



dead river
watershed - based plan
2008

foreword

The Dead River Watershed - Based Plan was developed through a cooperative effort between the Lake County Stormwater Management Commission and representatives of the watershed stakeholders. A number of different entities, ranging from homeowners to municipal governments and county agencies, consistently attended monthly meetings during the planning process. Twelve public meetings were held to solicit input from the stakeholder committee.

The Dead River Watershed Management Plan was developed to provide a "blueprint" for reducing flood damages, improving water quality, and protecting natural resources in the watershed. The Plan is intended to assist private citizens and the local, State, and Federal units of government concerned with managing the water resources of this watershed in a cost-effective and environmentally sound manner.

The Plan contains a summary of data collected for the watershed, quantifies water resource-related problems, presents goals and objectives agreed upon by the stakeholder group, and presents a list of recommended actions for effectively managing watershed resources in concert with activities such as comprehensive planning, development standards, and transportation planning. The Plan provides a basis for inter-jurisdictional communication and coordination on water resources issues.

This Plan is an advisory document for stakeholders of the watershed, but we encourage stakeholders to endorse the Plan, utilize the document as a reference, and pursue implementation. This document does not contain subwatershed regulatory requirements, but instead provides proactive guidance on opportunities to balance the uses and demands on the watershed's resources to improve the quality of life for future generations.

Lake County Stormwater Management Commission

Michael D. Warner, P.E., CFM
Executive Director

September 2008

Our vision for the Dead River Watershed is of . . .

a network of healthy streams and ecosystems where habitat for native plants and animals, and surface and ground water quality, are protected and enhanced;

unique, vibrant communities with sustainable and healthy economies;

a dedicated system of open space is protected, enhanced and preserved.

**~ THE DEAD RIVER WATERSHED
PLANNING COMMITTEE**

executive summary

THE DEAD RIVER WATERSHED

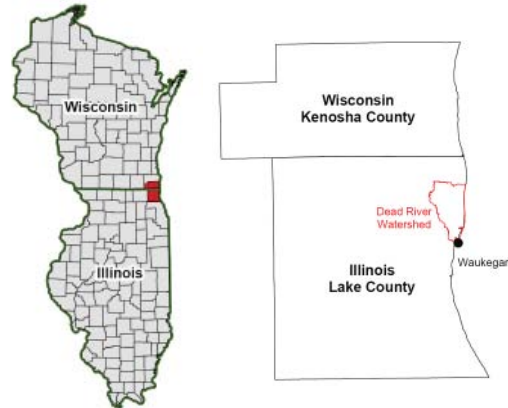
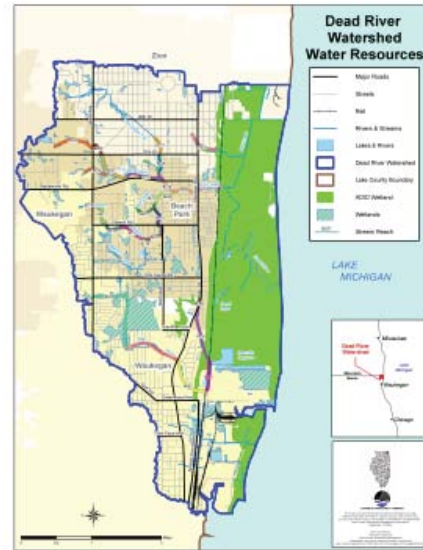
The Dead River watershed is the area of land where water that falls as rain or snow flows across the landscape, enters our streams and wetlands, and ultimately drains into Lake Michigan. The 16 square mile (10,200-acre) watershed is bounded by Green Bay Road on the west, Lake Michigan on the east, Waukegan Harbor on the south, and Shiloh 25th Street on the north.

The watershed is part of the Root-Pike watershed system that includes Kellogg Creek to the north and the Root and Pike Rivers in southeastern Wisconsin. The Dead River watershed is one of the few remaining Illinois tributaries that drains to Lake Michigan, and contributes to the overall quality and health of Lake Michigan and the Great Lakes system.

The watershed includes over twelve miles of stream and more than 1700 acres of wetlands. From north to south, the major stream channels include an unnamed tributary, Bull Creek, and Glen Flora Tributary. Bull Creek is made up of the 27th Street Tributary, North Branch of Bull Creek, South Branch of Bull Creek, and the Wilson Avenue Tributary, which together become the Dead River in Illinois Beach State Park. The Glen Flora Tributary, formerly known as the Little Dead River, currently flows through the Johns Manville lagoons and discharges through a pipe to Lake Michigan.

The watershed includes part of Illinois Beach State Park, a National Natural Landmark visited by 2.8 million people annually, which contains 2000 acres of Illinois Nature Preserve, a high concentration of threatened and endangered species, and unique ecosystems found nowhere else on earth. The park also contains the last remaining undeveloped Lake Michigan shoreline and sand dune complex in Illinois.

The Dead River watershed includes areas of the City of Zion, Village of Beach Park, and City of Waukegan, as well as lands owned and managed by Lake County, the Lake County Forest Preserve District, the State of Illinois, and a number of other public and private entities.



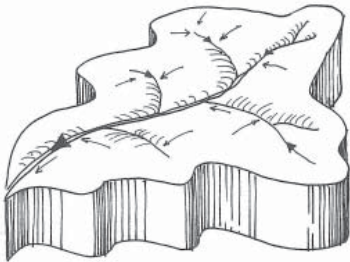
The Dead River watershed within the context of Illinois, Wisconsin, and the Great Lakes basin.

THE WATERSHED OVER TIME

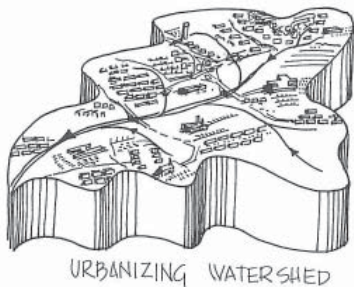
In the early 1800s, the watershed landscape consisted of scattered oak trees, prairies, and wetlands in the central and western thirds, large areas of open oak woodlands along the ridges and ravines, and a coastal 'beach ridge' along the Lake Michigan shoreline. Before settlement, the Dead River and tributary streams flowed cool and clear, and were surrounded with dense ground vegetation and scattered trees. When water reached the Lake Michigan beach plain, it spread out across the landscape creating a vast wetland and dune system and slowly seeped into the lake.

In the 1800's, the fertile soils and openness of the oak tree and prairie landscape attracted farmers, who converted these lands, including the draining of wetlands, for agriculture. In the early 1900's, urbanization of settlements began and continued with suburbanization following World War II. Today, the coastal beach ridge has been preserved as Illinois Beach State Park, and many of the ravine woodlands are intact. The rest of the watershed has been converted into downtown areas, older neighborhoods, and newer suburban development interspersed with commercial and industrial land uses.

A watershed is the geographic area of land that drains water to a particular stream, lake or wetland, and is defined by the topography of the landscape. The watershed includes not just the surface of the land, but also the area below the surface where water that infiltrates into the soil flows toward the receiving stream or waterbody as underground flow.



A WATERSHED DRAINS AN AREA OF LAND



URBANIZING WATERSHED



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These landscapes have been restored to resemble presettlement conditions similar to that found in the Dead River watershed.

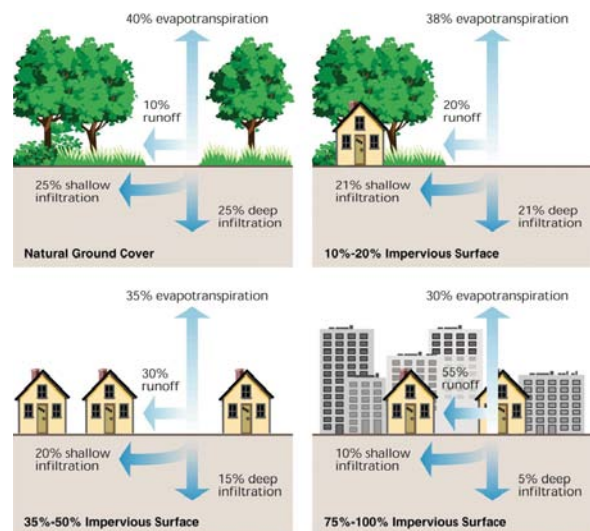
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THE IMPACT OF WATERSHED DEVELOPMENT

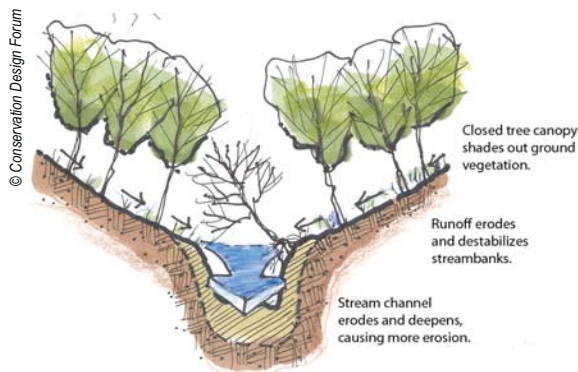
Under natural conditions, most of the water that falls on earth is used by plants, evaporates into the air, or seeps into the soil and becomes groundwater. Water that does not evaporate or infiltrate into the ground is called runoff. As a watershed develops, natural areas are converted into lawns, rooftops, roads, and parking lots. Instead of being used by plants or seeping into the ground, water that falls on these surfaces quickly flows to our streams directly or through the stormwater drainage and sewer system. As a result, streams and wetlands receive large pulses of water in shorter periods of time, resulting in erosion and destabilization of the stream channel and streambanks. When this happens, streambanks erode away, causing the loss of property and the pollution of our water with sediment. Where the landscape or the stormwater system is insufficient to contain this flush of water, flooding can occur.

Streambanks are further destabilized by the type and density of vegetation along the streambanks. Due to the introduction of plants that are not native to Illinois, and to the lack of natural landscape processes such as fire, deep-rooted ground vegetation that used to stabilize stream edges have been replaced with non-native plants and dense woods that shade out good vegetation and do not adequately stabilize the stream banks.

In addition to increasing the volume and rate of runoff, pollutants such as oil and grease, road salt, eroding soil and sediment, metals, bacteria from pet wastes, and excess nutrients (nitrogen and phosphorus) from fertilizers are washed from streets, buildings, parking lots, construction sites, lawns and golf courses into the streams and lake. This kind of pollution is called nonpoint source pollution. Additional pollutants include increased water temperature, altered pH, and low dissolved oxygen levels, making the river unhealthy for aquatic life.



Greater imperviousness results in a greater percentage of rainfall leaving as runoff and less infiltrating into the ground.



High runoff can cause erosion and incision of stream channels.



Impervious surfaces contribute pollutants to rain water runoff.

The health of the Dead River system and Lake Michigan are a direct reflection of land use activities throughout the watershed such as how we develop the watershed, and how we live in and manage our urban landscape, have a dramatic effect on the condition of watershed resources. These impacts affect not only the residents and visitors of Zion, Beach Park, and Waukegan, but all of the communities that depend on Lake Michigan to provide water, recreation, food, economic well-being, or other values. Fortunately, there are proven practices for addressing these impacts, and landowners, business owners, public officials, and all who live, work, and play within the watershed can take positive action towards improving the watershed. One of the first steps in the process is to understand watershed problems and make a plan for moving forward -- a watershed plan.

WATERSHED PLANNING

Healthy watersheds offer many benefits including a healthy river with better water quality, enhanced opportunities for recreation and environmental education, opportunities for environmentally sustainable economic development, better wildlife habitat, reduced food damage, and a healthier Lake Michigan.

One of the first steps to rediscovering and enhancing these watershed benefits is through a process called watershed planning. The purpose of the watershed planning process is to better understand the condition of Dead River watershed resources, and to identify actions to prevent existing watershed problems from worsening as a result of future land use and management changes, preserve and improve water resources, reduce food damage, protect property and infrastructure, and improve the quality of life for watershed residents. Watershed planning has the added benefit of bringing numerous communities together to plan for the greater good and to protect and improve the land and water resources they share and impact.

The following general steps were used in developing this watershed plan.

1. Conduct monthly Watershed Planning Committee meetings with watershed stakeholders and technical team members.
2. Solicit public input on watershed issues and opportunities and formulate watershed goals and objectives.
3. Review and analyze existing studies, watershed conditions, and watershed data to identify watershed problems.
4. Identify best management practices and policies to improve watershed resources.
5. Develop detailed watershed improvement action and implementation plan and recommendations.



Watershed planning is a participatory process with watershed stakeholders.

executive summary

WATERSHED ISSUES AND GOALS

During the first two Watershed Planning Committee meetings, watershed stakeholders developed a list of watershed issues and opportunities and prioritized them via a voting process. Specific areas of concern include the stream system and erosion problems, the ravines, the area north of Waubesa Harbor, and Lake Michigan and its shoreline. These and other issues were categorized into the following topic areas, with the number of votes received shown in parenthesis:

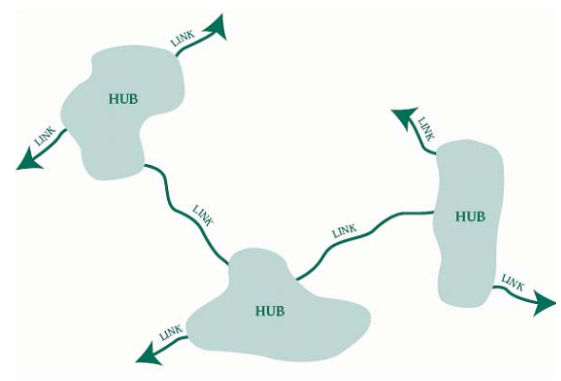
1. Stream Restoration and Management (53)
2. Floodplains (16)
3. Natural Resources (34)
4. Watershed Education & Coordination (32)
5. Stormwater Infrastructure (0)
6. Water Quality (0)

Due to the similarity and proximity of the Kellogg Creek and Dead River watersheds, these results were combined with those of the Kellogg Creek watershed as the foundation for developing the following watershed management goals, which are further detailed in Chapter 2:

- Goal A:** Restore the health and function of streams as part of a watershed *green infrastructure* (see description at right).
- Goal B:** Reduce and prevent flood damage to protect health, safety, property and infrastructure.
- Goal C:** Preserve and restore a *green infrastructure* network of land and water resources.
- Goal D:** Provide people with watershed improvement education, resources, and opportunities.
- Goal E:** Improve water quality by reducing the impacts of land use and development.
- Goal F:** Improve public, private, and non-profit coordination and decision-making.
- Goal G:** Stabilize the stream systems by reducing surface runoff.

Green infrastructure: On the local scale, municipal or neighborhood, green infrastructure consists of site-specific best management practices (such as naturalized detention facilities, vegetated swales, porous pavements, rain gardens and green roofs) that are designed to maintain natural hydrologic functions by absorbing and infiltrating precipitation where it falls.

On the regional scale, green infrastructure consists of the interconnected network of open spaces and natural areas (such as forested areas, floodplains and wetlands, greenways, parks and forest preserves) that mitigate stormwater runoff, naturally recharge aquifers, improve water quality while providing recreational opportunities and wildlife habitat.



Conservation design: A county-wide method for developing land that conserves the green infrastructure elements of a site while providing for development at full density on the remainder of the site. Conservation design typically includes the use of stormwater management measures that filter and infiltrate runoff on site.



WATERSHED INVENTORY AND ASSESSMENT

Chapter 3 of this plan is an assessment of watershed conditions based on data, studies, and inventories, and the preparation of a series of watershed maps. The assessment included stream corridor conditions, stormwater infrastructure, flooding, water quality, land use, wetlands, and other relevant data and information. This information serves as baseline data for comparison with future watershed assessments. Five important conclusions based on this watershed assessment are summarized here.

1. The Dead River system exhibits rapid increases and decreases in water flow, level and velocity, which reduces water quality, reduces the quality of stream habitat, and destabilizes the stream channel, causing erosion of streambanks and ravines and damage to stormwater infrastructure.
2. Streambank and ravine erosion are a major concern along many reaches and require immediate attention. Stormwater discharge points are of particular concern as many of them were found to be failing or negatively impacting the stream system.
3. Water quality is impacted primarily by sediment, low dissolved oxygen levels, high phosphorous concentrations, and other typical urban watershed non-point source pollutants. The Waukegan Regional airport, other impervious surface areas, and the industrial legacy of Waukegan Harbor and areas to the north of the harbor are significant contributors to water runoff and pollution.
4. Preserving and restoring priority green infrastructure areas, including Illinois Beach State Park, Lyons Woods Forest Preserve, wetlands, and stream corridors, is critical for improving water quality and other watershed resources. Restoration measures include controlling invasive species, which threaten high quality natural, beach erosion in Illinois Beach State Park, and the habitat of the stream channel and the natural corridor through which the stream channel runs.
5. The municipalities, residents, businesses, landowners, and other organizations and agencies within the watershed lack the coordination and communication necessary to improve watershed resources.

WATERSHED BEST MANAGEMENT PRACTICE TOOLBOX

Chapter 4 of the watershed plan includes a description of best management practices and policies that can improve watershed resources. Included in this toolbox are actions that can be taken by residents, landowners, business owners, agencies, and municipalities to prevent conditions from worsening and to improve existing impaired conditions. Best management practices described in the toolbox include:

- Stabilize eroding streambanks using deep-rooted vegetation and other environmentally-friendly measures.
- Use conservation design principles for new development and retrofitting existing development with improved stormwater management practices.
- Install vegetated swales, raingardens, and filter strips, to help slow, filter, infiltrate, cool, and cleanse stormwater before being discharged to our streams and wetlands.
- Reduce the area of impervious surfaces and using permeable paving practices that allow water to infiltrate into the ground rather than run across the surface.
- Maintain deep-rooted, native vegetation buffers around streams, wetlands, and detention basins.
- Preserve green infrastructure including open space, stream corridors, wetlands, and natural areas.

executive summary

WATERSHED ACTION PLAN

The effectiveness of the Dead River watershed plan will be largely dependent on the quality of the action plan in Chapter 5. The action plan provides the “who, what, where and when” for making watershed improvements and includes programmatic, policy, and site-specific recommendations. The site-specific action items are tied to a particular location in the watershed or along the stream corridor, and include details such as area, length, cost, responsibility, schedule, and priority. The eleven most important recommendations are summarized as follows:

1. Stabilize streambanks and ravine slopes to reduce erosion, protect property and infrastructure, improve water quality, and improve habitat.
2. Restore and manage stream corridors by restoring native riparian buffers, reducing the density of trees, removing excessive debris, and stabilizing the stream bed with practices that also enhance habitat.
3. Manage, retrofit, and stabilize the stormwater management system including detention basins and culverts, with focused attention on stormwater discharge points (pipes and ditches), to reduce runoff rate and volume and to improve water quality in the streams and Lake Michigan.
4. Preserve and restore priority green infrastructure areas to provide natural surface water storage areas, provide space for installing best management practices, and



An eroding stream channel before (left) and after restoration (right).

preserve an ecologically functioning network of open space, wetlands, streams, and natural areas as part of an interconnected system.

5. Manage and restore watershed natural areas including wetlands, former wetlands / hydric soil areas, and especially Lyons Woods Forest Preserve and Illinois Beach State Park.
6. Develop positive and creative new uses for the Zion Nuclear Power Plant and Waukegan Harbor areas, ensuring that these uses are compatible with protecting and improving watershed resources and Lake Michigan.
7. Remediate existing flood problems and prevent future flooding by reducing stormwater runoff and preserving areas for surface water storage and absorption such as floodplains, depressional storage areas, and wetlands, which also provide water quality improvement benefits.
8. Use better stormwater management, conservation design, and low impact development practices for new and existing development that slows, filters, infiltrates, cools, and cleanses stormwater runoff, especially in Critical Subbasins. This includes source controls and lot level best management practices such as vegetated swales, naturalized detention basins, rain gardens, stream buffers, filter strips, and reduced use of lawn chemicals and fertilizers.



Monitoring is an important part of improving watershed resources.

9. Modify and use planning and development standards, policies, and capital improvement plans and budgets to protect and enhance water quality.
10. Provide public education and outreach to enhance understanding and appreciation of watershed resources and problems, to provide solutions, and to provide opportunities for people to get involved in watershed improvement activities.
11. Monitor and evaluate watershed plan implementation and physical watershed conditions to gauge progress towards watershed goals.

MONITORING AND EVALUATION PLAN

A monitoring and evaluation plan was developed to provide a means of measuring progress towards watershed goals and plan implementation. This plan should be used by watershed plan stakeholders and other implementers to monitor watershed resources and to track whether meaningful progress is being made towards plan goals. The monitoring plan includes details such as the frequency of monitoring, short, medium, and long term milestones, responsible party, and mode of collection.

THE FUTURE OF THE WATERSHED DEPENDS ON ALL OF US

This plan has limited usefulness without the dedication and commitment of watershed stakeholders to the improvement, restoration, management, and stewardship of watershed resources. As the primary land use, development, and infrastructure authorities in the watershed, municipal and county officials and staff have a significant amount of the responsibility for plan implementation. County, state, and federal agencies also have a significant role in watershed plan implementation, by approving and supporting projects with funding, and by providing technical information, tools, and resources to assist local authorities and watershed organizations in their efforts. Watershed residents and landowners must also accept responsibility for managing

their own land and water resources, for identifying watershed problems and opportunities, and for working with others to implement this plan.

All of these people and organizations will need to work together to successfully protect and restore the Dead River watershed, to ensure long-term watershed stewardship, and to share the responsibilities, costs, and benefits of watershed improvements. Plan implementation will also depend on a watershed organization to oversee, guide, coordinate and monitor watershed activities on behalf of the stakeholders. This organization typically forms as an outgrowth of the Watershed Planning Committee with support coming from a variety of state and local agencies as well as local land use authorities and decision makers. This is the primary mechanism for the general public to be involved in watershed activities, to support the implementation of the watershed plan, and to voice their concerns and celebrate their successes in restoring watershed resources.

THIS PLAN IS A BLUEPRINT

The Dead River Watershed-Based Plan provides specific guidance for addressing impacts and for preserving and enhancing the valuable resources of the watershed. It provides a source of information and recommendations for municipalities, forest preserves, developers, residents, county and state agencies, and others to effectively plan and conduct land use and other activities in a way that is appropriate for protecting watershed resources. It provides guidance for comprehensive planning, development standards, green infrastructure preservation, natural resource restoration, land management, and water quality improvement, with an overall focus on water resources. It also provides indirect guidance for capital improvement planning and budgeting.

acknowledgements

The Lake County Stormwater Management Commission secured the funding and provided project oversight and management. The dedication and support of the Dead River Watershed Planning Committee and other watershed stakeholders in the planning process made development of this plan possible. The municipalities of the watershed graciously hosted our planning committee meetings. Special acknowledgment goes to Beach Park who hosted the majority of our meetings due to their central location in the watershed. Conservation Design Forum and Montgomery Watson Harza assisted with data collection and plan preparation. Funding for the Dead River Watershed Management Plan was made available through the United States Department of Agriculture Natural Resources Conservation Service and Lake County Stormwater Management Commission.

The following people generously gave their time to speak to the Planning Committee about watershed issues: Tim Girmscheid, Liberty Prairie Conservancy; Don Wilson, Illinois Beach State Park; Deb Maurer, Lake County Forest Preserves; Joe Hughes, Bull Creek Stakeholders Association; Tony Wolff, Patty Werner, Mike Prusila, Scott Paszkiewicz, and Crissy Mehle, SMC; Jason Navota and Tom Price, CDF; and Erin Maloney, MWH.

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DEAD RIVER WATERSHED - BASED PLAN

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Section 5.4 contains watershed-based plan element #5: public information and education plan.

Section 6.2 contains watershed-based plan element #2: water quality improvement expected from implementing plan recommendations.

Section 6.3 contains watershed-based plan elements #4 and #6: technical and financial assistance needed to implement this plan, and plan implementation schedule.

Section 6.4 contains watershed-based plan elements #7, #8 and #9: milestones for measuring plan implementation progress, indicators to determine whether loading reductions are being achieved, and monitoring component.

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DEAD RIVER WATERSHED - BASED PLAN

Prepared for:
Dead River Watershed Planning Commission

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