Dr. Steve M. Raciti
Assistant Professor of Biology

Hofstra University
Department of Biology
Gittleson Hall
Hempstead, NY 11549
Email: steve.m.raciti@hofstra.edu

December 15, 2021

Nitrogen Sequestration from a Floating Wetland Pilot Project in Fort Pond, Montauk, NY

Methods and Results:

Floating wetlands were installed in Fort Pond in Montauk, NY to assist with nitrogen sequestration from this waterbody. The floating wetlands were installed using 6 islands with 4 floating mats per island. Based on photographic records taken during the project period, we estimated that 5,616 plants were actively growing among the 6 islands.

Based on representative samples of 4 plant species on the islands the average wet weight of each plant was 167g (dried weight of 32g). In total 935 kg (about 2000 lbs) of wet plant material was harvested, which was equal to 180 kg (about 400 lbs) of dry plant material. The average nitrogen concentration of this dried plant material was 0.96% (SE = 0.035%).

Based on the mass and nitrogen content of the collected plant material, we can conclude that approximately 1.73 kg of nitrogen (N) was sequestered from Fort Pond by the plants themselves. Based on a floating wetland area of 384 m^2, this equates to a nitrogen removal rate of 45.1 kg N/ha (SE = 1.6). That is to say that for a hypothetical hectare of floating wetland area, we would expect to remove 45.1 kg of nitrogen by direct incorporation of nitrogen into plant tissues. To put that number into greater context, this is approximately 3 times larger than the rate of atmospheric nitrogen deposition to this region of Long Island (e.g. Gobler et al. 2016).

Direct uptake by plants is only one way that wetlands can help remove nitrogen from waterbodies. Past studies of floating wetlands have demonstrated that they can help remove nitrogen by stimulating denitrification (i.e. the microbial conversion of reactive nitrogen into harmless nitrogen gas), which may have a larger influence on nitrogen removal than direct uptake by the plants themselves (Barco et al.

2020, Choudhury et al. 2019, Pavlineri et al. 2017). Unfortunately, we were not able to measure denitrification rates before and during the project period to obtain estimates of this effect, but we suspect that it is another important method of nutrient removal that is enhanced by floating wetlands such as the ones installed at Fort Pond.

I have attached a table that outlines the values used in these calculations. Please feel free to contact me if you have any questions about this work or these calculations.

Sincerely,

Steve Raciti

Steve M. Raciti
Associate Professor of Biology
Hofstra University

Dry sample weights of plants:	**Dry weight (g):**	**Wet Weight (g)**
Iris Versicolor:	53.9	323.2
Carex Crinita:	31.7	170.1
Carix Lurida:	32.9	133.2
Petlandra Virgi:	10.0	39.7

Average Wet Plant Weight (g)	166.6
Average Dry Plant Weight (g)	32.1
Number of Plants	5616
Average Nitrogen Concentration	0.96%
SE of the mean for N Concentration	0.035%
Total Plant Wet Mass (kg) (entire project)	935.4
Total Plant Dry Mass (kg) (entire project)	180.5

	Total	**SE**
Nitrogen Sequestered (kg)	1.73	0.06
Nitrogen Sequestered (kg N/ha)	45.1	1.6

Comparison to other N inputs

Atmospheric N Deposition (kg N/ha) 18 Source: Gobler et al. 2016

Other Assumptions

Each mat appears to have 26 x 9 = 234 wells for plants.
(26 x 9) x (4 mats) x (6 islands) = 5616 plants
Mat size appears to be approximately (2m x 8m) = 0.0016 ha
Total Mat Area 384 m2 or 0.0384 ha