thead> <tbody> <tr> <td>EX1903L2_D14_03G_A01</td> <td>Porifera</td> </tr> </tbody> </table> | | Associates Sample ID | Field Identification | EX1903L2_D14_03G_A01 | Porifera |
| | Associates Sample ID | Field Identification | | | | |
| | EX1903L2_D14_03G_A01 | Porifera | | | | |
| Comments | | | | | | |



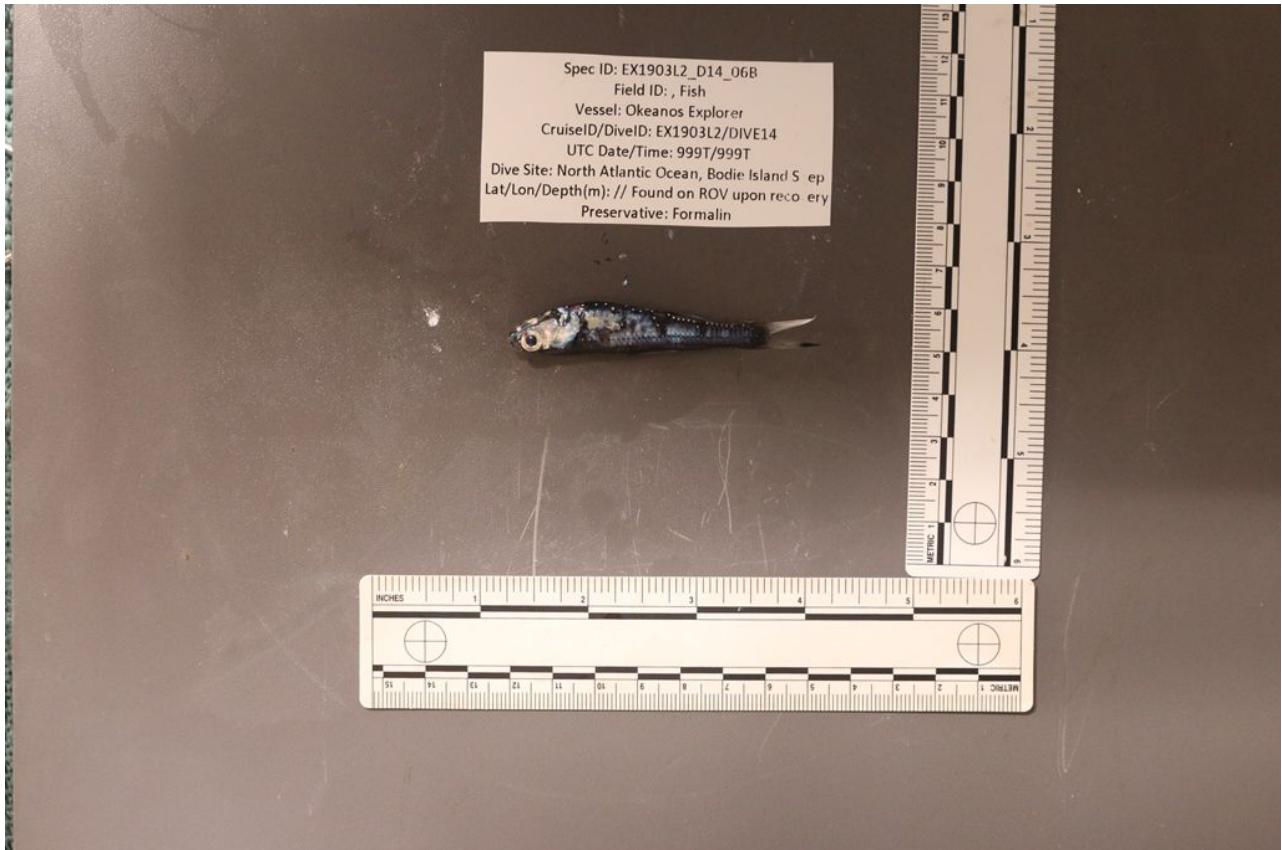
| | | |
|-------------|----------------------|----------------------|
| Sample ID | EX1903L2_D14_04B | |
| Date (UTC) | 20190706 | |
| Time (UTC) | 193605 | |
| Depth (m) | 367.6 | |
| Temp. (°C) | 8.301 | |
| Field ID(s) | Shrimp (Decapoda) | |
| Associates | Associates Sample ID | Field Identification |
| | No associates | |
| | | |
| Comments | | |





| | | |
|-------------|------------------------------|----------------------|
| Sample ID | EX1903L2_D14_04B | |
| Date (UTC) | 20190706 | |
| Time (UTC) | - (opportunistic collection) | |
| Depth (m) | - (opportunistic collection) | |
| Temp. (°C) | - (opportunistic collection) | |
| Field ID(s) | Fish (Osteichthyes) | |
| Associates | Associates Sample ID | Field Identification |
| | No associates | |
| | | |
| Comments | Found on ROV upon recovery | |





| | | |
|-------------|------------------------------|----------------------|
| Sample ID | EX1903L2_D14_05B | |
| Date (UTC) | 20190706 | |
| Time (UTC) | - (opportunistic collection) | |
| Depth (m) | - (opportunistic collection) | |
| Temp. (°C) | - (opportunistic collection) | |
| Field ID(s) | Fish (Osteichthyes) | |
| Associates | Associates Sample ID | Field Identification |
| | No associates | |
| | | |
| Comments | Found on ROV upon recovery | |

Please direct inquiries to:

NOAA Office of Ocean Exploration & Research
 1315 East-West Highway (SSMC3 10th Floor)
 Silver Spring, MD 20910
 (301) 734-1014