

# HITCHHIKERS *and* STOWAWAYS

*Invasive species threaten  
New Hampshire's coastal ecosystems*



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*A relatively recent invader of  
New Hampshire's coast, the  
Asian or Japanese shore crab is  
an aggressive species with a  
voracious appetite.*

**I**nvasive, exotic, introduced, non-native, alien.....these are fighting words! People consider themselves native to the place of their birth—regardless of their family history—and carry that honor proudly. “A New Hampshire native? Well, pull up a chair and have a cup of coffee!” Plants and animals are not given that same birthright, especially ones that are economically or ecologically destructive. It doesn’t matter if a species arrived in New Hampshire 200 years ago or two years ago—if they cause trouble, they are forever scorned. Hemlock woolly adelgids, gypsy moths, Dutch elm disease, Eurasian water milfoil and purple loosestrife are just a handful of species that will always raise the ire of New Hampshire’s citizens. Sure, we brought them all here, but that is beside the point (right?). We also brought countless species that we embrace warmly. Earthworms, honeybees, apple trees and rainbow trout do not belong in New Hampshire, but what kid doesn’t like to search for nightcrawlers on the evening before a fishing trip? What family doesn’t enjoy an autumn Sunday in the apple orchards?

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BY ETHAN NEDEAU

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## Unwitting Voyageurs

When sailing ships began to bring Europeans to the New World, they not only carried the people and supplies to create a paradise in the image of the motherland, but they also carried plant and animal “hitchhikers” that—like the people—would forever change North American ecosystems. Thousands of hitchhiking marine species have been brought to North America, beginning more than 500 years ago.

Wooden ships moored in European seaports were colonized by shipworms (which are actually molluscs) and gribbles (isopods); these two species have voracious appetites for wood. They bored into boat hulls, creating a labyrinth of holes and tunnels that weakened the wood. This created an ideal living situation for creatures specialized to attach to surfaces or live within spaces, including algae, sponges, barnacles, anemones, bryozoans, tunicates, molluscs and tube-building crustaceans. Collectively, we call these “fouling organisms” because they foul surfaces that we would like to keep clean. Crabs, fish and snails are among the species that take refuge in the shelter that fouling communities provide. A single ship setting sail for America could have carried dozens or even hundreds of species in or on its hull: unwitting voyageurs.

Ships carrying an unusually light load were unstable in the water, so ballast (weight) was added to fix the problem. At first, sailors used dry ballast consisting of materials they could scrape from near the docking area. This was usually sand, rock or other debris that was chock-full of tiny marine and terrestrial animals and plants. Once the ship reached its destination, dry ballast was unloaded along with the creatures that survived the journey. Hundreds of years later, ships began using water ballast instead of dry ballast. Seawater—along with phytoplankton, zooplankton, larval fish and invertebrates—was pumped into ballast tanks. Once a boat reached its destination, thousands of miles

away, the water was released and millions of organisms were poured into the local ecosystem to start a new home.

Commercial fisheries and aquaculture became a very effective vector for invasive species. By the late 1800s, adult oysters were being transported all across the world. Oysters were packed in crates with mud, vegetation and water from their native habitat. American oysters from New England were sent to far corners of the world and oysters from other oceans were sent here. Today, commercial shipping, fisheries, aquaculture and oil platforms continue to play a role in the spread of marine invasive species.

## Invaders on New Hampshire’s Shores

Ships from Europe arrived in New Hampshire’s waters by the early 1600s, and years later, from all across the world. These ships carried thousands of foreign species to coastal waters and estuaries. Most of these species failed to become established—perhaps too few individuals were released to reproduce and sustain a population; or they might not have found New Hampshire’s waters to their liking; or they could not compete with the natives. Others may have gained a foothold very early on and by the time scientists began doing careful surveys—two or three centuries later—the species might have become so widely distributed and harmonious with the native community that scientists may have mistaken them for native. A few species—the worst of the worst—shook the foundation of our native ecosystems and threatened the prosperity of our coastal communities.

Some of New Hampshire’s marine invasive species are obvious. Most people admire or study the ocean from the shore—standing in salt marshes, gathering crabs and snails among boulders at low tide or strolling along the beach. Green crabs and periwinkles are two of the most common species in these habitats, allowing people to see first-hand how dominant non-native species can become. But most never witness the ecological damage that some invasive species are causing further offshore.

## New Hampshire’s Least Wanted

### Crabs

Some invaders eat their way into an ecosystem by out-muscling native competitors and eating almost everything. Green crabs (*Carcinus maenas*) were introduced to the mid-Atlantic more than 250 years ago. They scuttled up the coast, spreading through New England and into the St. Lawrence region by the 1950s. They are now one of the most abundant predators along our coastline, feasting among eelgrass, shellfish beds and rocky intertidal areas. Their strong claws can crush shells of small clams, scallops, mussels and oysters.

Though green crabs have held reign as the toughest thugs in the neighborhood, there are new contenders that may soon take over. Asian shore crabs (*Hemigrapsus sanguineus*) have rapidly eaten their way northward to Maine since being first seen in New

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## SEA SQUIRTS SLIME SEABED

Recent news reports document the alarming spread of *Didemnum sp.* or “sea squirt” infesting waters off New Hampshire. Late last year, researchers found dense, slimy colonies present in an area of at least 40 square miles on the Georges Bank seabed. Sea squirts reproduce rapidly and have no known predators, making them a potential threat to marine habitats, aquaculture and commercial and recreational marine fisheries. Scientists are rushing to learn more about the current and future impact of the species on our marine resources and what can be done to stop the spread. When you’re on the coast, be on the lookout for *Didemnum* (a Google search for *Didemnum* will lead you to the U.S. Geological Survey’s Woods Hole Science Center, which has lots of pictures for accurate identification of the species in its various forms), and report sightings to e-mail address [pvalentine@usgs.gov](mailto:pvalentine@usgs.gov).



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Jersey in 1988. In the lab, a single Asian shore crab ate 150 juvenile snails and 170 juvenile mussels in one day! The eating contest between green crabs and Asian shore crabs in New Hampshire’s coastal waters will certainly have a profound effect on their hapless prey.

### Algae

With a name like deadman’s fingers, you know the invasive green algae means trouble. Originally from Japan, it was brought to North America—and eventually New England—on shells of transplanted oysters. This species (*Codium fragile tomentosoides*) has tightened its grip on shallow subtidal and intertidal marine habitats in the Gulf of Maine in the last thirty years. It thrives in shallow water and often outgrows native kelp and eelgrass—two irreplaceable native species that provide habitat for countless others. To make matters worse, our champion native herbivores, green sea urchins, prefer to eat tastier foods. Other herbivores have taken up the fight, including snails and sea slugs, but *Codium* is definitely winning. Even though you may never go snorkeling to witness its abundance, you can still get an inkling of what is happening offshore from the enormous amounts of *Codium* that storms tear from the ocean bottom and deposit on beaches and shorelines.

### Diseases

Not all invasive species can be plucked from the water. Several diseases have been introduced into New Hampshire’s waters, causing sickness and death among our wildlife that is difficult to chronicle. Three

oyster diseases—Dermo disease, MSX and Bonamia oyster disease—exist in New Hampshire and have wreaked havoc on most populations (keep in mind that oyster populations were mainly non-native to begin with). These parasitic protozoans were introduced to New Hampshire’s waters with infected oysters transported from the mid-Atlantic or southeast coast. They flourish in the summer when water temperatures are warmest. Oysters had enough troubles with coastal pollution and overfishing, so these diseases only added insult to injury. New Hampshire is working to improve conditions for oysters, but may have to import strains with disease resistance because ridding an ecosystem of a disease is nearly impossible. Thus, the cycle of species introductions and reintroductions will likely continue.

### Fouling Species

This ragtag group of hitchhikers and stow-aways has crossed the high seas ever since humans first built boats and began exploring the globe. While these species are certainly adaptable and have good dispersal abilities, most would not have had the wherewithal to cross oceans on their own, and thus they cemented or encrusted themselves to our vessels. Blue mussels, barnacles, bryozoans, tunicates, sponges and worms are the most common types of fouling species. The easiest way to find them is to visit ports and harbors at low tide—piers, docks and wharves (as well as natural habitats) are often smothered with fouling communities and many of the species are not native. While many are innocuous, some may have profound effects on ecosystems, fisheries and marine industries. The white lace bryozoan

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*Introduced to the Atlantic coast centuries ago, green crabs (left) are being threatened by a new invader, the ravenous Asian crab. Deadman’s fingers, an invasive green algae (right), is taking over tidal habitats in the Gulf of Maine.*



*Smooth periwinkle. A prized food in northern Europe, periwinkles were introduced in Canada for food, then spread throughout New England in the 1800s bringing a disease harmful to fisheries.*

closely regulating fisheries and aquaculture industries will help stop their spread. Monitoring programs—using New Hampshire’s citizens armed with knowledge and a watchful eye—may help detect invasives early enough to eradicate them. Residents and visitors come to New Hampshire’s seacoast area for the high quality of life; we must do our best to thwart those invasive species that threaten to spoil it. <sup>WJ</sup>

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(*Membranipora membranacea*) smothers and kills native plants and has devastated native kelp forests in the Gulf of Maine. The colonial tunicate *Didemnum sp.* forms large, gruesome colonies that cover rocks, docks, gravel bottoms, mussels, oysters, or any other firm substrate; they have even been found offshore in Georges Bank (see sidebar on page 6).

## Forever Changed

Before you go off with your scoop and pail to “do your part” by making garden compost out of green crabs, periwinkles or other well-known invasive species, be aware that—unfortunately—your efforts are likely to have no effect on the ecosystem. Once species become firmly established, it is nearly impossible to get rid of them. Mother Nature sometimes finds clever ways to shift the balance and keep species from eating everything or carpeting the ocean, but often not before species go extinct and ecosystems are forever changed.

We have made so many mistakes that we should have learned at least one important lesson: keep out invasive species. Sure, accidents happen, but often because of ignorance, laziness or misguided efforts to make things better. There are several species in southern New England creeping toward New Hampshire to join ranks with other invasives. Carefully regulating the use of ballast water, cleaning boats before entering our waters, and

*Visit harbors at low tide to see stowaways like blue mussels and barnacles (right), fouling species that disperse with the shipping trade.*

*The preparation of this article was funded in part by a grant from the Office of Energy and Planning, New Hampshire Coastal Program, as authorized by the National Oceanic and Atmospheric Administration (NOAA), Grant Award Number NA17OZ1129.*



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## WHAT CAN I DO?

Yes, it’s a big ocean, but there *are* things you can do—or avoid doing—that can help prevent or reduce new introductions.



- Always discard unused fishing bait and packing material in the trash bin; live bait species may be invasive.
- Clean off all boats and boat trailers, canoes, kayaks, and diving and fishing gear of all plants and animals before going into a body of water.
- Never discard fish or aquatic pets or plants in the wild (see page 19).
- Contact your elected officials to let them know you care, and encourage them to act to prevent and reduce invasives from various pathways.

[www.protectyourwaters.net](http://www.protectyourwaters.net)