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

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

- terrestrial habitat creation
- aquatic habitat creation
- erosion control
- water quality treatment

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Applications | Types of Water Bodies

Wastewater
Shallow lakes
Stormwater ponds
Backyard ponds
Rivers
The Technology:

WHAT MAKES FLOATING WETLANDS WORK
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

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**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.

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**Surface Area + Circulation:**
Technology | The roots

Substantial hanging roots slow water movement
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
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
The following have done research on Floating Islands:

- MONTANA STATE UNIVERSITY
- LOUISIANA STATE UNIVERSITY
- CLEMSON UNIVERSITY
- UNIVERSITY OF MARYLAND
- VIRGINIA TECH
- NORTH CAROLINA STATE UNIVERSITY
- TOWSON UNIVERSITY
- UNIVERSITY OF MINNESOTA
- NIWA
- University of Missouri-Columbia
- University of Wisconsin-Madison

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Applications | Research partners
## Typical Removal Rates

<table>
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<tr>
<th>Parameter</th>
<th>Net Removal Rate (lb/yr/ft³)</th>
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<tr>
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<td>High Conc.</td>
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<tr>
<td>TN</td>
<td>1.7</td>
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<tr>
<td>TP</td>
<td>0.54</td>
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<tr>
<td>TSS</td>
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</tr>
<tr>
<td>BOD</td>
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</tr>
<tr>
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<tr>
<td>NO₃-N</td>
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<tr>
<td>Total Cu</td>
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</tr>
<tr>
<td>Total Zn</td>
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</table>

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
Recent projects | Eden Prairie

3 Islands for habitat and water quality
Prairie Island Project:
Prairie Island | Location
Planting Close to the shore
Planting Materials

- Long kitchen gloves
- Waders
- Peat moss
- Topsoil or dirt
- Hand trolls and shovels
- Large totes or 5 gallon buckets
- Waterproof plastic stakes to designate where plant goes
Planting | Plants
Planting | Getting the Plants In
Planting Crew
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.
No evidence that the turtles had ventured into the sand “breeding pits.”

Eliminated the sand feature on the third island and added more plants.
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
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
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
2017 | First Ice
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

**Autumn Boos**, Midwest Floating Island
Director of Sales and Marketing
email: autumn@MidwestFloatingIsland.com
phone: (651)379-2492

**Peggy Obear**, Prairie Island Indian Community
Non-point Source Pollution Coordinator
email: Margaret.Obear@piic.org
phone: (612) 812-3916