

Native Salt Marsh Plants and Animals

Flora and Fauna Respond to Restoration Projects

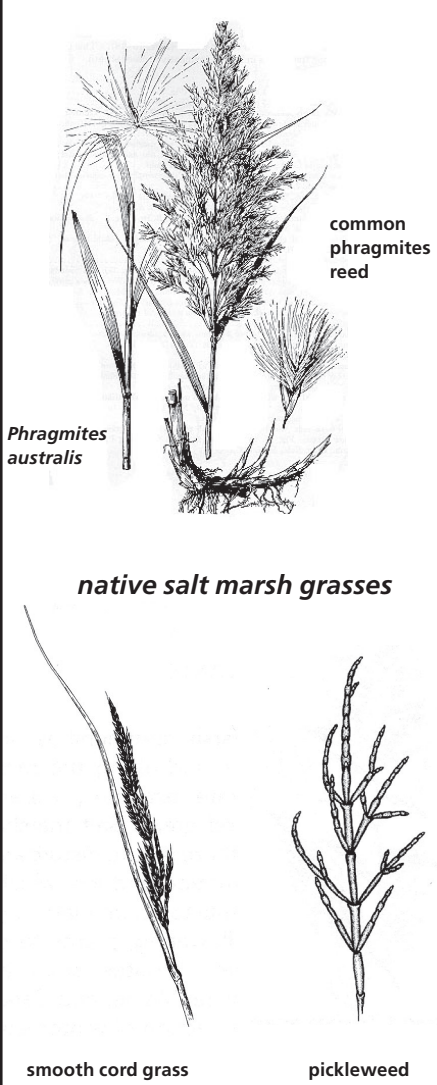
by John Portnoy, PhD., Park Ecologist

Cape Cod National Seashore has an active program of estuarine restoration for the nearly 2500 acres of Outer Cape coastal marshes altered profoundly since the construction of tide-restricting dikes and causeways during the nineteenth and early twentieth century. Tides were restricted by roads and railways built across coastal wetlands, and by dikes intended to limit floodwater mosquito breeding and to promote lowland agriculture. With tide restoration under way since 1999 at 90-acre Hatches Harbor in Provincetown, and just beginning in 700-acre East Harbor (also referred to as Pilgrim Lake) in Truro, both native and introduced plants and animals are responding.

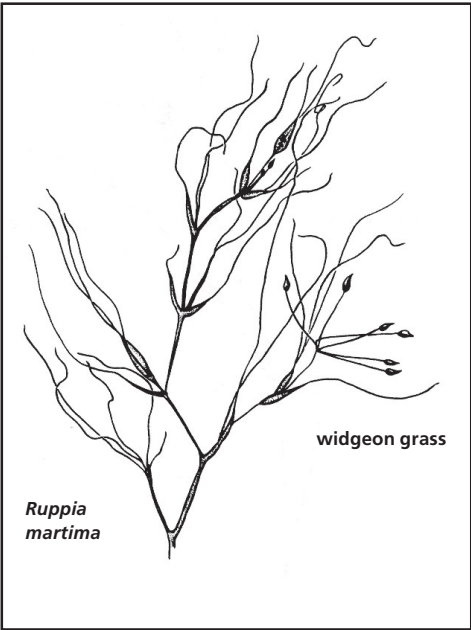
PLANTS

The blockage of seawater over many decades has had varying effects on plants depending chiefly on site-specific differences in marsh surface elevation and distance from the ocean. Some diked salt marsh plant communities that are low in elevations, near creek banks and/or just upstream of leaky tide gates, still receive some seawater, and salt marsh grasses (e.g. smooth cord grass, *Spartina alterniflora*) persist.

Further upstream, and at slightly higher elevations, the water is only brackish. The common phragmites reed (*Phragmites australis*), a highly invasive exotic plant, has typically invaded this region, crowding out native grasses.



Native plant and fish illustrations by Andrea Sulzer are used with permission from the artist, originally produced for the book *Life Between the Tides: Marine Plants and Animals of the Northeast*, written for the Maine Sea Grant Program by Les Watling, Jill Fegley and John Moring, published by Tilbury House Publishers of Maine.



At even higher elevations, and where ditch drainage has lowered the water table, the normally waterlogged peat has become perennially drained, allowing the near-total displacement of wetland plants by upland herbs, trees and shrubs.

With the return of the tides at Hatches and East harbors, native salt marsh plants are also returning. Unnoticed by most of us, a slow and silent territorial battle is raging among the plants of the marsh surface. By restoring high salinity and water levels, we tip the battlefield in favor of native salt marsh vegetation by stressing and killing the recent invaders with seawater flooding.

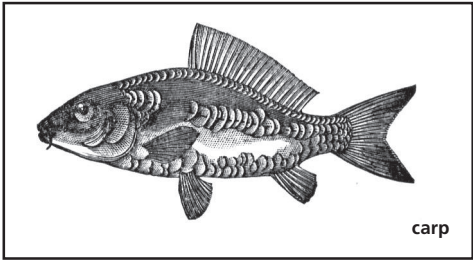
Just above the Hatches Harbor Dike, where until recently vigorous *Phragmites* stood 10 feet high, it now stands brown and stunted over an intensely green carpet of native salt marsh plants recolonizing the area: sea blite (*Suaeda*), pickleweed (*Salicornia*), and *Spartina* - all native salt marsh plants.

Much less conspicuous, but at least as important to estuarine fish and shrimp, has been the sudden appearance last summer of large beds of widgeon grass (*Ruppia maritima*) under the shallow waters of East Harbor. The plant emerged after the seashore and the Town of Truro partially restored the harbor's native salinity, reduced by diking since 1868.

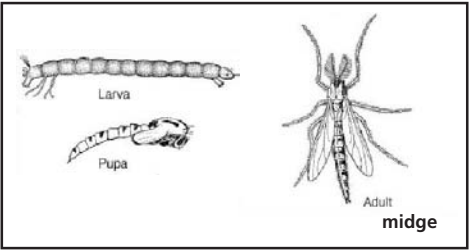
Ruppia is most abundant at moderate salinities. At East Harbor, it teems with estuarine fish, shrimp and other invertebrates. As its name suggests, widgeon grass attracts and feeds several species of migratory and wintering waterfowl. Black ducks have become very frequent in the beds, even in summer.

Tide restrictions also reduce or eliminate the marine connection for animals, hindering estuarine and near-shore fish, crustacean, shellfish, and benthic invertebrate migrations that are essential to their life histories and contribute to fish and shellfish production. Tide restrictions also severely disturb natural chemical cycling in estuaries, with damaging effects on water quality and fish habitat.

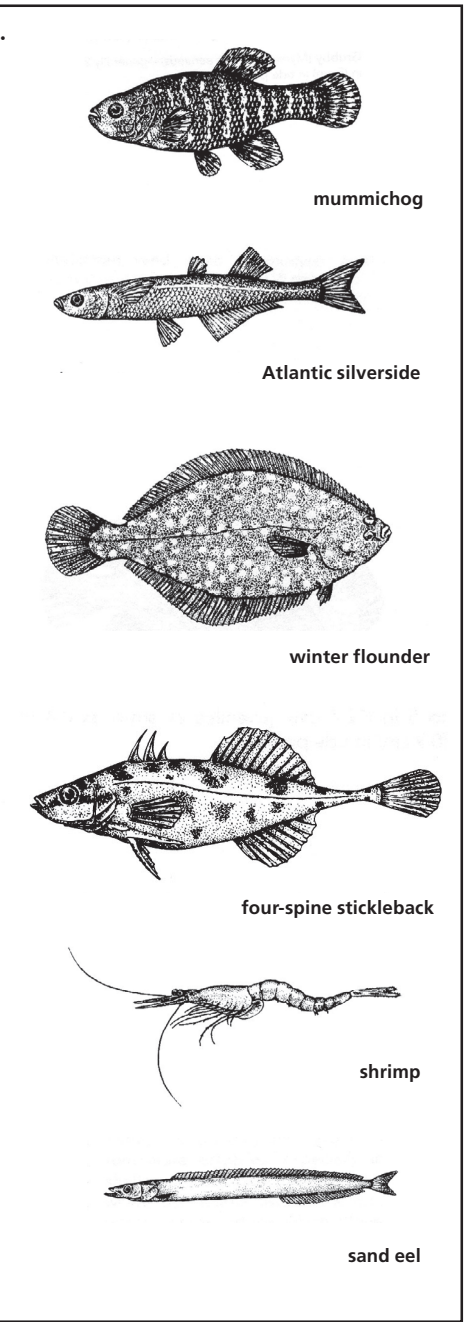
With the reintroduction of salt water, the big change at East Harbor has involved fish and nuisance insects. Before the partial restoration of tidal flushing and salinity, East Harbor was dominated by exotic common carp. These hulking bottom feeders churned



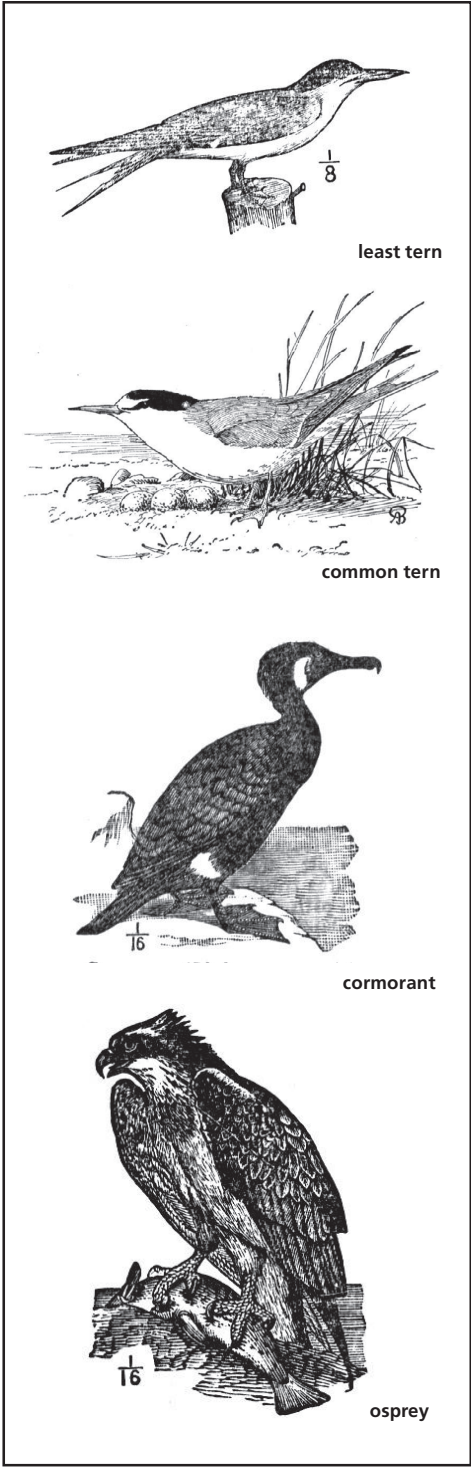
up sediment, muddied the shallow water column and contributed to chronic summer oxygen depletions, to which they are largely immune. Low salinity, no tidal flushing and organically rich bottom sediments led to massive midge (a small non-biting fly)



emergences that episodically blanketed nearby homes and motels and even obscured visibility on adjacent U.S. Route 6. As expected, partial restoration of the harbor's tidal flow has caused the demise of most salt-sensitive carp and nuisance midges. The reestablishment of native estuarine fish has greatly exceeded expectations. Where once only introduced carp, alewives, American eels and white perch could be found, East Harbor now supports a variety of native estuarine fish: mummichog, Atlantic silverside, winter flounder, nine-spine and four-spine stickleback, sand and shore shrimp and sand eels by the thousands.



The modest increase in tidal exchange between East Harbor and Cape Cod Bay has triggered a profound recovery of estuarine animals. Besides the usual flock of gulls that have used the harbor for decades, it's now common to see least and common terns, cormorants and ospreys, ever watchful for new opportunities, hunting the newly abundant mummichogs, silversides and shrimp. Even river otters, normally associated with freshwater environments, continue to fish East Harbor, having apparently made the dietary switch from carp to perch and flounder.



Scientific research conducted here and salt marshes damaged by historic tide restrictions can, to some degree, recover simply through the reestablishment of tidal flow. Our management approach is to restore the marine connection, and then to allow nature to repair itself. Implicit in this approach is the understanding that we have much to learn about salt marsh restoration. To maximize what we learn, and to actively manage any unanticipated problems, tide-restoration projects are accompanied by intensive environmental monitoring. Through systematic monitoring we are seeing some dramatic, and often surprising, examples of the recovery of salt marsh flora and fauna.

Although plant and animal response to tidal restoration has so far been rapid and encouraging, final results are not yet in. Seashore scientists, along with town, state and university cooperators, will continue to monitor these restoration sites, as well as other marshes, both undisturbed and human altered, throughout Cape Cod.