Methods for Identifying Potential Artificial Reef Sites in Nantucket Sound

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Background

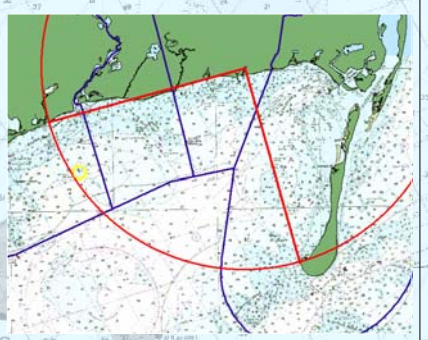
There is an increasing concern that the amount of available fish habitat suitable for commercial and recreational fish species along southern Cape Cod is diminishing. Many of the once plentiful shipwrecks are decaying, resulting in an overall loss of relief and habitat value. In response to this loss, artificial reef development has been proposed as a possible technique to provide additional recreational and commercial fishing opportunities in the area of Nantucket Sound.

Methodologies utilized in artificial reef site selection utilize a three-step process for identifying potential artificial reef sites. The first step identifies potential development zones using existing geographic, oceanographic, socioeconomic, and environmental information. Next, exclusion mapping eliminates existing productive habitats, areas designated for other uses (i.e. navigational channels, aquaculture sites, or disposal sites), and identifies areas of proper water depth and suitable hydrographic conditions. Finally, field survey and groundtruthing work is conducted.

STEP 1: Identify development zone.

Proposed artificial reef must be:

- Within Nantucket Sound
- In an area within or near the Harwich town boundaries
- In an area greater than 20 ft depth (preferred depth >30ft)
- Away from any identified sites of potential archaeological significance
- In an area that will not restrict traditional fishing activities

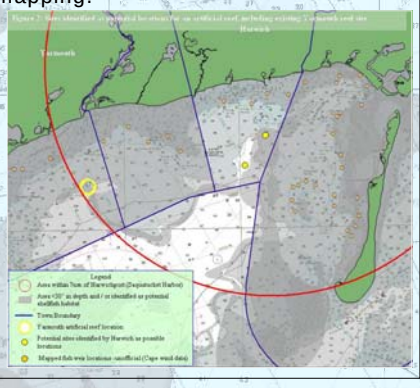


STEP 2: Exclusion mapping.

Identify and eliminate areas unsuitable for reef development.

- Bathymetry
- Depth
- Potential shellfish habitat
- Slope
- Existing hard bottom
- Sites of archaeological significance
- Existing structure
- Navigational areas

This information is used to identify potential areas suitable for field survey



STEP 3a: Acoustic mapping

Sidescan sonar survey of area identified through exclusion mapping

- Sonar imagery of bottom features and debris
- Collected by navigating predetermined survey lines
- Differentiates substrate types
- 75 meter swath coverage

Towfish on deck prior to deployment

Survey lines run during sidescan data collection

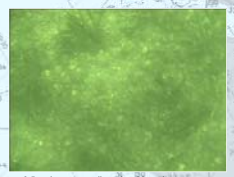
Geo-referenced sidescan image

Scientist reviewing data collection aboard the R/V Mya.

STEP 3b: Photo groundtruthing

- Stations randomly selected within survey area
- Interpretation of benthic features using photos
- Validates benthic classifications of interpreted acoustic data

R/V Mya being outfitted with camera quadpod

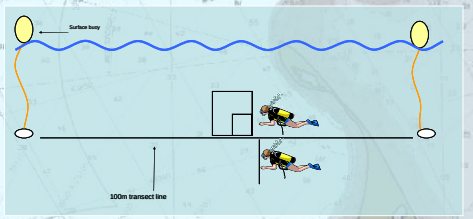


± 0.5m photo area collected at 20 stations

DMF technician preparing quadpod for deployment

STEP 3c: SCUBA surveys

- Quadrat used to assess substrate type, algal coverage, and sessile invertebrates
- Swath bars used to quantify all mobile macroinvertebrates, sessile macroinvertebrates and fish



Depiction of transect sampling methodologies using SCUBA

Quadrat survey technique used for collecting data

Swath bar survey technique used for collecting data

Project Partners

Massachusetts Seaport Advisory Council

Massachusetts Division of Marine Fisheries

Town of Harwich

References

- Barber, J. S., K. A. Whitmore, M. Rousseau, D. M. Chosid, and R. P. Glenn. 2009. Boston Harbor artificial reef site selection and monitoring program. MA Division of Marine Fisheries Technical Report TR-35.
- Barber, J.S., D.M. Chosid, R.P. Glenn, K.A. Whitmore. 2009. A systematic model for artificial reef site selection. New Zealand Journal of Marine and Freshwater Research. 43: 283–297.
- Hueckel G.J., Buckley R.M., B.L. Benson 1989. Mitigating rocky habitat loss using artificial reefs. Bulletin of Marine Science 44: 913–922.
- Pratt J.R. 1994. Artificial habitats and ecosystem restoration: managing for the future. Bulletin of Marine Science 55: 268–275.
- Rousseau, M.A. 2008. Massachusetts Marine Artificial Reef plan. MA Division of Marine Fisheries Policy Report P-3.
- US Department of Commerce 2007. National Artificial Reef Plan (as amended): Guidelines for siting, construction, development, and assessment of artificial reefs. NOAA, National Marine Fisheries Service. 61p.