



Juvenile Fish Communities Are in Transition on a Long Island Sound Reef

Juvenile fish communities shifted on a Long Island Sound rock reef in recent years, in part because of warming waters

Scientists at the NOAA Milford Lab have found that juvenile fish abundance in communities found on a rock reef in Long Island



Renee Mercado-Allen (far left) works with and helps Hollings Scholar Eileen Bates (center) and Volunteer Allie Grusky (right) quickly process fish traps during field work in Long Island Sound.

The Rise of Warm-Adapted Species

Two warm-adapted species: **black sea bass**, a commercially and recreationally important fish, and **oyster toadfish** became more abundant in recent samples.

Oyster toadfish prefer rocky habitats and are not often captured by trawl surveys. Meanwhile, cold-adapted species, including cunner and grubby, declined in numbers over the course of the study, which was recently published in Fishery Bulletin.



A juvenile black sea bass that was caught in a fish trap in Long Island Sound.

Winter flounder, also a commercial species, and rock gunnel were notably absent in more recent years. Long-term trawl data collected by the Connecticut Department of Energy and Environmental Protection (CT DEEP) suggests winter flounder abundance has been declining in the Sound for 20 years.

The scientists found no consistent trend in the abundance of **tautog** and **scup**, two temperate residents of Long Island Sound. The species are often captured on video by our GoPro Aquaculture Project.

Summer water temperatures were a small but statistically significant predictor of changes in species composition. Publicly available long-term temperature records collected at the Milford Laboratory document 50 years of gradually increasing water temperatures in Long Island Sound’s central basin. Both summer and winter temperatures have been on the rise since 1965.

Fish in estuaries like Long Island Sound already experience

a broader range of temperatures than fish in the open ocean. Because of this, estuaries are key to monitoring how fish communities are responding to a changing climate. While some species are able to adapt to changing conditions, others may shift northward or become less abundant. Some species may increase in response to warming temperatures.

Gary Shepherd, lead assessment scientist for black sea bass at the Northeast Fisheries Science Center, said, “This study agrees with what we’ve been seeing throughout southern New England: **there’s a definite increase in juvenile black sea bass.** The fish caught in 2016 were likely from the 2015 spawning, when there was good survival of the young sea bass because of favorable oceanographic conditions offshore during the winter.” The Milford Lab’s GoPro Aquaculture Project uses cameras to collect video at a rock reef and around oyster aquaculture gear. It continues to document high abundance of black sea bass, including young-of-the-year and juvenile fish.

Fish Traps Helpful Where Trawling is Not Possible

Fish traps are helpful to sample areas like rock reefs where an uneven seafloor makes trawling challenging or impossible. These samples paint a more complete picture of fish abundance.

The team from the Milford Lab used fish traps with a mesh size that targets juvenile and small adult fish living close to the seafloor. They placed traps in a temperate rock reef habitat west of Charles Island in Milford, Connecticut, during six summers between 2004 and 2016. The research team deployed strings of traps for 24 hours, two to three times per week at five sites. Because the number of sampling trips and traps deployed varied from year to year, the team used catch-per-unit-effort as a standardized index of abundance. This allowed them to compare data collected among years. Scientists released the fish after sampling.



Photograph of the basic style of trap used for sampling of juvenile fish on a cobble and boulder reef in L.I. Sound.

Reef fish are structure-oriented, meaning they rely on rock reefs and other structures for shelter and camouflage to avoid predators. **(to page 30)**