

# North Carolina National Estuarine Research Reserve

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## Invasive Species *Gracilaria vermiculophylla*

Invasive species continue to disrupt ecosystems around the world, with significant environmental and economic consequences. Some marine invasive species, like lionfish and zebra mussels, have gained international notoriety. You may not know that there is an invasion occurring within the Zeke's Island component of the North Carolina National Estuarine



Oyster beds smothered by *G. vermiculophylla* (photo courtesy of Byron Toothman)

Research Reserve (NCNERR).

*Gracilaria vermiculophylla* is a highly branched rhodophyte, or red algae, indigenous to the coast of the Pacific Northwest. It easily recruits to hard substrates such as oyster and other shell material and fragmented specimens recover well and travel easily. This exotic is thought to have arrived to the U.S. East Coast near the Chesapeake Bay via Asian oysters imported into Virginia, or through ballast water transport. *G. vermiculophylla* is now considered an established invasive

species along both coasts of North America and parts of central Europe. This aquatic invasive species can be found year-round in Masonboro Sound and the Cape Fear River estuary system.

Once established in a particular area, the invasive species can disrupt natural ecosystems in several ways. With no known predators and broad habitat and dietary tolerance, *G. vermiculophylla* can quickly fill ecosystem niches and out-compete native species. *G. vermiculophylla* has become the only year-round macrophyte in the region.



The North Carolina National Estuarine Research Reserve is a cooperative program between the North Carolina Department of Environment and Natural Resources, Division of Coastal Management and the National Oceanic and Atmospheric Administration.

Its tolerance for a broad range of temperatures, salinities, and light enhances its survival in a variety of habitats and seasons. Fragments of *G. vermiculophylla* can rapidly grow to form dense algal mats, which physically alter aquatic habitat, retard water circulation, lower oxygen levels in the water, and accumulate sediment. Large increases in algal biomass can easily supersaturate the water column via photosynthesis. While photosynthesis may produce increased oxygen levels during the daytime, at night only respiration can occur. During this period of no light, the large biomass contained in the algal mat can easily strip the water of all its dissolved oxygen which can lead to death of bivalves, crustaceans, and fish.

The increased prevalence of *G. vermiculophylla* also impacts human activities by fouling crab pots, fishing nets, and industrial water intakes.

*G. vermiculophylla* was first documented in North Carolina waters around Zeke's Island in 2000. Research conducted in 2006 by Dr. Wilson Freshwater of the University of North Carolina Wilmington reported that 94% of potential substrates in a Masonboro Sound study area had attached *G.*



Anoxic areas created by *G. vermiculophylla* (photo courtesy of Byron Toothman)

*vermiculophylla* tissue material. Currently, research staff at the NCNERR are working to better understand how the addition of novel *G. vermiculophylla* algal mat habitat will influence existing habitat types included in the North Carolina Coastal Habitat Protection Plan.

Documenting the impacts of competition between the invasive or native species, and assessing *G. vermiculophylla*'s ability to provide critical habitat functions for valuable estuarine species will be useful for coastal management agencies. Additionally, collaborative research between Duke University and the University of North Carolina Wilmington is also investigating the use of *G. vermiculophylla* as a source of plant growth promoters with the potential for use in high value products. This "turning lemons into lemonade" strategy may lead to better control for this invasive species, with commercial demand facilitating increased harvesting.

To learn more about *Gracilaria vermiculophylla* monitoring and research efforts at the Zeke's Island NCNERR component, please contact Research Biologist [Byron Toothman](#) at 910-962-2334.

**N.C. National Estuarine Research Reserve**  
101 Pivers Island Road  
Beaufort, NC 28516  
(252) 838-0883

**[www.nccoastalreserve.net](http://www.nccoastalreserve.net)**