



Parks & Public Works Committee Agenda Item Report

FROM: Scott Herbert – Public Works Superintendent

MEETING DATE: March 25, 2025

SUBJECT: Stormwater Presentation

DESCRIPTION:

Paul Hausler and Carrie Rivette from Progressive Companies are here today to present on various topics relating to stormwater infrastructure and their impacts.

BUDGET ACTION REQUIRED:

N/A

COMMITTEE/COMMISSION REVIEW:

N/A

LEGAL REVIEW:

N/A

SAMPLE MOTION:

N/A

Stormwater Presentation

These days, most lakefront homeowners are aware of how their actions can affect the water quality in their lakes. However, lakes with storm sewer discharges to them are facing additional issues, that can't be resolved only by lakefront homeowners' actions. Lakes in more urban areas are dealing with runoff from yards beyond the lakefront and from streets and parking lots. Our presentation is intended to give the City of Saugatuck a quick update on sources of stormwater contaminants and their impacts on lakes and rivers, especially with rainfall frequency and intensity changing. The precipitation information consists of personal anecdotes and those from across the state with a few graphics on anticipated future rainfall conditions. From there, we will discuss green infrastructure/nature-based solutions that can reduce contaminants coming in from stormwater systems that discharge to the Kalamazoo Lake/River.

Below is an outline of the presentation. While we can customize this to fit your community's needs, it is intended that items A through D are a brief refresher. The emphasis is on nature-based solutions.

- A. Impacts of stormwater on surface water
- B. Probability for more extreme precipitation events
- C. Contaminant sources
 - a. Lawn/Driveway Runoff
 - i. Fertilizers
 - ii. Pet and Avian Waste
 - iii. Pesticides
 - iv. Household Chemicals
 - v. Salt
 - b. Streets
 - i. Sediment
 - ii. Oils and Greases
 - iii. Cleaners/Detergents
 - iv. Increased Water Temperature
 - v. Salt
 - c. Outfalls
 - i. Soil Erosion Sediment
 - ii. All of the Above
- D. Impacts of above contaminants
 - (i) Harmful algal blooms
 - (ii) Biological oxygen demand – anoxic “dead zones”
 - (iii) Loss of biodiversity
 - (iv) Habitat loss
- E. Nature-based Solutions
 - a. Rain gardens and bioswales
 - b. Natural shorelines and filter strips
 - c. Daylighting outfalls and buffer strips
 - d. Permeable pavement
 - e. Leaching catch basins
 - f. Mechanical filters
- F. Questions

Paul Hausler

WATER RESOURCES
PRACTICE LEADER



CONTACT

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EDUCATION

Bachelor of Science, Aquatic Biology
Grand Valley State University

Certificate of Wetland Delineator Certification
Program,
Wetland Training Institute

Natural Shoreline Professional Certification,
Michigan State University—Cooperative
Extension Service

Over the past 34 years, Paul has been involved in all of Progressive Companies large water resource management projects. Paul is primarily responsible for leading the water resources team and overseeing and coordinating large projects.

Spring Lake- Lake Board

Schoolcraft Township, Barton Lake

Marble-Coldwater Lake Improvement Board

Watervliet and Coloma Townships, Paw Paw Lake

Diamond Lake Association

Hodunk-Messenger Lake Improvement Board

Upper Straits Clean Lake Association

Village of Wolverine Lake

Wixom Lake Improvement Board

Lake Oakland Improvement Board

Presentations

- Wixom & Sanford Lakes, a Re-birth in Progress, Midwest Aquatic Plant Management Society, Grand Rapids, Michigan
- The Fishery and Aquatic Invasive Species Control, Michigan Lakes and Streams Association, Crystal Mountain Resort, Michigan
- Lake Boards, a Half-Century of Cooperation & Accomplishment, Michigan Association of County Drain Commissioners, Mackinac Island, Michigan
- Collaborative research on invasive aquatic plant management, National Aquatic Plant Management Society, Grand Rapids, Michigan
- Using Bioassays to Effectively Manage Tolerance Issues in Select Milfoil Bio-types, Midwest Aquatic Plant Management Society, Cleveland, Ohio
- Houghton Lake, Michigan: A Challenge in Aquatic Plant Management, Midwest Aquatic Plant Management Society, Chicago, Illinois
- Evaluation of Renovate OTF to Control Eurasian Milfoil in Wixom Lake, Michigan, Midwest Aquatic Plant Management Society, Sandusky, Ohio
- A Large-Scale Application of Alum to an Inland Lake: A Synopsis of the Treatment and Early Indications of Success, Midwest Aquatic Plant Management Society, Grand Rapids, Michigan

**Carrie
Rivette, PE**
SENIOR CIVIL ENGINEER



CONTACT

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EDUCATION

Michigan Technological University
*Bachelor of Science, Environmental
Engineering*

CREDENTIALS

Licensed Engineer

Carrie Rivette, a Project Manager and Senior Civil Engineer who recently joined Progressive Companies, brings over a decade of specialized experience in stormwater management and green infrastructure. For 12 years, she managed Grand Rapids' Municipal Separate Storm Sewer System (MS4) permit, playing a vital role in advancing the City's green infrastructure initiatives. Her work supported significant urban sustainability plans, including the Green Grand Rapids Master Plan Update, the Stormwater Master Plan, and the Vital Streets Plan, and she helped shape the city's Green Infrastructure Portfolio Standards and Strategic Plan. Carrie's collaborative efforts connected the City with prominent organizations like Friends of Grand Rapids Parks and Plaster Creek Stewards and saw her serve nearly ten years on the executive committee for the Lower Grand River Organization of Watersheds (LGROW).

Among Carrie's notable projects, the **Curb Cut Rain Gardens Initiative** (2013–2023) stands out as a model of sustainable infrastructure. In partnership with Plaster Creek Stewards, she guided the installation of around 150 curb cut rain gardens in the city, an effort that other local municipalities have since adopted. Her leadership in the **Daylighting at The Highlands** project (2018–2023) also exemplifies her commitment to environmental restoration. Partnering with the Land Conservancy of West Michigan and other stakeholders, she oversaw the removal of 1,500 feet of stormwater pipe to restore 2,000 feet of natural stream, aligning the project with both grant and city requirements. In the **Rainy Day Project** (2018–2020), Carrie collaborated with WMEAC and the Green Homes Coalition to implement water conservation efforts and green infrastructure assessments in underserved Grand Rapids neighborhoods, achieving a community-wide reduction in water usage.

Carrie's project portfolio reflects her dedication to sustainable, community-driven solutions and her skill in managing complex partnerships and regulatory requirements. Her extensive experience in green infrastructure development and collaborative project management will enhance Progressive Companies' approach to water resources and urban sustainability.

PROGRESSIVE
COMPANIES



STORMWATER RUNOFF AND LAKES



Keeping Our Lakes Clean and Healthy
in a Changing Regional Climate





HYDROLOGIC CYCLE

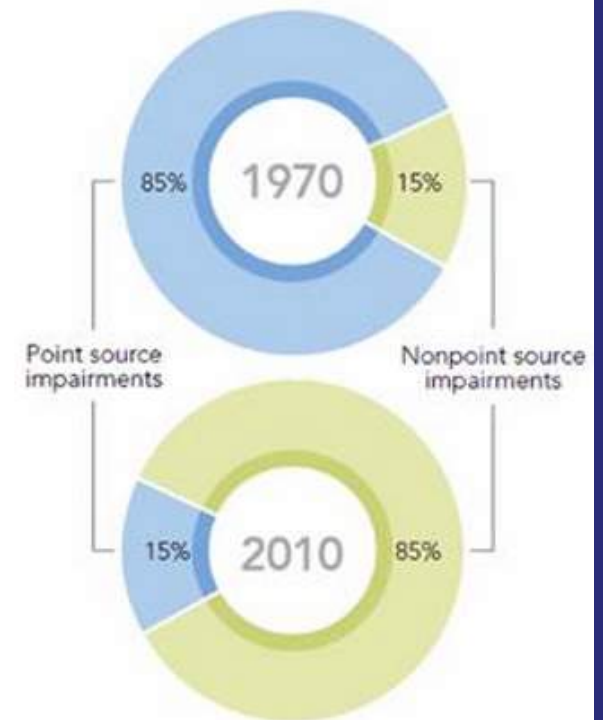


National Issue

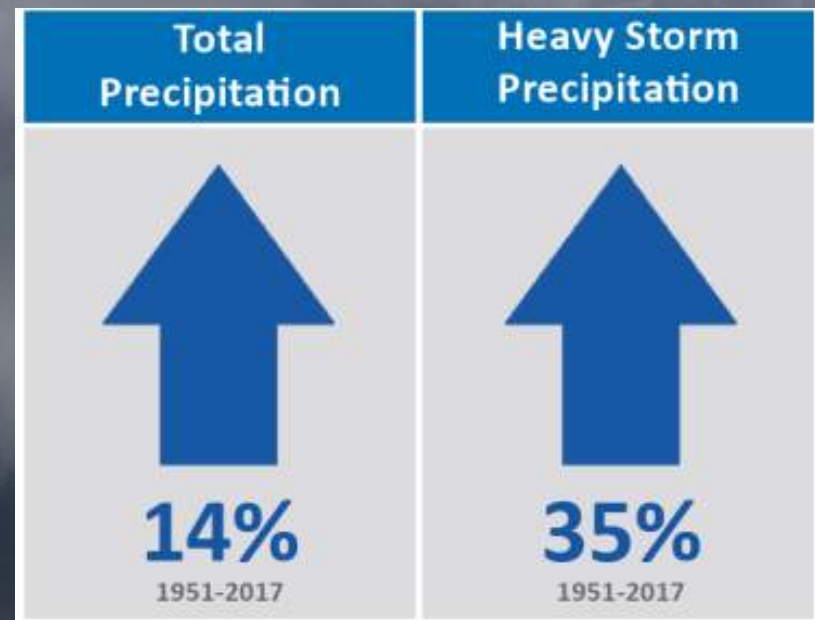
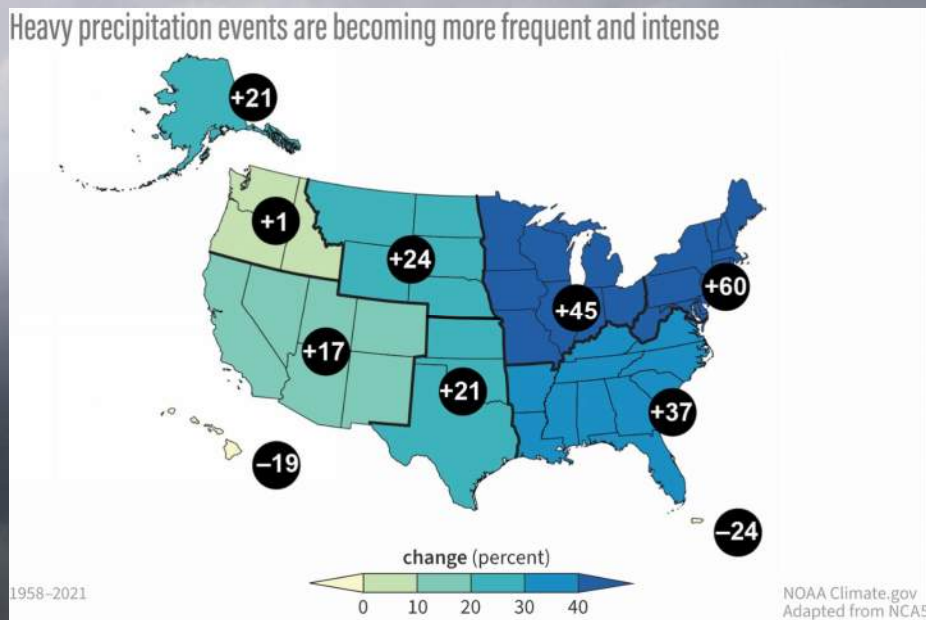
“Stormwater is the only growing source of water pollution in many watersheds throughout North America. Urbanization and climate change exacerbate stormwater pollution, and, today, more than half the world’s population lives in cities.”

“To put this issue in the context of environmental effect, in 1970, 85% of water quality impairments were associated with point-source pollution. The remaining 15% came from nonpoint sources such as agricultural and urban stormwater. Today, after significant advancements in wastewater treatment, these values have flipped — 85% of impairments now stem from nonpoint and urban stormwater discharges.”

Rainfall to Results: The Future of Stormwater
Water Environment Federation, 2015



Extreme Precipitation Events



Michigan Data Courtesy of GLISA 2019

Changes in the Heaviest 1% of Daily Precipitation Events from 1951-1980 to 1981-2010 in the Great Lakes Region

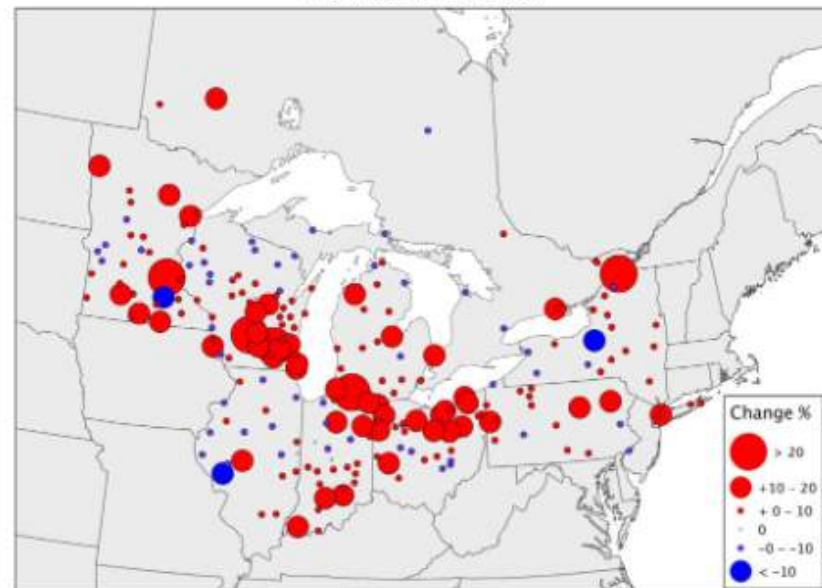
Change in Intensity of
1% Heaviest Storm (%) 5.1

Change in Number of
1% Heaviest Storm Days (%) 23.6

Change in Amount Falling in
1% Heaviest Storms (%) 24.5

Regional analysis of extreme precipitation. Values are based on observations from 230 U.S. and Canadian GHCN stations across the Great Lakes region.

Observed Changes (%) in the Intensity of the 1% Heaviest Precipitation Days (1951-1980 vs. 1981-2010)



Change in intensity of the heaviest 1% of daily precipitation events for GLISA quality-controlled GHCN-Daily stations in the Great Lakes region.

Impacts from Storm Sewers and Open Drains



- Lawn/Driveway Runoff
 - Fertilizers
 - Pet and Avian Waste
 - Pesticides
 - Household Chemicals
 - Salt
- Streets
 - Sediment
 - Oils and Greases
 - Cleaners/Detergents
 - Increased Water Temperature
 - Salt
- Outfalls
 - Soil Erosion Sediment
 - All the Above

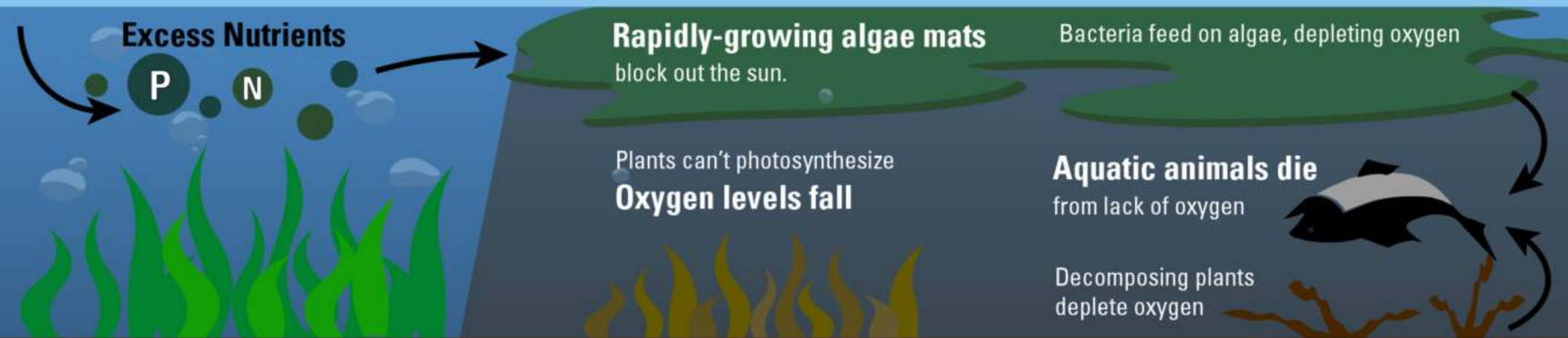
An aerial photograph showing a massive, swirling green algal bloom in a body of water. The bloom has a complex, fractal-like pattern with many smaller swirls and eddies. The color is a vibrant green, contrasting with the darker water. The text "HARMFUL ALGAL BLOOMS" is overlaid in white on the left side of the image.

HARMFUL ALGAL BLOOMS

Fertilizers and Nutrients

- Plant and Algal Growth
- Blocks Sunlight
- Decreases Oxygen

Nutrient Pollution



Virginia and West Virginia Science Center



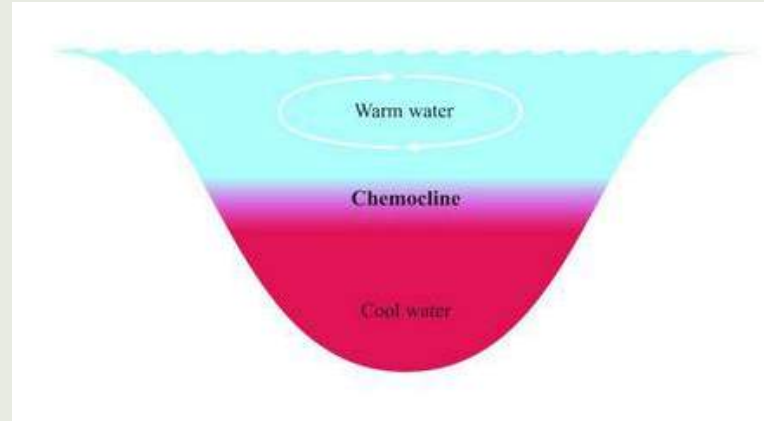
Pet and Avian Waste

- *E. coli*
- Nutrients

Household Chemicals

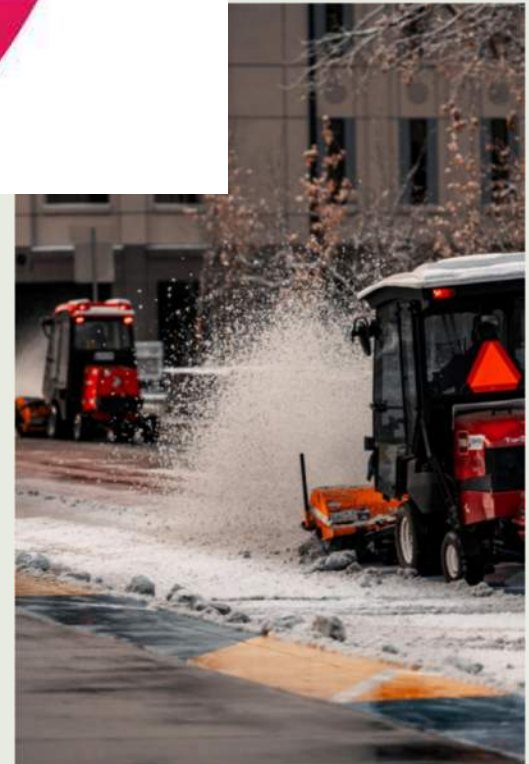
- *E. coli*
- Cleaners/Detergents
- Pesticides
- Oil and Grease

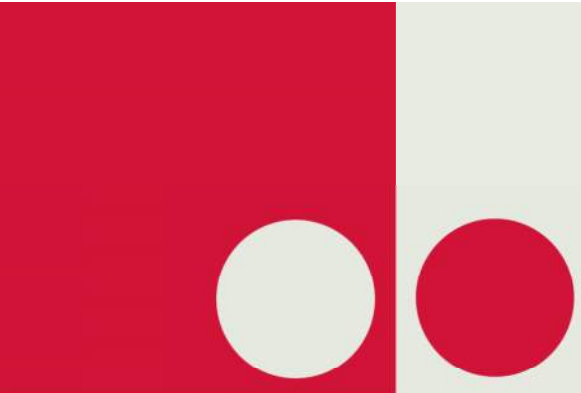




Chlorides

- Habitat/Biodiversity Decreases
- Water Temperature
- Very Transmissible/Soluble
- Increases Available Phosphorus
- Decreased Oxygen





Sediment

- Habitat
- Blocks Sunlight
- *E. coli*
- Build up

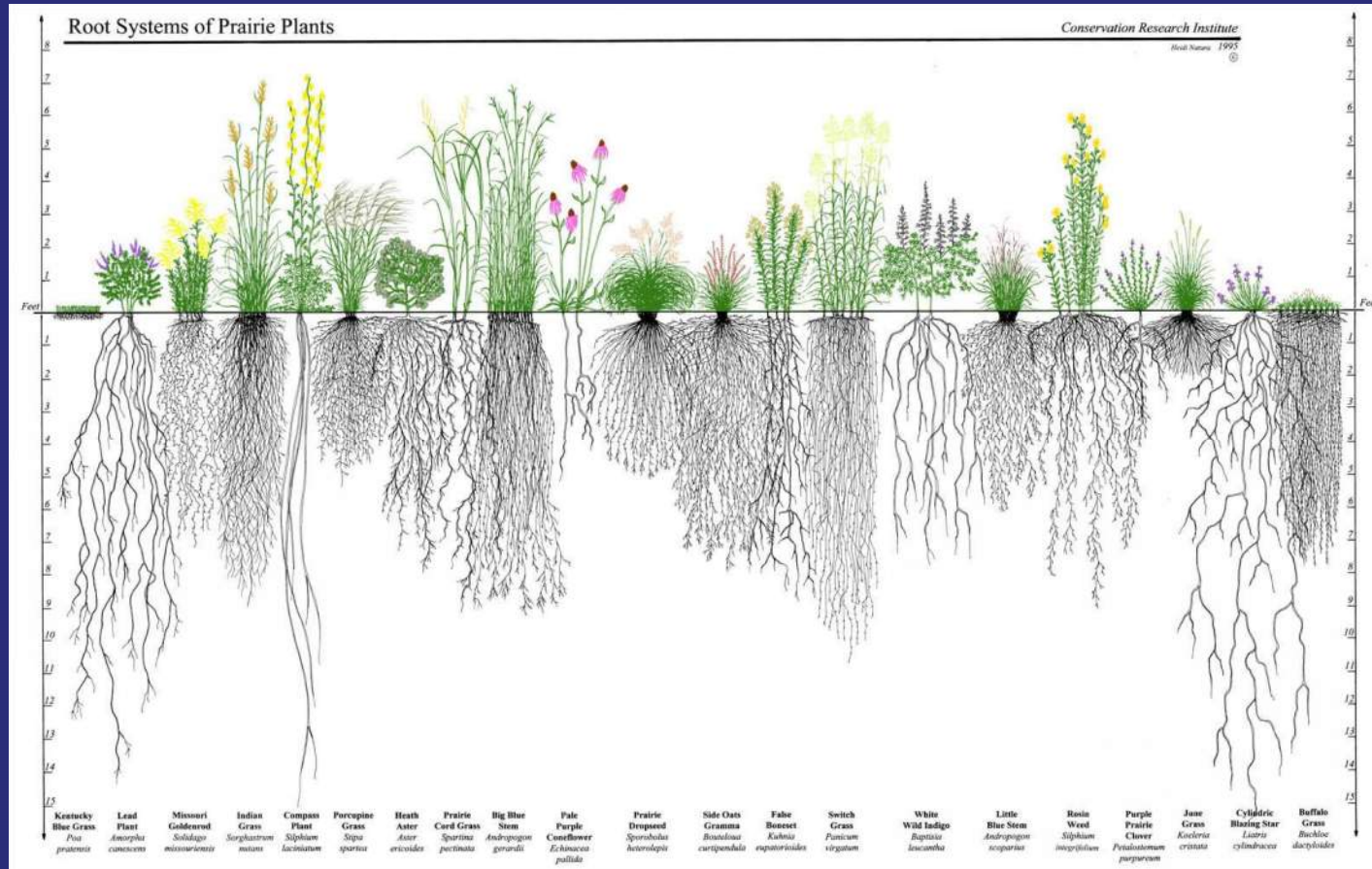
Increased Water Temperature

- Plant and Algal Growth
- Loss of Habitat/Loss of Native Species





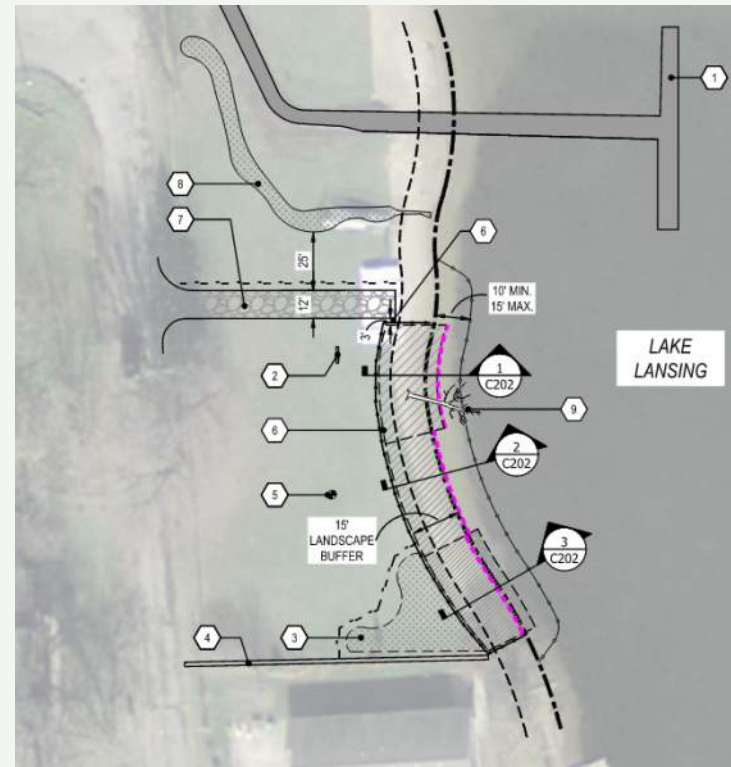
NATURE-BASED SOLUTIONS

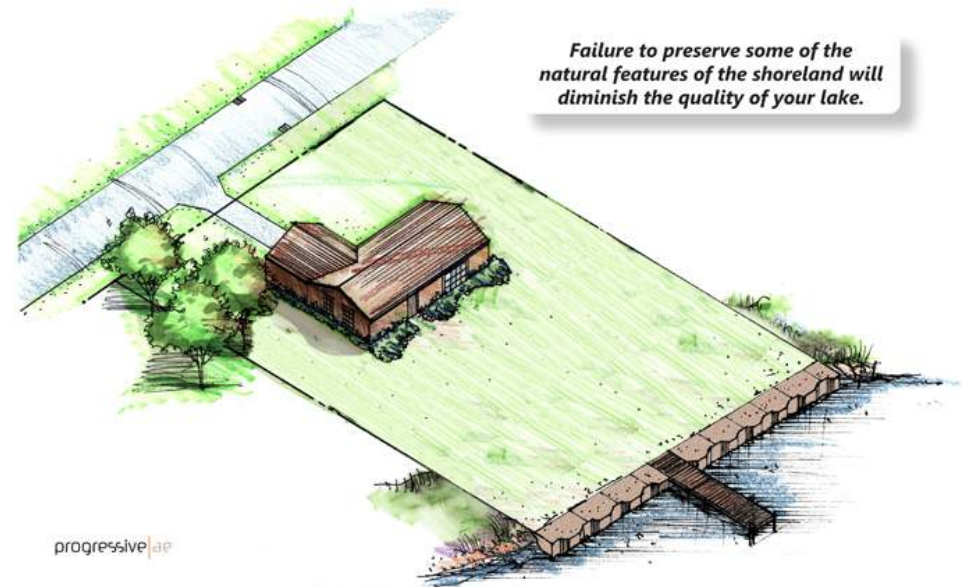
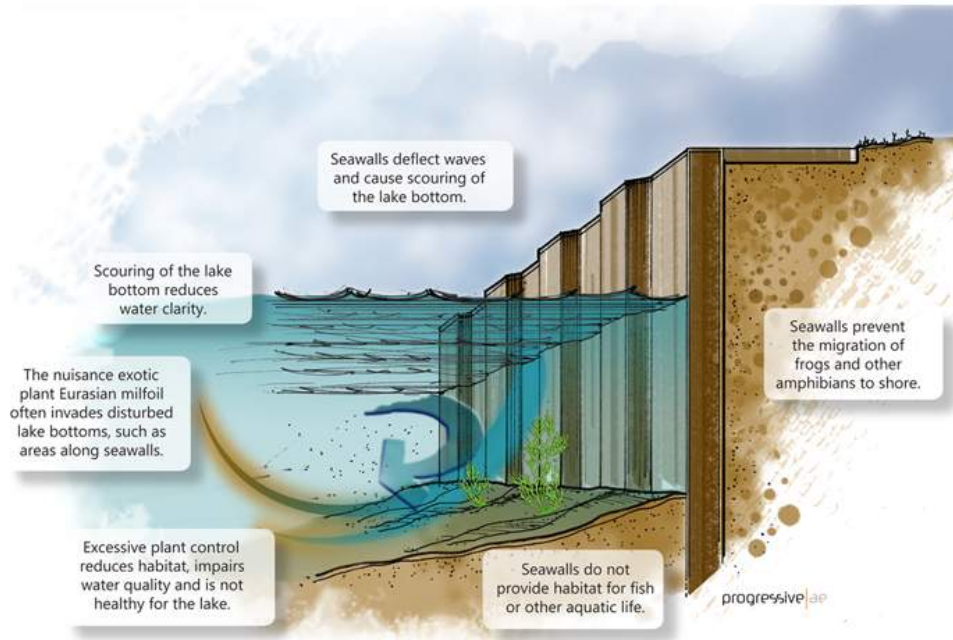


Rain Gardens and Bioswales



Natural Shorelines and Filter Strips





Hardened Shorelines

Your shoreland can be maintained to provide beach and boat access for you while maintaining habitat for fish and wildlife.

Don't dump into storm drains; pollutants may be piped directly to the lake.

Most lakeside soils have more than enough phosphorus to grow lawns, trees, and shrubs. Adding phosphorus fertilizer is usually not necessary, and can cause excessive growth of aquatic plants.

Maintain a greenbelt of trees, shrubs, and ground cover—it's habitat for fish and wildlife, and helps protect water quality too.

Minimize lawn area to reduce the need for fertilizer.

You can maintain a small beach and dock area—it's "habitat" for you!

Establish a greenbelt to filter runoff and discourage nuisance geese.

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Aquatic plants are part of a healthy lake. They produce oxygen, provide food and habitat for fish, and help to stabilize shoreline and bottom sediments.

Insects and other invertebrates live on or near aquatic plants, and become food for fish, birds, amphibians and other wildlife.

Plants and algae are the base of the food chain. Lakes with a healthy fishery have a moderate density of aquatic plants.

Aquatic plants provide habitat for fish and other aquatic life.

Aquatic plants help to hold sediments in place and improve water clarity.

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Trees and shrubs prevent erosion and provide habitat.

Roots and stones absorb wave energy and reduce scouring of the lake bottom.

Predator-fish such as pike hide among plants, rocks, and tree roots to sneak up on their prey. Prey-fish such as minnows and small sunfish use aquatic plants to hide from predators.

Natural Shorelines

Daylighting Outfalls and Buffer Strips



Permeable Pavement



Leaching Catch Basins

Mechanical Filters

- Floatables
- Solids
- Hydrocarbons



PAUL HAUSLER

B.S BIOLOGY, GRAND VALLEY STATE UNIVERSITY
CERTIFIED NATURAL SHORELINE PROFESSIONAL
WETLAND DELINEATION CERTIFICATION

Water Resources Practice Leader



CARRIE RIVETTE

B.S. ENVIRONMENTAL ENGINEERING,
MICHIGAN TECHNOLOGICAL UNIVERSITY
PROFESSIONAL ENGINEER (MI)

Senior Civil Engineer



The background of the slide is a complex, abstract geometric pattern. It consists of various light green shapes, including rectangles, triangles, and rounded forms, arranged in a way that creates a sense of depth and movement. The shapes are layered, with some appearing to be in front of others, creating a 3D effect. The overall color palette is a soft, muted green and white.

THANK YOU

We welcome your feedback,
insights and inquiries.



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