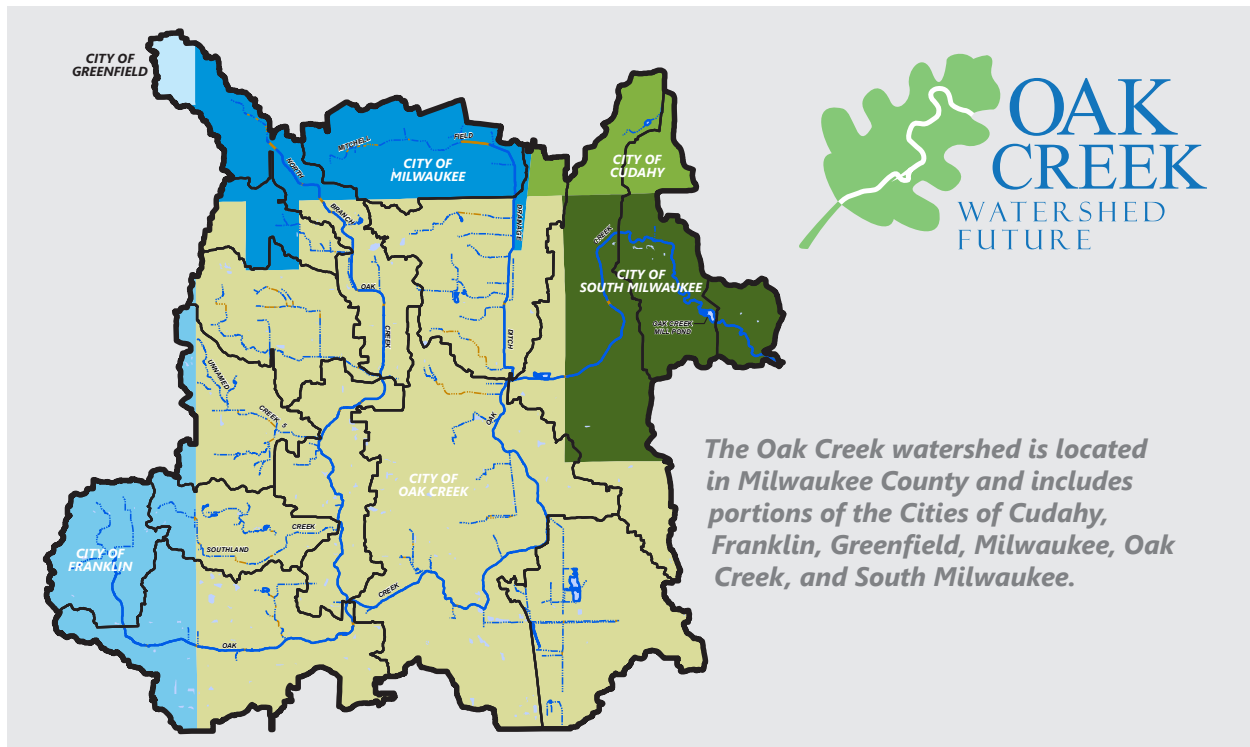


# A RESTORATION PLAN FOR THE OAK CREEK WATERSHED

## EXECUTIVE SUMMARY



### PURPOSE

The Oak Creek Watershed Restoration Plan (Plan) is a comprehensive resource developed to provide a set of specific, targeted recommendations to improve Oak Creek, its tributaries, and the watershed as a whole. The recommendations are for focused implementation over the next thirty years, but the Plan is comprehensive in scope and it is likely that it will be implemented well beyond that timeframe.

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 Oak Creek watershed. This Plan includes a detailed review of the implementation status of these recommendations.

This Plan is also intended to meet the U.S. Environmental Protection Agency's Nine Key Elements for a Watershed Plan. The elements specify requirements that include identifying the sources of pollutants, describing watershed management measures and timeline for implementation, estimating costs, setting milestones and criteria for plan progress, and providing information and education.

The four focus areas for this Plan include water quality, habitat, recreational access and use, and targeted flooding. A review for these focus areas was also completed specifically for the Mill Pond and Mill Pond dam near the downstream end of the watershed in the City of South Milwaukee. This Plan was developed in consultation with an Advisory Group of experts and interested parties. Stakeholders participated through the project webpage and numerous public meetings.

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

- Water Quality
- Habitat Conditions
- Recreational Access and Use
- Flooding

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## PLAN SUMMARY

The Oak Creek Watershed Restoration Plan is divided into six chapters and 21 appendices. The first three chapters provide background on how the Plan was developed, prior work that has been completed in the watershed that relates to this Plan, and a general characterization of the watershed.

The fourth Plan chapter provides a detailed inventory of the state of the watershed based on research, field work, and existing data. Major findings for each category are summarized below.

### Stream Characteristics

Commission staff surveyed about 22 miles of Oak Creek, North Branch Oak Creek, and the Mitchell Field Drainage Ditch inventorying and geolocating stream components such as channel and water dimensions, habitat types, streambank erosion, outfalls, culverts and bridges, large debris jams, and large trash items. Historical modifications to the stream channels, the loss of wetlands, and increases in impervious surfaces due to rapid urbanization have led to many impairments to Oak Creek and its tributaries. Impairments include excessive streambed and bank erosion, disconnection of the streams from a functional floodplain, excessive sedimentation, and loss of critical instream and terrestrial habitat. In addition, impediments to aquatic organism passage between Oak Creek, its tributaries, and Lake Michigan have contributed to a relatively poor-quality aquatic organism community.



*Commission staff conducted instream surveys to assess the existing conditions of the waterways. This included an assessment of habitat conditions and an inventory of the physical attributes and infrastructure associated with the stream system.*

### Water Quantity

Flows on Oak Creek are very flashy and adversely impact the streams of the watershed. Stream and stormwater flooding impacts are scattered throughout the watershed.

### Mill Pond and Dam

The Mill Pond has significant sediment accumulation that has adversely impacted its water quality, fishery, and recreational use. The Mill Pond dam is in good condition, except that its maintenance sluice gate is inoperable.

### Surface Water Quality

While instream levels of pH and concentrations of total suspended solids and some heavy metals have improved, high concentrations of fecal indicator bacteria, total phosphorus, total nitrogen, and chloride are present and constitute ongoing water quality problems. Low concentrations of dissolved oxygen are present in some tributaries and the upper reaches of Oak Creek, which is another water quality problem.

High levels of bacteria have been found in streams within the Oak Creek watershed. Potential sources of bacteria include wildlife, pet waste, or cross-connections between sanitary and storm sewers. The presence of dry-weather flow from stormwater outfalls may be an indication of illicit connections to the storm sewer system

### Biological Conditions

While the quality of the biological community in some reaches of the mainstem of Oak Creek has improved, the watershed contains poor to fair quality fish and aquatic macroinvertebrate communities, reflecting the combined effects of poor water quality, habitat alteration, and habitat fragmentation.

## Recreation Access and Use

Commission staff conducted various recreational use surveys to better understand the patterns of outdoor recreation throughout the watershed. While the existing 1,165 acres of County Parkway, 12 miles of Oak Leaf Trail, the many acres of parks and open spaces, the Mill Pond warming house, and fishing access offer good opportunities for outdoor recreation along Oak Creek, interested plan participants identified the desire for high quality trails that support walking, hiking, and bicycling and restoration of the Mill Pond to expand and enhance the watershed recreational use and access opportunities.



Credit: Ken Mattison

*The Oak Creek watershed contains many miles of recreational trails, including over 12 miles of Oak Leaf Trail and over nine miles of Forked Aster trails that support walking, hiking, biking, and other passive recreational uses.*



*Fishing is an important recreational activity in the Oak Creek watershed. The most popular fishing locations are located between the Creek's confluence with Lake Michigan and the Mill Pond dam. During the fall, this stretch is known for its salmon and brown trout runs.*

The fifth chapter of the Plan summarizes the goals and management objectives to improve conditions in the watershed. These goals and objectives were used to develop the Plan recommendations.

## PLAN RECOMMENDATIONS

The sixth and final Plan chapter summarizes the recommendations to improve conditions related to water quality, habitat, recreational access and use, flooding, and the Mill Pond and dam in the Oak Creek watershed. This includes a list of projects to be implemented over time. Recommendations include the following types of projects.

### Water Quality

The Plan includes recommendations to address water pollution from point sources and urban and rural runoff. A major emphasis is placed on installing green infrastructure. The Plan also includes recommendations for implementing innovative runoff management practices to address specific pollutants such as phosphorus and pathogens. In addition, the Plan offers example stormwater management projects to retrofit current infrastructure for both water quantity and quality improvements.

#### Strategies to Reduce Pollution from Urban Runoff:

|                         |                                 |                                    |
|-------------------------|---------------------------------|------------------------------------|
| Grassed swales          | Rain barrels                    | Fertilizer application controls    |
| Bioretention facilities | Soil amendments                 | Pet litter and debris controls     |
| Rain gardens            | Pervious pavement               | Iron enhanced sand filters         |
| Green roofs             | Stormwater treatment facilities | Riparian buffers                   |
| Native landscaping      | Storm sewer systems             | Regenerative stormwater conveyance |
| Cisterns                | Leaf and lawn waste management  |                                    |

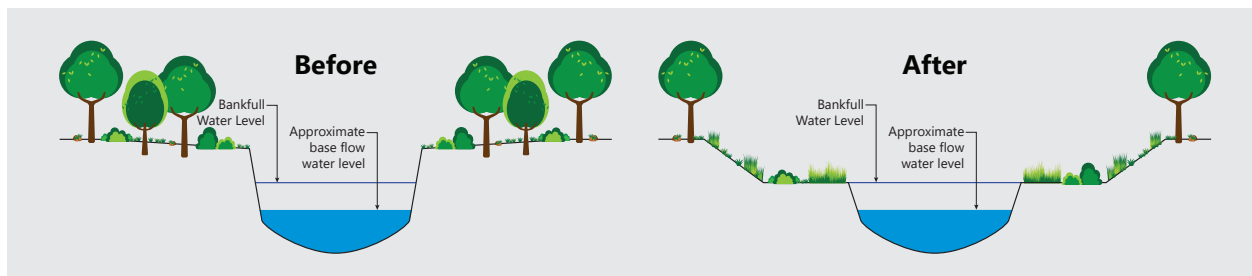
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## Recommended Water Quality Monitoring Includes Analyzing Indicators Related To:

|                          |                    |                      |                    |
|--------------------------|--------------------|----------------------|--------------------|
| Dissolved oxygen         | Metals             | Phosphorus           | Water flow         |
| Fecal indicator bacteria | Nitrogen compounds | Stream invertebrates | Water temperature  |
| Fish                     | Organic compounds  | Suspended solids     | Water transparency |

## Habitat

Recommended actions to maintain and re-establish natural surface water hydrology include to; protect, restore, expand, and connect riparian buffers; restore and connect wildlife habitat; restore the quality and diversity of instream habitat; mitigate the negative impacts on aquatic and terrestrial ecosystems that are associated with climate change; and reduce trash and debris within the stream channels and riparian areas.



*A well-connected floodplain can provide many beneficial functions related to water quality, aquatic and terrestrial wildlife habitat, and flood reduction. Many stream reaches within the Oak Creek watershed have been disconnected from their floodplains through channelization and erosion of the streambeds. An important recommendation in this Plan is to improve the connection of streams to a functional floodplain.*

## Recreational Access and Use

Recommended actions include providing a better connected trail system to both local and regional trail systems; continue to expand passive recreational opportunities throughout the watershed; pursue opportunities for voluntary acquisitions of lands adjacent to publicly owned open spaces; additional access sites for fishing; examine additional uses for the Mill Pond warming house; and continue to strive for equal access and use of recreational facilities for all interested users.

## Targeted Flooding

Due to the scattered nature of flooding concerns, solutions should be evaluated on a case-by-case basis as opportunities arise. Retaining runoff onsite as much as possible and protecting areas for infiltration and flood storage is also recommended.

## Mill Pond and Dam

Five alternatives and one optional spillway enhancement are summarized to improve the Mill Pond and dam area. Sediment core sampling in the Mill Pond is recommended to refine the alternatives.

The final chapter also provides details regarding Plan implementation, including public participation, measuring plan success—including water quality monitoring, a schedule and interim milestones, and potential funding sources.

The Oak Creek Watershed Restoration Plan can be accessed online at:  
[www.sewrpc.org/OakCreekWRP](http://www.sewrpc.org/OakCreekWRP)

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