Students Gather Data for Tidal Flow Restoration Project at Sunken Meadow State Park

Ariana Newell, New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP), Regional Environmental Office, Babylon, NY 11702;
Heather Young, New York State Department of Environmental Conservation (NYSDEC); Larissa Graham, New York Sea Grant

The Problem: Restricted tidal flow

Sunken Meadow Creek was a free flowing tidal tributary to the Nissequogue River, before it was impounded by a dike in the 1950's, with two culverts restricting flow. To restore tidal flow, NYSOPRHP, along with other partners plan to remove the restrictive culverts and allow for natural ecosystem restoration to 132 acres of former estuarine habitat. Increased tidal flow will reduce the amount of *Phragmites australis* and allow the area to return to a native tidal salt marsh community. Habitat restoration will allow improved fish access to spawning areas, provide important nursery habitat for estuarine-dependent species and will increase diversity of other species dependant on salt marshes. This project will enhance ecosystem suitability, species diversity, recreational opportunities, and environmental education opportunities.

Degraded culverts

Dead Alewives

Phragmites monoculture

The Project: Students lend a hand

Since 2008, NYS Parks has worked with the Open Space Stewardship Program (OSSP) on Long Island to conduct much needed environmental monitoring and stewardship projects with teachers and students. In addition to providing valuable data, another goal of the program is to enable students to become stewards of public land and increase their appreciation of the environment.

As part of the tidal flow restoration project, NYSOPRHP partnered with Hauppauge High School's A.P. Environmental Science classes (APES), NY Sea Grant, NYSDEC, and OSSP to develop a long-term habitat monitoring program along Sunken Meadow Creek located in Sunken Meadow State Park. Data collected will be used to monitor changes in the system before, during, and after tidal flow is restored to the creek.

This is the third school year that students from Hauppauge's APES program have collected pre-restoration monitoring data. They collect data on water quality, macro-invertebrates, fish, wildlife and plants each month during the fall and spring of the school year to gather pre-restoration data which will be useful to NYS Parks and other agencies.

Some of the techniques students use to gather data are seines and minnow traps to catch fish, hoop traps to catch turtles and D-nets for macroinvertebrates. Water quality parameters tested include temperature, pH, dissolved oxygen, salinity, nitrates, phosphates, and carbon dioxide.

Students collecting water quality and fish data

Changes in Sunken Meadow Creek and the landscape over time (1930 vs. 2007). The creek channel was moved, dredged, and a dike was constructed during park expansion in the 1950's.

Figure 1. Salinity Levels Along Sunken Meadow Creek

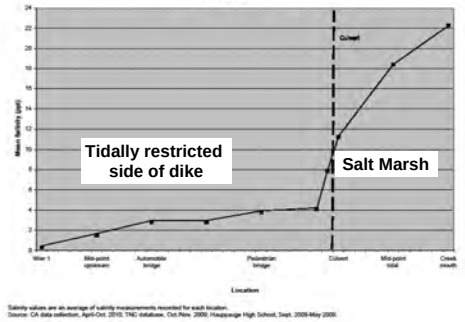
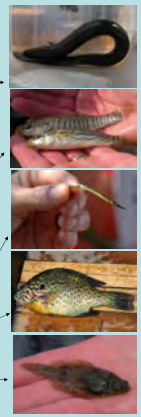


Table 1. Fish species captured during monitoring efforts 2008-2011

Common name	Scientific name	Inside Tidally Restricted Area (Upstream of dike)	Outside Tidally Restricted Area (Downstream of dike)
Fish			
American Eel	*Anguilla rostrata*	X	X
Blueback Herring	*Alosa aestivalis*		X
Alewife	*Alosa pseudoharengus*	X	X
Atlantic Menhaden	*Brevoortia tyrannus*		X
Golden Shiner	*Notemigonus crysoleucas*	X	
Banded Killifish	*Fundulus diaphanus*	X	
Striped Killifish	*Fundulus majalis*		X
Mummichog	*Fundulus heteroclitus*	X	X
Sheepshead Minnow	*Cyprinodon variegatus*	X	X
Atlantic Silverside	*Menidia menidia*	X	X
Nine spine stickleback	*Pungitius pungitius*	X	X
Four spine Stickleback	*Apeltes quadracus*	X	
Northern Pipefish	*Syngnathus fucus*	X	X
White Perch	*Morone americana*	X	
Pumpkinseed Sunfish	*Lepomis gibbosus*	X	
Sand Lance	*Ammodytes americanus*		X
Grubby	*Myoxocephalus aenaeus*		X
Winter Flounder	*Psuedopleuronectes americanus*	X	
Mosquitofish	*Gambusia holbrooki*	X	



Views on each side of the culverts

Healthy salt marsh on unrestricted side of culverts

Unhealthy, tidally restricted side of culverts

The Plan: Restoring tidal flow

Tidal flow will be restored to the creek by replacing the existing dike with a bridge or large box culverts that will enable tidal exchange that more closely resembles natural tidal conditions that existed before the dike was installed. The increased salinity levels will decrease the density, height and vigor of the *Phragmites,* allowing recolonization of the native *Spartina* marsh community. Fish and wildlife utilization is expected to increase dramatically as natural vegetative communities and natural tidal flushing are restored, better enabling use of the site as spawning grounds, nursery habitat and foraging habitat for striped bass, bluefish, winter flounder and other predatory and prey species. Foraging habitat is also expected to substantially increase and crabs and shellfish will be able to recolonize the creek, further restoring the ecosystem services the creek once provided. Restoration of tidal flow will reconnect 132 acres of wetlands to daily tidal flushing. The overall goal is resetting the wetland on a long-term trajectory to becoming a self-maintaining ecosystem that is in dynamic equilibrium with sea level and reaching a target restoration that delivers an ecosystem dominated by salt marsh.

The Proof: Students collect data and become stewards

Results of the students' research showed that there was decreased salinity and dissolved oxygen levels on the restricted side of the culvert as compared to the unrestricted side (Figure 1). The fish assemblage on the salt marsh side of the culverts are typical estuarine species, while the restricted side the culvert had more freshwater species present (Table 1). Other wildlife species were noted, such as diamondback terrapins, horseshoe crabs, and invasive Asian shore crabs. Their monthly visits also showed how the system changes throughout the year. Besides exhibiting an increased knowledge of scientific methods, water quality parameters, and identification of local species, the students showed greater appreciation for nature, Sunken Meadow Creek, and science, and an increased understanding of the problems affecting SMSP. Each year, the students present their findings at OSSP's year end celebration and have received an "Outstanding Stewardship Partner" award for their efforts. This partnership is expected to continue for years to come as the project progresses through the implementation and post- construction phases.

A BIG thanks to:

Hauppauge High School's A.P. Environmental Science Classes; Heidi O'Riordan and the NYSDEC's Region 1 Fisheries Unit staff; Angel Dybas, Cornell Cooperative Extension; The Nature Conservancy; Long Island Sound Study; Long Island Botanical Society; New York Sea Grant; Save the Sound; NOAA; USFWS; and OPRHP's Kate Dunn for her assistance with printing.