



Taiga Wetlands – How Volunteers Restored Habitat in an Urban Lake with Constructed Floating Wetlands

Rob Zisette
SWS 6-30-23



Friends of Green Lake



City of Seattle



BIOMATRIX
WATER



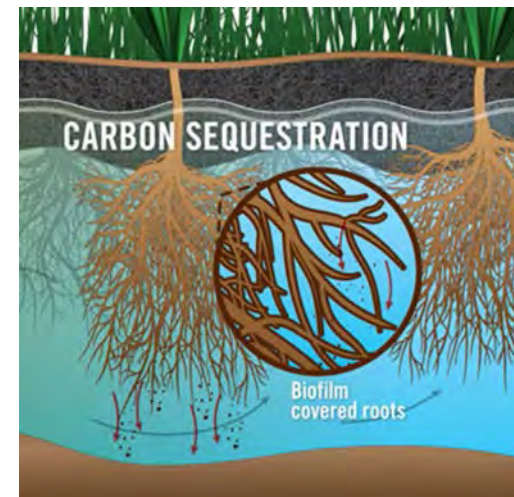
HERRERA
Science + Planning + Design

Introduction	<ul style="list-style-type: none">• Floating Wetland Benefits and Types
Planning	<ul style="list-style-type: none">• Project Planning and Funding• August 2018 – September 2021
Design	<ul style="list-style-type: none">• Project Design, Permitting, and Procurement• January 2021 – April 2022
Installation	<ul style="list-style-type: none">• One Day Event• May 28, 2022
Monitoring	<ul style="list-style-type: none">• Plant Surveys and Waterfowl Management• July 2022 – June 2023
Next Steps	<ul style="list-style-type: none">• Ecosystem Monitoring and Maintenance• 20+ Years



Floating Wetland Benefits

- Inexpensive bird and fish habitat without land cost and plant loss
- Root biofilm takes nutrients from water reducing algae blooms and supporting invertebrates for fish food
- High aesthetic and educational value



Floating Wetland Types

1. Homemade Experimental

- Natural/recycled products of limited life and visual quality

2. Traditional Commercial

- Recycled polypropylene and urethane foam of limited life

3. Biomatrix Water

- Recycled/natural materials of high durability and longevity



Biomatrix Water Advantages

- High buoyancy/strength (2,500 kg) and longevity (>20 years) of HDPE tubing
- Design flexibility with varied interlocking shapes and quick-connect stainless-steel flanges
- Natural coir fiber matrix and recycled HDPE netting with zero waste production
- No microplastics, phthalates, PVC, or polyurethane foam
- Increased nutrient uptake with underwater media columns



Project Planning

August 2018 – September 2021

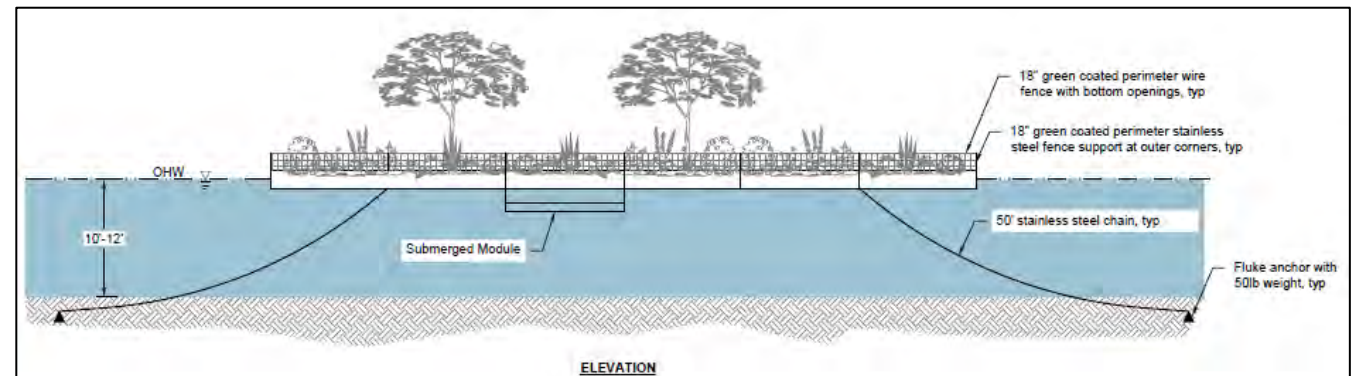
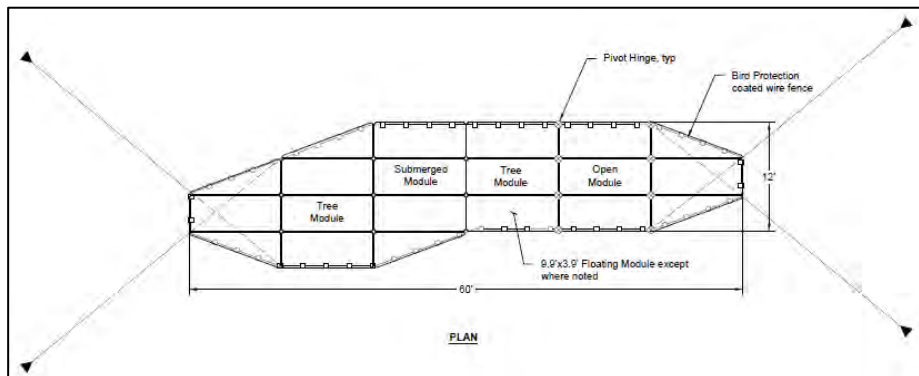
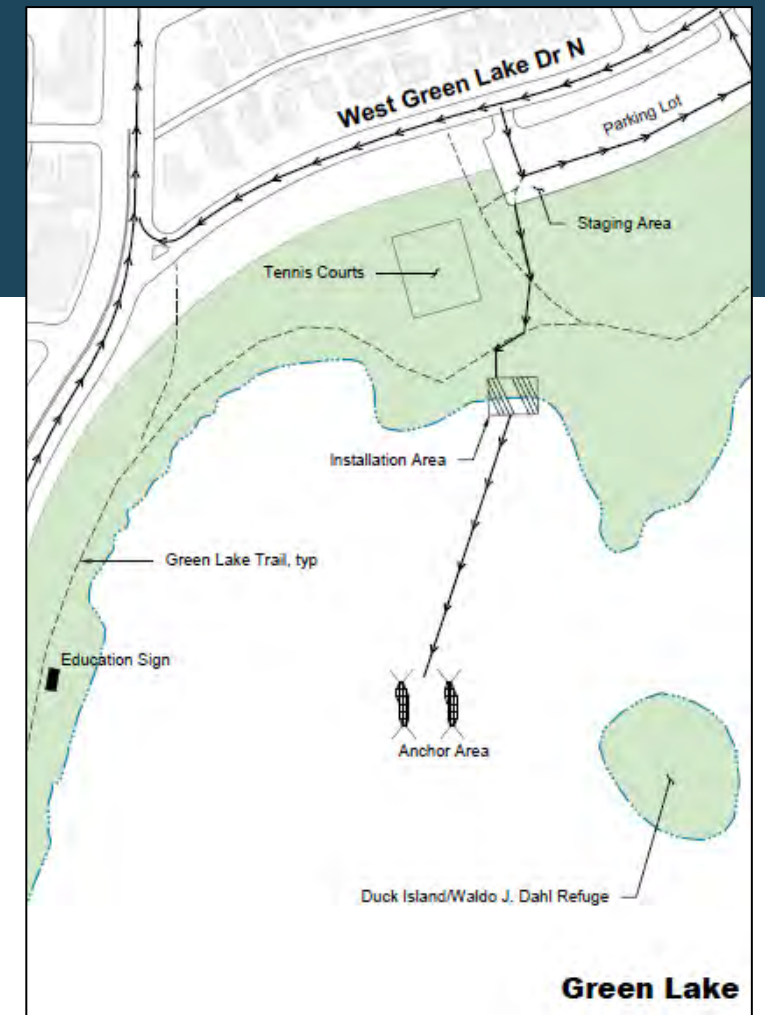
- Taiga Hinckley and other donations of \$15,000 to FOGL
- Select FW to best meet Taiga's interests
- Seattle Neighborhoods Grant of \$50,000 on second try
- Simple JARPA for HPA permit
- Park use permit



Project Design

January 2021 – April 2022

- Duck Island site selection
- Pair of 680 ft² islands
- Open, submerged, and tree modules
- Goose fencing with duck doors
- Four 30-lb anchors on 50-ft, 3/8-inch steel chain/island at 45 degrees to withstand 15–30 mph winds (W-S)
- Education and keep-off signs



Wetland Procurement January – April 2022


- Issue RFP, receive two bids
- Select Biomatrix Water
- Finalize design
- Announce installation event
- Prepare planting plan and order plants from Go Natives
- Ship modules in 3 weeks
- Unload truck and store at Parks Maintenance Yard

COMING TO GREEN LAKE

TAIGA WETLANDS


FLOATING ECOSYSTEM DEMONSTRATION PROJECT!

Infrastructure Quality Floating Ecosystems



FRIENDS OF GREEN LAKE (FOGL)
is seeking contributions to raise an **additional \$10,000**
for materials and future monitoring.
Help support our efforts with a tax deductible donation!

Scan this code



FOGL Taiga Wetlands
@FOGLTaigaWetlands

or send a check to
Friends of Green Lake
P.O. Box 30544
Seattle, WA 98113


venmo


Memorial Day Weekend
May 28 & 29, 2022


Built by
Biomatrix Water
and funded by the generosity of
Seattle Neighborhoods
and **Individual Donors**


Designed, installed and maintained by
Friends of Green Lake (FOGL)
to provide native plant habitat for birds
and wildlife, and underwater biofilm for
nutrient uptake and fish habitat.


friendsofgreenlake.org




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Parks & Recreation

 **BIOMATRIX**
WATER
biomatrixwater.com

 **Friends of Green Lake**
friendsofgreenlake.org

 **HERRERA**
herrerainc.com

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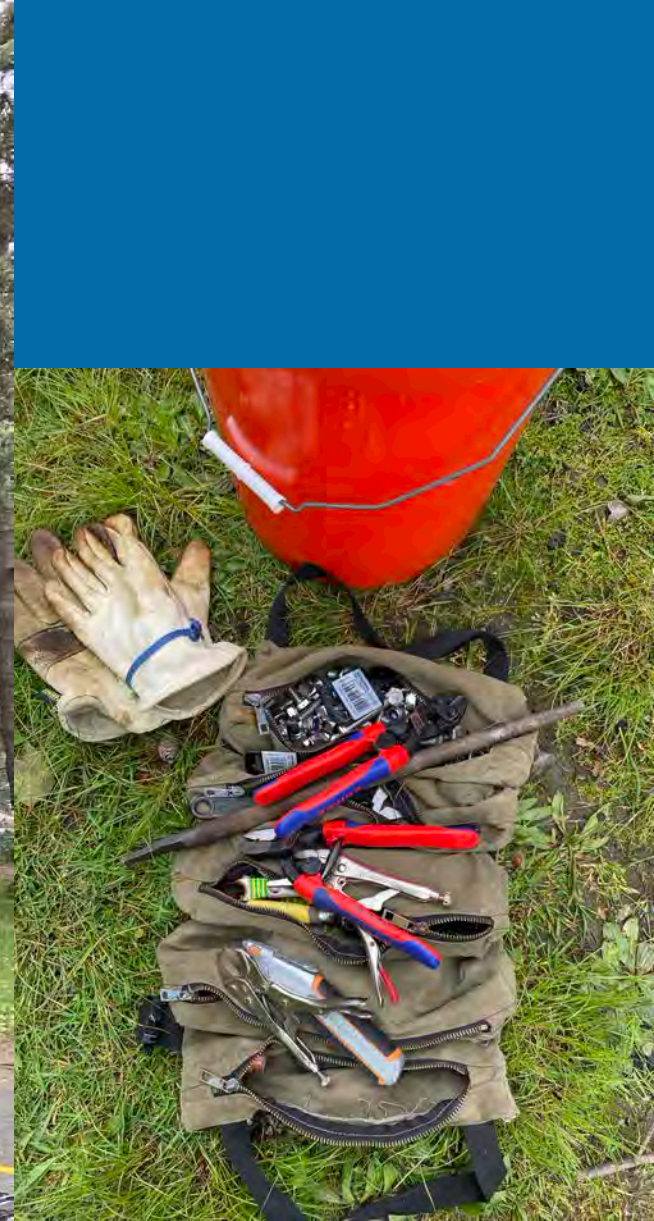


Installation Day

Saturday May 28, 2022

- Parks staff delivered modules and provided foot traffic control
- Support Team provided public information and team nourishment
- Assembly Team organized and bolted 40 modules in 3 sections/island
- Planting Team delivered plants, procured extra plants, spaced pots, planted 1,088 plants, and mulched
- Everyone launched sections and installed fencing
- Anchoring Team pulled islands by boat in place and set anchors

Support	Monica	Grafström Hinkley
	Josephine	Jardine
	Katherine	Jardine
	Brian	DeLuca
	Jo	Sullivan
Assembly	Galen	Fulford
	Michael	Spillane
	Mason	Bowles
	Pete	Hinkley
	Jeff	Howard
	Jon-Erik	Jardine
	Rebecca	Dugopolski
Planting	Alicia	Kellogg
	Eliza	Spear
	Julia	Munger
	Emily	Zisette
	Shelby	Petro
	Christina	Merten
	Josh	Wozniak
	Heidi	Spillane
Anchoring	Sandy	Shettler
	Rob	Zisette
	Nick	Bartish
	Camryn	Steiner
	David	Garcia

















July 22, 2022 Drone Survey



Monitoring at 2 Months July 29, 2022

- No vandalism!
- ~16 Mallard ducks/island, nesting with minor plant browsing/damage
- Count plant species by pod: total = 1,032 plants vs 1,088 planted (32 species) = **95% survival**
- Low growth, minor die-off, record heat
- Small plant roots in water

Common Name	Scientific Name	Install		2-Month Count			
		Size	No.	West	East	Total	% Survival
Hardstem bulrush	Schoenoplectus acutus	1 gal	30	39	13	52	173
Lady fern	Athyrium felix-femina	1 gal	24	12	12	24	100
Small fruited bulrush	Scirpus microcarpus	1 gal	25	16	19	35	140
Small fruited bulrush	Scirpus microcarpus	4"	82	1	4	5	6
Soft-stem coastal bulrush	Scirpus lacustris validus	4"	50	0	0	0	0
Pacific native crabapple	Malus fusca	1 gal	2	1	1	2	100
red-osier dogwood	Cornus sericea	1 gal	6	2	4	6	100
Seaside fleabane	Erigeron glaucus	4"	23	0	5	5	22
Goldenrod	Solidago canadensis	4"	6	5	6	11	183
Douglas hawthorn	Crataegus douglasii	1 gal	2	1	1	2	100
Large-leaf lupine	Lupinus polyphyllus	4"	6	2	2	4	67
Yellow monkeyflower	Mimulus guttatus	4"	40	11	3	14	35
Pacific ninebark	Physocarpus capitatus	1 gal	10	3	6	9	90
Peafruit rose	Rosa pisocarpa	1 gal	13	3	10	13	100
Common rush	Juncus effusus	4"	101	155	289	444	146
Dagger-leaf rush	Juncus ensifolius	4"	110	11	106	117	
Elk blue rush	Juncus patens	2"	19	0	0	0	
Elk blue rush	Juncus patens	4"	74	0	0	0	75
Salmonberry	Rubus spectabilis	1 gal	4	3	0	3	
Merten's sedge	Carex mertensii	1 gal	1	123	31	154	
Sawbeak sedge	Carex stipata	4"	80	0	0	0	107
Sitka aquatic sedge	Carex aquatilis	4"	48	0	0	0	
Slough sedge	Carex obnupta	1 gal	15	19	0	19	
Pacific silverweed	Potentilla anserina	4"	73	11	54	65	89
Skunk cabbage	Lysichiton americanus	4"	22	12	3	15	68
Spike rush	Eleocharis palustris	4"	208	0	0	0	0
Sweet Gale	Myrica gale	2 gal	4	2	1	3	75
Twinberry	Lonicera involucrata	1 gal	4	2	4	6	150
Sitka willow	Salix sitchensis	1 gal	4	5	13	18	450
Sitka spruce	Picea sitchensis	1 gal	1	1	1	2	200
Shore pine	Pinus contorta	1 gal	1	1	1	2	200
Totals			1088	441	589	1030	95

November 22, 2022 Fall Colors



Inspection at 10 Months March 19, 2023

- **No vandalism!**
- **Canada geese building 1 nest on each island**
- **Turtles resting**
- **Very little plant growth**
- **Goose damage appeared minor**
- **Late summer heat or winter freeze mortality?**
- **Too early to tell?**



April 1, 2023

Install:

- Swallow house
- Wood duck house
- Goose wires

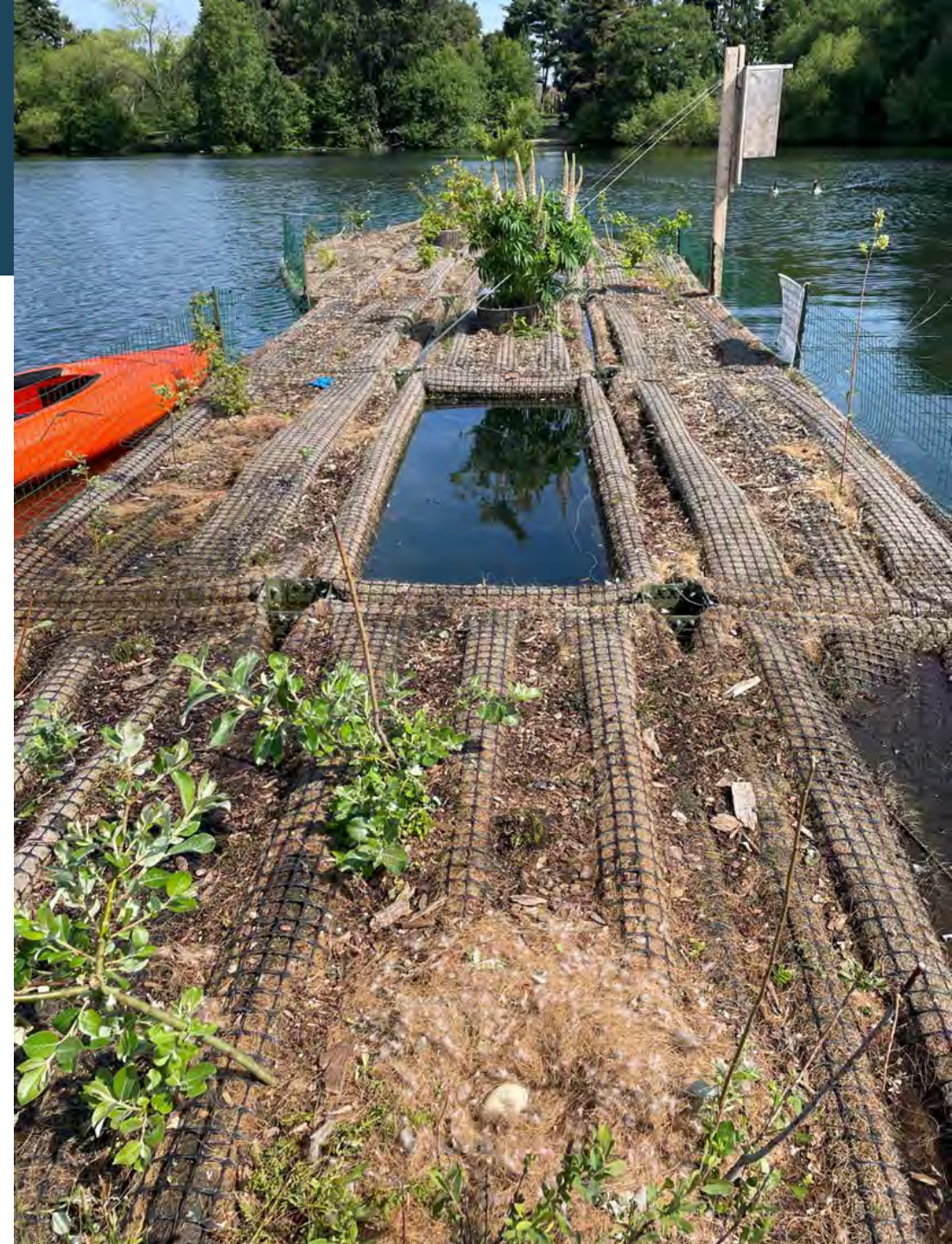


May 9, 2023 Drone Survey



Inspection at 1 Year May 20, 2023

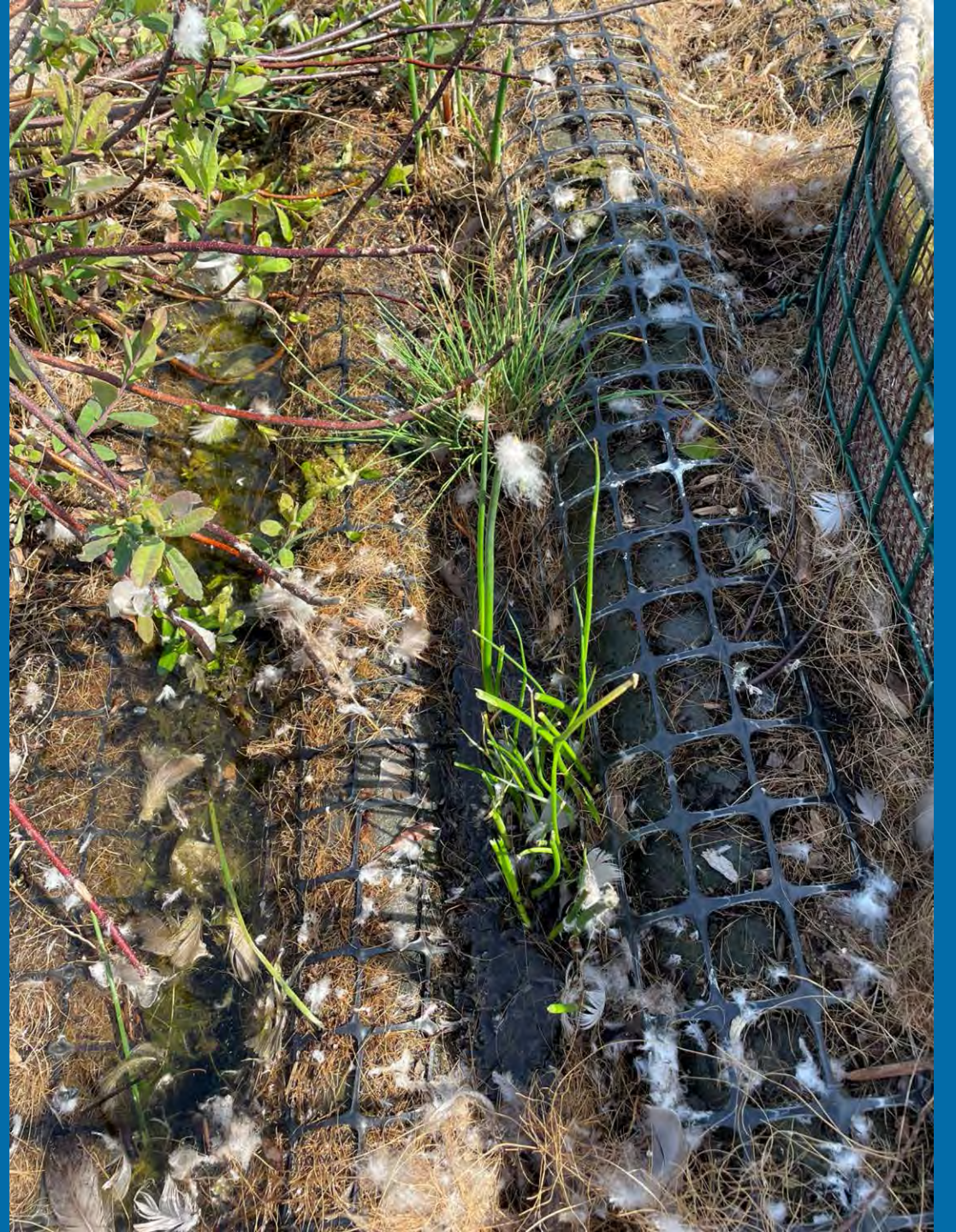
- Canada geese pair on both islands with 1 egg in 1 nest and dead goose next to other nest
- Decent shrub growth and low herbaceous plant growth
- Grazed Juncus/Carex, massive goose feces, and trampled herbs
- Nesting swallows













Green Lake Floating Ecosystem Project

TAIGA WETLANDS

Creating habitat for wildlife and keeping Green Lake clean

In 2022, Friends of Green Lake installed two floating wetlands to improve water quality and fish and wildlife habitats. The two 650 square-foot islands are permanently anchored west of Duck Island to provide excellent habitat for native birds.

Volunteers monitor and maintain the health of the floating wetlands year round.

Friends of Green Lake is a nonprofit organization devoted to maintaining a healthy lake for wildlife and recreation. FOGL is instrumental in water quality improvements, shoreline restoration, and community education. Visit the website to learn more.



WETLAND PLANTS
Over 1,000 native plants of 11 species provide diverse habitat and refuge for aquatic birds and animals.

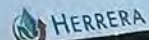
PLANT ROOT BIOFILM
Attached algae and other microorganisms absorb nutrients, reducing toxic blue-green algae growth in the lake.

NATURAL BIODIVERSITY
The wetlands are home to a variety of native plants, birds, and insects. Each island has multiple habitats, including submerged, open water, and tree pool.

INVERTEBRATES & FISH
The wetlands provide food and refuge for native organisms, and improve the quality and abundance of many populations.

Illustration © Kathryn Zahn, 2020

Funded by a grant from the Seattle Department of Neighborhoods
Matching Fund and donations in memory of Taiga Brant Hinckley



Monitoring at 1 Year

June 7, 2023

- **Canada geese pair on both islands with 1 egg in 1 nest**
- **Count plant species by pod: total = 337 plants vs 1,088 planted = 31% survival**
- **Moderate plant root growth with low biofilm growth**
- **Nesting/feeding swallows**

Resilient Plants

Common rush	<i>Juncus effusus</i>
Hardstem bulrush	<i>Schoenoplectus acutus</i>
Pacific ninebark	<i>Physocarpus capitatus</i>
Pacific silverweed	<i>Potentilla anserina</i>
Red-osier dogwood	<i>Cornus sericea</i>
Salmonberry	<i>Rubus spectabilis</i>
Sitka willow	<i>Salix sitchensis</i>
Sweet gale	<i>Myrica gale</i>
Twinberry	<i>Lonicera involucrata</i>

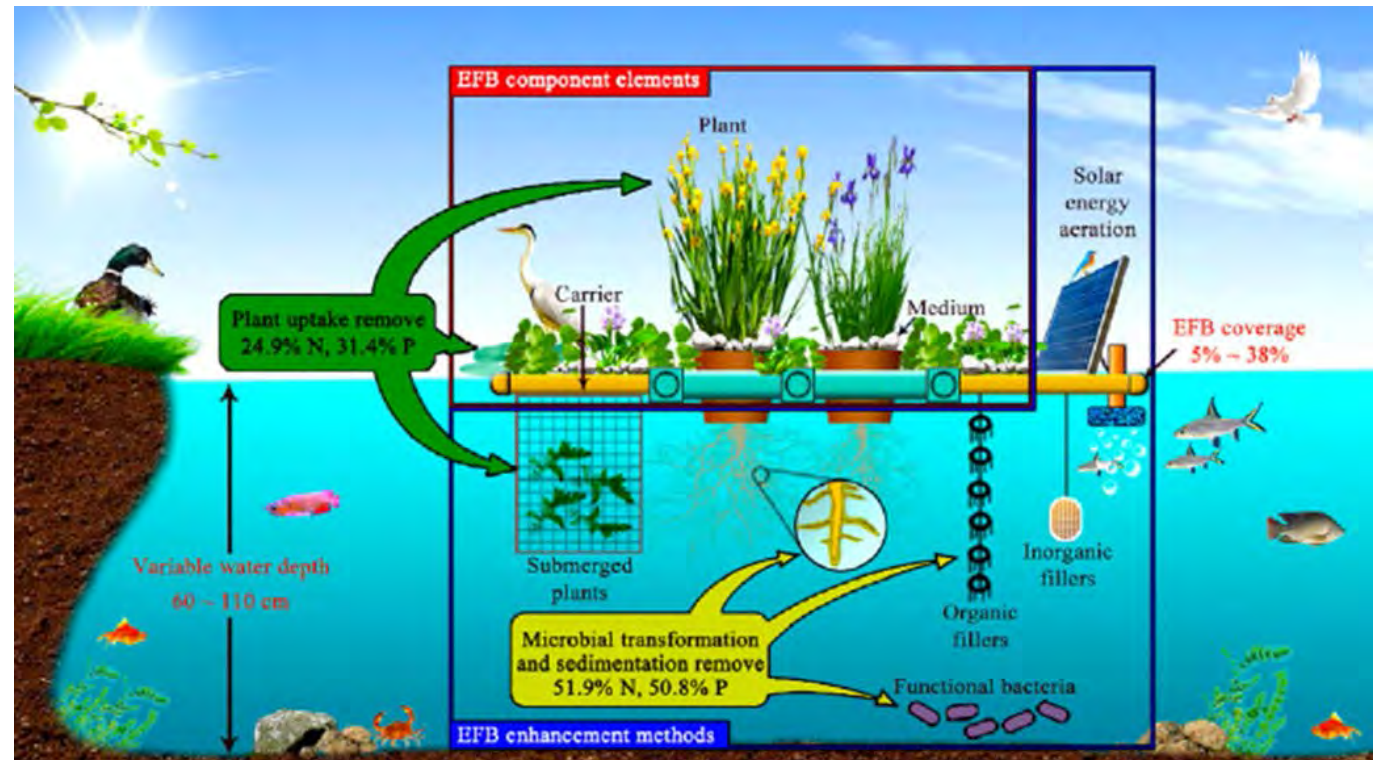






Next Steps

- Project celebration on Thursday July 27, 2023 at 7:30 pm
- Plant goose-hardy plants in fall
- Experiment with a safe goose deterrent method, or learn to live with them
- Install and sample sediment traps under and outside each island to measure nutrient sequestration by root biofilm, and include microplastic analysis



Questions: rzisette@herrerainc.com
More Info: <https://friendsofgreenlake.org/>

