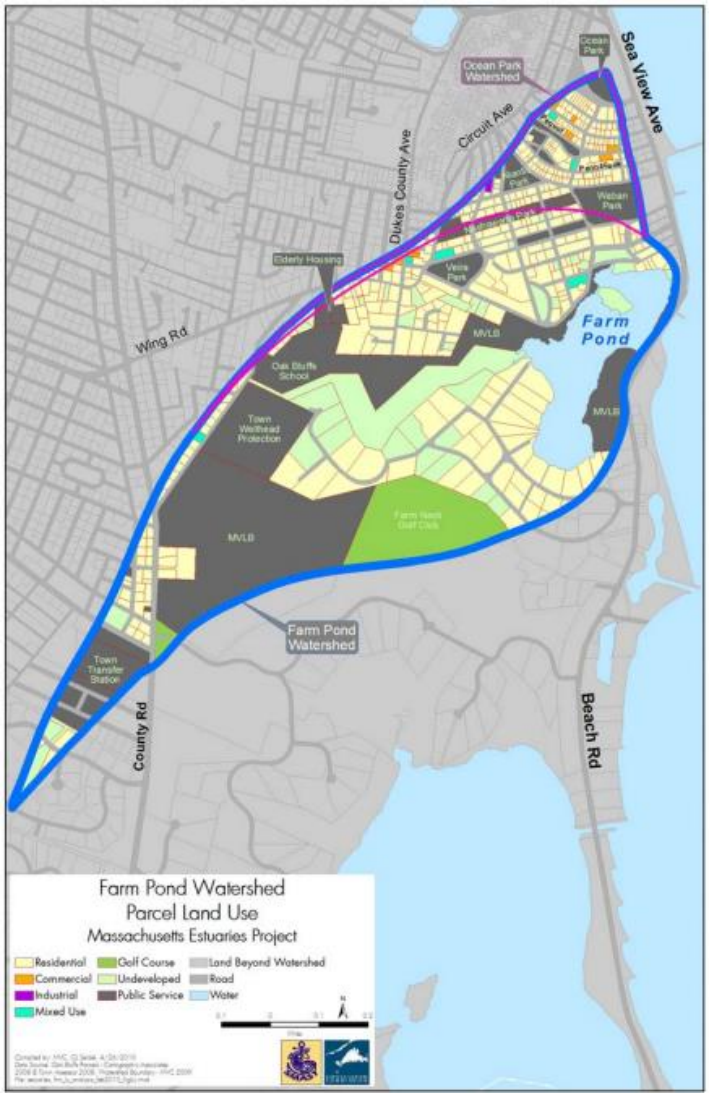
MARTHA'S VINEYARD COASTAL PONDS FACT SHEET

HIGHLIGHTS OF THE MASSACHUSSETTS ESTUARIES PROJECT REPORT

Farm Pond

In 2010, the Massachusetts Estuaries Project (MEP) published its study of Farm Pond, on Martha's Vineyard. The following are highlights from this study, prepared by staff of the Martha's Vineyard Commission. This should be read in conjunction with *"Highlights of the MEP: Nitrogen Loading in Coastal Ponds"* which explains some of the process and technical terms referred to in this summary.



1. The Pond and the Watershed

- Farm Pond is a 42 acre coastal salt pond (at high water) that includes about 8 acres of salt marsh, in the Town of Oak Bluffs
- The Pond's watershed is, about 10 times larger than the pond, at 402 acres
- The Pond is characterized by a single main basin with a small upper basin partially separated by an undeveloped island, Woody Island, which was detached from the upland by an artificial channel
- The Pond is tidally connected to the Nantucket Sound through a single inlet
- Farm Pond is placed on the Massachusetts' Wetland Restoration Priority List

2. Current Water Quality

Generally, the water quality in the pond is showing moderate nitrogen enrichment and impairment of both eelgrass and infaunal habitats. Nitrogen management of this system will be for restoration rather than for protection or maintenance of existing conditions.

- **Dissolved Oxygen:** The table below shows the percentage of time dissolved oxygen stayed above the acceptable limit of 6 ppm.
- **Pond-Bottom Habitat:** A study was conducted at 4 stations throughout the pond. Diversity and Evenness of species were very low consistent with the frequent summertime hypoxia in bottom waters and the organic rich soft sediments with only a thin oxidized surface layer.
- **Eelgrass:** Although the population exists across a relatively large portion of the system particularly in the south basin, there was an expected slight decline resulting from the increased nitrogen loadings in the last 10 years.
- **Algae (Chlorophyll):** A continuous record of dissolved oxygen and phytoplankton over 43-day period indicated that the pond rarely contains too much organic matter with algae exceeding desirable levels showing moderate impairments.

Table 1**: Water Quality in Farm Pond**

	Dissolved Oxygen (above acceptable limit)	Habitat Rating (degree of impairment)	Existence of Eelgrass Beds	Algae (degree of impairment)
North Basin	67%	Severe	Yes	Moderate
South Basin	67%	Significant	Yes	Moderate

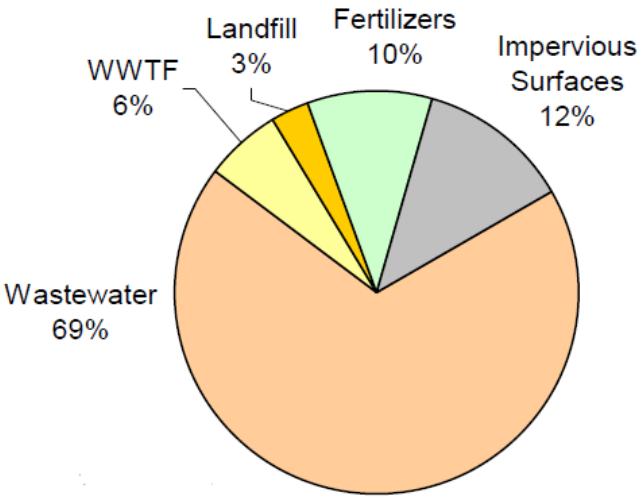
Table 2: **Farm Pond Nitrogen Loads**

Sources of Nitrogen Loading	**Amount** (kg/y)	**Share of Manageable Load**	**Share of Total Load**
Septic Systems (wastewater)	1,482	69%	61%
Treatment Facility (wastewater)	132	6%	5%
Landfill	68	3%	3%
Fertilizer (lawn use)	217	10%	9%
Runoff	264	12%	11%
Manageable Total	**2,163**	**100%**	**90%**
Atmospheric Deposition	179		7%
"Natural" Surfaces	68		3%
Total Load current	**2,410**		**100%**
Buildout	**432**		
Total at buildout	**2,842**		

3. Current and Projected Nitrogen Loading

Sources of Nitrogen

Current sources of nitrogen are shown in Table 2 on the opposite page, which shows both the *Manageable and Total Loads*. The full MEP report gives detail by sub-watershed.



Sources of Manageable Nitrogen Load

- **Septic Systems (Wastewater):** Based on Census in 2000, MEP was able to estimate that the amount of nitrogen contributed by the on-site septic systems using average per capita water usage results in 69% of the watershed's manageable load.
- **Treatment Facility (Wastewater):** The treatment facility (WWTF) treats wastewater from a sewer collection system generally concentrated in the most densely developed portions of town, contributing 6% of the nitrogen load.
- **Landfill:** Although capped in 1998, the landfill continues to release nitrogen through groundwater.
- **Fertilizer Application:** Fertilizer from residential/commercial lawns and Farm Neck Golf Club represent 10% of the overall contribution of nitrogen. This is based on established loading rates, lawn size, and the size of the golf club. A leaching rate to groundwater of 20% is used.
- **Runoff:** Precipitation and other water sources traveling on impervious surfaces (i.e. asphalt, concrete, rooftops, etc.) will go directly into the pond and/or potholes, carrying nitrogen and other harmful nutrients with no treatment, contributing 12% of the total manageable load.
- **Atmospheric Deposition:** Acid rain deposits nitrogen from polluted air, largely from upwind coal-fired power plants and other industrial sources off-Island.
- **"Natural" Surfaces:** Sources of nitrogen that enter the pond through land (permeable surfaces) within the watershed through groundwater.

Tidal Flushing

The overall system presently exchanges tidal waters near the eastern shore with Nantucket Sound via two culverts. However, tidal flushing of this system has been highly altered over the past 150 years by storms and human alteration; most recently the second culvert, opened in 2004, stayed open for only one week. Farm Pond supports a very limited/restricted tidal exchange due to the size of the inlet (4-ft wide culvert) thus increasing the sensitivity of an estuary to nitrogen inputs.

4. Goal and Nitrogen Limits

Goal

For the Farm Pond, the MEP set the goal of restoring and maintaining SA waters or high habitat quality. This is defined as supportive of eelgrass and infaunal communities.

Nitrogen Concentration Limits

The current overall nitrogen loading – an average of levels that vary from 0.51 parts per million (ppm) to 0.530 ppm – is:

0.52 ppm.

The MEP sets the target for maximum average total nitrogen concentration at:

0.45 ppm.

Meeting this target requires a 14% reduction to deal with current loads. When this target is reached and maintained, the amount of dissolved oxygen and algae will be acceptable and eelgrass will thrive. A healthy infaunal habitat can clearly be achieved at this level.

5. Approaches to Improving Water Quality

It is important to note that load reductions can be produced by reduction of any or all sources or by increasing the natural attenuation of nitrogen within the freshwater systems to the embayment. The nitrogen load reductions within the system necessary to achieve the threshold nitrogen concentrations will require the following:

- Removal of 40% of the septic nitrogen load from entire system

One alternative would be to take advantage of natural attenuation, which could not only significantly reduce the nitrogen load but also ensure the most cost-effective strategy.

Another cost-effective alternative would be to construct a wider, larger inlet (culvert) to increase tidal flushing thus helping to reduce the nitrogen concentrations throughout the system, and reduce the amount of watershed nitrogen load necessary to achieve the target threshold concentrations. This option is currently under planning.

Another approach is to examine the Best Management Practices for landscape fertilizer use to reduce the nitrogen inputs from the agricultural and lawn fertilizer uses.

Note: These highlights were prepared by MVC staff, which made every attempt to accurately summarize the MEP report. However, for full and accurate information please use the original report, especially for decision making.

The full MEP report on the Farm Pond is available at: http://www.oceanscience.net/estuaries/report/FarmPond/FarmPond_MEP_Final_Report.pdf

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