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SAV THE RIVER!

Annuals and Perennials in the River's Garden

BY ANDY MELE

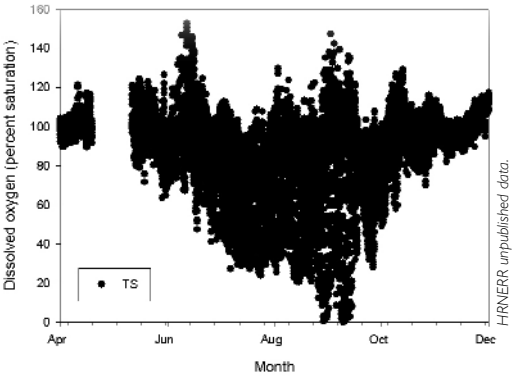
Aquatic rooted plants (macrophytes) are integral to the Hudson River's complex web of physical and biological relationships. It is because of a robust system of rooted plant beds that the river remains a viable habitat for many familiar species. Zebra mussels – the striped villains of so many estuarine tales – might have taken dissolved oxygen levels below pre-Clean Water Act levels were it not for constant oxygen replenishment from submerged aquatic vegetation. As the underwater plant beds go, so goes the river.

But not all rooted macrophytes play the same roles in the drama. True submerged aquatic vegetation (SAV) includes a number of species descended from flowering land plants. Water celery *(Valisneria americana)*, the predominant SAV, is a rhizomal perennial, and its beds provide habitat characteristics that differ significantly from the more conspicuous water chestnut *(Trapa natans)*.

In SAV beds, the river water is rich in oxygen because the plant leaves are fully submerged, and give off their photosynthetic oxygen into the water column. More importantly, the dissolved oxygen from these plant beds becomes distributed throughout the river, compensating for much of the oxygen depletion caused by zebra mussels.

Water chestnut is an annual, and propagates by reseeding itself with the distinctive sharp-horned seed pods sometimes called "devil's heads." The water chestnut seeds remain viable as long as ten years, enabling the plant to weather wide swings in environmental conditions.

Dissolved Oxygen in Tivoli Bays in 2004



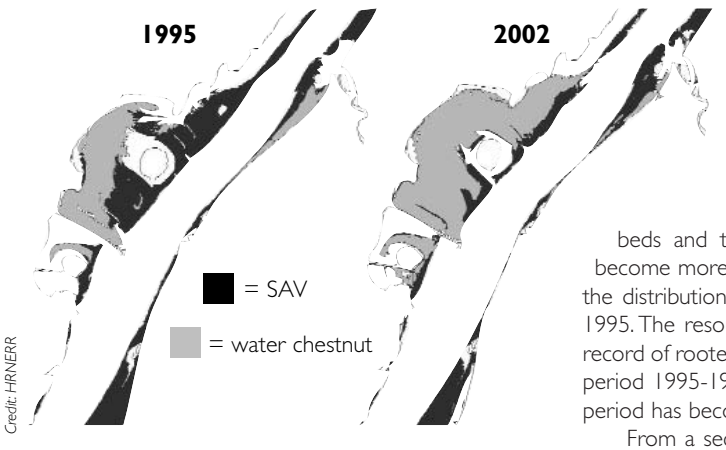
Plot of dissolved oxygen readings in a large water chestnut bed near Tivoli, NY, clearly showing hypoxia and anoxia.

Water chestnut forms thick leaf mats on the water's surface; therefore it is not submerged, and not SAV. It contributes its photosynthetic oxygen to the atmosphere, not the river. It creates deep shade beneath its canopy, and may also impede normal gas exchange between atmosphere and water. Beneath the canopy, hypoxic (low oxygen) and anoxic conditions (zero oxygen) are regularly observed in larger water chestnut beds near low tide. Fish cannot tolerate these events, and must migrate from the beds to open water.

However, in this post-zebra mussel era, water chestnut beds have become a very important habitat for benthic (bottom-dwelling) invertebrates. The benthic inverts, once more evenly distributed across the open, unvegetated river bottom, are being aggressively grazed by very hungry fish, and are finding refuge in water chestnut beds.

According to Hudson River National Estuarine Research Reserve (HRNERR) scientist Chuck Nieder, mapping plant beds and tracking changes in their distribution have become more important than ever. Nothing is known of the distribution of either SAV or water chestnut prior to 1995. The resources and study design to begin creating a record of rooted macrophytes were first put to work in the period 1995-1997, and the information gleaned from that period has become our baseline for further study.

From a second inventory developed in 2002, preliminary, unpublished results seem to indicate that areas occupied by both SAV and water chestnut remain essentially



Inbocht Bay, near Smith's Landing, in 1995 and 2002, showing spread of Trapa in calm bay waters, and gains in SAV acreage in the faster-flowing open river.

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