

# How Do We Defend Against Invasion?



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European green crab (*Carcinus maenas*)

Photo Declan Connolly, IrishSeafood.com

When we venture into relatively undisturbed forests, walk along an undeveloped shore, gaze across a salt marsh, or paddle through free-flowing waters, and have the luck to avoid crowds, most of us imagine ourselves in the place of the Native Americans or the early European colonists who saw America's shores before the growth of industry, intensive agriculture, and urbanization. However, many of the plants and creatures which you encounter today would be unknown to inhabitants of New Jersey three centuries ago. Turn over rocks below the high-tide mark, and dozens of Asian shore crabs (*Hemigrapsus sanguineus*) will scuttle away—they were first discovered by a college biology class near Cape May in 1987. These crabs were probably transported and discharged with the ballast water of cargo ships. You might also see the European green crab (*Carcinus maenas*), first reported by the naturalists Say and Rafinesque in 1817. The most numerous snails on the rocks today are the common periwinkles (*Littorina littorea*) of European coasts, first seen in New Jersey in the 1890s. These 19<sup>th</sup> century stowaways may have been brought with stones and sand used as ballast by sailing ships, or ridden among seaweed and barnacles on ships' hulls.

In the tidal creeks and coastal bays, you will find many empty oyster shells, but few living ones. Heavy and constant fishing took its toll on the oyster reefs, but recovery of the eastern oyster

(*Crassostrea virginica*) has been hindered by MSX disease, caused by the protozoan *Haplosporidium nelsoni*. This parasite was brought to the Delaware Bay in 1957, probably by an illegal planting of the Pacific (Japanese) oyster (*Crassostrea gigas*), which is largely immune to MSX. In marshes and along creeks, you will see tall stands of common reed (*Phragmites australis*) and dense crimson masses of purple loosestrife (*Lythrum salicaria*), a long-escaped garden plant. Most of our *Phragmites* populations originate from an aggressive Eurasian strain, perhaps brought with stones and soil used as ballast by sailing ships, or with plants used as packing material for imported goods. In the freshwater rivers flowing into New Jersey's estuaries, anglers catch common carp (*Cyprinus carpio*), native to Asia, and many now familiar southern and midwestern game fishes, such as the largemouth bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*), and bluegill (*Lepomis macrochirus*), introduced in the 19<sup>th</sup> and 20<sup>th</sup> Centuries by government agencies and individual fishermen seeking to improve our fisheries.



Asian shore crab (*Hemigrapsus sanguineus*), actual carapace width of 20mm

So human beings have irreversibly altered the flora and fauna of our coastal waters. Our group at the Smithsonian Environmental Research Center has found that more than 160 species of plants, animals, and microbes have invaded the Chesapeake Bay. A database on these species is available at <http://invasions.si.edu/nemesis/chesdb/ChesResSp.jsp>. A less complete analysis for New Jersey tidal waters and wetlands finds that more than 70 species have been introduced to the lower Hudson River estuary, the New York Bight, and the Delaware Bay estuary. The actual total is probably much higher. Unlike chemical pollution, which can be stopped and cleaned up, living things can keep spreading and multiplying, so most of them are here to stay. Most biological invaders probably fail to survive and reproduce in their new habitats. Of the survivors, some have no detectable effects on natives, but some run rampant, competing with the natives, and changing the way ecosystems work, often affecting the economic value and aesthetic beauty of "natural" areas. Once a species becomes well established, attempts at control and removal have to be weighed against the environmental damage caused by hunting, trapping, mowing and digging, the use of chemicals, or other means of control and eradication. Prevention, including education of fishermen, pet owners, gardeners, and ship operators, is probably our best defense against future invaders.

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