RI's Climate Challenge
Waves of Change

Invasives, Diseases, and Acidification

What species are affected?

The impacts of ocean acidification may be highly variable among different species.

Recent laboratory research has shown that many organisms with calcium carbonate shells, such as periwinkles, oysters, urchins, and calcareous green algae, formed weaker shells when the acidity increased.

Impacts to reproduction and larval development have already been shown in a lab setting, but other potential impacts could include affects on immunity to diseases and on development at other life stages.

All of these impacts are harmful and present a serious threat to many marine species, especially shellfish and lobsters, so there is a pressing need to minimize the amount of acidic materials from entering any water body through the air or any outside source.

Increasing water temperatures and salinity hereabouts due to a changing climate are creating conditions that are favorable to the spread of disease organisms, tropical or otherwise.

Disease

Why We Put the Mayo Sandwiches in the Cooler

There is a reason why one hears so much about—and fears, if he or she cares about their health—exotic diseases. It is warmer where they have their genesis, and the invisible beasties that make us ill like the warmer winters that we are experiencing in Rhode Island waters.

Increasing water temperatures and higher salinity levels in New England due to a changing climate are creating conditions that are favorable to the spread of disease organisms, especially ones typically found to our south.

Temperature change generally increases the vulnerability of marine species to stress and disease, particularly if it occurs during critical periods of the species' life cycle. Diseases in southern waters could extend northward and have a severe effect on local marine plant and animal communities.

Impacts in the Northeast U.S.

This nasty "mission creep," the northern movement of disease, has already reached New England.

For example, the American oyster, which had re-populated Narragansett Bay and Rhode Island's south shore salt ponds in the 1990s, after being absent from commercial fisheries for nearly four decades, was severely afflicted by a southern oyster parasite causing Dermo disease.

A 1998 disease survey found this parasite, which was rarely seen north of Delaware Bay until the 1990s, in over half of the dead oysters found. The spread of Dermo is attributed to warming waters that have extended the northern limit of the parasite's geographic range through Rhode Island and up into Maine waters.

Though the cause of the spread of lobster shell disease is currently unknown, it has been speculated that human-related forces are responsible, including warmer water temperatures. Currently, the northern extent of the affected commercial lobster harvest appears to be limited by this temperature-sensitive disease, but these impacts are expected to increase as near-shore water temperatures rise—and they are indeed rising.

The disease was found in less than 1 percent of lobsters sampled in 1996 and by 2004 the percentage of diseased lobsters sampled grew to 20 to 40 percent. Though it is unknown if the disease is fatal, it has had negative consequences for lobster marketability—since many people order their lobsters in-shell, the sight of a blackened or severely mottled shell is enough to cause apprehension in even the most adventurous of diners.

The persistence and increasing prevalence of the disease in recent years has serious implications for the sustainability of the lobster fishery, especially as marine waters continue to change.

Invasive Species

Formally, an invasive species is an introduced, non-native species that survives when introduced to a new ecosystem and does, or is likely to, cause harm to the ecosystem. Invasive species are recognized as one of the main man-made threats to biological systems. Rhode Island may not have the national media darlings, species such as the land-crawling snakehead fish or zebra mussels that out-muscle other species, but anyone who has stepped on the spikes of an invasive water chestnut, or seen the forests ravaged by the Asian longhorned beetle in nearby Massachusetts should have pause cause for thought.

The dangerous and unseen barb of a water chestnut.

Northward Migration

As local and regional waters warm, additional warm-water species that once found the colder temperature inhospitable will be able to reproduce and spread. Three-quarters of the recently observed range shifts were in a northward direction, consistent with climate change scenarios.

The increasing northward shift of warm water species may introduce new species into Rhode Island waters, and warmer temperature could prolong the stay of current seasonal migrants. Invasive species that can breed in warmer winter waters may have an advantage over native species that breed in colder water.

As environmental changes affect native species health, abundance, and potentially diversity, resistance to the establishment and spread of invasive species could decline. These native species are essentially taken by surprise by a hale and hearty invasive adversary for which they have little or no warning or defense.

Resistance to invasive species may also be impeded by a variety of stressors, one of which is man-made ecosystem disturbances. The chances of the spread of new diseases also increase, in addition to the pressures caused by rising temperatures.

It is also possible that certain non-native species could have minimal impacts to local marine ecosystems, and perhaps become acceptable or even desirable in future years. We humans face a real challenge as we attempt to adapt to the changing landscape of climate. It is our nature to treat such a threat with a combination of fear, acceptance, helplessness, curiosity, and, yes, even excitement. Most importantly, we will have to adapt and the smarter path is to plan among the modes of adaptation as opposed to being buffeted by the winds of change.

Water chestnuts covering the surface of Rice City Pond, on the Blackstone River. *Photo Credit: Blackstone River Watershed Association*