

# A Restoration Plan for the Root River Watershed

A Guide to Managing Water Quality, Recreational Access and Use, Habitat Conditions, and Flooding

Source: Jay Warner, Warner Consulting

Source: Joseph E. Boxhorn, SEWRPC



Source: Joseph E. Boxhorn, SEWRPC

Source: Civil Air Patrol

### Executive Summary

Prepared for Root-Pike Watershed Initiative Network and Southeastern Wisconsin Watersheds Trust, Inc. by the Southeastern Wisconsin Regional Planning Commission

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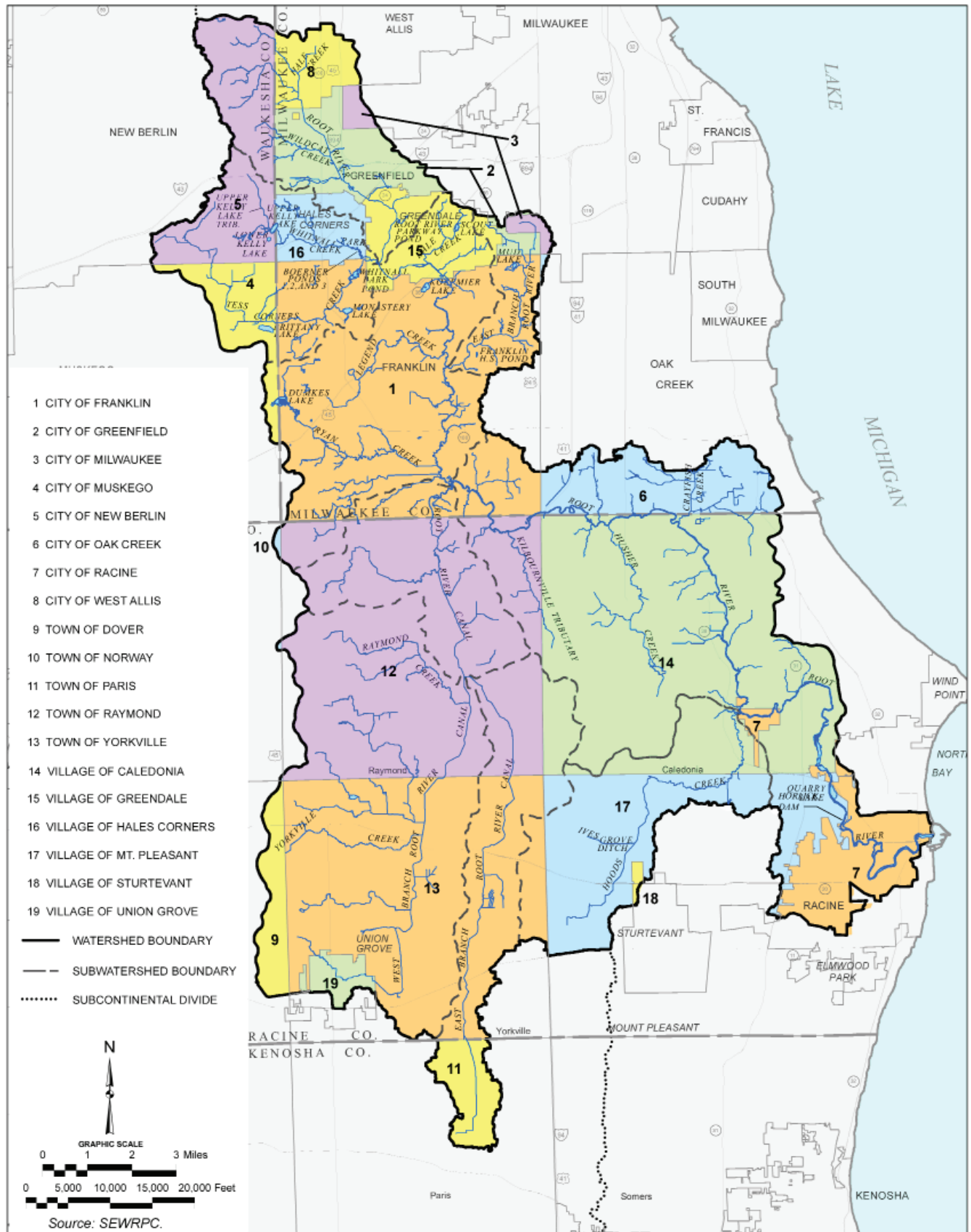
# Civil Divisions Within the Root River Watershed: 2012

Water quality

Recreational use and access

Habitat conditions

Flooding



The Root River watershed is located in Kenosha, Milwaukee, Racine, and Waukesha Counties. It reaches into eight cities, six villages, and five towns in southeastern Wisconsin.

## A Restoration Plan for the Root River Watershed

The health of a river system is usually a direct reflection of the use and management of the land within its watershed. The Root River watershed in southeastern Wisconsin is not in the best of health and has shown signs of degradation over several decades. The Root River Watershed Restoration Plan is a comprehensive resource developed to provide a set of specific, targeted recommendations to improve the Root River and its tributaries. The recommendations are for focused implementation from 2014 to 2019, but the plan is comprehensive in scope and it is likely that it will be implemented well beyond 2019.

Source: Aaron W. Owens, SEWRPC



Erosion is evident in this portion of Hoods Creek.

The plan is coordinated with other recent plans and recommendations. Notably, the 2007 SEWRPC regional water quality management plan update provides comprehensive recommendations related to land use, pollution abatement, and water quality management that are directly related to the Root River watershed. The 2014 Root River plan includes a detailed review of the status of implementation of these recommendations.

### Root River characteristics and conditions

The Root River watershed contains a mixture of urban and rural land uses, with urban development concentrated in Milwaukee and Waukesha Counties, the City of Racine, and the southeastern portion of the watershed. The remaining two-thirds of the watershed is primarily influenced by rural land uses.

The ecological integrity of the River and its tributaries is threatened by a number of problems that restrict potential uses of those streams. Although the watershed includes environmental corridors, parks, and natural areas, and provides opportunities for outdoor recreation, it is adversely affected by:

- Areas with chronically low concentrations of dissolved oxygen that inhibit aquatic habitats,
- High concentrations of bacteria which indicate that disease-causing agents may be present,
- High concentrations of phosphorus and chloride,
- High concentrations of total suspended solids,
- Streambed and streambank erosion,
- Disconnected habitats for wildlife that rely on natural land and water corridors,
- Exotic invasive species that can displace native species and degrade habitat, and
- A lack of recreational access in some places.

Source: Joseph E. Boxhorn, SEWRPC



The Root River watershed attracts geese and other waterfowl.

The Root River Watershed Restoration Plan seeks to preserve, restore, and enrich the natural environment by focusing on these four areas:

- Water quality
- Recreational access and use
- Habitat conditions
- Flooding

### Integrated watershed planning

Using existing plans and recent scientific data from established sources, Root River watershed restoration planners at SEWRPC, working with an Advisory Group of experts and interested parties, developed specific, targeted recommendations to improve water quality, recreational access and use, and habitat conditions, and to reduce flooding in Racine County. These water quality recommendations include measures to reduce the levels of phosphorus, bacteria, and pollutants.

## Urban recommendations for restoring the watershed

Nonpoint source pollution contributed by urban and rural stormwater runoff is a major source of pollution in the Root River watershed. The Root River plan recognizes the watershed's sensitivity to human influences and includes strategies to reduce the pollutants from runoff.

Municipal and county governments, property owners, and resource managers can implement best management practices to reduce runoff pollution in the watershed. In urban areas, nonpoint sources of runoff can be controlled through many different independent and coordinated practices and green infrastructure.



Source: Root-Pike Watershed Initiative Network

Bioswales are one urban solution to stormwater runoff.

### Strategies to reduce pollution from urban runoff

- Grassed swales
- Infiltration basins
- Bioretention facilities
- Rain gardens
- Green roofs
- Native landscaping
- Cisterns
- Rain barrels
- Soil amendments
- Porous pavement
- Stormwater treatment facilities
- Storm sewer systems
- Vacuum sweeping of roads and parking lots
- Non-chloride (road salt) snow and ice controls
- Fertilizer application controls
- Pet litter and debris controls
- Marine sanitation controls



Source: Joseph E. Boxhorn, SEWRPC

Porous pavement can include brickwork, as show above.

## Green infrastructure

The Root River watershed plan is closely aligned with numerous relevant governmental and nongovernmental entities, and incorporates projects, plans, programs, and data from these entities. In 2013, the Milwaukee Metropolitan Sewerage District (MMSD) developed a green infrastructure plan for its planning area, including significant portions of the Root River watershed. The MMSD plan includes many of the strategies to reduce urban runoff that are listed on this page.

**Municipalities can address water quality by monitoring stormwater for illicit discharges of contaminated water; designing facilities to reduce sediment, nutrient, bacteria, and pathogens; and implementing and enforcing pet litter controls.**



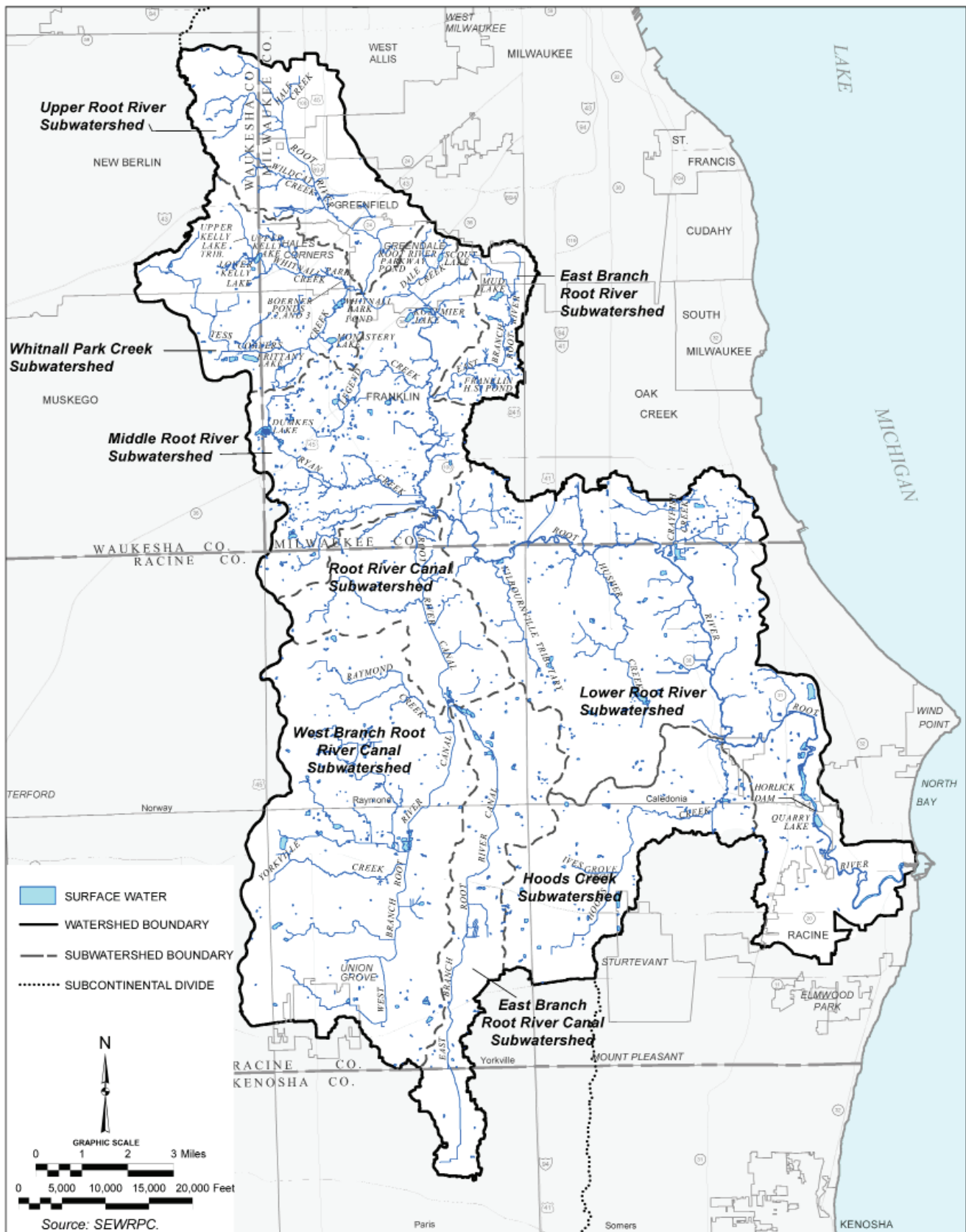
Source: Milwaukee Metropolitan Sewerage District

Source: Root-Pike Watershed Initiative Network



Green roofs, left, and rain barrels, above, catch stormwater runoff.

## Surface Water Within the Root River Watershed: 2012



The Root River watershed includes nine subwatersheds: the Upper Root River, Whitnall Park Creek, East Branch Root River, and Middle Root River upstream in Milwaukee and Waukesha Counties, and the Root River Canal, West Branch Root River Canal, East Branch Root River Canal, Lower Root River, and Hoods Creek downstream in Racine and Kenosha Counties.

## Rural recommendations for restoring the watershed

Rural nonpoint source pollution control measures are also an important part of the Root River watershed plan. The plan includes erosion-control, farm management, and other recommendations for rural areas derived from the regional water quality management plan update. In addition to agricultural best management practices, both the Root River and the regional plans recommend regulatory oversight of private-property wastewater treatment systems.

Source: Chad Sampson, Racine County Land Conservation



Pollution from agriculture can be reduced through best practices such as grass swales and inlets for collecting and filtering runoff.

### Strategies to reduce pollution from rural runoff

- Riparian buffers
- Conservation tillage
- Grassed waterways
- Cover crops
- Manure storage
- Nutrient management
- Barnyard runoff controls
- Livestock controls
- Wetlands and prairies
- Milking wastewater controls
- Drainage water management
- Saturated buffers
- Woodchip bioreactors (trenches)
- Drain tile controls

## Groundwater recharge

Groundwater recharge in the Root River watershed supplies water to shallow aquifers which, in turn, provide water to the River and its tributaries. This supply of “baseflow” water is invaluable to maintaining the natural hydrology, instream habitat, and the overall health of the River, particularly during droughts and low water flows (which may become more frequent due to climate change). The Root River plan includes recommendations for protecting groundwater recharge and flow related to urban development and green infrastructure.

Source: Ann Dee Allen, SEWRPC



Members of the public and governmental and nongovernmental agencies provided input for the Root River plan at a series of public meetings in the watershed.

## Surface water hydrology

Urbanization and agricultural development have altered the landscape with regard to the surface water drainage characteristics within the watershed, leading to increasing volumes of water and runoff. The Root River plan includes recommendations for slowing and moderating water flow in an effort to restore more natural, normal flows. Many different urban and rural solutions can be implemented to manage water fluctuations, including stream rehabilitation, erosion controls, wetlands, and natural vegetation.

**The Root River Watershed Restoration Plan was developed to meet the U.S. Environmental Protection Agency’s Nine Elements for a Watershed Plan. The elements specify requirements that include identifying the causes of pollutants, describing watershed management measures and timelines for implementation, estimating costs, setting milestones and criteria for plan progress, and information and education.**



The Root River offers urban and rural opportunities for recreation.

### Urban fishing and recreation

The Root River is a major draw for southeastern Wisconsin residents and visitors who enjoy fishing from the banks of public lands and from boats. The Wisconsin Department of Natural Resources and local governments manage and stock trout into several small lakes and ponds in the watershed.

The watershed is also served by Wehr Nature Center in Milwaukee County and by River Bend Nature Center and the Root River Environmental Education Community Center in Racine County. Seven additional nature centers outside the watershed are also located in the counties the River traverses. The Root River plan recommends that nature center facilities, programs, and services continue to be provided and enhanced according to each center's needs and resources.

### Recommendations for recreational use and access

One of the primary reasons for developing and implementing the Root River plan is to improve access to the outdoors and enhance the outdoor experience for people who fish, boat, picnic, hike, visit nature centers, and engage in other recreational activities in the watershed. To accomplish this, the plan includes recommendations to improve water quality by reducing bacteria and pathogens that enter the watershed and affect human, animal, plant, and aquatic life. Optimum recreational use of the watershed is dependent upon the propagation and protection of desired species of fish and the exclusion of invasive aquatic and terrestrial species and plants.

Source: Joseph E. Boxhorn, SEWRPC



Fishing is popular at Scout Lake in the northern portion of the watershed and other places.

Source: Tom Slawski, SEWRPC



Fishing appeals to all ages.

**Nature centers in the watershed offer programs and services unique to their locations. Although facilities and activities vary by nature center, the following activities are available at one or more of the nature centers within the Root River watershed, and rental of some equipment is also provided.**

- Hiking and cross-country skiing**
- Connections to bicycle or multiuse trails**
- River access for canoes and kayaks**
- Sledding**
- Equipment Rentals**
  - Canoes**
  - Cross-country skis**
  - Kayaks**
  - Snowshoes**

## Riparian buffers

The preservation and development of riparian buffers—land zones that help protect water quality and function as core habitat and travel corridors for many wildlife species—are keys to the existing and future economic, social, and recreational well being of the Root River watershed.

Derived from the Latin word *ripa*, for “bank,” riparian buffers refer to the natural or relatively undisturbed lands adjacent to waterbodies and to corridor lands in need of protection. As buffers, these areas lessen the adverse effects of development and urban and rural runoff, and so contribute to water quality, recreational use and access, and habitat conditions. They also reduce flooding.

Riparian buffers:

- Protect surface- and ground-water quality and recharge,
- Help protect wildlife for fishing and hunting,
- Allow native species to flourish while discouraging unwanted species, and
- Provide natural areas for rivers and streams to overflow into during floods.

Source: Joseph E. Boxhorn, SEWRPC



Riparian buffers provide environmental corridors for wildlife and also protect water quality.

### Buffer design

Property owners, farmers, businesses, and developers can all benefit from learning more about environmental buffers that promote water and habitat quality and prevent or mitigate flooding. Urban and rural buffer designs vary as much as nearby areas. Landscapers and other professionals use many factors to determine the best buffer design for a specific area, including slope, soils, incoming pollution, land area dimensions, and vegetation.



Source for photos on pages 8-9:  
 Donna Pelikan Boxhorn; Joseph E. Boxhorn, SEWRPC,  
 and the Wisconsin Department of Natural Resources



## Habitat and wildlife protection

The Root River Watershed Restoration Plan recommends that efforts be made to develop buffered areas to the extent practicable within the watershed. Several practices contribute to the effectiveness of riparian buffers, including: 1) eradicating nonnative plant species, 2) establishing and restoring native vegetation, and 3) promoting awareness and education about managing buffer zones to prevent the introduction of nonnative species of plants, fish, and animals.

Source: Joseph E. Boxhorn, SEWRPC



Muskrats can be found in the watershed, as evidenced by this lodge.

## Open spaces and corridors

Riparian buffers and other natural areas cannot fully protect and nurture native species when they are disconnected from each other. Open spaces and corridors that enable water to flow, fish and other wildlife to travel and reproduce, and native trees and plants to grow, are essential to environmental health. The Root River plan recommends that open spaces be preserved and expanded through native landscaping and small wetlands, woodlands, and prairies. Nonessential roads and stream crossings are discouraged, as they interrupt natural corridors.



The Root River watershed is home to many species of plants, animals, insects, and birds.

Source: City of Racine Department of Public Works



City of Racine residents experience periodic flooding from the Root River.

## Flooding

At times, flooding in Racine County contributes to health, environmental, and safety hazards—including bacteria, sedimentation, and real and personal property damage. The Root River plan identified areas prone to flooding within the Racine County portion of the watershed. In areas where flooding is scattered, flood mitigation measures such as structure floodproofing or removal should be considered. In areas of the City of Racine where there is a more concentrated flood hazard, more detailed flood mitigation planning will be necessary, considering a wide range of alternatives including floodwater storage and conveyance.

The Milwaukee Metropolitan Sewerage District (MMSD) is responsible for flood mitigation in the upstream segment of the watershed. The Southeastern Wisconsin Regional Planning Commission (SEWRPC) is in the process of updating floodplain delineations in Milwaukee County

Source: Bill Miller, City of Racine Public Works



The Horlick dam must be upgraded to safely pass floodwaters.

## Examples of flood mitigation

- Convey and store River floodwaters in stream overbanks
- Floodproof, elevate, or demolish flood-prone buildings
- Construct or modify bridges and culverts along roadways
- Construct or modify stormwater management systems to infiltrate, store, and/or convey runoff
- Construct emergency overflow routes for peak runoff from stormwater systems

Source: David L. Maack, Racine County Office of Emergency Management

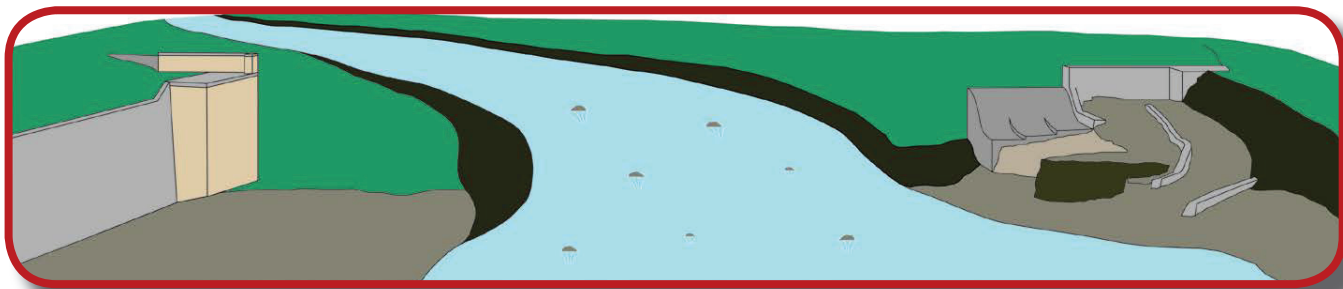


Flooding causes property damage.

## Water quality monitoring

Many governmental and nongovernmental organizations are involved in monitoring the Root River watershed for water quality, recreational use and access, habitat conditions, and flooding. More than two dozen water quality monitoring stations are in use within the watershed.

Source: SEWRPC



The Root River plan includes four alternatives for the Horlick dam, plus a recommendation to remove it, as depicted above.

## Horlick dam

Horlick dam on the Root River in Racine County has become an issue of concern because it contributes to sedimentation, which increases phosphorous levels and also raises water temperatures and lowers the levels of dissolved oxygen necessary for fish and aquatic organisms to thrive. The dam also interrupts and disconnects the river system. While the dam does provide some protection from aquatic invasive species, it is not a complete barrier.

The WDNR has notified Racine County that it has until the year 2024 to increase the capacity of the Horlick Dam spillway if the County chooses to maintain the dam. Another option available to the County is to abandon and remove the dam. The Root River plan includes four alternatives for reconstructing the spillway and one to remove the dam. Based on environmental considerations—including water quality, fish community effects, and flooding—the plan recommends that the dam be removed. The plan notes that Racine County's decision

on the future of the dam must also consider cost and include cultural and social implications regarding recreation, safety, and property owners' interests. It is recommended that Racine County work closely with the WDNR to determine what actions to take regarding the dam. In addition, other dams in the watershed could be evaluated for modification or removal.

Source: Laura Kletti, SEWRPC



Sports enthusiasts fish for coho salmon, chinook salmon, and other species at the Horlick dam spillway.

The Root River plan recommends comprehensive monitoring of water quality by continuing existing monitoring and adding more than 40 more monitoring stations along the River, its tributaries, and several lakes. This would allow the health of the watershed to be more accurately gauged by location.

### Different types of water monitoring include analyzing indicators related to:

Ammonia	Nitrite
Cyclic organic compounds	Nitrogen
Chlorophyll-a	Stream invertebrates
Dissolved oxygen	Suspended solids
Fecal indicator bacteria	Water flow
Fish	Water temperature
Phosphorous	Water transparency
Metals	Water turbidity
Nitrate	

## Root River Watershed Restoration Plan

In developing a 2014-2019 plan for watershed water quality, recreational use and access, habitat conditions, and flooding, two fundamental questions were addressed: 1) What are the conditions of the Root River watershed, and 2) What are the specific, targeted recommendations for improving the River and its tributaries?

The Root River Watershed Restoration Plan sets forth a comprehensive plan for the four areas on which it focuses.

The plan includes recommendations for both general and site-specific management measures to address the physical, chemical, and biological health of the watershed. It also includes a comprehensive description of conditions in the watershed and provides lists of funding sources for implementation. The plan contains information to help people become more aware of the health and use of the watershed.

The Root River watershed is an important natural resource which, managed wisely, will continue to improve as a place for animal, plant, and aquatic life to flourish—providing decades of healthy recreation for southeastern Wisconsin residents and visitors.

Source: Chad Sampson, Racine County Land Conservation



Restored areas of the Root River watershed provide habitat and improve water quality.

The Root River Watershed Restoration Plan can be accessed online at [www.sewrpc.org/SEWRPC/Environment/Root-River-Watershed-Restoration-Plan.htm](http://www.sewrpc.org/SEWRPC/Environment/Root-River-Watershed-Restoration-Plan.htm). For more information, please contact the Root-Pike Watershed Initiative Network at [info@rootpikewin.org](mailto:info@rootpikewin.org), the Southeastern Wisconsin Watersheds Trust at [info@swwtwater.org](mailto:info@swwtwater.org), or SEWRPC at [mhahn@sewrpc.org](mailto:mhahn@sewrpc.org).



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