



CBR4 Vision for River Restoration

Third CBR4 Technical Workshop
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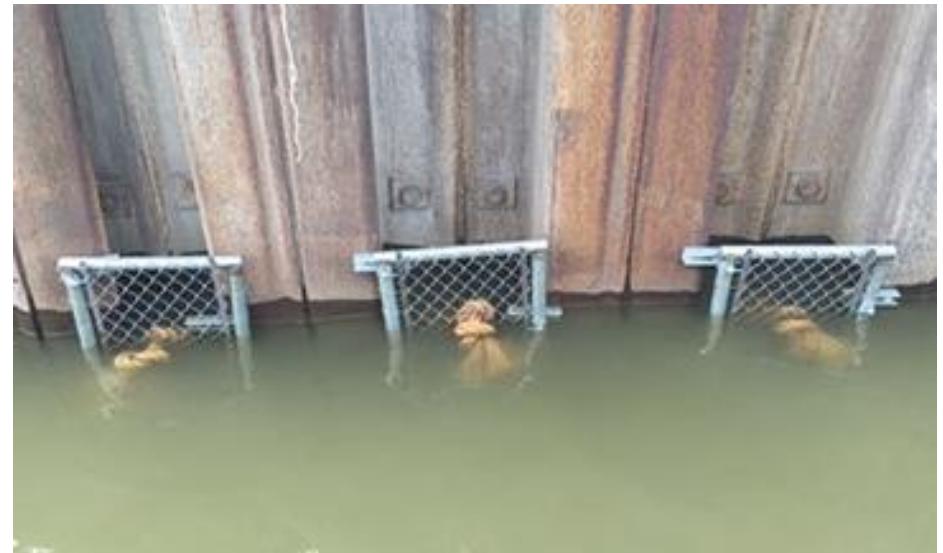
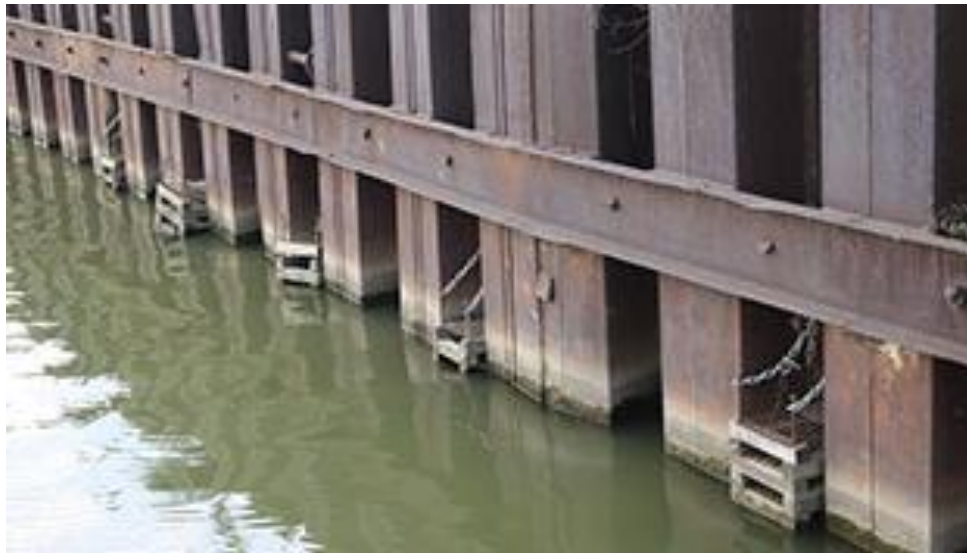
Cuyahoga River on Fire in 1948





2022 Master Plan for Cuyahoga Riverfront

Fish Habitat Structures in Cleveland Bulkheads



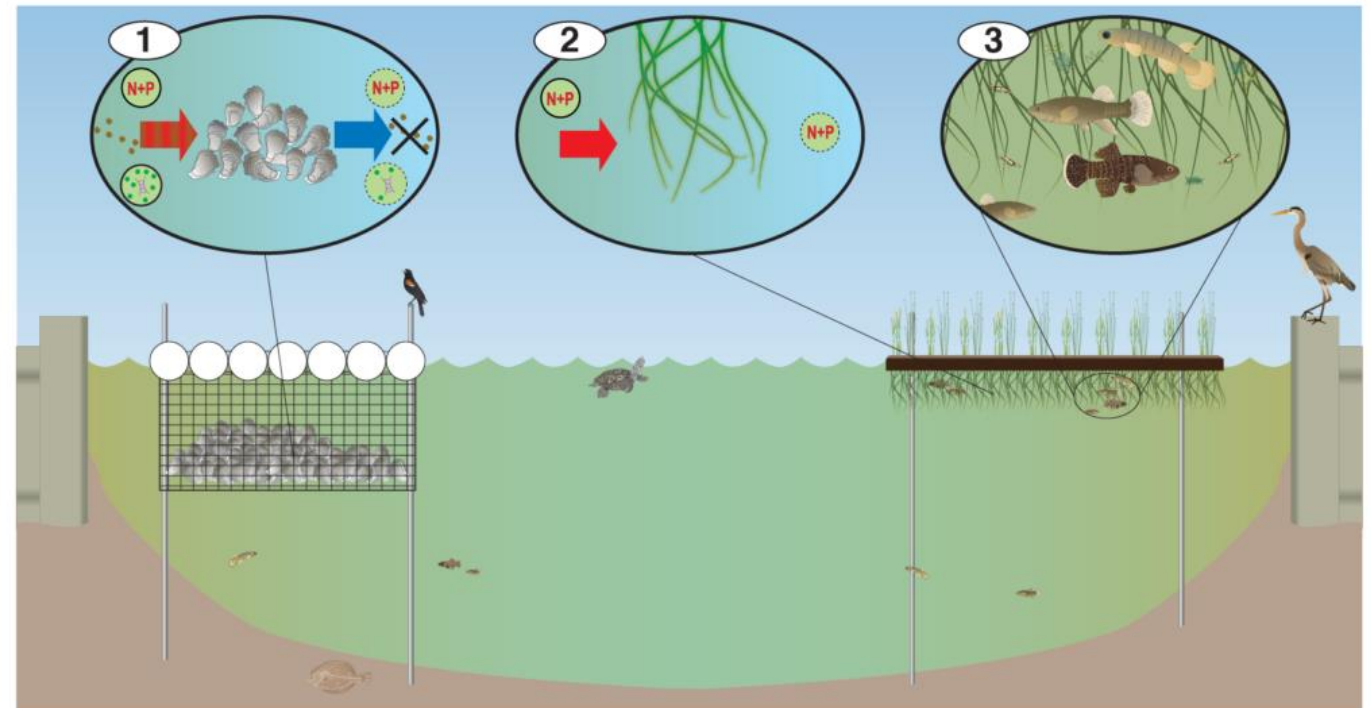
Floating Wetlands & Oyster Cages in Canals South Bethany, DE

Center for the Inland Bays is using Floating Wetlands in the manmade canals around boating communities to:

- treat stormwater runoff
- take up nutrients
- decrease sediment
- increase dissolved oxygen.

Oyster cages are tended by local homeowners until the oysters are large enough to be placed out into open waters.

Floating oyster cages and wetlands can positively affect water quality in dead-end canals.

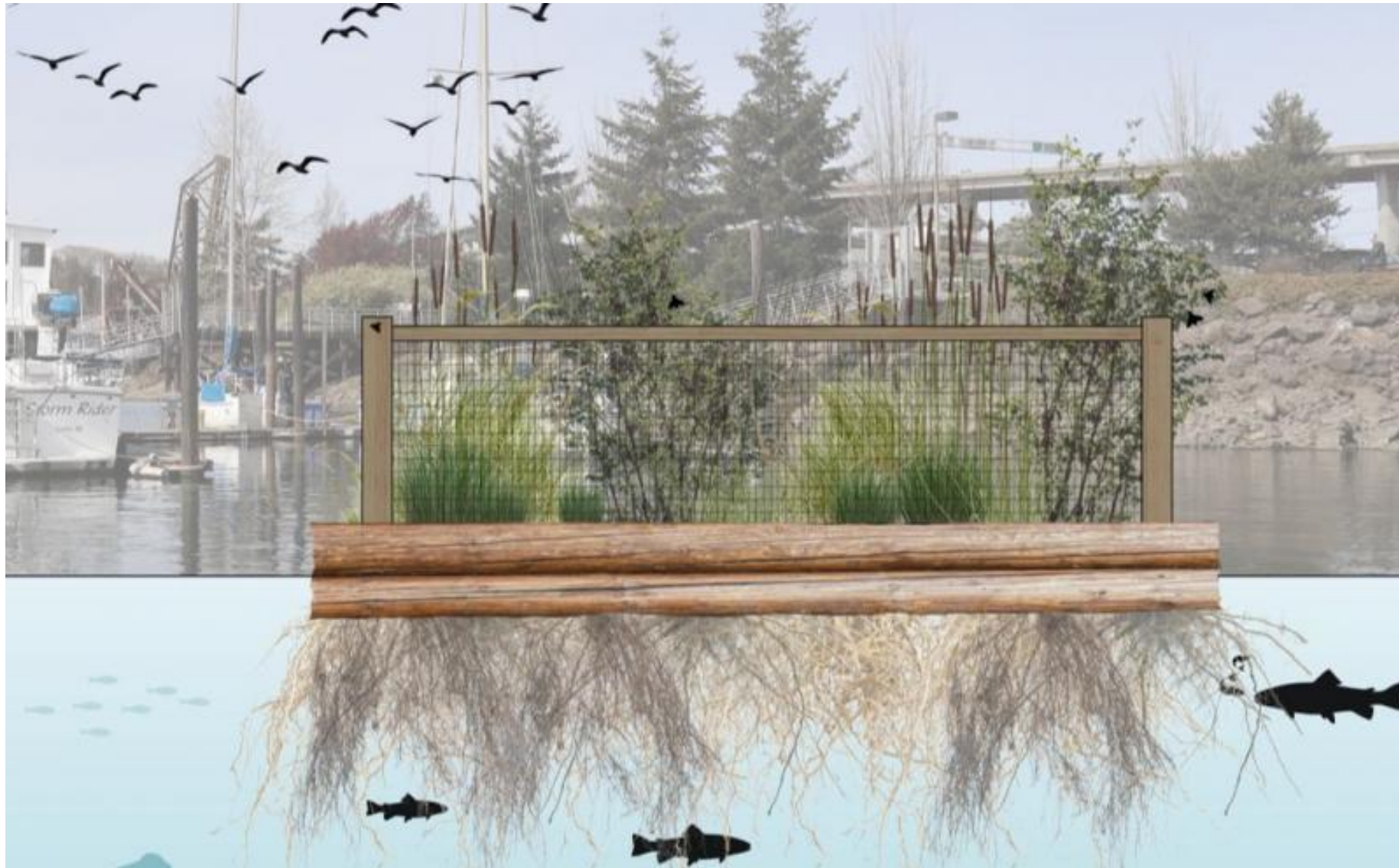


1
High concentrations of nitrogen and phosphorus (N+P) in dead-end canals can cause algal blooms (of phytoplankton) which, when combined with suspended sediments, can lead to poor water clarity and poor water quality.
In an oyster float, each oyster can filter up to 50 gallons of water daily, leading to lower concentrations of nitrogen and phosphorus (N+P), suspended sediments, and phytoplankton (micro algae). This leads to improved water clarity and water quality.

2
In a floating wetland, plants like *Spartina alterniflora* and *Eleocharis spp.* have roots that extend into the water. These roots are naturally covered in a thin layer known as biofilm: a slimy film made up of microorganisms including bacteria, fungi, and algae.
This biofilm can help the plant grow and protect it from pathogens, but it can also take up nitrogen and phosphorus (N+P) from the water, leading to lower concentrations of nitrogen and phosphorus (N+P) and improved water quality.

3
In a floating wetland, plants like *Spartina alterniflora* and *Eleocharis spp.* create excellent habitat for native fishes like mummichogs and striped killifish. This habitat provides a safe hiding spot for protection, as well as food in the form of micro-organisms like algae and small critters like shrimp.
As the ecosystem grows healthier, it will also play host to birds, turtles and other creatures who come to the canal in search of a convenient meal.

Floating Wetland Pilot Project – Port of Seattle



Floating Wetlands on South Branch of Chicago River

- Collaboration between Shedd Aquarium & Urban Rivers, a group of ecologists and entrepreneurs looking to convert city rivers into wildlife havens.
- Archipelago of 3,000+ square feet of floating wetlands at confluence of Bubbly Creek & Chicago River.
- Bubbly Creek earned its nickname because gases from tons of decomposing animal carcasses dumped there from the nearby Union Stockyards bubbled to the surface for decades. The stockyards closed in 1971.



Floating Islands Restore Coastal Wetlands



Living Seawalls in Sydney Australia



3 MINUTE READ

**Sydney Institute of Marine
Science**

Living Seawalls are scalable mosaics fitted to marine built structures

- Installed in Sydney in 2018
- Now in 3 other Australian cities, plus Singapore, Gibraltar, Wales & soon to be in Boston Harbor.
- Rapid growth of seaweeds, fish, crabs, oysters & mussels.
- Add protection to marine life from high temperatures and predators.
- Guidance Documents include Fish Friendly Infrastructure & Breakwater Upgrades.



Increasing Habitat on/in Hardened Shorelines

Bricks removed to allow colonisation by plants and nesting birds.



Gravels introduced to provide substrate for riparian plants to grow and to establish a deeper channel for water to flow.

Biohuts in Copenhagen Harbor



Mussel Restoration in St. Croix Falls, Wisconsin



Mussel Hatchery planned in Philadelphia



Image courtesy of WRT

Onward CBR4!

- Share Knowledge
- Expand the Team
- Interim Projects
- Pilot Projects
- Best Practices
- Think Globally

