

## OYSTER POND ESTUARY REPORT RELEASED

Total nitrogen concentration levels in Oyster Pond need to be reduced by up to 21% to restore it to ecological health, according to the recently released Oyster Pond Estuaries Report. Not surprisingly, the bulk of Oyster Pond's nitrogen (86%) comes from household septic systems that release nitrogen into the groundwater and carry it to the pond. Lawn fertilizers and stormwater runoff are the other contributors. These are the findings of the Massachusetts Estuary Project (MEP) Report for Oyster Pond released by a technical team comprised of the University of Massachusetts Dartmouth School of Marine Science and Technology, the Massachusetts Department of Environmental Protection (DEP) and the Cape Cod Commission.

The nitrogen threshold number was developed through a multi-step process using a Linked Watershed Embayment Management Model that combines layers of information from watershed inputs (delineation of watershed boundaries, land use analysis, groundwater discharge rates, etc.) to embayment circulation and biogeochemical characteristics of nitrogen. The result is a model that determines nitrogen sensitivity and nitrogen threshold loading levels for Oyster Pond and serves as the technical basis for development of Total Maximum Daily Loads (TMDLs). The TMDL, developed by the Massachusetts (DEP), is the amount of pollutant, in this case nitrogen, a system can absorb without impairment of water or habitat quality. Nitrogen, not phosphorus, continues to be the nutrient of concern for Oyster Pond.

Unlike other estuaries in the MEP program, changes in the distribution of eelgrass growing in the pond cannot be used as an indicator of pond habitat quality. Oyster Pond "lost" its eelgrass over a hundred years ago as outlets to the ocean closed and the pond salinity dropped to the currently maintained 2 to 4 parts ppt, too low to support eelgrass. Instead the MEP Technical Team chose to examine the health of Oyster Pond's benthic commu-

*(Continued on pg. 2)*

*Please Join us for the*

**OPET Annual Meeting  
Monday July 24, 2006  
Woods Hole  
Research Center  
149 Woods Hole Rd.**

**7 pm Light Refreshments  
7:30 pm Short Business Mtg**

**Followed by**

**Dr. Brian Howes**

*Lead author of the Oyster Pond  
MEP Report*

**"Results of the  
Oyster Pond Estuary  
Report"**

## Remembering long time OPET Board Member — Martin Keister White 1931—2006

Martin, who preferred to be called Keister, died in March after a long struggle with cancer. He was from Lexington, and he came to Cape Cod after purchasing a vacation home across the street from us at 1 Fells Road--the house that Bob Livingstone lived in for many years. My first conversation with him and his wife Tanya was on the bike path. I stopped to introduce myself, and Keister said, "I know who you are, and we are going to be a lot closer in the near future." It turned out that he knew that we had both signed up for the same Audubon whale-watching trip in Baja California. He was a lover



*Keister White with his wife Tanya.*

of birds and birding, an avid gardener, and it was very fitting that he became a member of the OPET

board. Keister was a pediatrician in Lexington for 40 years, and he was honored and revered by his colleagues and patients and their parents at a memorial service in April. His time on the Cape was too short both in years and on weekends when he and Tanya could get away. He became a good friend, and he was a good friend to Oyster Pond. He greatly enjoyed his pond watch duties with John Downing in all kinds of weather. His presence on the pond, beside the pond, and at OPET board meetings will be missed.

*by Lou Turner*

(Estuary report ...continued from pg. 1)

nity. Benthic organisms such as worms, insect larvae, and crustaceans live at the bottom of water bodies or burrow into the sediments. These organisms are an important link in the estuarine food web, consuming plant debris or plankton and in turn are food sources for fish. Assessing a benthic community's diversity, population densities and distribution is another way to measure the health of an estuarine ecosystem.

Sampling revealed a consistent pattern of moderate to significant impairment throughout the basins of Oyster Pond. Oyster Pond supports both fresh and estuarine invertebrate populations due to its brackish water, but supports only a few species (only 3 per sample overall, as compared to 30 species per sample found in nearby healthy systems) and only a few of those in significant numbers. The distribution of these animals was also low. Altogether, these are indicators of an impoverished community showing the signs of nutrient related stress and low dissolved oxygen levels.

Nitrogen enrichment of estuarine waters impacts oxygen levels by increasing the amount of phytoplankton and algae growing in the water. As the plant and alga matter decompose they promote low dissolved oxygen conditions in the water column. This can cause stratification of the water column, preventing oxygen from moving from the oxygen rich surface layers to the pond bottom. These problems are magnified in a system such as Oyster Pond that already experiences stratification due to differences in salinity. The level of nitrogen enrichment inputs in Oyster Pond is relatively low compared to other systems, but due to its unique nature, this is enough to cause periodic oxygen depletion in waters below 4 meters in the summer.

In order to determine how much nitrogen is causing impairment of Oyster Pond's benthic community, a sentinel site was selected. The sentinel site is a representative location where if nutrient threshold concentrations in the water column are

achieved habitat quality throughout the pond may occur. The OP-3 station, located in the southern basin and also a Pond Watchers and OPET monthly sampling site, was selected. Depths from 0-4 m were targeted for setting the nitrogen threshold levels, as this water depth is impaired the most by nutrient enrichment but if improved, offers the most potentially useable benthic habitat.

Results from the Linked Watershed Model show that to achieve the targeted dissolved oxygen concentrations at the sentinel location, total nitrogen removal rates range from 9% to 15% to 21% depending on the level of minimum dissolved oxygen levels desired – 3.8 mg/l to 5 mg/l to 6 mg/l, respectively. This translates into removing 82% of the septic load without any reductions in fertilizer or stormwater runoff to achieve a minimum dissolved oxygen level of 6 mg/l for waters 0 to 4 meters deep. It should be noted that below 5 mg/l,

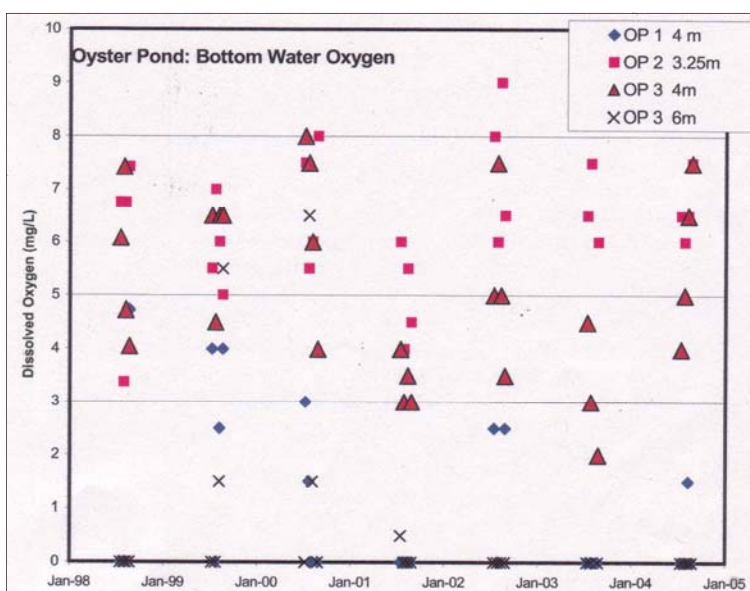
many aquatic organisms are at stress and fish kills can occur at oxygen concentrations less than 2 mg/l.

Reducing septic inputs is just one method for reducing nitrogen inputs. Load reductions can be achieved in many different ways including reducing or removing any or all sources of nitrogen either by engineered removals or via natural attenuation within the freshwater portions of the pond system. The load reductions presented in the MEP report for Oyster Pond represent only one of a suite of options that need to be evaluated by the community.

OPET members are now armed with an understanding of how much nitrogen load should be removed from the Oyster Pond water-

shed system under one specific scenario to achieve ecological health. Now the next phase of questioning – how do we achieve it?

by Wendi Buesseler



Bottom water dissolved oxygen levels measured by Falmouth Pond Watch during July & August, determined from grab samples and Winkler Titrations (to 0.5 mg/L). Note that OP 1, 4 m (within the enclosed northern basin) and OP 3, 6 meters (within the deep southern basin) periodically go anoxic. The benchmark for the threshold analysis is OP-3 at 4 meters, this site had a D.O. >3 mg/L on 96% of sampling dates.

Source: MEP Oyster Pond Report, Jan. 2006

### Officers & Directors 2005–2006

Robert King, <i>President</i>	<i>Directors</i> Carl Breivogel	Arthur Silverstein
Lou Turner, <i>Vice President</i>	John Dowling	Peter Valtin
Bill Kerfoot, <i>Clerk</i>	Susan Gagosian	Martin White
Barry Norris, <i>Treasurer</i>	Max Holmes	<i>Consultant</i>
	Michael McNaught	Wendi Buesseler
	Dana Rodin	<i>Hon. Board Member</i>
		Robert Livingstone

OPET Board meetings are open to all OPET members. Meetings are usually held on the third Sunday of the month, at 4:30 pm in the Tree-tops Clubhouse.

We'd love to have you come!

OPET does not have an official phone, but you can leave a message at 508-540-7345. We'll gladly get back to you!

Or email [asirasking@aol.com](mailto:asirasking@aol.com) or [bisler@adelphia.net](mailto:bisler@adelphia.net).

**Please visit our website [www.opet.org](http://www.opet.org).**

## Specimen Trees at Spohr Garden

A visit to the Spohr Gardens on Oyster Pond, Fells Road in Falmouth, will enable those who are interested in rare trees to see them in good health and some in bloom. With the help of local arborists a number of unusual specimen trees have been identified on the grounds, and the Falmouth Garden Club generously prepared and mounted signs identifying them.

During their 30-year development of the gardens, Charles and Margaret Spohr selected some unusual trees for planting. One of these is the Viburnum, actually a tall shrub. This one, *Viburnum acerifolium*, has maple-shaped leaves. It and the similarly leafed red maple do especially well here. In addition to the American Beech (*Fagus Grandifolia*) growing in the garden, there is a European beech and a beautiful weeping beech in the allee. There are also two Dawn Redwoods (*Metasequoia Glyptostroboides*) growing in the path along the pond.

Several red mulberry trees (*Morus* spp.) are also labeled. These provide a bounty of delicious nuts for both birds and squirrels. Surprisingly, the Sassafras (*Sassafras albidum*) with its finger-shaped leaves, usually more common further South than New England, also grow well here. Miscellaneous evergreens are also in the Gardens, including Japanese

*Cryptomeria*. There are also several Japanese umbrella trees (*Scindopticus Variquillata*).

Another common New England tree is the oak, many of which are growing here. While not unusual, many of the Spohr specimens are decorated by climbing hydrangeas, a graceful vine whose flowers look like the usual hydrangea bush.

One of the few arboreal disappointments are the Eastern hemlocks (*Tsuga canadensis*), originally planted in a long double row forming an allee all the way from Fells Road to Oyster Pond. Like many other hemlocks, these have been beset by the wooley algeid. They have not done well, slowly withering away, and as part of the arborists' work-day project, many dead hemlocks were removed this Spring.

One of the unusual features of the Gardens stemmed from Charlie Spohr's involvement in World War II. He participated in the invasion of France, where he was wounded in action. There he became familiar with the *Aralia* bush, a thorny plant encountered on the almost impenetrable French hedgerows. Charlie planted these in several places in the Gardens, presumably to remind him of those trying days. by *Fran Silverstein*

## Excellent run of Herring at Trunk River this Spring



Significant numbers of herring migrated up Trunk River to enter Oyster Pond to spawn this past spring. "I haven't seen this many fish running in the Trunk River for about 20 years," enthused Carl Breivogal, long time observer of Falmouth's herring population. "In contrast to other runs along the south coast of Falmouth," said Carl, "Trunk River's herring population has improved significantly, while other runs are struggling at recent low levels or declining."

One way to gauge the health of a run is not just the numbers of fish, but also the length of time the run remains active. This year, herring were steadily migrating up Trunk River from mid March to mid May. "It is not just the big peaks that are important but also the shoulders in terms of numbers of fish. The characteristic of a good run is to have a strong run all the way through," said Chuck Martinsen, Falmouth's herring warden. Trunk River is typically most active at night, but this year some herring even migrated on windy, cloudy days. The darkened skies and turbid water gave them cover from hungry herons, gulls and osprey. There also appeared to be a greater number of larger-sized fish in the run. These are the repeat spawners, another sign of a robust population.

Unfortunately, there was a problem with poachers on the river. Perhaps in reaction to the state's 3-year moratorium on the taking of herring, several dams were built across the river. These dams, always built in the middle of the night, make it easier to scoop fish into dip nets. Lou Turner, OPET board member, Carl Breivogal, Chuck Martinsen and I were kept busy this spring dismantling dams and keeping the river pas-



*One of the four dams discovered one morning on Trunk River in mid April. It was built some time after 10 pm, the last time Lou Turner checked the river that evening.*

sage open. On the whole though, Chuck said that the public was good and poaching problems not too wide spread.

Evidence of the fishes' spawning success comes from Bill Kerfoot, OPET board member who reports seeing a cloud of herring fry near the Ransom Road dock. Bill estimates the 30' x 50' group held nearly a million ½ to 1" long fish! When these fish return to spawn in four years, imagine the numbers we will see coming up the Trunk River. That will be a sight to see!

by *Wendi Buessler*



## Plant Survey Of Zinn Park Underway — Nature Walk Planned for September

Mario DeGregorio is half way through a season long plant survey of Zinn Park, the seven acre property owned by OPET on Ransom Road. Mario was hired by the OPET Board to document the existing plants and cover types at the property. Mario is founder of the Botanical Club of Cape Cod and the Islands, and author of several natural history books, including *A Vanishing Heritage: Wildflowers of Cape Cod*.



*A Spinulose Woodfern (Dryopteris carthusiana) with Canada Mayflower (Maianthemum canadense).*

OPET is particularly interested in whether there are rare or endangered species and the presence of invasive exotic plants that threaten the land's native biodiversity. This survey will

assist the board in developing a management plan.

Four surveys will be made over the growing season to "catch" plants at different times of the year. Some plants are difficult to identify until they are in flower while others make only a brief appearance before disappearing until the next growing season. The spring ephemerals are a classic example of this. These fleeting little jewels appear on the forest floor before the trees fully leaf out. During the early May survey, there were carpets of Starflowers (*Trientalis borealis*), Canada mayflower (*Maianthemum canadense*) and Bellworts (*Uvularia sessilifolia*) just as Lady slippers (*Cypripedium acaule*) were emerging from the ground.

So far, two surveys found over 70 plant species. The good

news is there are several wonderful trees of significant size on the site – beeches (*Fagus grandifolia*), tupelos, (*Nyssa sylvatica*) Atlantic white cedars (*Chamaecyparis thyoides*) and possibly a huge elm or American linden. The tree is so tall it is difficult to see its leaves. Once the tree is fully leafed out or blossoming it will be easier to identify. Most likely it is a linden, as few elms survive to any size in the wild due to Dutch elm disease. The few remaining elms in Falmouth manage to limp along due to their constant, expensive treatment from the town's tree warden.

The bad news is there are about a dozen invasive species in the Park. Luckily, most of them currently appear in small, manageable numbers. The biggest problem by far is with bush honeysuckle (*Lonicera morrowii*). A large patch is growing under the large elm/linden tree near Mosquito Creek. This area looks like the remains of an old dump, which makes sense. Invasive plants like to move in and quickly take advantage of disturbed areas muscling out our native plants. OPET needs to develop a management plan to eradicate these plants before they take over the entire low land near Mosquito Creek. We also need a strategy for dealing with the other invasives before they spread and we have to deal with large numbers of even nastier invasives such as Oriental bittersweet (*Celastrus orbiculatus*) or Multiflora rose (*Rosa multiflora*).



*The delicate flower of Trailing arbutus or Mayflower (Epigaea repens).*

Taking part in these surveys allows one to appreciate the quiet beauty of Zinn Park. On the first survey we saw the Massachusetts state flower, Trailing arbutus, or Mayflower (*Epigaea repens*). People come from Boston to see this flower on Cape Cod as it has nearly disappeared in their area as a result of development. This low, creeping evergreen likes to grow along the edges of woodland paths. If you lift the leaves you can find tiny, white bell-shaped flowers and if you crouch low enough, you can smell its sweet scent. It is discoveries such as these that make Zinn Park special.

Luckily for OPET members, you too can get a chance to enjoy the beauty of Zinn Park. Mario will combine the final plant survey in September with a nature walk, date and time to be announced. Watch for notices on the OPET web site ([www.opet.org](http://www.opet.org)) and the Falmouth Enterprise.

by Wendi Buesseler

### Upcoming Events

#### OPET Annual Meeting

Monday, July 24 7:00 pm

#### Phragmites Removal Work Day

End of Aug.

Please contact us (see page 2) if you are interested in helping. We can add you to our email or phone list.

#### Nature Walk of Zinn Park w/ Mario DeGregorio

September TBA

Join us for a tour of Zinn Park with noted botanist Mario DeGregorio author of *Cape Cod Wildflowers: A Vanishing Heritage*

#### Interested in becoming more active in OPET?

We are looking for officers and directors to serve on OPET's board.

Contact Rob King  
508-548-8403