TAIGA WETLANDS

Green Lake Floating Ecosystem
Demonstration Project

Introduction

In 2018, Friends of Green Lake (FOGL) received a large donation in memory of Taiga Hinckley, who was a valued employee at the Greenlake Boathouse Center but tragically did not survive an evening paddle on the lake. FOGL evaluated potential projects and selected the floating wetland project to best represent Taiga's interest in protecting lake water quality and wildlife habitat. To supplement this and other donations with additional funds, FOGL applied for a Seattle Neighborhoods Matching Fund grand in September 2020 and won a $50,000 grant with our second application in September 2021. In addition to our well-planned design of exciting environmental restoration technology, keys to our grant success include first obtaining support from Seattle Parks and Recreation (SPR) and the Hydraulic Project Approval (HPA) permit from the Washington Department of Fish and Wildlife (WDFW).

FOGL carefully assembled a project leadership team of a dozen highly qualified volunteers to further develop the project design and plans, solicit proposals from two highly qualified floating wetland vendors, and select Biomatrix Water in Scotland to finalize the design and supply the Taiga Wetlands. The Taiga Wetlands design consists of two, 650-square-feet islands that will be permanently anchored west of Duck Island. The Duck Island location was selected over other locations because it provided the best habitat for native birds, which is our primary environmental objective. At this location, Taiga Wetlands will also function to sequester nutrients from the lake for uptake by the plants and, more importantly, the thick microbial biofilm growth on the plant roots, supporting a diverse macroinvertebrate community and fish habitat. In addition, this location provides good viewing of the wetlands from our education sign to be installed on the west shore and this more remote area of the lake reduces the potential for vandalism.

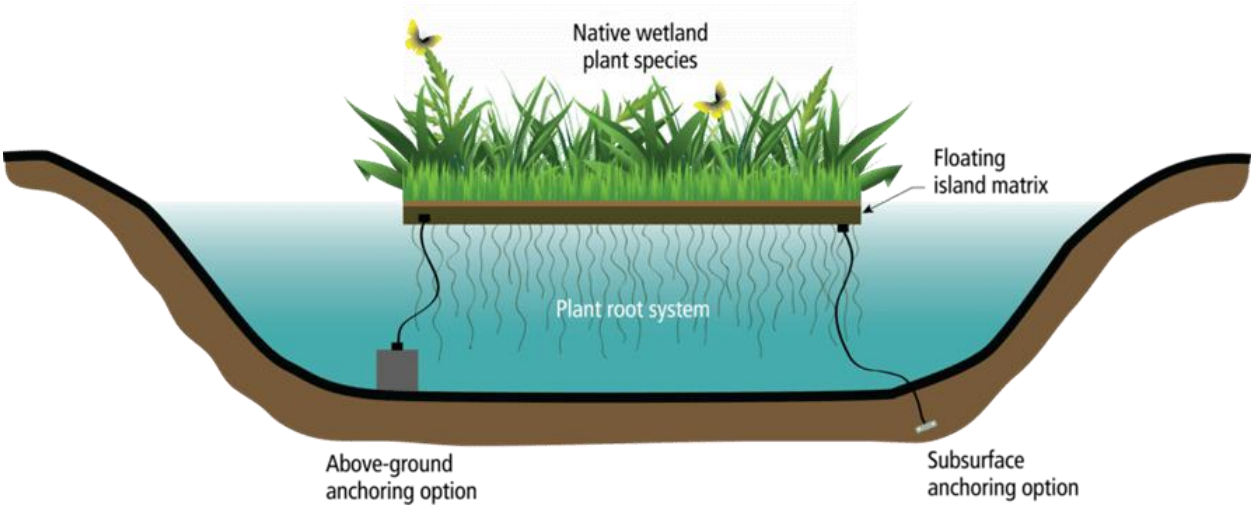
Work Plan

The project goal is to demonstrate and educate how floating wetlands are an effective tool for restoring impacted aquatic habitats in urban waters within the Puget Sound region. FOGL prepared the Taiga Wetlands Work Plan that includes wetland design and installation, planting, and monitoring and maintenance plans. The wetland modules are being shipped from Scotland and due to arrive in Seattle on about May 11, 2022 for storage at the Seattle Parks and Recreation Densmore Maintenance Facility. The project team will assemble, plant, and anchor the wetlands in Green Lake on Saturday and Sunday of Memorial Day Weekend May 28 and 29, 2022. See the Taiga Wetlands Flyer to share with others about the project.

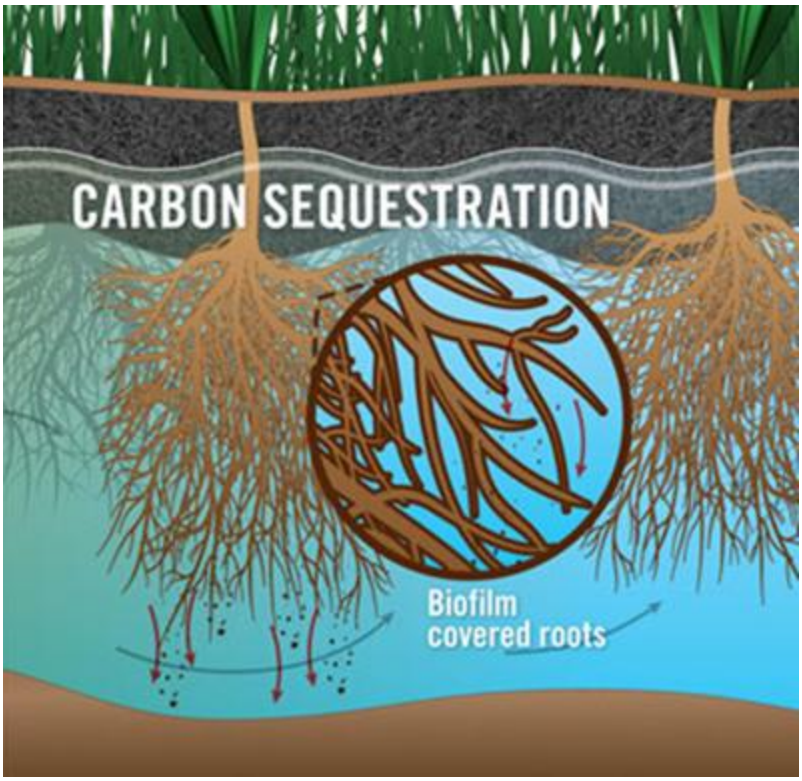
Floating Wetlands Background

Floating treatment wetland systems (floating wetlands or floating ecosystems) are engineered, vegetated rafts made of natural or inert materials that mimic floating bog mats. Root systems of the planted

vegetation extend deep into the water and become covered with a biofilm comprised of a variety of microbes (algae, bacteria, fungi, and protozoans).



The biofilm grows rapidly, taking nutrients and other pollutants from the water, improving water quality by reducing the nutrient supply for phytoplankton growth, and hence reducing algae blooms. The biofilm also readily adsorbs toxic pollutants dissolved or suspended in the water. Ultimately, the biofilm sloughs and becomes incorporated into lake sediments. Some nutrients (approximately 20%) are also incorporated into the planted vegetation during active growth that become incorporated into the wetland media. Floating wetlands also reduce high water temperatures from shade. The degree of water quality improvement depends primarily on the floating wetland area in relation to the water body area, but also depends on nutrient concentrations, water currents, temperature, and dissolved oxygen.



Floating wetlands also provide valuable habitat for fish and wildlife, particularly in urban water bodies lacking natural shoreline vegetation. Small fish seek refuge from predators and feed extensively on insects and other invertebrates that populate the underlying biofilm. Floating wetlands can be designed for waterfowl access using ramps, or for waterfowl exclusion using perimeter netting to protect planted vegetation and/or using plant species that are not a preferred waterfowl food source. Recent innovative designs include submerged platforms to create shallow water habitat above the plant matrix for juvenile salmonid rearing and optimum habitat for native bulrush species and other emergent vegetation historically used by Native Americans.

Floating wetlands offer several advantages over shoreline wetlands. Plant survival is higher because there is no lack of water since they are not affected water level fluctuation or drought. Plants are also less disturbed by foot traffic and vandalism since they can only be accessed by boat. It is much less expensive to expand wetland habitat using floating wetlands than constructing shoreline wetlands. Floating wetlands are also used as breakwaters to reduce shoreline erosion or bulkhead undermining, including some in the Gulf of Mexico that have survived hurricane winds and waves.

Floating islands are not a new technology, but they have not been used very often in the Pacific Northwest. Those installed in Washington State's public lakes have been to decrease water temperature and nutrients, but not the occurrence of toxic algal blooms. Floating islands have been used in other areas throughout the world, most often in stormwater detention ponds, sewage treatment lagoons, and urban canals for nutrient removal to inhibit algal blooms. Multiple studies have shown that floating wetlands have been shown to be effective in reducing high nutrient concentrations in stormwater detention ponds (e.g., Headley and Tanner, 2011; White and Cousins, 2013; Wang and Sample, 2014). Limited water quality effectiveness data are available for floating wetland treatment systems in natural lakes or other water bodies. Even lakes with nuisance algal blooms typically have nutrient concentrations substantially lower than in sewage-contaminated canals or stormwater detention ponds. Although inconclusive, three years of monitoring data collected from Hicklin Lake after the installation of two small floating wetlands indicated that the wetlands were too small to significantly reduce nutrient or algae concentrations (King County 2018).

Click on the graphic above for a larger view of the Infrastructure Quality Floating Wetlands.