INLAND LAKE FACT SHEET SERIES

Bioengineering (Lower-Energy)

Bioengineering is a best management practice in which native Michigan plants are restored in lower-energy nearshore areas along a lake shoreline. Lower-energy areas along a shoreline are typically characterized by site-specific conditions that may include a relatively short unobstructed distance across the lake from the proposed project, and the project being in a location where erosive forces from wind and boats are low, such as a protected bay. Bioengineering serves many functions that protect lakeshore properties and property values, improve recreational opportunities, and promote lake health. Natural shorelines are a critical component of a healthy lake, and a well-designed bioengineered shoreline can balance lake access, views, aesthetics, and lake health. A bioengineered shoreline does not have to look messy, a finished and well-manicured look can be achieved through careful planning.

ADVANTAGES
of installing shoreline bioengineering

Erosion Control
Bioengineering stabilizes the shoreline by utilizing native plants with strong, deep rooting, and complex root systems that hold soil and sediment and protect the shoreline from erosion.

Improved Water Quality
Bioengineering uses native plants to intercept nutrients and pollutants before they enter the lake, leading to clearer water and decreased algal blooms.

Fish and Wildlife Habitat
Bioengineering provides clean water, cover, feeding habitat for fish; nesting, basking, and feeding habitat for turtles, frogs, birds, butterflies, and other wildlife. Bioengineering also deters property damaging geese!

Turf-grass to the shoreline leads to poor lakeshore habitat. Poor biological health is three times more likely in lakes with poor lakeshore habitat. Forty percent of Michigan's inland lakes have poor lakeshore habitat. Photo courtesy of Michigan Natural Shoreline Partnership.

This bioengineered shoreline stabilizes the soil, slows runoff from upland areas, increases fish and wildlife habitat, improves water quality, and dissipates wave energy from wind and boats. Photo courtesy of Eric Calabro.

DISADVANTAGES
of hardened shorelines and lawn to water's edge

Wave Reflection
Seawalls and hardened shorelines don't allow for the absorption and dispersal of wave energy, they reflect wave energy. The reflection of waves can make erosion worse in other areas through wave flanking and scour - potentially causing erosion problems on neighboring properties.

Weak Roots
Turf-grasses (lawns) are not naturally found at the lake edge, and the shallow roots of turf-grass do not have enough strength to withstand waves and ice. Turf-grass also attracts property damaging geese.

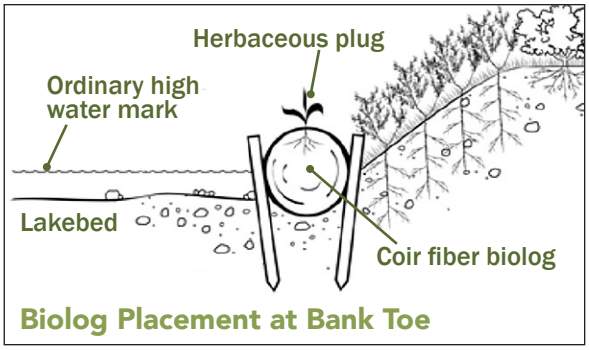
Poor Water Quality
Seawalls degrade lakes by promoting runoff of nutrients and pollutants that lower water quality. Waves reflecting off seawalls suspend sediment in the water column, reducing water quality. Seawalls block the ability of animals, like turtles and frogs, to move in and out of the water, and eliminate habitat required by fish and wildlife.

EGLE MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

Protect natural shoreline areas by using selective control techniques for invasive species. Maintain natural areas containing native shoreline plants, shrubs, and trees on your riparian property.

Minimize shoreline development and impacts. Design shoreline projects to minimize native vegetation removal and shading of native aquatic plants. Utilizing EGLE's Minor Project and General Permit Categories can assist in project minimization.

Restore shorelines with native aquatic and wetland plants. There is a continuum of options for erosion control for shorelines with increasing energy potential. The pictures to the right show an example of a strategy for a relatively low-energy area. This example shows a coir log being staked-in at the bank toe and native plants installed behind the coir log. Your property does not necessarily have to be restored to predevelopment conditions, but it should provide many of the same benefits to a lake, such as habitat and shoreline stabilization. There is more than one right way to design a bioengineered shoreline, so create a shoreline that incorporates your goals as well as changes that will benefit the lake. More information on recommended installation methods and procedures, and a list of Certified Natural Shoreline Professionals can be found at shorelinepartnership.org.



Example cross-section of a lower-energy bioengineering project design.

Bioengineering project right after installation. Photo courtesy of Michigan Natural Shoreline Partnership.

Bioengineering project being installed as part of the Michigan Natural Shoreline Partnership Certified Natural Shoreline Professional (CNSP) Training

Apply for a Permit

If you would like a bioengineered shoreline, a permit from EGLE is required. If your project meets the criteria in EGLE's Minor Project Categories or General Permit Categories it can be processed on a faster timeline and at a reduced fee. For more information, and to submit a permit application visit Michigan.gov/JointPermit.

For More Information

EGLE Inland Lakes: Michigan.gov/LakesAndStreams
Michigan Natural Shoreline Partnership: ShorelinePartnership.org
Michigan Inland Lakes Partnership: Canr.msu.edu/MichiganLakes
Michigan Shoreland Stewards: Michigan Shoreland Stewards

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09/2021