

A major goal of NRAB is to help ensure that Wellfleet harbor remains a clean and productive site for residents and those who earn their living directly from harbor waters.

Monitoring of harbor waters and biology is an important part of achieving this goal. Back in 1972, the Division of Marine Fisheries produced a comprehensive report to this end entitled "A Study of the Marine Resources of Wellfleet Harbor". The lead author was John R. Curley, so we refer to the "Curley Report". A copy can be accessed on the NRAB web-page.

One of the recommendations of the report was that the survey be repeated every 10 years. This was not done. We recommend a renewal of the report, which would provide a guide for an action plan based on nearly 50 years of changes.

The Curley report has a number of sections:

- > harbor morphology
- > water quality: temperature, oxygen, pH
- > Finfish, both bait and sport
- > Shellfish
- > Marine and Marsh vegetation
- > Other harbor monitoring,

Harbor Morphology.

The original report has a basic but still useful depth contour map of the harbor. (attach here). A more detailed study of the benthic harbor habitat was issued in 2019 by the Center for coastal studies (ref here). This report can also be found on the NRAB web-page.

An action item is to review and compare both reports. The newest report also contains benthic related biological information, useful for planning.

Water Quality

Much more extensive water quality testing is on-going, lead by Amy Costa at The Center for Coastal Studies. A link to this data is: xxx. Crucially, this data also contains information on harbor nitrogen and phosphorous, the importance of which has become better understood in recent years.

Finfish

Nine finfish stations were established in 1975 (map attached). Sampling used a 60' beach seine and an otter trawl in deeper water. Data was taken monthly.

Key baitfish were Silversides, Mummichog and Striped Killifish. Winter Flounder, Alewife, and Menhaden were also significant among the larger fish. Interestingly, neither Bluefish nor Striped Bass were found.

We propose that the same basic sampling be repeated, with two additions. Beach seining locations should be established in Fox Island Marshes and upper Blackfish Creek. Salt Marshes are key breeding ground for baitfish, so the contribution of these marshes is important. Secondly, restoration of the Herring River will provide a major opportunity for change: data from that project will be important.

Shellfish.

There is extensive shellfish data in the Curley report, especially for Quahog and Oyster. We also have data from the early 1900's due to the research of Dr. David Belding. Very useful commercial data is compiled annually by the Shellfish Constable.

However, a direct comparison with modern data for the purpose of monitoring overall harbor health will be difficult. There have been two significant changes in the intervening 45 years:

- > the use of aquaculture for commercial shellfishing has become a key part of the shellfishing business. Many of the test sites in the earlier study are now used for aquaculture. Sites will need to be identified that are wild growth only: the Fresh Brook estuary, west side location along Great Island south to Jeremy Point, and parts of the Gut.

- > clutching has become a widely used and effective tool to encourage shellfish propagation. The study could compare clutched and native sites that are adjacent or nearly so: Chipmans Cove and the Gut are possibilities.

These changes have benefitted shellfish populations in the harbor. Aquaculture provides a source for "spat" – young oysters and clams. Clutching provides habitat for oyster spat to adhere and grow.

However, in order to use shellfish information to monitor long term general harbor quality, we will need to effectively start over. Therefore, comparisons back to Curley (or even David Belding's works will be difficult. Probably, we will need more repetitions of shellfish data. Co-operation with the Shellfish Constable and SAB will be essential.

Sampling decisions that need to be considered are:

- > clutched versus totally wild sampling sites;
- > harbor east (here most of the marshes are located) versus harbor west (fewer marshes) and harbor north (protected waters) versus harbor south (open waters)
- > The Curley report took no mid-harbor samples. Dragging for shellfish is an important tool for the shellfish business in Wellfleet. For mid-harbor data to be useful, some short-term designation of dragging sanctuaries would be needed.

Marine and Marsh Vegetation

Shellfish live on phytoplankton. The abundance of these microscopic algae is critical to the populations of shellfish. In addition, the blooms of phytoplankton relative to spat release by breeding shellfish is important. This is the phenomenon called “phenology”. So, measures of phytoplankton blooms compared to shellfish spat release could be a critical measure of the health of the harbor.

Monitoring salt marsh vegetation changes is discussed under a “Climate change” chapter.

> Other harbor monitoring.

There is already underway various harbor monitoring projects, of great value, which deserve support:

- Diamond-backed Terrapins, Horseshoe Crabs : MassAudubon

Note: Horseshoe Crab populations in the harbor are greatly reduced; these crabs greatly benefit shellfishing beds.

- Eels ; MassAudubon

Note: this monitoring should be expanded; for example to Hawes Pond and the Herring River

- River Herring: Friends of Herring River

Note: an annual Spring herring run count is over 10 years old; a fall menhaden run is not currently recorded

- Birds : perhaps the most interesting data could be obtained in the winter; for examples, Eider eat small shellfish; Loons and Merganser eat small fish.