

The role of *sand lance* in the Northwest Atlantic ecosystem

Sand lance are small fish (<20 cm) that play an important functional role in marine ecosystems throughout the Northwest Atlantic Ocean (NWA) where two species are present. In the Northern Hemisphere, sand lance are considered to be a “quintessential forage fish”, serving as a nutritious source of prey for a wide range of marine predators including seabirds, fish, and marine mammals.



The Northwest Atlantic is home to two species of sand lance: Ammodytes americanus, a primarily inshore species, and A. dubius, a primarily offshore species.

Although it is known that sand lance serve as an energy conduit linking upper and lower trophic levels, specific aspects of their regional ecology, population dynamics, and vulnerability to current and future stressors are poorly understood. This is in part because their small size, elongate body form, and unique behavior of burrowing into the seabed make them difficult to sample, using typical survey methods.



Ongoing field studies on Stellwagen Bank National Marine Sanctuary are bringing together federal and academic scientists to improve understanding of sand lance distribution and abundance relative to top predators.

Sand lance form dense schools that appear to fluctuate widely in abundance and distribution over seasonal, annual, and decadal scales. Unlike most forage fishes, sand lance are strongly associated with bottom habitats comprised of clean sandy sediments located in relatively shallow water depths of <100 meters. This “place-based” aspect of their ecology can make them a spatially predictable resource for predators, but also increases their vulnerability to climate change and other human impacts such as overfishing, sand mining, and oil spills.

A changing ecosystem

The abundance and distribution of commercially valued fishes such as Atlantic Cod and Bluefin Tuna, as well as species of high conservation concern like Great Shearwaters, Humpback Whales, and endangered Roseate Terns have been associated with sand lance availability. Multiple predator species congregate and benefit from facilitative interactions when foraging on sand lance.

Rapid changes are occurring in the NWA region including shifts in environmental conditions, altered species distributions, and changes in the intensity and types of human activities. Given these increases in potential stressors, a better understanding of the biology, population dynamics, and ecosystem role of sand lance is needed to inform relevant management and conservation efforts.

Sand lance: Conservation and management implications

In May 2017, a multidisciplinary, international workshop convened 55 scientists, natural resource managers, and conservation practitioners from 15 state, federal, academic, and non-governmental organizations with interest and expertise in sand lance ecology.

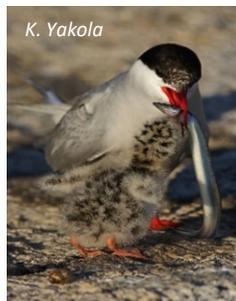
Presentations covered emerging research on the importance of sand lance as prey, community spatial ecology, vulnerability to climate change, and new frontiers for forage fish management in the Mid Atlantic and New England regions. Additionally, scientists from the United Kingdom provided lessons learned from a parallel ecosystem, where a large commercial sand lance fishery has been implicated in reducing the number of breeding pairs and the productivity of local seabird colonies.

Overall, the workshop and subsequent synthesis activities have focused on five primary themes related to sand lance in the NWA:

- Biology and life history
- Trophic ecology and behavior
- Habitat, distribution, and population dynamics
- Ecosystem services role
- Human and environmental threats

How will results be applied?

Working group efforts are building partnerships, informing new research, and helping guide conservation and management efforts for sand lance and their predators in the NWA region. Results are expected to be of particular interest to regional Fishery Management Councils, regulatory agencies, fishing communities, conservation and coastal development groups.



This work is being conducted in cooperation and with support from USFWS, NOAA Stellwagen Bank National Marine Sanctuary, DOI Northeast Climate Science Center, Boston University, University of Massachusetts Amherst, and the Woods Hole Oceanographic Institution.



A 2-day expert workshop held at the Parker River National Wildlife Refuge in Massachusetts brought together 55 participants from around the world to discuss the ecological role of sand lance.

Next steps

Workshop outcomes are being combined with a comprehensive literature review, insights from ongoing field and laboratory work, and new analyses of long-term datasets to summarize the current state of knowledge.

For more information contact:

Michelle Staudinger, DOI Northeast Climate Science Center (mstaudinger@usgs.gov)

Linda Welch, Maine Coastal Islands NWR (Linda_Welch@fws.gov)

Dave Wiley, Stellwagen Bank National Marine Sanctuary (David.Wiley@noaa.gov)