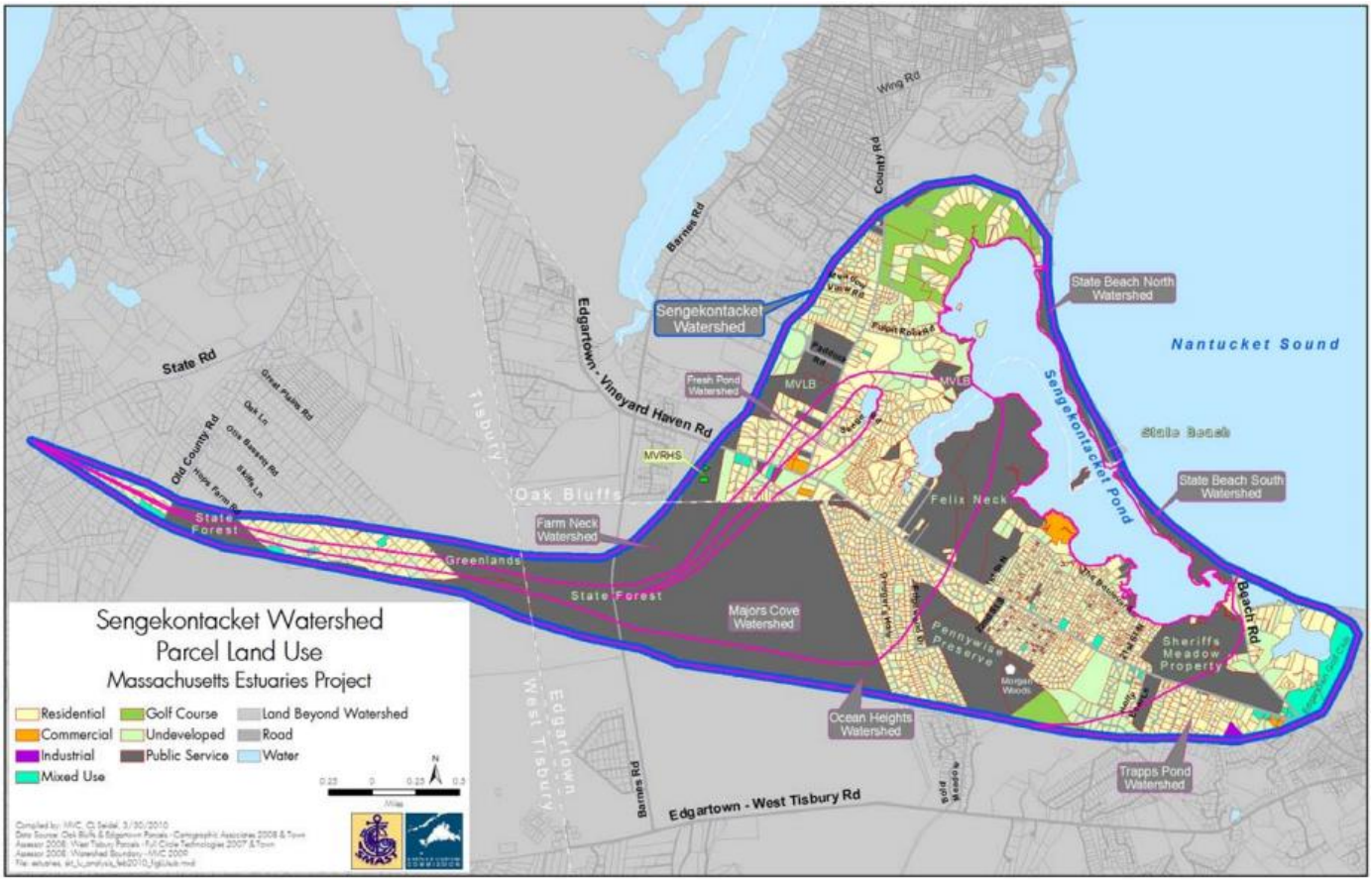
MARTHA'S VINEYARD COASTAL PONDS FACT SHEET

HIGHLIGHTS OF THE MASSACHUSSETTS ESTUARIES PROJECT REPORT

Sengekontacket Pond

In 2011, the Massachusetts Estuaries Project (MEP) published its study of Sengekontacket Pond, on Martha's Vineyard, Massachusetts. 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

- The Sengekontacket Pond is about 716 acres, in the Town of Oak Bluffs and Edgartown
- The Pond's watershed is about six times greater than the pond, namely 4,440 acres, mostly in Oak Bluffs and Edgartown with a small area in West Tisbury
- The Pond is divided into 2 main basins: North and South; and 2 tributary sub-embayments: Majors Cove and Trapps Pond
- The watershed is made up of six sub-watershed areas, each discharging to the Pond's estuary, and then into the ocean

2. Current Water Quality

Generally (at present), the water quality in the pond is showing low to 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 unimpaired system

- **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 19 stations throughout the pond. Southern main basin supports the poorest habitat with nitrogen enrichment, while Majors Cove supports slightly higher quality habitat, although still moderately impaired with nitrogen enrichment. Trapps Pond and northern main basin support low to moderate impairment habitats.
- **Eelgrass:** Eelgrass has nearly disappeared several times in the last sixty years.
- **Algae (Chlorophyll):** A continuous record of dissolved oxygen and phytoplankton at 4 locations over a 48-day period indicated that the ponds rarely contain too much organic matter with algae exceeding desirable levels showing low to moderate impairments while Trapps Pond only showing moderate impairment.

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

	Dissolved Oxygen (above acceptable limit)	Habitat Rating (degree of impairment)	Existence of Eelgrass Beds	Algae (degree of impairment)
Majors Cove	N/A***	Moderate	Yes*	N/A***
Trapps Pond	71%	Low to Moderate	Yes**	Moderate
Northern Basin	37%	Low to Moderate	No	Low to Moderate
Southern Basin	45%	Significant-Moderate	No	Low to Moderate

*Exists only within a small portion of the system at the upper reaches
** Only in the inner and outer basins of Trapps Pond
***Mooring (data collector) could not be located and retrieved, assuming it was stolen and vandalized

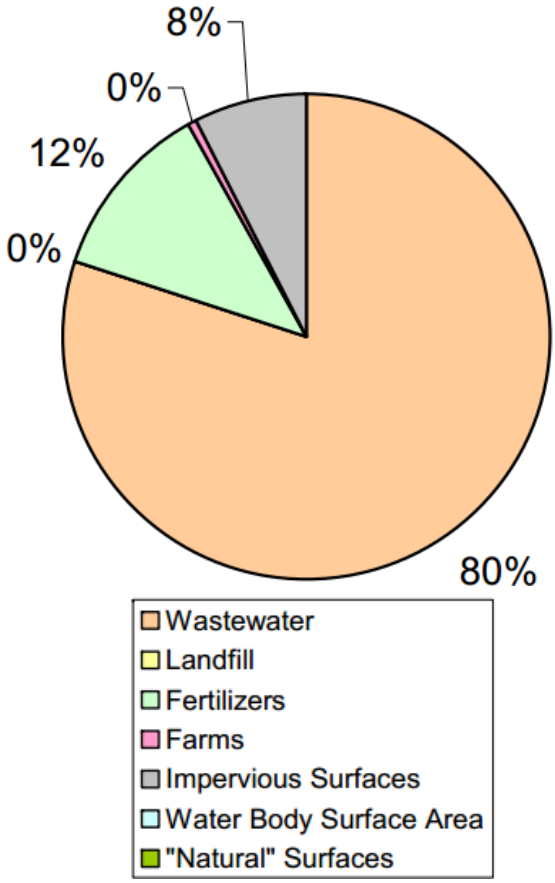
Table 2**: Sources of Nitrogen Loading in Sengekontacket**

	Amount (kg/y)	**Share of Manageable Load**	**Share of Total Load**
Septic Systems (wastewater)	10,255	80%	58%
Landfill	26	0%	0%
Fertilizer (Lawn use)	1,540	12%	9%
Fertilizer (Agricultural use)	47	0%	0%
Runoff	972	8%	5%
Manageable Total	**12,840**	**100%**	**72%**
Atmospheric Deposition	4,110		23%
"Natural" Surfaces	851		5%
Total Load current	**17,801**		**100%**
Buildout	**4,595**		
Total at buildout	**22,396**		

3. Current and Projected Nitrogen Loading

Sources of Nitrogen

Current sources of nitrogen are shown in the table below, 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 the amount of nitrogen contributed by the on-site septic systems using average per capita water usage, resulting in 80% of the manageable nitrogen load.
- **Landfill:** Although capped in 1998, the landfill continues to release nitrogen through groundwater.
- **Fertilizer Application:** Fertilizer from residential lawns, golf clubs and agriculture represents 12% of the overall contribution of nitrogen. This is based on established loading rates, lawn size and acres of measured golf turf and agricultural fields. A leaching rate to groundwater of 25% 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 with no treatment, contributing 8% of the nitrogen 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 supports two separate armored inlets: North and South, through which tidal exchange with adjacent Nantucket Sound occurs. While tidal-flows within Sengekontacket Pond are unrestricted due to the width and depth of the channels, the exchange with Trapps Pond is significantly restricted, which reduces the flushing of Trapps Pond waters and increases the sensitivity of the pond to nitrogen loading. Although the influence of human-induced changes has increased nitrogen loading to the systems and contributed to the degradation in ecological health, the Sengekontacket Pond basins are especially sensitive to nitrogen inputs because of the characteristics of tidal exchange with Nantucket Sound water.

4. Goal and Nitrogen Limits

Goal

For the Sengekontacket 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 0.210 parts per million (ppm) to 0.610 ppm with the depth of 2 meters– is: 0.410 ppm.

The MEP sets the target for maximum average total nitrogen concentration at: 0.350 ppm.

Meeting this target requires a 15% 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 60% of the septic nitrogen load from Majors Cove watershed
- Removal of 100% of septic nitrogen load from Trapps Pond watershed

The Trapps Pond watershed does not contain a significant amount of development, however due to the limited tidal flushing occurring between the two shallow basins that comprise Trapps Pond and the main basin, there was no other alternative available to meet the nitrogen threshold physically altering the culverts within Trapps Pond.

One specific scenario was ran by the MEP staff to divert the existing septic wastewater from Ocean Heights/Arbutus Park subwatershed to the Edgartown Wastewater Treatment Plant Facility, which could significantly reduce (-61.3%) in the wastewater related nitrogen loading as well as improve the health of sub-basins adjacent to Ocean Heights and Trapps Pond. However, this reduction is not sufficient by itself in fully restoring the nitrogen impairment to the Sengekontacket Pond System.

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.
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The full MEP report on the Sengekontacket Pond is available at:
http://www.oceanscience.net/estuaries/report/Senge/Senge_MEP_Final_Report.pdf

MARTHA'S VINEYARD COMMISSION
BOX 1447, OAK BLUFFS, MA 02557
PHONE: 508-693-3453 FAX: 508-693-7894
INFO@MVCOMMISSION.ORG WWW.MVCOMMISSION.ORG