



FLOATING WETLAND FILTERS AND NATIVE PLANTS

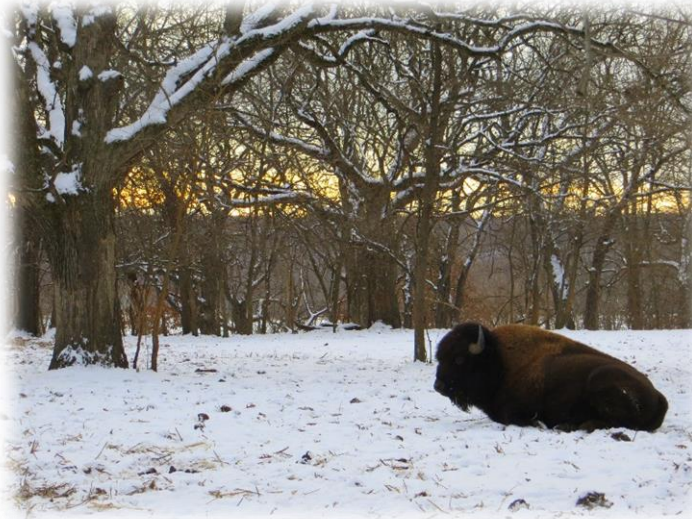
Peggy Obear, Prairie Island Indian Community
Autumn Boos, Midwest Floating Island

Agenda

- Who we are
- Why floating wetlands
- Technology
- How islands are made
- Prairie Island Indian Community Case Study



Intro | Prairie Island Indian Community



Intro | Who are we?

Floating Island International was founded in 2005 by inventor Bruce Kania.



international licensees

Midwest Floating Island is the exclusive manufacturer in MN, WI and MI, but can manufacture worldwide



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THE PROBLEMS:



Pollutants and Lack of Habitat

Pollutants | Excess nutrients

Excess phosphorus and nitrogen **fuel algae**



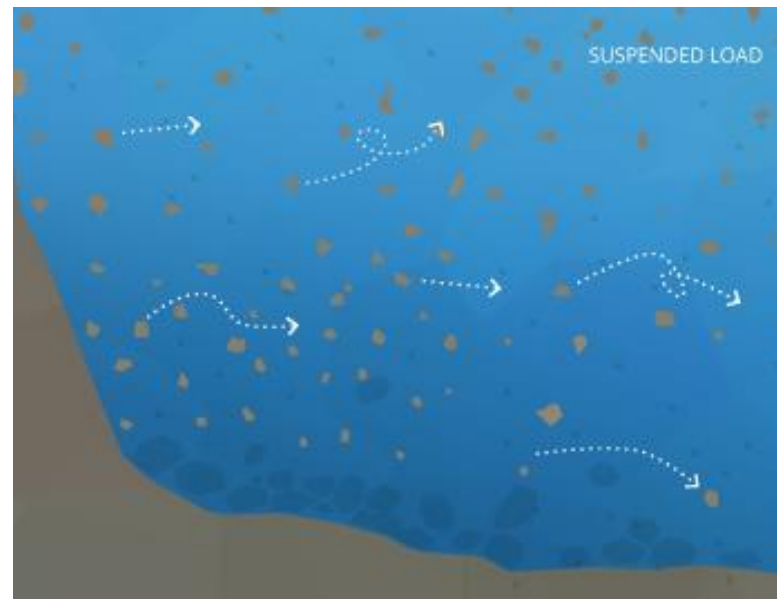
Fertilizer, agricultural runoff, and decaying leaves contribute to excess nutrients

Pollutants | Total Suspended Solids

Total Suspended Solids (TSS) → murky, turbid water

Can clog fish gills

Turbidity increases cost of drinking water



Particulates become attachment sites for pollutants



Intro | Why Floating Wetlands?

- Reduce nutrient pollution
- Compete with harmful algae blooms (HABs)
- Restore bio-complexity/habitat to the environment



Intro | Variety of Names

Floating Wetland Filters (FWF)

Floating Islands

Floating Treatment Wetlands (FTW)

BioHaven® Technology

Floating Islands | What's Going On

BIOHAVEN FLOATING WETLAND



Applications | Types of Water Bodies



Wastewater

Shallow lakes

Stormwater ponds

Backyard ponds

Rivers



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The Technology:



WHAT MAKES FLOATING WETLANDS WORK

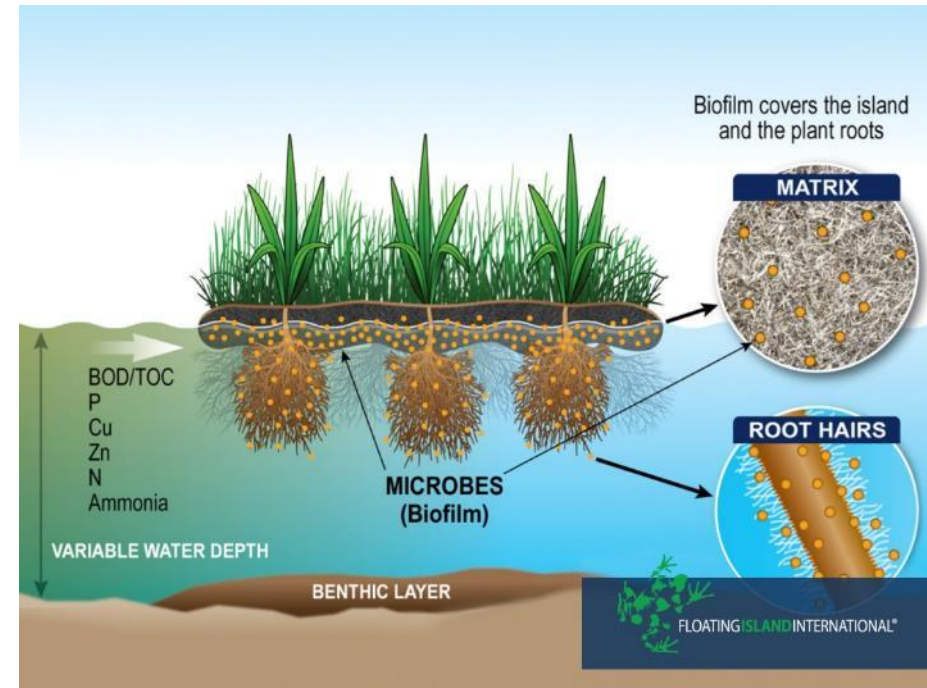
Technology | The biofilm

Promotes **healthy biofilm** and **periphyton**

TSS and small colloidal particles attach to biofilm

Substrate maximizes surface area

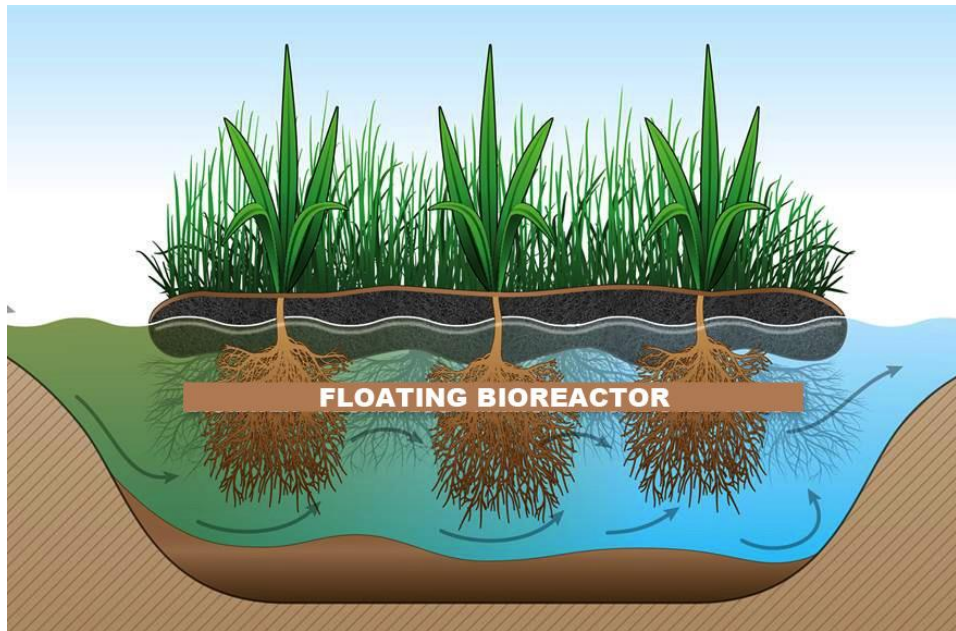
More microbe and bacteria colonization



Periphyton = microbes growing on submerged surfaces which become food source for fish and aquatic wildlife



Pollutants | How Islands Reduce Algae



Surface Area +
Circulation:

- .

Biota comprises all living organisms (bacteria, fungi, plants, animals) that inhabit a given area.
Periphyton are freshwater organisms attached to or clinging to plants and other objects projecting above the bottom sediments.



Technology | The roots

Substantial [hanging roots](#) slow water movement



Technology | The roots

Substantial **hanging roots** pull up nutrients.

Microbes grow on roots.

Creates rich **food source** for beginning of food web.



HOW ISLANDS ARE MADE:



CREATING FLOATING ISLANDS

Making islands | Matrix

RECYCLED



BPA free PET used in the matrix material is resistant to attack by micro-organisms.

- Inert, won't biologically degrade and will not leach, so widely preferred for packaging foods and beverages.
- PET is also inherently more UV resistant than other plastics, like polypropylene, because of its molecular structure.
- 100 SF island keeps 2,500 bottles out of a landfill



Making islands | Matrix

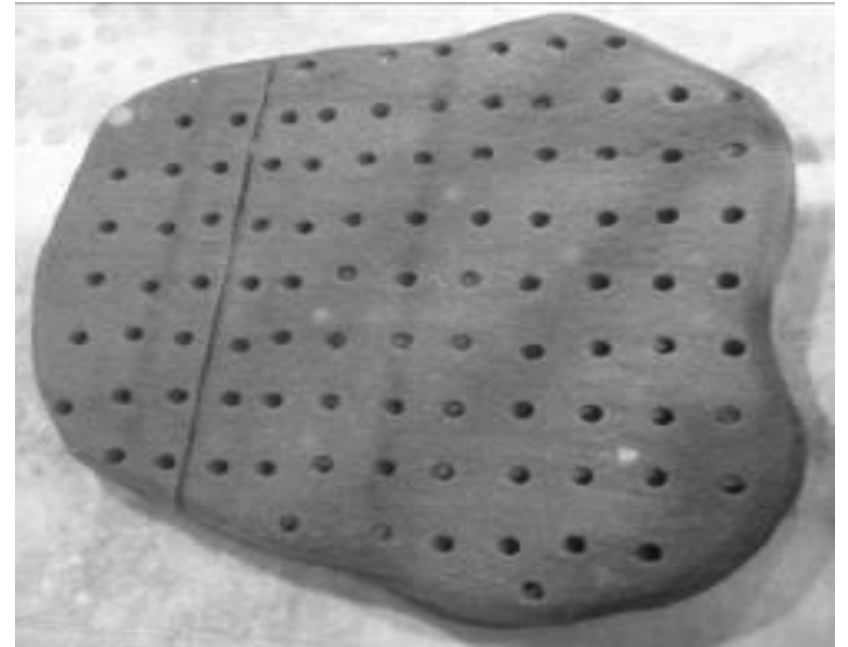


Proprietary

Drilled planting holes

Internal substructure

Foam injected for buoyancy



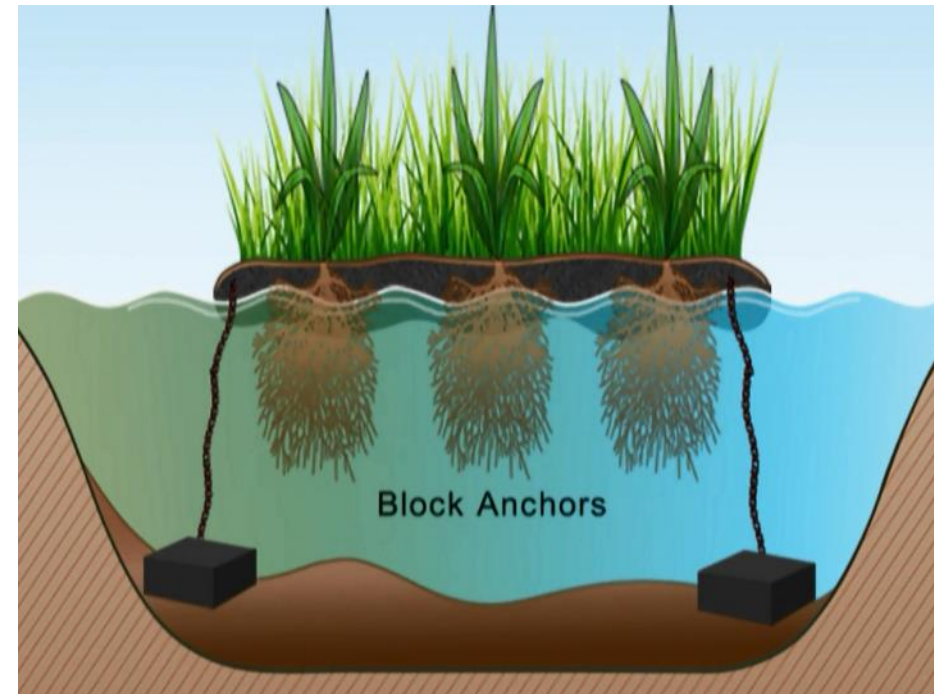
How islands are made | Anchoring

Benefits:

- Changes with water level
- Can float up and down
- Avoids plants drying out or flooding

Design:

- Can be tethered to posts
- Row islands out



Applications | Research partners

The following have done research on Floating Islands:



UNIVERSITY OF MINNESOTA



Typical Removal Rates

Parameter	Net Removal Rate (lb/yr/ft ³)	
	High Conc.	Low Conc.
TN	1.7	0.40
TP	0.54	0.052
TSS	26	1.5
BOD	15	0.8
NH ₃ -N	2.8	0.1
NO ₃ -N	0.9	0.02
Total Cu	NA	0.01
Total Zn	NA	0.06

The higher the concentration, the better the removal rates



Applications | Water Quality

Archipelagos

More islands = more surface area = more **biofilm**

Increased biofilm
leads to greater
reduction of
pollutants



Applications | Creating habitat

Creating **fish** habitat

- Projects in Milwaukee and the National Aquarium
- Increases fish spawning

Enhancing biodiversity

- Macroinvertebrates in the island



Applications | Creating habitat

Loon nesting island



Undisturbed habitat

Away from predators

Good sight lines

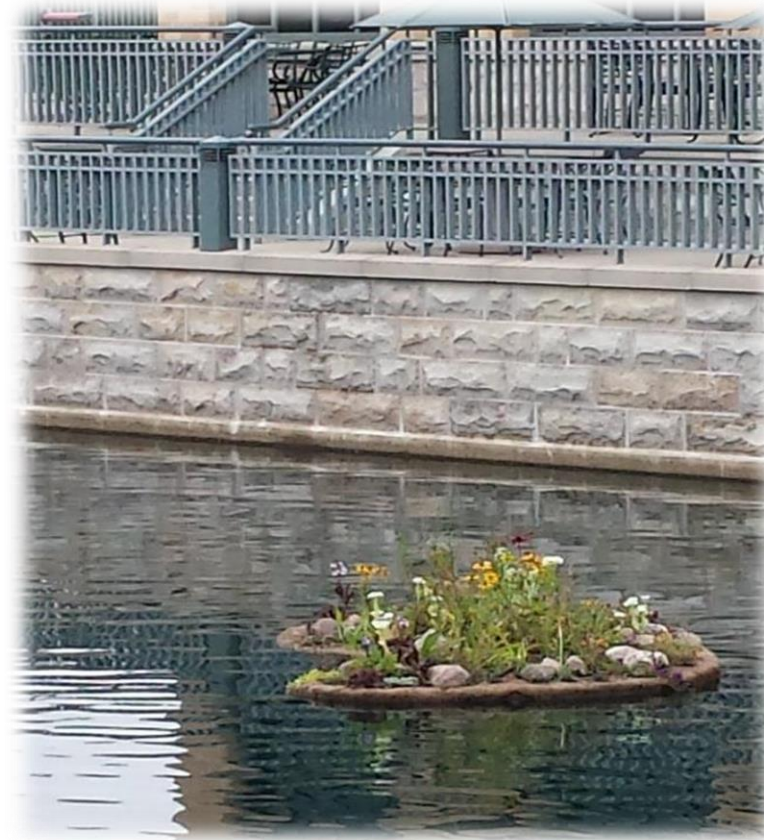
*Installed in:
Michigan, Minnesota, Montana*

\$600 plus anchors/plants



Applications | Beautification

Enhance
aesthetics outside
home or office



Applications | Beautification

Bank islands **beautify** and improve water quality



Applications | Beautification

Pop up gardens of Philadelphia



Interesting Designs| Yin Yang



Tamarack Nature Center, Minnesota



Recent projects | Dubuque, IA

Bee Branch Channel

Launch day

2,674 square feet

14 islands



Recent projects | Dubuque, IA



Launch Day, 2017 in Bee Branch



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Recent projects | Eden Prairie



3 Islands for habitat
and water quality



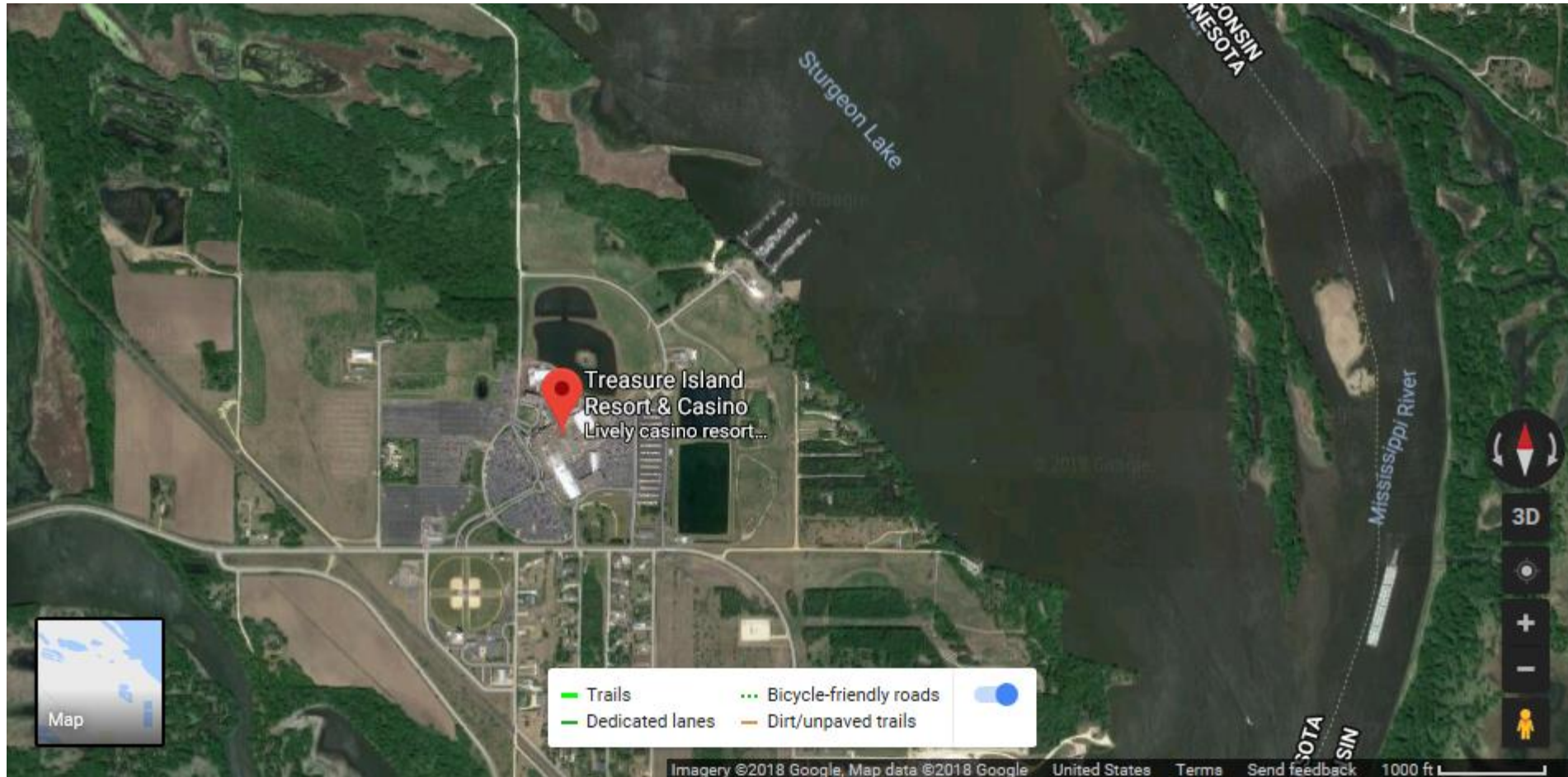
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Prairie Island Project:



Prairie Island | Location

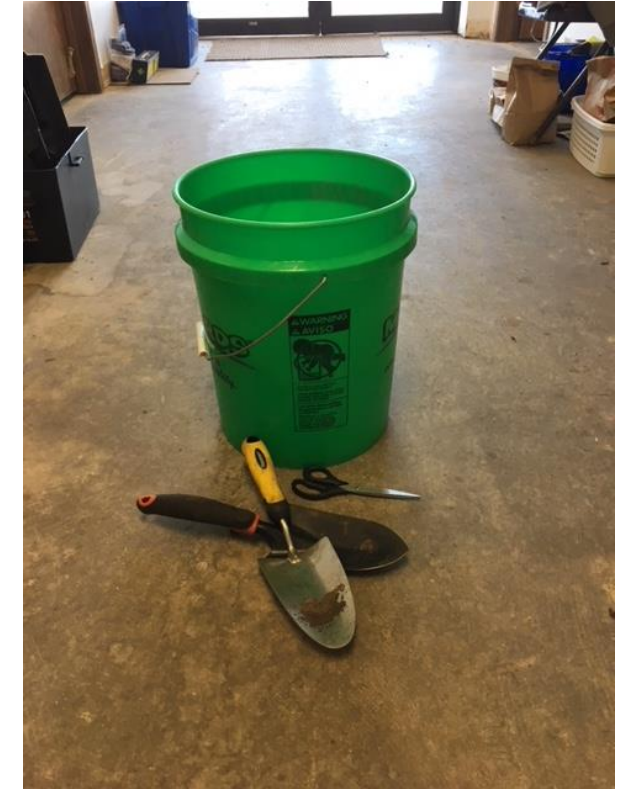


Planting| Close to the shore



Planting| Materials

- Long kitchen gloves
- Waders
- Peat moss
- Topsoil or dirt
- Hand trols and shovels
- Large totes or 5 gallon buckets
- Waterproof plastic stakes to designate where plant goes



Planting | Plants



Planting | Getting the Plants In



Planting| Sand for Turtles



Planting | Crew



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Mulch | For UV and Turtle Claw Protection



Same mulch on the islands as we do in our bird boxes.

Natural cedar that stands out nicely against the dark water.



Trial and Error | Turtles



No evidence that the turtles had ventured into the sand “breeding pits.”

Eliminated the sand feature on the third island and added more plants.





Treasure Island Resort and Casino

Native Plants for Prairie Island Project:

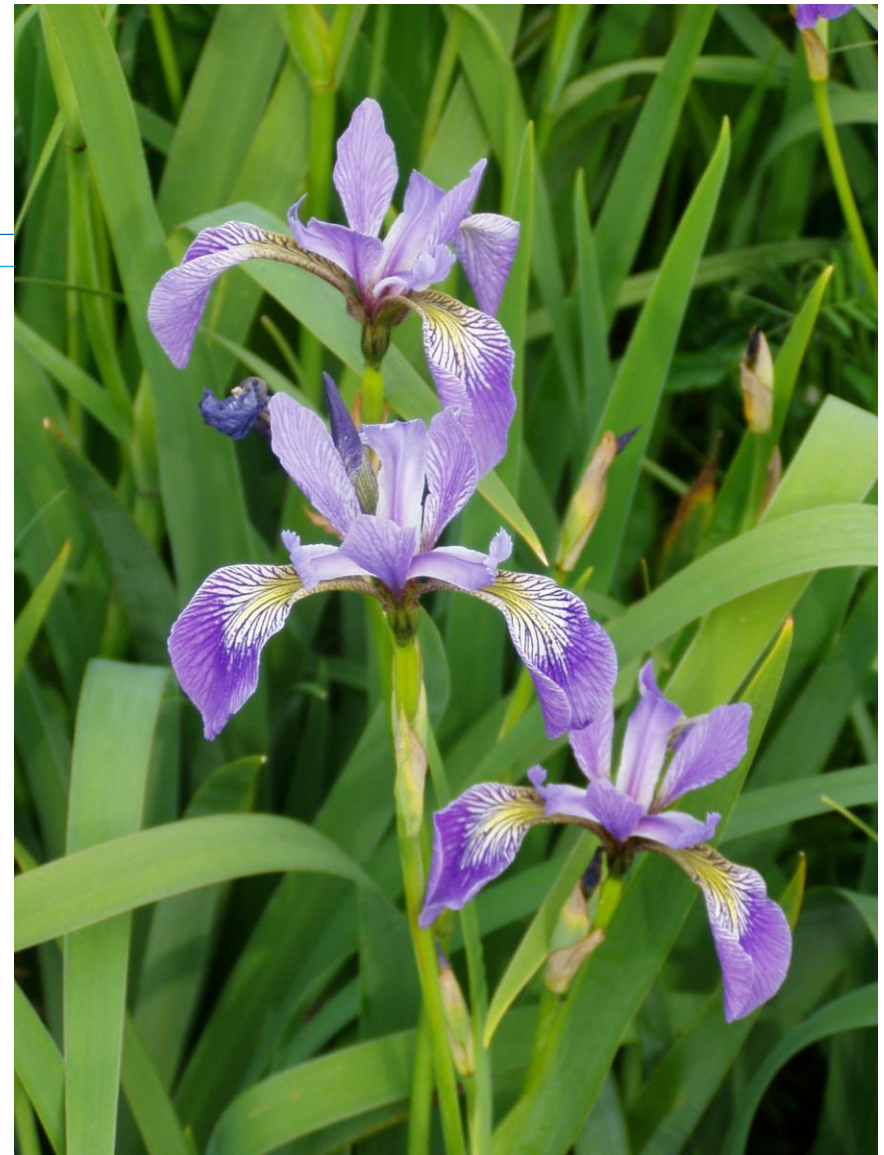


So many options, so little toil

Native Plants | Iris

One of the first to bloom in spring

While the flowers fade rather quickly, the leaves excel at creating a nice backdrop for shorter summer blooms



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Native Plants | Swamp Milkweed



Vary in height from 3 to 5 feet

The mid to late summer blooms attract butterflies and other pollinators



Native Plants | Great Blue Lobelia

Impressive purple color stands out in late summer flowers

Lobelias produce a compound which discourages herbivores



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Native Plants | Marigolds



Sunny marigolds bloom in April

Grow in low mounds



Native Plants | Hibiscus

Northern native hibiscus is also known as Rose Mallow

Woody bush that can grow up to 5 feet



Native Plants | Iron Weed



Common native found in wetlands,
along roads and on shorelines

Can reach a height of 6 feet

Is well liked by most pollinators



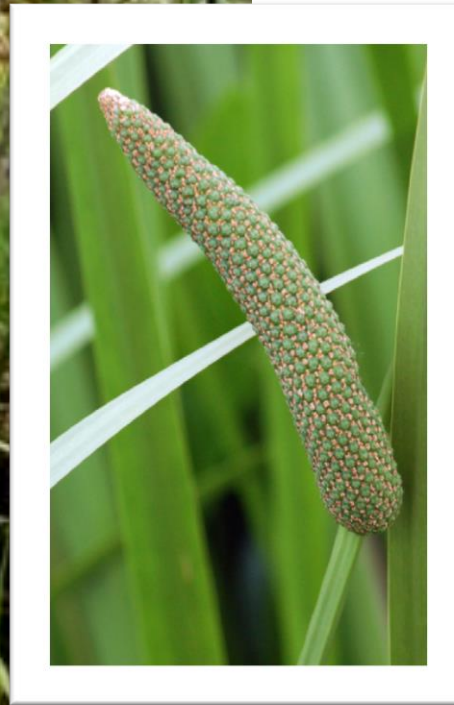
Native Plants | Tussock Sedge

A sturdy wetland sedge that will thrive on your island

Excellent choice if you want thick grass coverage to deter the geese



Native Plants | Sweet Flag



Does not have a typical flower; it has a spathe

Favorite medicinal resource for Native American Tribes



Native Plants | Obedient Plant

Not included in our planting list

Some “volunteers” took root and did quite well on island



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2017 | First Ice



Winter | Habitat

Plants are left unpruned over the winter to offer food and refuge wildlife.

This is the second winter for the 2 outside islands and the 1st for the center island.



Outreach Opportunities

This deck overlooks
the floating island filters.

Signage educates our
visitors about the islands,
rain gardens and erosion
control measures they see.



Future Plans

Summer research project with University of Minnesota

Fourth island to be launched at Treasure Island Resort and Casino



SUMMARY:



FLOATING ISLANDS AS A GREEN INFRASTRUCTURE TOOL

Summary | Floating islands

- Effectively remove pollutants (N, P, TSS, etc.)
- Create habitat and increase biodiversity
- Floatation → avoids issues with plants drying out/flooding
- **Excellent retrofit** - Minimal impact on land vs other water BMPs
- Variety of applications for waterway stewardship



Summary | Contact us

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