

## ASPIRE: Coral Gardens in the Gulf of Maine

### Contact Information

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**Willing to Attend Workshop?** Yes

**Target Name(s):** Gulf of Maine (200m+ depth) – e.g. Schoodic Ridges, Northeast Channel, Western Jordan Basin.

**Geographic Area(s) of Interest within the North Atlantic Ocean (Indicate all that apply)**  
Northeast

**Relevant Subject Area(s) (Indicate all that apply)**

Biology

Chemistry

Physical Oceanography

### Description of Topic or Region Recommended for Exploration

**Brief Overview of Area or Feature:** Though it was originally thought that extensive coral and sponge habitats would not exist in the Gulf of Maine due to intensive fishing pressure, a series of four cruises from 2013 – 2017 using towed cameras and ROV systems (ISIS 2, Kraken II and ROPOS) demonstrated this was not the case. Though fishermen had frequently pulled up corals as bycatch, it wasn't until this series of cruises that coral gardens were visualized, identified and sampled. Extensive coral ecosystems were located from 170-250m depths in three major locations within the Gulf of Maine (Schoodic Ridge, Western Jordan Basin and Central Jordan Basin). Coral and sponge ecosystems are also well known from the Northeast Passage, where cold nutrient rich deep water feeds into the Gulf of Maine, as well as canyons on the outer continental shelf edge. This area is one of the fastest warming bodies of water in the world, and this year has seen a large influx of abnormally warm water, leading to unknown consequences for these ecosystems.

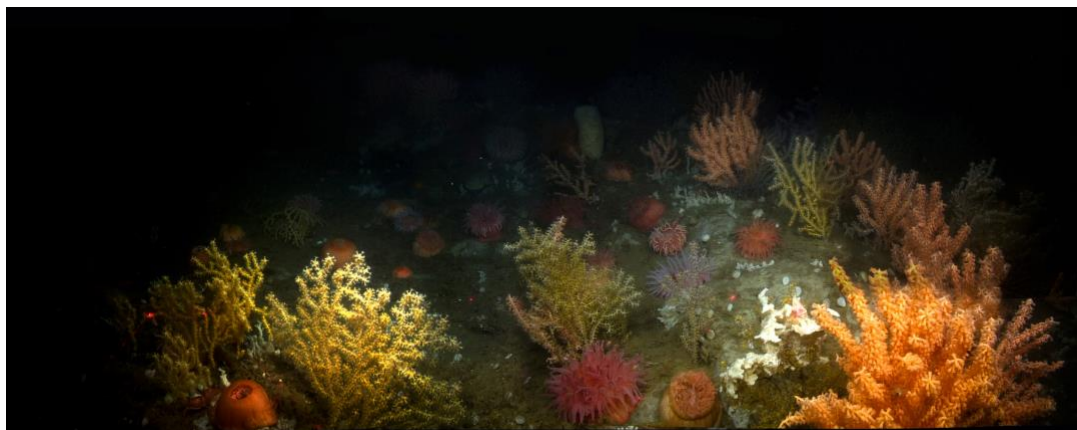


Fig. 1. Coral ecosystem within the Gulf of Maine (Central Jordan Basin). Courtesy of NOAA, UConn., Mystic Aquarium, UMaine.

**Brief Summary of Current State of Knowledge:** Four cruises identified three major areas of coral growth within the Gulf of Maine – Schoodic Ridges (a large ridge following the coastline from Mt. Desert Rock northwest towards Canadian waters). Two of these cruises used an ROV (Kraken II and ROPOS) to sample these three areas. Samples were split between identification, genetics and reproduction. Genetics (Morrison (USGS) pers. Com.) show the populations within the Gulf of Maine to be isolated from coral populations outside the Gulf (with crossover seen in the Northeast channel). Reproductive work shows the Schoodic Ridge population to be critically important to the Gulf of Maine as a whole, as it produces significantly more larvae than the other two sampled populations (Fountain et. al. in review). The other two populations have smaller coral colonies, indicating either a younger, or more disturbed, community.

Exploration for corals occurred only on two towed camera cruises and did locate some other coral colonies along points on Schoodic Ridges. The towed camera proved inefficient at examining coral areas thoroughly however due to topography. ROV cruises were focused on collections of corals.

**Rationale for Future Exploration:** This region is an important region in the US (and Canadian) economies in terms of intensive fisheries areas. Benthic communities are important to the overall health of the ocean ecosystem and many species of corals observed in the area potentially provide habitat for commercially viable species. We know little of the extent of coral communities in this area, and it was notable that despite records of corals within the Gulf of Maine extending back into the 1800's, and numerous submersible and ROV dives in the region in the 1990's, it wasn't until 4 years ago that extensive communities were finally discovered – there are likely more pockets of perseverance within Gulf waters awaiting discovery.

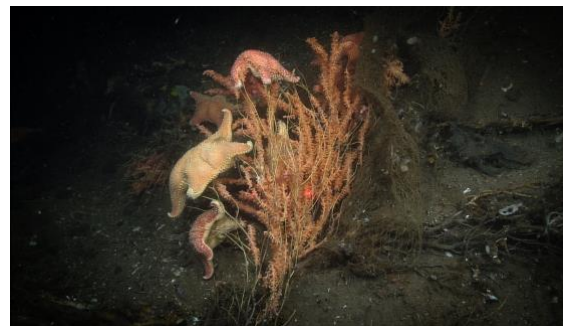


Fig. 2. Seastar predation. Courtesy of NOAA, UConn., Mystic Aquarium, UMaine

The Gulf of Maine is also one of the fastest warming bodies of water on this planet, and the effects of this ocean warming are already being felt in commercial species (e.g. lobster, clams etc.). This year a core of warm water entered the Gulf of Maine through the Northeast passage, warming waters at around 200m depth to up to 11C warmer than usual averages. This water is still sitting in the Gulf of Maine, at depths where we find these critical coral and sponge communities, and will move out in a few months time.

This is a unique opportunity to not only explore for more populations of corals within the Gulf of Maine, an urgent need in itself given fisheries pressures in this region, but also to explore the effects of ocean warming on populations that have already been fairly well documented and examined. We know from other studies warming waters can have detrimental effects in terms of reproduction and eventual colony death, though these studies are all done within laboratory settings. To explore these effects in a natural setting would be unique and exciting.

#### **Relevant Partnerships (If Applicable)**

**ATLAS:** Fits with ATLAS Work Packages 2, 3 and 5 – examining ecosystem function, biodiversity and biogeography and has consequences for ocean and fisheries health.

**SponGES:** Many species of sponge were observed in the first cruises that would be of interest to the SponGES group.

**Canada Healthy Oceans Network:** The Gulf of Maine extends into Canadian waters and is an important resource to both the US and Canada in terms of fisheries.