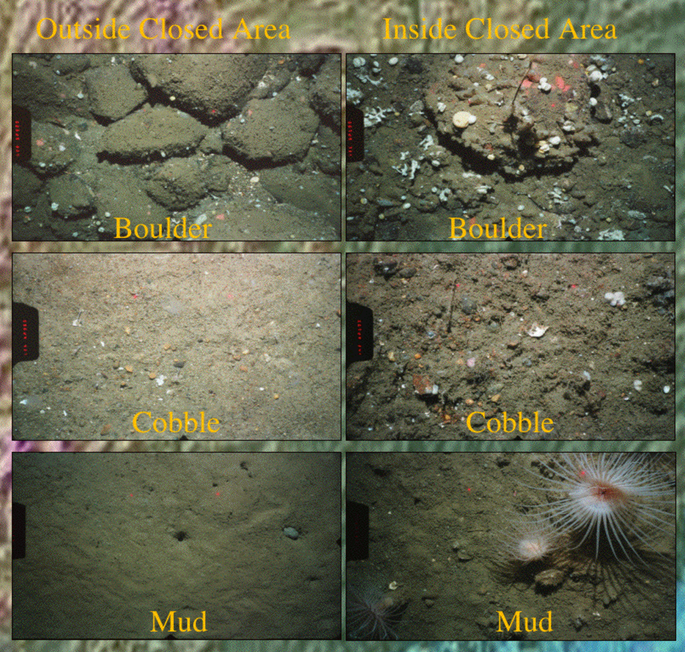
Recovery trajectories of seafloor habitats and associated taxa in areas open and closed to mobile fishing gear

Chelsea Parrish-Kuhn[1], James Lindholm[1], Peter Auster[2], Page Valentine[3]

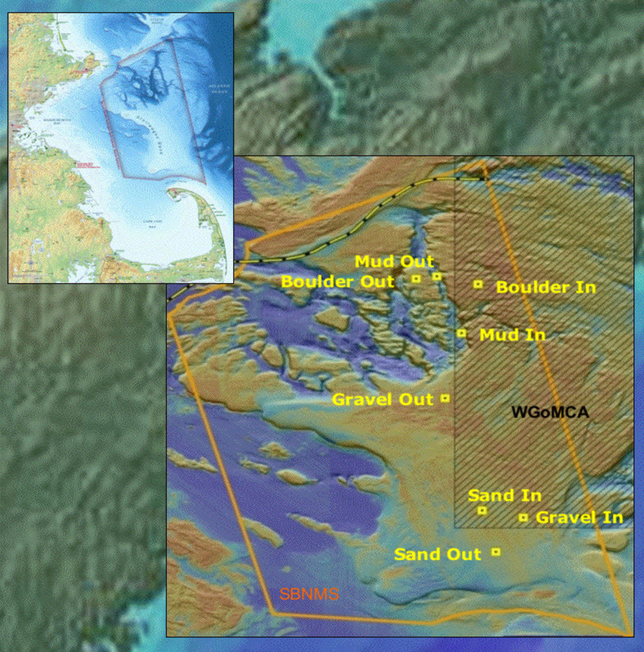
1) Institute for Applied Marine Ecology, California State University Monterey Bay, Seaside, CA 2) National Undersea Research Center at the University of Connecticut, Groton, CT 3) US Geological Survey, Woods Hole, MA



Introduction

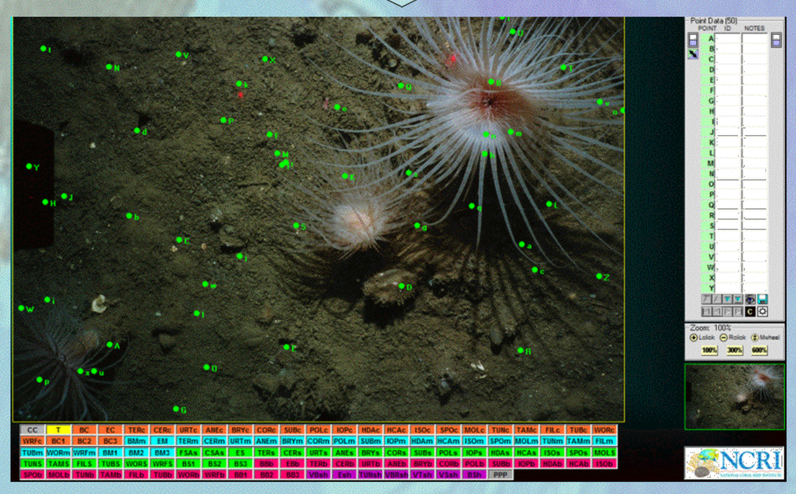
Mobile, bottom-contact fishing gear (such as otter trawls) can alter seafloor habitats and associated biota. Little information exists on the recovery of these resources following such disturbances, though this type of information is critical for successful management. The designation of the Western Gulf of Maine Closed Area (WGOMCA) in 1998, which prohibits the use of mobile fishing gear, provided an excellent opportunity to track the recovery of historically trawled areas and to compare recovery rates to adjacent areas that continue to be trawled. In 1998 we implemented a monitoring program in the overlap between the closed area and the Stellwagen Bank National Marine Sanctuary to quantify the recovery of seafloor microhabitats and other associated benthic fauna. Sampling sites were selected for each of the four major seafloor habitat types in the sanctuary —boulder, cobble, sand, and mud. Within each habitat type, impacted and unimpacted reference sites were selected for sampling on either side of the closed area boundary. The specific objective of the program is to quantify the relative impacts of anthropogenic disturbance, specifically mobile fishing gear with respect to microhabitat structure. This objective can be stated by the following null hypothesis:

Ho: There are no differences in the relative abundance of each microhabitat type in impacted and unimpacted sites.



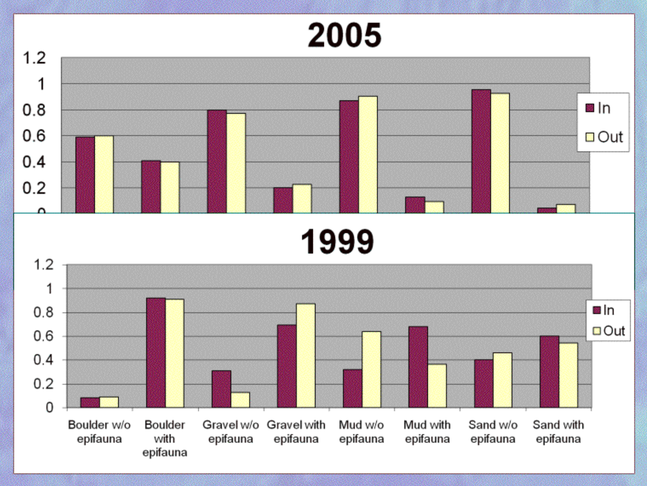
Data Collection

An annual cruise (14 days of operation) was conducted from 1998 to 2008 with the use of the Bottom Camera to monitor recovery of seafloor habitat. 20 photos were taken per transect with three transects per site.

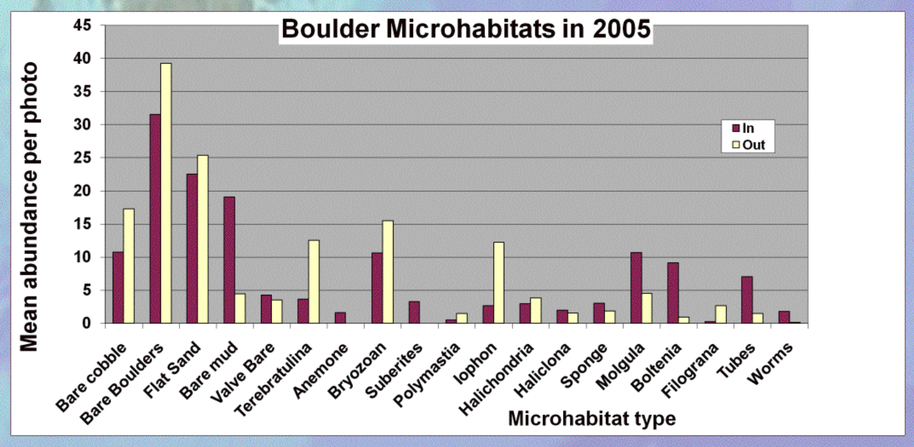


Data collected from Hi-8 (ISIS) video tapes and still photographs was analyzed using random point counts with the program CPC-E. 50 random points were assigned to each photo and the microhabitat under each dot was recorded

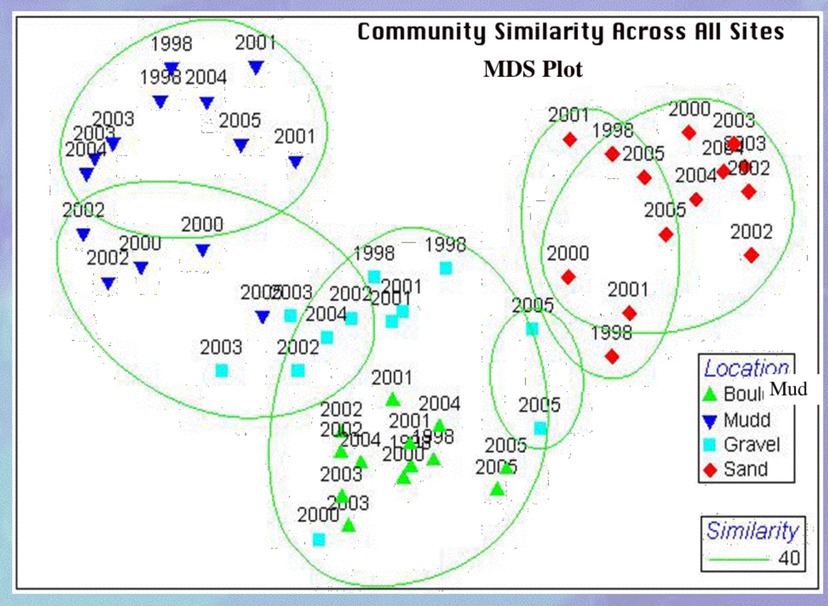
Results



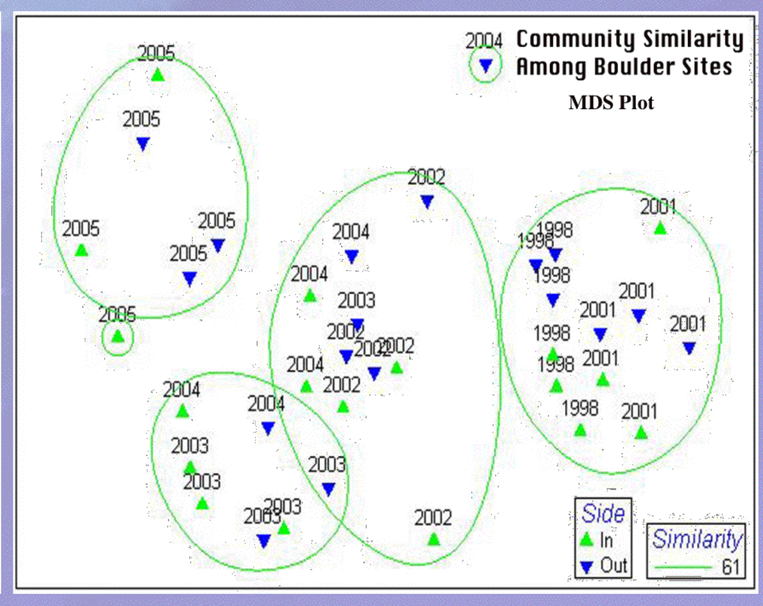
Differences in the relative abundance of epifaunal microhabitats inside and outside the closed area over years were apparent.



Differences in the relative abundances of specific microhabitat types inside and outside the closed area were also apparent.



Numerical classification (cluster analysis) of the microhabitat samples revealed a clear difference between sites due to differences in the relative abundances of component species.



Differences across years were also shown within individual habitat types.

Conclusions

We attribute the differences inside and out of the closed area to fishing impacts and varying levels of recovery. Additional sampling and data analysis is needed to evaluate subsequent recovery trends and persistence of effects. Ultimately, the goal of this project is to characterize the recovery trajectories of a wide spectrum of seafloor habitats and to link that recovery to the dynamics of exploited marine fishes.

Acknowledgements

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