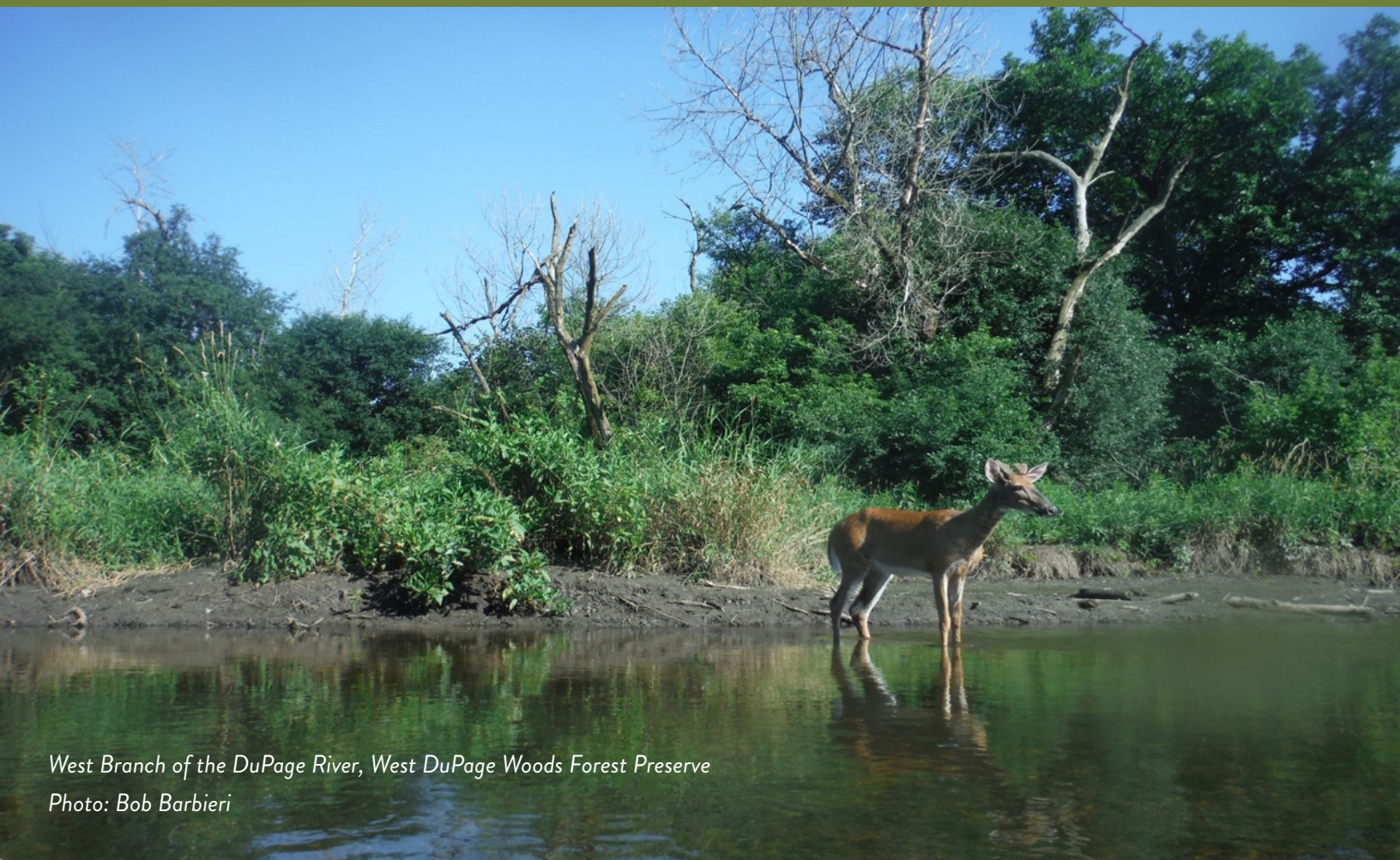
SIERRA CLUB
ILLINOIS CHAPTER

DuPage County's Rivers - A System on the Mend

Nutrient Capture and Improved Road Salting Practices Along with Dam Removal are Key to Continued Progress

2020 Status Report on the Condition of Salt Creek and the East and West Branches of the DuPage River



West Branch of the DuPage River, West DuPage Woods Forest Preserve
Photo: Bob Barbieri

Photo: Bob Barbieri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River Monitoring Project 2020 Update
Sierra Club—River Prairie Group
Water Sentinels Program

Executive Summary

The River Prairie Group is the local section of the Sierra Club and is made up of members in the greater DuPage County, Illinois, area. The group's river-monitoring network is entirely volunteer run, and this report is a result of almost 19 years' worth of monitoring and involvement in local water-quality monitoring, environmental planning, and implementation efforts. This report is designed to illustrate the water-quality monitoring that has been done by the group and put it in context of current work and the great vision for improved water quality in the DuPage River and Salt Creek watersheds and the state of Illinois.

The water quality in the watersheds continues to reflect the urbanization of the county. The monitoring shows elevated levels of nitrate and phosphate, which mostly come from fertilizer runoff either directly into our waters or through wastewater that is collected and treated by wastewater facilities (or Publicly Owned Treatment Works [POTWs]). The nutrients feed algae and plant overgrowth, leading to low levels of dissolved oxygen or big fluxes in dissolved oxygen levels, which are detrimental to aquatic life. Chloride levels are often in violation of the national aquatic life criteria and Ilinois's chloride standard because of road salt use in the wintertime, which washes off into the waterways.

DuPage County should consider a ban on the application of phosphorus-containing fertilizer and coal-tar sealants containing polycyclic aromatic hydrocarbons (PAHs), which are carcinogenic and toxic to aquatic life. These measures would lead to improved water quality in all three watersheds and in downstream water bodies including the Gulf of Mexico, which suffers from a hypoxic ("low oxygen") zone because of nutrient over-fertilization where aquatic life cannot survive.

The latter half of this report summarizes work done by the state, county, and municipalities to improve water quality. Since the River Prairie Group began monitoring in 2000, substantial steps have been taken to address chloride and nutrient pollution, but there is still work to be done. Maintaining vegetative buffers along waterways, controlling stormwater runoff from construction sites and implementing green infrastructure will greatly benefit the Salt Creek and DuPage River watersheds. The group looks forward to seeing decreases in nutrient levels as green infrastructure becomes more widespread and wastewater treatment facilities are upgraded to increase nutrient removal from effluent. Chloride reduction measures, improved fertilizer guidelines, and dam removal will also lead to healthier waters in DuPage County.

Photo: Jill Spealman

Introduction

The south-flowing streams of DuPage County are a result of the last glaciation of the area 13,000 years ago. Later, Native Americans and then European immigrants moved into the area. By the early part of the 20th century, towns had sprouted along the three rail lines that traverse the county, while the rest of the county was farmed. After World War II, people began flocking to the newly suburbanizing area, which grew to have the second largest population in the state. Consequently, the landscape of DuPage County was converted first from native prairie and wetland to farmland, then to homes, roads, and businesses. In the process, over 90% of the county's original wetlands were lost, and 51% of its streams were channelized.

Today, the water quality of Salt Creek and the East and West Branches of the DuPage River reflect the urbanization of the county. All three fail to meet state water-quality standards, and clean-up plans are ongoing. This document is an update of Sierra Club—River Prairie Group's **2001 Troubled Waters in DuPage County, 2007 Restoring DuPage Counties Rivers**, and **2012 As The River Flows** reports and presents the group's latest river testing results as well as the progress being made in restoring the county's rivers to good health.

Point source pollution comes from specific sources such as Publicly Owned Treatment Works (POTWs) or industrial facilities that literally have a point (a pipe) from which they discharge wastewater into a body of water. Recently the Illinois Environmental Protection Agency (IEPA) has designated storm water discharges from storm systems as a point source as well.

Non-point source pollution is pollution that enters streams in rain and snowmelt runoff from lawns, streets, and parking lots, and farmland through open ditches and direct overland flow. Examples include urban runoff of motor oil, road salt, lawn fertilizers, and pesticides into storm ditches during storm events.

The Watersheds of DuPage County

The DuPage River Watershed covers major portions of DuPage and Will counties and minor portions of Cook, Grundy, Kane, and Kendall counties. The river's headwaters consist of east and west branches. The East Branch originates in Bloomingdale's West Lake, and the West Branch in Schaumburg. The two branches meander south until Bolingbrook, where they converge as the DuPage River just south of the Will-DuPage county line. The DuPage River flows south to its confluence with the Des Plaines River in Channahon.

	Stream Length Miles	**Watershed Area** Square Miles
East Branch of DuPage River	24	79
West Branch of DuPage River	35	127
Salt Creek	40	150

The Salt Creek Watershed lies just east of the DuPage River Watershed. Salt Creek runs from Inverness south to Lyons, traveling approximately 40 miles before emptying into the Des Plaines River.

Together the Des Plaines, DuPage, and Kankakee Rivers form the headwaters of the Illinois River, which empties into the Mississippi River, which empties into the Gulf of Mexico. In this way, the River Monitoring Project embodies the adage "think globally, and act locally."

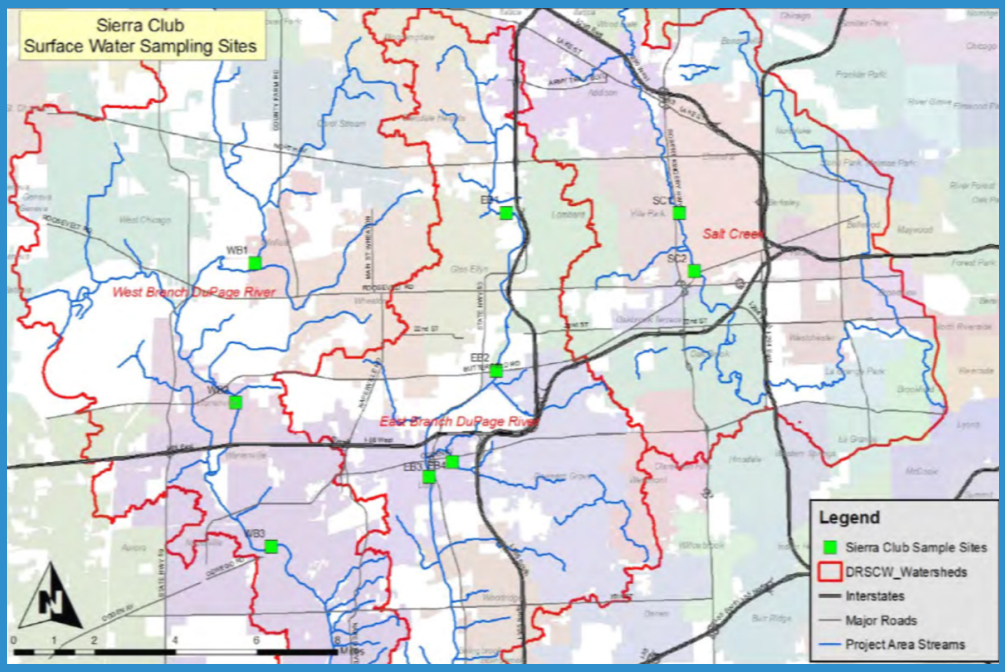
The River Monitoring Project: Sierra Club's Investment in Clean Water for DuPage County

DuPage County's local Sierra Club group, the River Prairie Group, conducts water tests on the rivers throughout the county. Their River Monitoring Project, launched in January 2000, performs quarterly and monthly testing on a number of sites in Salt Creek and the East and West Branches of the DuPage River.[1] Most aspects of the tests are performed by local Sierra Club volunteers.[2] The group summarizes the test results on their website to educate DuPage residents about the waterways in their backyards.[3] The test data are also valuable to researchers, educators, and policymakers, and have ongoing value, providing a baseline against which the rivers' water quality can be analyzed in the future.

River samples are routinely tested for four chemical compounds (phosphate, nitrate, ammonia, chloride), temperature, pH, and in some areas, dissolved oxygen.[4] The first four chemical compounds pose the greatest threat to DuPage County's watersheds, but it is worth noting that the first two are not toxins – in fact, they are just the opposite. Categorized as "nutrients", phosphate and nitrate act as fertilizers that feed algae and aquatic plants, and in sufficient concentrations, fuel their overgrowth, suffocating fish and other river life. This can lead to harmful algal blooms (HABs), which can be toxic to people, pets, and wildlife. Ammonia, too, acts as a fertilizer, but in addition, it is highly toxic to aquatic organisms. Besides their use as landscaping and agricultural fertilizers, phosphorus, nitrate, and to a lesser degree ammonia are also present in POTW's discharges. Chloride is also, to a lesser degree, discharged by POTWs, but its primary source in DuPage County rivers is road salt runoff in wintertime.

Eutrophication (noun): the process by which a body of water becomes enriched in nutrients that stimulate the growth of algae and other aquatic plant life, often resulting in the depletion of dissolved oxygen.

River Prairie Group Sampling Sites in the DuPage River-Salt Creek Watersheds



[1] Hereafter, the East Branch and West Branch are collectively referred to as DuPage River branches.

[2] River samples are analyzed using Hach Chemical Co. analysis procedures with a Hach DR2010 spectrophotometer and a conductivity probe, a digital titrator, a pH probe and thermometer. In October 2018 the Hack DR2010 was replaced with a Hach DR900 colorimeter. Measurements of radioactive isotopes and mercury are performed by a commercial lab.

[3] All river monitoring data collected by River Prairie Group volunteers are posted at the group's website at https://www.sierraclub.org/illinois/river-prairie. The group also provides their data to the Illinois EPA and the DuPage River Salt Creek Workgroup for use in their river assessment programs.

[4] Testing does not include all potentially harmful pollutants in these streams. There are many pollutants, such as heavy metals, organic chemicals, pesticides, endocrine-disrupting chemicals, and others, which may cause serious problems in these waterways, but the test are sophisticated and expensive and exceed the River Prairie Group's resources.

River Monitoring Project Results

PHOSPHORUS:

Phosphorus, usually found as the compound phosphate, is a naturally occurring element abundant in our rich Illinois soils and is a necessary nutrient for animal and plant growth. In undisturbed watersheds little phosphate reaches the water as most runoff infiltrates into the ground. Natural levels of phosphate in streams are thought to be very low, probably much less than we normally find in Illinois rivers and streams. For example, the U.S. EPA considers phosphorus levels of 0.0765 mg/L to be indicative of pristine streams in the Midwest ecosystem. In January 2019, Illinois' Nutrient Science Advisory Committee recommended numeric criteria that the Illinois EPA establish as phosphorus water quality standards for rivers and streams in Illinois.[5] The applicable proposed phosphorus standard for DuPage County streams is 0.113 mg/L.

In largely disturbed watersheds in DuPage County the greatest source of phosphorus is likely storm water runoff from lawns and gardens and wastewater discharges. Phosphate is the limiting nutrient for growth, which means that nutrient heavy inputs lead to algal overgrowth, especially where there is abundant sunlight and slower-moving waters. Excess algae and aquatic plants can cause dissolved oxygen (DO) levels to drop to extremely low levels, suffocating aquatic life; this condition is called eutrophication. Furthermore, wide fluctuations in the DO levels due to algal activity have been shown to be detrimental to aquatic life, even when low levels of DO are not reached.[6,7] Additionally, eutrophication promotes blue-green algae (cyanobacteria) blooms which can release toxins known to make people and animals sick. These are known as Harmful Algal Blooms (HAB).[8]

POTWs discharge into DuPage County's streams on a daily basis, and while they are required to control for many different pollutants, Illinois did not, until recently, require plants discharging into rivers and streams to control, or even monitor, the levels of phosphorus. In 2006 the Pollution Control Board ruled that new and expanded POTWs will limit phosphorus to 1.0 mg/L or less. Recent efforts to reduce POTW phosphorus discharges are discussed later in the watershed and state action sections.

A 2016 study found that autumn leaf litter can release excess nutrients such as phosphorus and nitrates into local streams and lakes, causing eutrophication and algal blooms. Timely removal of leaf litter from streets can reduce phosphorus load by 80 percent. Leaf removal is one of a few options available to reduce dissolved phosphorus.[9]

Findings

The median levels of phosphorus (as phosphates) that the River Prairie Group has detected in Salt Creek and the DuPage River branches over the last seven-year period often exceeded the statewide median of 0.2 mg/L, with the highest levels found in the East Branch of the DuPage River.[10] As shown in the graph below, a slight decrease in the phosphorus levels was noted in the West Branch with a sharp increase in the East Branch and and a smaller increase in Salt Creek compared to results from earlier years. Only St. Joseph's Creek, a tributary to the East Branch, had low levels of phosphorus (0.08 mg/L phosphate-P median value) approaching the US EPA's levels indicative of pristine streams.

[5] https://www2.illinois.gov/epa/topics/water-quality/standards/Pages/default.aspx

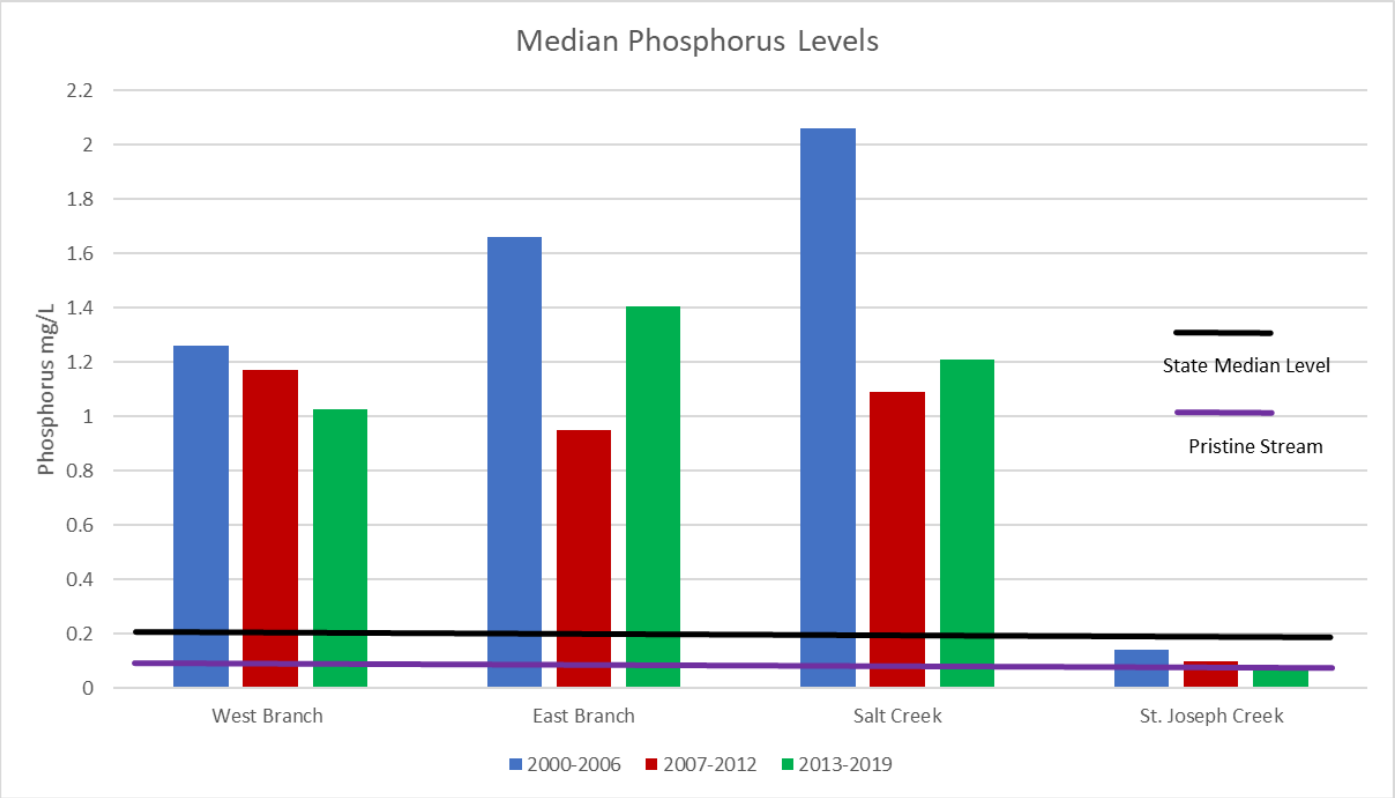
[6] Minnesota Nutrient Criteria Development November 2010, updated 2013. https://www.pca.state.mn.us/sites/default/files/wq-s6-08.pdf

[7] Miltner J., A., Method and Rationale for Deriving Nutrient Criteria for Small Rivers and Streams in Ohio, Environmental Management, DOI 10.1007/s00267-010-9439-9 (2010), https://www.owrb.ok.gov/quality/standards/pdf_standards/scenicrivers/Miltner%202010.pdf

[8] https://www2.illinois.gov/epa/topics/water-quality/monitoring/algal-bloom/Pages/default.aspx

[9] Selbig, William R, Evaluation of leaf removal as a means to reduce nutrient concentrations and loads in urban stormwater: July 3, 2016. Science of the Total Environment, USGS Publications Warehouse, http://pubs.er.usgs.gov/publication/70175058

[10] Baseline Loadings of Nitrogen, Phosphorus, and Sediments from Illinois Watersheds: October 1980- September 1996. Illinois Environmental Protection Agency-Bureau of Water. 1999



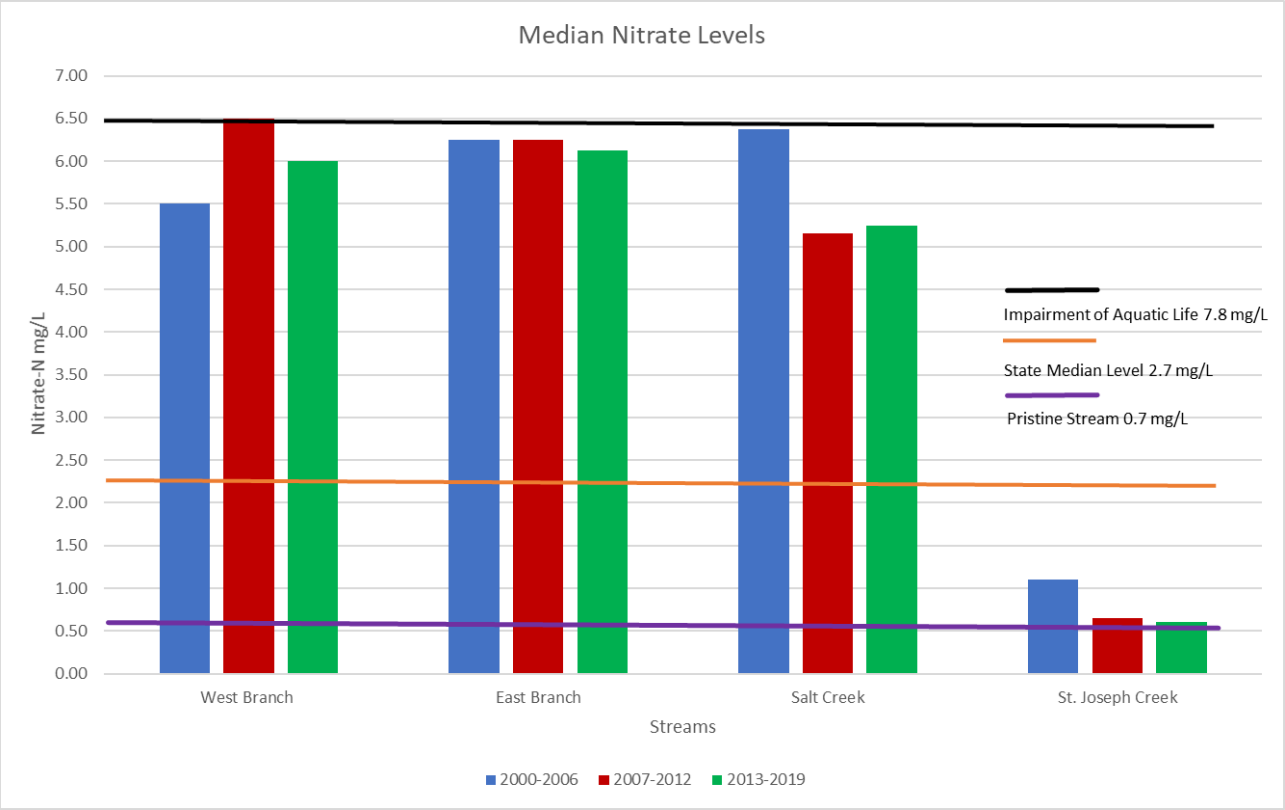
Nitrogen:

Nitrogen, like phosphorus, is a nutrient integral for supporting plant growth. However, if concentrations of nitrogen compounds become too high, they stimulate excessive plant growth leading to dissolved oxygen sags impacting aquatic life in streams. Major sources of nitrogen in water are POTWs and industrial wastewater effluent, failed or failing septic fields, animal wastes (livestock, birds, mammals, and fish), notably Concentrated Animal Feeding Operations (CAFOs), fertilizers, and vehicular exhausts. Like phosphorus, nitrate levels in water fluctuate by season with spring concentrations usually higher after snowmelt or heavy rainfall events.

A drinking water standard of 10 mg/L has been established for nitrate. Illinois does not yet have a standard for rivers and streams to protect aquatic life here or downstream in the Gulf of Mexico. Illinois' Nutrient Science Advisory Committee has recommended Illinois EPA establish total nitrogen water quality standards for rivers and streams in Illinois. The applicable proposed nitrogen standard for DuPage County streams is 3.979 mg/L.

The Illinois River makes up 3% of water volume in the Mississippi River but contributes 12% of the nitrate load.[11] We must act to reduce our disproportionate nutrient loading to the Gulf, which will also allow our rivers and streams to return to their more natural nutrient levels. Additional information about nutrient pollution can be found on the Illinois Environmental Council web site https://ilenviro.org/nutrient-pollution/ and the Sierra Club, Illinois Chapter's web site https://www.sierraclub.org/illinois/our-work/water/nutrients. On the Sierra Club's web site there are links to fact sheets about Illinois's Nutrient Problem and Nutrient Reduction Strategies for Homeowners.

[11] Hey, Donald L. "Nitrogen Farming: Harvesting a Different Crop." Restoring Ecology Vol 10, No. 1, March 2002



Findings

Median nitrate-nitrogen levels have decreased slightly in the West Branch, East Branch and St. Joseph Creek over the last seven-year period compared to a slight increase in median nitrate levels in the and Salt Creek since the 2007-2012 period. While the nitrate levels in the Salt Creek and the DuPage River branches are safely below the Illinois Water Quality Standard for drinking water (10 mg/L Nitrate-N) and the Illinois EPA Guideline for Impairment for aquatic life (7.8 mg/L Total Nitrogen), they are well above the median level found in Illinois streams (2.7 mg/L Nitrate+Nitrite) and the recommended nitrogen standard of ~4mg/L. However, St. Joseph's Creek has consistently displayed nitrate levels below the U.S. EPA Total Nitrogen Criterion for Pristine Streams (0.70 mg/L). These data may indicate that lower, healthier levels could be achieved by the remainder of the river.

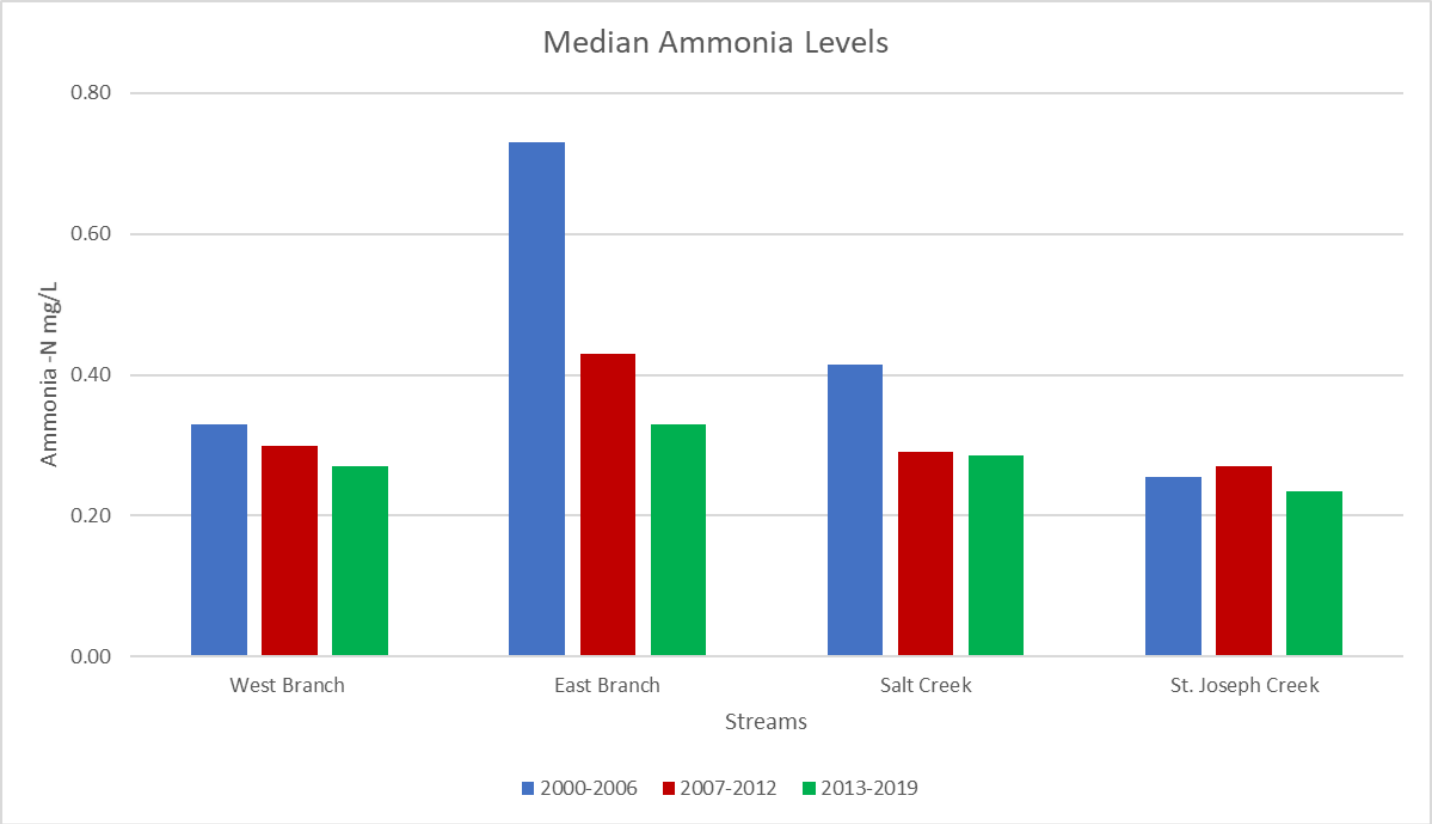
Ammonia:

Ammonia is also a nutrient like phosphate and nitrate that supports plant growth and thus can contribute to eutrophication. Unlike the other two nutrients, ammonia becomes more toxic as the pH of the water increases and may then negatively affect the hatching and growth rates of fish. Structural development problems in the gills, livers, and kidneys may also occur with increasing ammonia concentrations at high pH levels. Ammonia has been determined to be toxic to freshwater organisms in concentrations in the range of 0.53 to 22.8 mg/L (toxicity is both pH and temperature dependent).

Fertilizer production accounts for nearly three-fourths of the ammonia produced in the U.S. Ammonia is used to remove carbonate from hard water and is found in domestic wastewater. However, POTWs are very good at removing ammonia and normally discharge very low concentrations in their treated effluent.

In recent years the U.S. Fish and Wildlife Service has found that freshwater mussels and snails are more sensitive to ammonia toxicity than other aquatic organisms. Based on this new data, USEPA updated and lowered its recommendations for protective ammonia levels in 2013.[12] Illinois has not yet updated its standards to reflect this new science. As DuPage County works to restore mussels to its rivers and streams, the levels of this pollutant need to be minimized.

[12] https://www.epa.gov/wqc/aquatic-life-criteria-ammonia



Findings

The State of Illinois has established a total ammonia limit of 15 mg/L with lower site-specific limits based on the pH and temperature of the water. All samples tested by our group had levels below the state's Water Quality Standard for ammonia, indicating that POTWs in the watersheds are doing a good job of removing this toxin from their discharges (although most samples exceeded the median level found in Illinois streams of 0.1 mg/L). While no water quality violations were found, the East Branch DuPage River is clearly carrying higher levels of ammonia than the other streams in DuPage County.

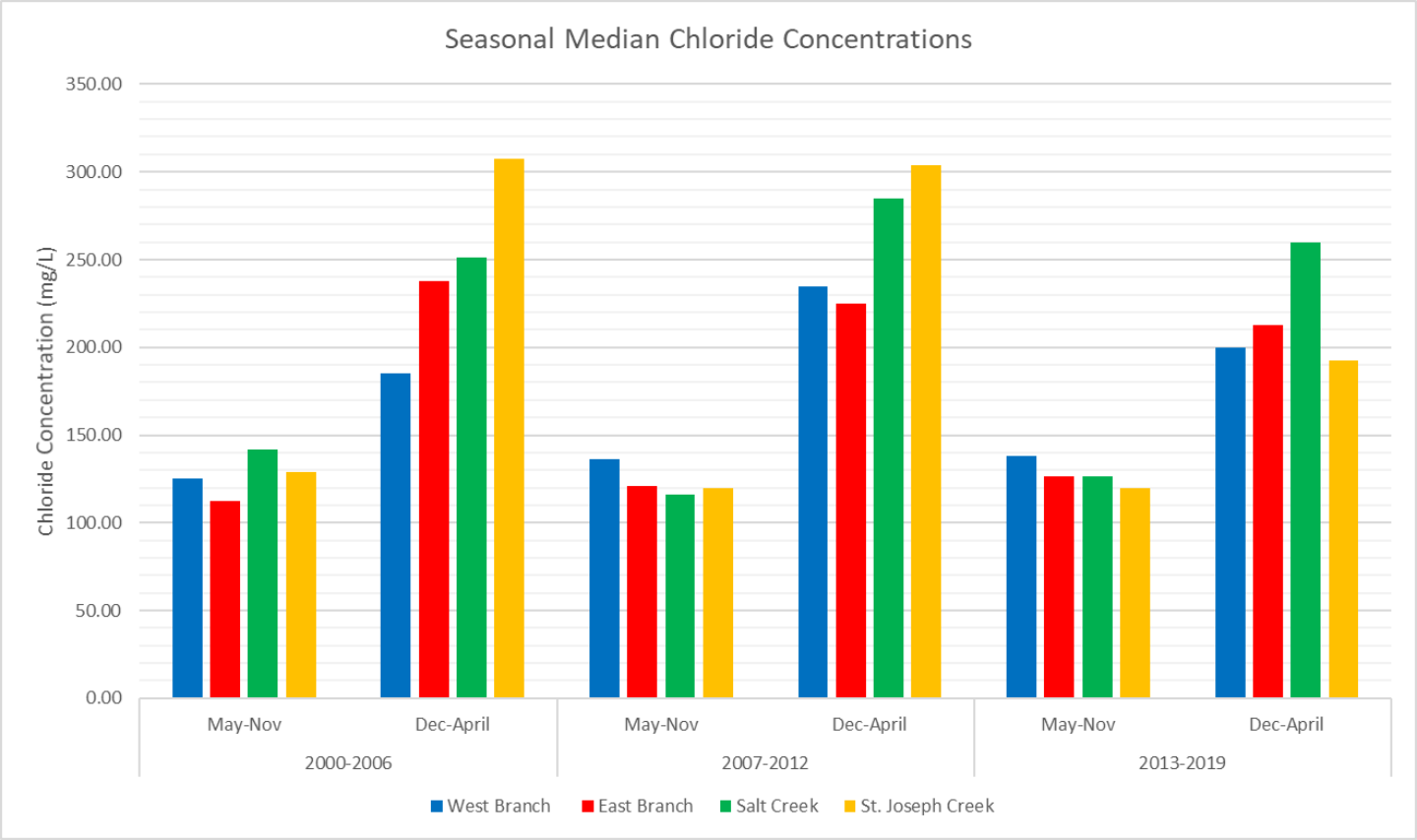
Chloride:

Chloride salts are essential for life and normal cell function. However, when high levels of chloride contaminate fresh water streams and lakes, it becomes toxic to fish and other aquatic life forms. Chlorides may enter surface water from rocks, agricultural runoff, industrial wastewater, wastewater treatment plant effluents and, most significantly, wintertime road salts.

Findings

The levels of chlorides detected in Salt Creek and the DuPage River branches fluctuate from season to season. Many winter test samples exhibit elevated levels of chlorides, sometimes violating the state's Water Quality Standard of 500 mg/L, the result of road salt runoff after a snowfall. Conversely, samples taken in the summer months reveal relatively low levels. The Illinois EPA has listed all three streams as impaired because of high chloride levels. The graph below was developed to illustrate the differences between summer (May through November) and winter (December through April[13]) chloride concentrations. The high winter chloride concentrations recorded in St. Joseph Creek may be attributed to the water sample point being adjacent to the St. Joseph Creek Condominiums parking lot. Private parking lots are often heavily salted during winter snow events. A slight decrease in all streams was observed over the last sampling period.

[13] Water samples are collected the first Saturday of the month, therefore April was included with winter concentrations since snow events are still possible during this time of year.



Dissolved Oxygen:

Oxygen dissolved in water is essential to all aquatic life. The amount of oxygen found in DuPage County streams is dependent both on physical and biological factors. First, oxygen solubility in water is temperature dependent; cold water holds more dissolved oxygen than warm water. Second, aquatic organisms can influence the level of oxygen in water. During the daytime, aquatic plants and algae performing photosynthesis consume carbon dioxide and release oxygen directly into the water. At nighttime, plants and algae change gears and join aquatic animals in the process of respiration, consuming oxygen and releasing carbon dioxide.

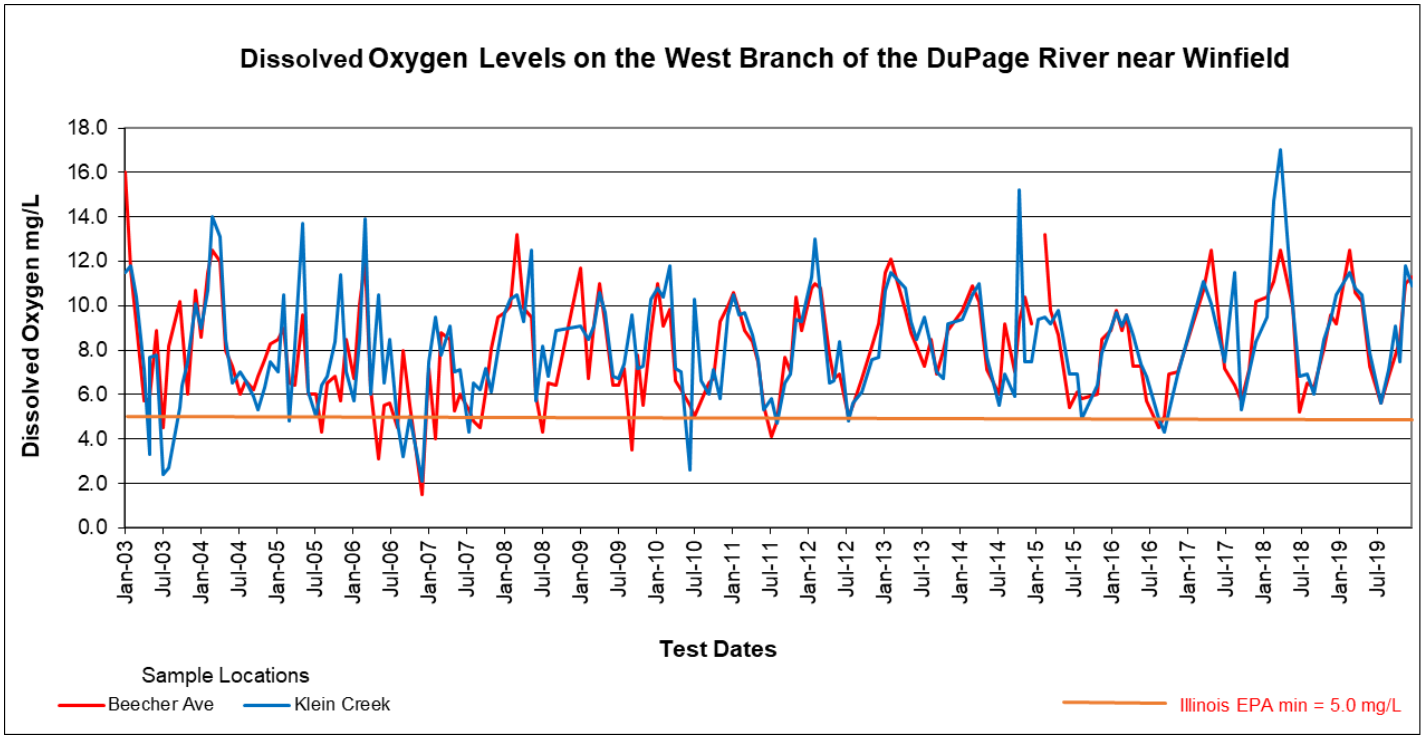
If algae colonies are sufficiently numerous, they can overtax the system and send nighttime dissolved oxygen levels plunging; the following day, dissolved oxygen levels rebound as the aquatic plants and algae resume photosynthesis.

Problems with low dissolved oxygen levels can occur under conditions of eutrophication. Low dissolved oxygen levels can also result when organic pollution enters a river. As bacteria decompose organic material, they too consume large quantities of oxygen and can reduce the amount of dissolved oxygen to levels dangerous for aquatic life. In fact, one aspect of the EPA's 2003 municipal storm water management program addresses this issue by stressing the need to reduce the quantity of leaves entering watersheds during the fall. To ensure sufficient levels of oxygen for aquatic life use, Illinois currently has established seasonally dependent water quality standards of no less than 3.5 mg/L in warmer months and 5.0 mg/L in cooler months.

A special study of dissolved oxygen levels in the West Branch DuPage River watershed began in 2003. At that time, the Illinois EPA had identified problems with low dissolved oxygen levels in both Salt Creek and the East Branch of the DuPage River. In its 2006 Illinois Integrated Water Quality Report, Illinois EPA now lists the West Branch as also failing to meet the state's water quality standard for dissolved oxygen.

Findings

Both sampling sites along the West Branch show levels of dissolved oxygen dipping below the water quality standards on only a few occasions. Low dissolved oxygen (DO) levels tend to happen during hot summer days in areas where there is low flow. Although our limited data set shows only a few dips below the water quality standard, it only takes an hour or two of low DO to hurt fish. Furthermore, we continue to see wide fluctuations in DO levels on a daily and seasonal basis. These fluctuations have been shown to be stressful to aquatic life.



pH and Temperature:

pH and temperature measurements are also taken during each river water testing event. pH is a measure of the acidity/alkalinity of the water, with a pH of 7 indicating neutrality. Aquatic organisms are generally adapted to pH levels near neutral; thus, the state's water quality standard requires pH levels in the range of 6.5-9.0. pH measurements on all streams fell within the state's standard. In addition, both parameters are needed to determine if measured ammonia levels are meeting site-specific standards that are based on the pH and temperature of the water.

Findings

pH measurements on all streams fell within the state's standard.

	Measured pH range
East Branch of DuPage River	6.8-8.7
West Branch of DuPage River	6.5-8.3
Salt Creek	6.5-8.3

Photo: Bob Barbieri

Discussion of Findings

In general, River Prairie Group's monitoring shows slight differences from previous years. The West Branch and St. Joseph Creek show a slight improvement in the phosphorus concentration and no change with regard to nitrate concentrations, compared to the previous six years. The East Branch and Salt Creek are showing increases in both phosphorus and nitrate concentrations compared to the previous six years. The median ammonia levels have remained consistent with previous years' concentrations. Some improvements are shown in the wintertime chloride concentrations in all streams except for the East Branch. Fortunately, the East Branch wintertime chloride concentration has stayed the same and not increased.

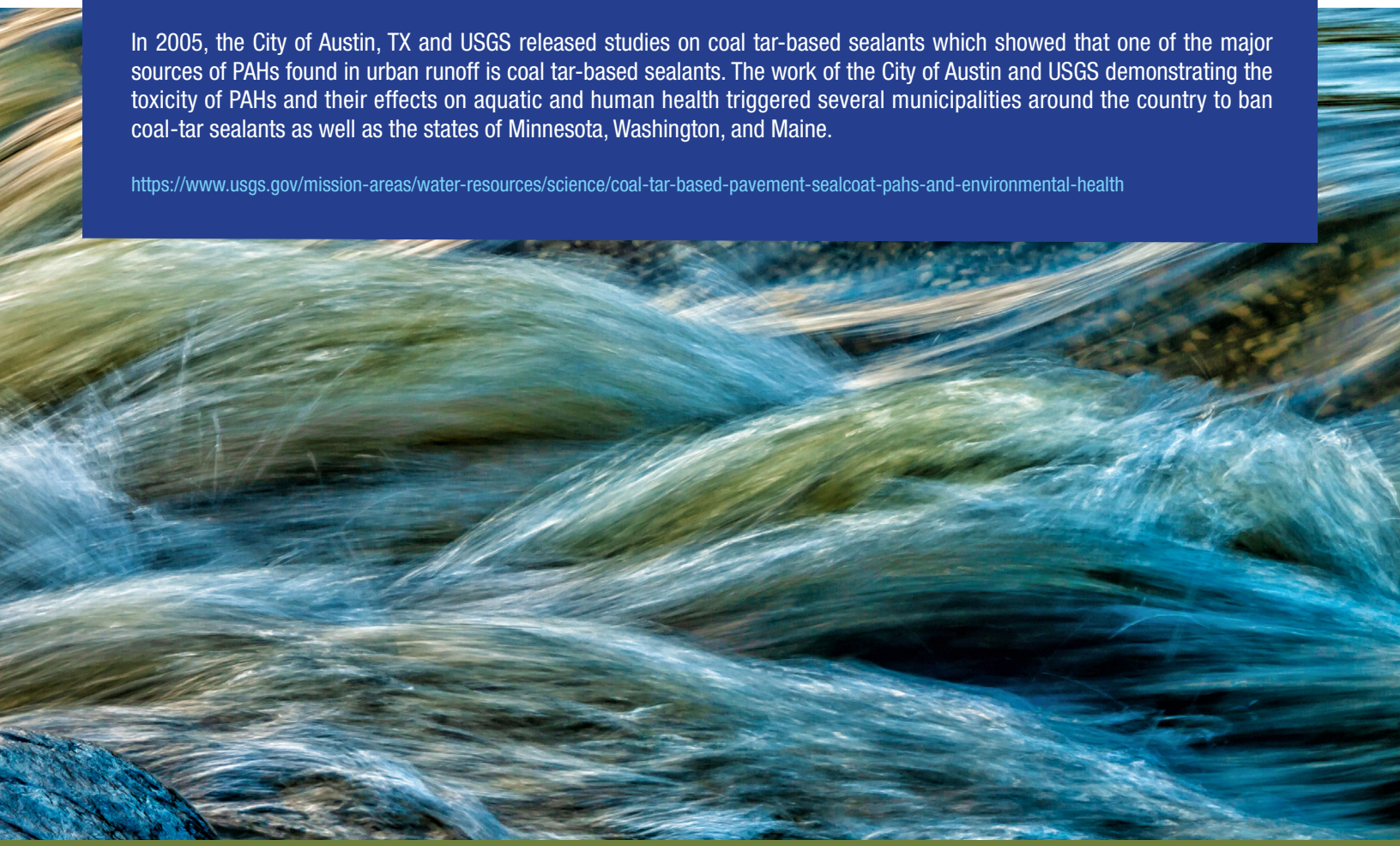
We continue to see low levels of nutrients along St. Joseph Creek, which are seldom observed in the rest of the DuPage River-Salt Creek watershed. The creek presents a rare opportunity in the urban environment of DuPage County to restore a small prairie stream. Although the data shows low nutrient levels in St. Joseph Creek, the DuPage River-Salt Creek Workgroup found high concentrations of polycyclic aromatic hydrocarbons (PAHs), a carcinogen that comes from coal-tar sealants used on roads, parking lots, and private driveways. In addition to habitat restoration along St. Joseph Creek, a ban on sealants containing PAHs would greatly benefit the stream.

Polycyclic Aromatic Hydrocarbons (PAHs)

A major source of PAHs is coal-tar based asphalt road sealers. This material is used on both public and private parking lots,driveways, and playgrounds. Unlike asphalt and water-based sealers, coal-tar based sealers release significant amounts of organic molecules collectively called polycyclic aromatic hydrocarbons. PAHs are a concern because some compounds have been identified as carcinogenic and mutagenic. The DRSCW has identified significant concentrations of PAHs in river sediment immediately downstream of dense residential areas that drain to DuPage rivers.

In 2005, the City of Austin, TX and USGS released studies on coal tar-based sealants which showed that one of the major sources of PAHs found in urban runoff is coal tar-based sealants. The work of the City of Austin and USGS demonstrating the toxicity of PAHs and their effects on aquatic and human health triggered several municipalities around the country to ban coal-tar sealants as well as the states of Minnesota, Washington, and Maine.

https://www.usgs.gov/mission-areas/water-resources/science/coal-tar-based-pavement-sealcoat-pahs-and-environmental-health



Ongoing Work in the Watershed

There has been a dramatic increase in attention to the restoration of DuPage County waterways since the River Prairie Group first highlighted the rivers' troubles in its 2001 report. The Illinois EPA finalized cleanup objectives (see TMDL sidebar) in 2004 that led to the formation of the DuPage River Salt Creek Workgroup (DRSCW) which has taken the lead in implementing a cleanup plan for the county's three waterways. In 2003, USEPA's Phase II Stormwater Program went into effect. DuPage County and municipalities work together to address this program's requirements to reduce pollution from non-point sources through the DuPage County Water Quality Stakeholders Group.

DuPage County Water Quality Stakeholders Committee meets periodically to address the compliance of the county and municipalities with the USEPA's urban storm water management program. This group has recently completed a manual of best management practices designed to reduce pollution from developed areas.

DuPage River Salt Creek Workgroup

The DRSCW is comprised of local communities, POTWs, the Sierra Club River Prairie Group, and other environmental organizations who have come together in response to the TMDLs developed for Salt Creek and the East and West branches of the DuPage River.

Since the 2012 Sierra Club report on the conditions of the rivers in DuPage County, the DRSCW has implemented several projects, developed a detailed statistical tool to evaluate data on the rivers, and continued the detailed sampling programs of chemistry, habitat, fish populations, and invertebrate populations in the rivers. All of the data are used to determine what stressors remain that are keeping the rivers from attaining the goals of the Clean Water Act. The DRSCW has also undertaken extensive education programs to reduce salt application to roadways in the watershed to mitigate the chloride impacts in the rivers.

TMDL Completion

Short for Total Maximum Daily Load, a TMDL is essentially a water pollution clean-up plan. TMDLs are a calculation of the maximum amount of a pollutant that a particular body of water can receive and still meet water quality standards. The calculation must include a margin of safety to ensure that the water body can be utilized for its designated uses set by the state. A tenet of the Clean Water Act of 1972, TMDLs set pollution reduction goals that are necessary to improve the quality of impaired waters, and its watershed approach considers all potential sources of pollutants, both point and non-point. For example, Salt Creek's TMDL for chloride is 74 million pounds per year; an estimated 8% reduction in chloride runoff is needed to achieve this goal.

Illinois EPA issued multiple TMDLs for Salt Creek and the East and West Branch of the DuPage River in 2004. The TMDLs addressed violations of Illinois's water quality standards for conductivity, chloride, copper, and dissolved oxygen. The goal of Illinois TMDLs is to achieve better water quality and balanced, healthy ecosystems overall, and to have a positive impact on the quality and quantity of fish and wildlife populations that depend on these waters for habitat, food, breeding, and survival.

In 2006, additional pollution problems were identified in DuPage County waterways, and TMDL development began in the fall of 2007. TMDLs for silver, chloride, fecal coliform, dissolved oxygen, manganese, and pH water quality violations were developed. Water quality violations that were found for copper, iron, and zinc are being addressed at the point sources where they originate. Illinois EPA released the draft TMDL report in Spring 2019. It calls for large reductions in fecal coliform pollution in all three watersheds and improvements in dissolved oxygen levels in the West Branch and its tributary Spring Brook.

https://www2.illinois.gov/epa/public-notices/Documents/DuPage%20River_Salt%20Creek%20Watershed%20DRAFT%20Stage%203%20TMDL%20Report_%20%28March%202019%20-Public%20Notice%29.pdf

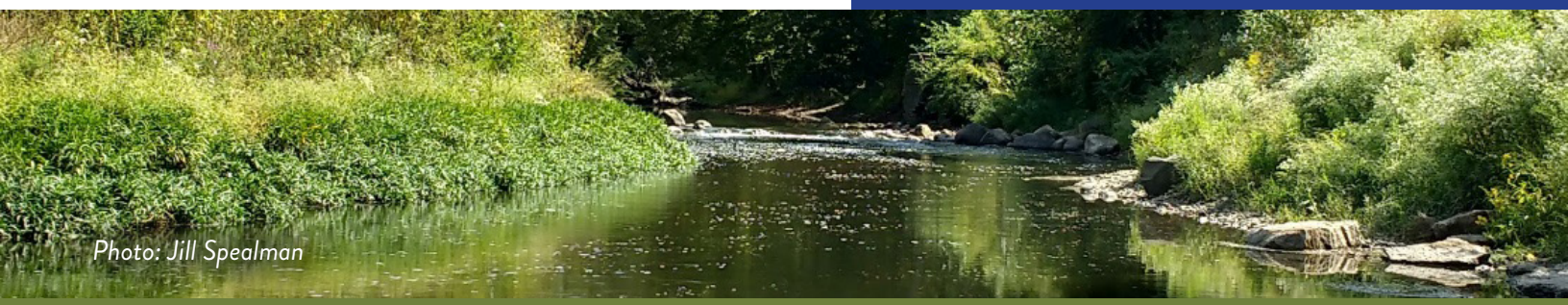


Photo: Jill Spealman

In 2015 the DRSCW negotiated with the USEPA and the Illinois EPA a delay in the implementation of costly POTW modifications to remove nutrients that the DRSCW data indicates will have little or no impact on water quality in the watershed in its current state. In return the POTWs will fund projects within the watershed that the DRSCW has prioritized as addressing the rivers' most pressing needs. The project period will end in 2024, by which time over $14 million will have been committed to instream improvements. To our knowledge this is the only agreement of this kind anywhere in the United States creating a partnership with POTWs, EPA, and environmental groups with a focus on achieving significant improvements in rivers. The Sierra Club supports this program between the Illinois EPA and the DRSCW but also encourages upgrading wastewater treatment technology at POTWs, which will reduce nutrient levels to some degree.

Dams' Impact on Water Quality

Dams tend to exacerbate the nutrient problems already found in streams because they create stagnant pools in which algae thrive. These blooms decompose leading to problems with dissolved oxygen levels for aquatic life. Dams also disrupt natural sediment transport processes. Sediment builds behind dams rather than being distributed to its natural floodplain. Below dams you tend to see channel bed degradation, channel narrowing, and bank erosion. Dams also modify temperature of river systems. Shallow impoundments can lead to warmer waters altogether, and in deeper systems dams lead to more stratification, meaning some water is much warmer or cooler than it would normally be.[14]

Dam modification or removal is considered one of the best ways to increase the health of a waterway. Several projects have already been completed which have resulted in increased fish diversity upstream of the dam sites. In 2016, the DRSCW completed the dam removal at Churchill Woods on the East Branch, including restoring the stream to its original channel and establishing natural wetland plantings along the banks.

The DRSCW, in collaboration with the Forest Preserve District of DuPage County and the DuPage County Stormwater Management, was involved with a river restoration project along the Salt Creek in the Oak Meadows Golf Course in Addison, which was completed in 2017. The project involved managing more than 280 acres and 1.5 miles of stream corridor by integrating a challenging golf course design and surface water management. That meant literally, but temporarily, moving the creek into a mile-long diversion channel, removing two dams, removing more than a mile of river bank armoring, adding 9,000 square feet of cobble to create a more natural habitat in the creek bed, and creating seven pool and riffle sequences along with the restoration of habitat on 103 acres of upland area.

Other dam modifications included the McDowell Grove Dam, which was built in 1930 by the Civilian Conservation Corps. It was modified in 2008, eliminating the water impoundment that limited fish passage and the movement of other aquatic species.

The Warrenville Grove Dam was modified in 2011 as part of the much larger West Branch restoration project that followed the thorium cleanup project known as the Kerr-McGee Kress Creek/West Branch DuPage River Site (discussed further below).

The River Prairie Group is an active member of the Workgroup, leading the Salt Creek subcommittee, participating on the projects committee, and serving on the group's Executive Committee. Learn more about the Workgroup on its website at www.drscw.org.

[14] ASFPM Working Group on Dams Issue 5: Environmental Issues Related To Dams http://www.scribd.com/doc/87351909/081105-Environmental-Issues-Related -to-Dams

West Branch DuPage River Superfund Thorium Cleanup and Restoration Project

From the 1930s to the 1970s, radioactive thorium-contaminated waste from the Rare Earth's Facility (later owned by Kerr-McGee), located in the City of West Chicago, was offered as a free material to homeowners to be used for landscaping projects and to local homebuilders to fill low-lying areas. Sediment from this material eventually ended up in local creeks and the West Branch of the DuPage River.

Radioactivity surveys performed by the Nuclear Regulatory Commission and the EPA resulted in placing the Kerr-McGee facility and Kress Creek sites on the Agency's National Priorities List ("Superfund") in 1990 and 1991. Approximately eight miles of creek and river sediment, banks, and floodplain soils contaminated by radioactive thorium waste material required cleanup. The River Prairie Group monitored the cleanup collecting 10 river water samples from the Warrenville Grove Bridge between 2005 and 2008. The samples were analyzed for thorium, radium, and mercury. None of the analyzed elements exceeded regulatory limits.

In its agreement with the US EPA, Tronox, previously known as Kerr-McGee, was obligated to excavate all contaminated material within the streambed, banks, and floodplains of Kress Creek and the West Branch of the DuPage River. The Kress Creek site consists of 1.5 miles of Kress Creek in West Chicago and 5.2 miles of the West Branch in West Chicago and Warrenville. Excavation of contaminated creek/river sediments commenced in 2005. Between 2005 and 2012, more than 129,000 cubic yards of soil and sediment contaminated with low-level nuclear waste were removed from the creek and river and shipped by rail to a facility in Utah that is licensed to handle such waste. The cleanup was completed in October 2012 at a total cost of $144 million.

Following cleanup activities damage caused to the vegetation, stream banks and streambed were required to be repaired. A $10 million grant from the National Oceanic and Atmospheric Administration allowed the restoration of the ecological health and biological diversity to Kress Creek and the West Branch. This included restoring stream banks utilizing bio-engineering techniques, removal of in-stream sediment deposits, improving in-stream structure for aquatic habitat, reestablishing diverse and healthy floodplain forests, replanting disturbed or mitigated areas, and diversifying landforms and ecological communities. Reports discussing the cleanup project and restoration in more detail can be found on the RPG web site at https://www.sierraclub.org/illinois/river-prairie/issues.

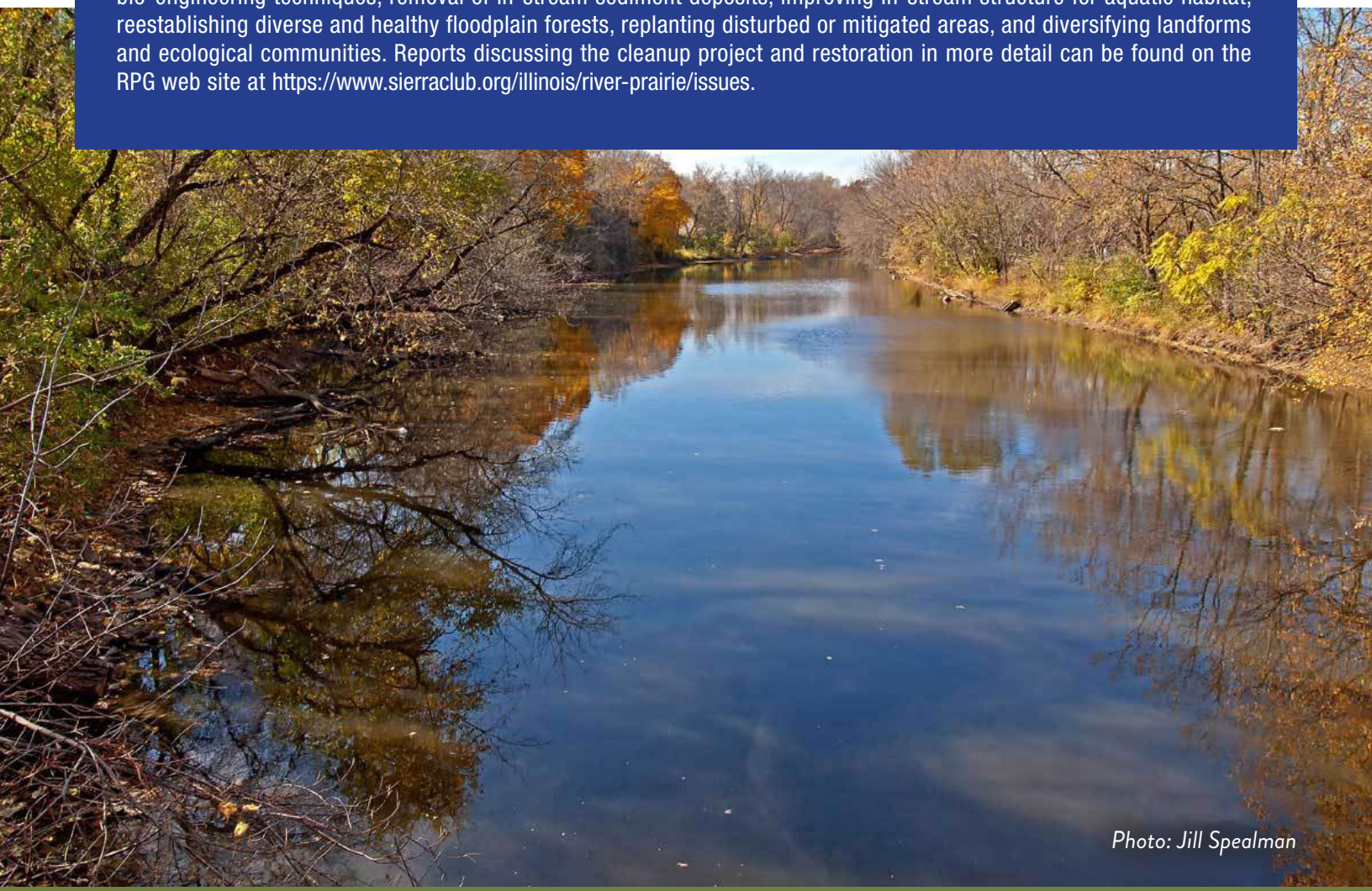


Photo: Jill Spealman

Healthy DuPage County Streams—Still A Way to Go

The River Prairie Group's river testing has highlighted areas where pollution control efforts are succeeding and other areas that still require attention. Among the successes are:

- Ammonia levels in DuPage county streams are within water quality standards, indicating that POTWs discharging into the streams are doing a good job of removing this aquatic life toxin.

However, eutrophication and obvious offensive conditions remain a major concern of the county's streams:

- Nutrient levels are high.
- Offensive conditions in the form of excess algae most likely due to elevated phosphorus levels can be found in some stream segments in DuPage County.
- Some stream segments occasionally have dissolved oxygen levels lower than allowed by existing state standards.
- Recent biological and habitat assessment performed by the DRSCW show that DuPage area streams exhibit significant habitat degradation that will need to be corrected before the streams can once again support the diversity of fish and insect species for a healthy aquatic environment.
- DRSCW research has found that artificial barriers such as dams are the single greatest impairment on the rivers and recommends historical dams that have no flood control function be removed or modified to allow fish migration.
- Chloride levels rise during late winter and early spring from road salt runoff. Although most levels found in the DuPage area are below the 500 mg/L water quality limit, research in Illinois has shown that concentrations of chloride as low as 250 mg/L have been recognized as harmful to freshwater life.

Photo: Jill Spealman

The climate for achieving improvements in the quality of DuPage County streams continues to improve since the River Prairie Group last reported on their status in 2012. Most significantly, a number of local efforts are underway studying the problems of the rivers and developing solutions, including the DuPage River Salt Creek Workgroup and the DuPage County Water Quality Stakeholders Committee.

The activities of these two groups are described in the Ongoing Work in the Watershed section above, and the importance of broad participation in these efforts is made clear in the Call to Action section below. In the past few years many in-stream measurements of pollutants indicate progress towards achieving good water quality, but new pollutants are being identified.

Healthy DuPage County Streams—A Call to Action

Clearly, action is needed at all levels of government and by the citizens of DuPage County if the county's streams are to be restored to good health.

State Actions

Since 2001, a number of actions by the Illinois EPA and state legislators have addressed the pollutant problems that continue to plague DuPage streams. These include:

- In 2004 the Illinois EPA completed Total Maximum Daily Load (TMDLs) requirements for Salt Creek and the DuPage River branches. (See Ongoing Work in the Watershed section). These studies led to the formation of the DRSCW.
- In 2006 Illinois EPA adopted an interim phosphorus effluent standard which requires new and expanding sewage treatment plants to reduce phosphorus in their discharges to 1 mg/L.
- Starting in 2010 the Illinois General Assembly required phosphorus levels in dishwasher detergent to be reduced to no more than 0.5% by weight.
- In 2010 the state of Illinois passed a law that prohibits hired applicators from using phosphorus-containing fertilizer.
- In May 2012 the Illinois Fertilizer Act was amended to include funding for a nutrient research council to help farmers reduce nutrient losses and improve water quality.
- In 2015 Illinois adopted the Illinois Nutrient Loss Reduction Strategy (INLRS), which includes goals to reduce the state's phosphorus load by 25 percent and its nitrate-nitrogen load by 15 percent by 2025, with an eventual target of a 45 percent reduction in the loss of these nutrients to the Mississippi River.
- The INLRS established a Nutrient Science Advisory Committee to make recommendations to Illinois EPA regarding numeric nutrient water quality standards for the protection of the aquatic life and human uses of Illinois rivers and streams. This select group of scientists worked three years on the report "Recommendations for numeric nutrient criteria and eutrophication standards for Illinois streams and rivers" which Illinois EPA released in January 2019 with a four-month public comment period. Illinois EPA anticipates releasing their own recommendations for next steps, after the review of comments received from the Sierra Club and numerous other stakeholders.
- In 2018 the Illinois EPA, the Illinois Association of Wastewater Agencies and the environmental community (represented by the Sierra Club and Prairie Rivers Network) came to an agreement on how to move forward to address Illinois's POTWs nutrient contributions to the dead zone in the Gulf of Mexico and the eutrophication problems in Illinois waterways in the absence of nutrient water quality standards for rivers and streams. The agreement requires all POTWs that treat one million gallons per day or more of wastewater to reduce their phosphorus discharges to 0.5 mg/L levels calculated annually by the year 2030 (depending on the treatment method they plan to use, the deadline may be five years sooner or later). The agreement also requires POTWs that discharge upstream of rivers or streams that Illinois EPA determines are at risk of eutrophication to work with other stakeholders in the watershed to develop a Nutrient Assessment and Reduction Plan by December 31, 2023. The DRSCW's 2015 plan developed with USEPA and Illinois EPA satisfies this requirement.

More State Help is Needed

Additional actions by the Illinois EPA would also aid in addressing the problems of DuPage streams. Illinois EPA needs to move quickly to adopt numeric nutrient water quality standards for the protection of the aquatic life and human uses of Illinois rivers and streams, based on the recommendations of the Nutrient Science Advisory Committee and the Sierra Club and bring those to the Illinois Pollution Control Board for approval.

Counties and Municipalities Can Help Reduce Pollution

In an urbanized area like DuPage County, the role of municipalities and other local governmental bodies is critical to the restoration of the county's waterways. The active participation of DuPage County government, the Forest Preserve District of DuPage County, and all municipalities and sanitary districts in the county in both the DRSCW and the DuPage County Water Quality Stakeholders Committee is a major avenue towards the restoration of the quality of DuPage County's waterways. By working together with watershed, conservation, and environmental groups, these efforts offer the best chance for multiple stakeholders to come together, make critical decisions, and implement projects to address the waterways' current problems.

Reducing road salt usage is a key to addressing the current problems of chloride pollution in DuPage County's streams.

The River Prairie Group of Sierra Club applauds the efforts of municipalities such as Carol Stream, Downers Grove, and Hanover Park, which employ anti-icing practices that reduce salt use. The Village of Glen Ellyn has invested in calibrated salt spreaders to reduce over-salting. In addition, the DRSCW has funded a chloride usage education and reduction program which is developing recommendations and an implementation plan for alternative products and practices designed to reduce chloride pollution in the county. The DRSCW, DuPage County, and the American Public Works Association conducted chloride reduction workshops each year since 2009 for public agencies and private operators. DRSCW reviewed the impacts of chloride reduction efforts through a questionnaire comparing 2007 to 2010 deicing methods. Twelve DuPage County communities are using GeoMelt, which contains beet juice, an environmentally friendly deicing alternative.

Promoting infiltration of storm water into the ground will help reduce pollution of our waterways by reducing urban runoff.

Sierra Club encourages continued efforts such as the county's seminar on permeable pavers, the Conservation Foundation's sale of rain barrels, and incentives for rain gardens. Municipalities could emulate the Rock Island, Illinois, program which helps homeowners fund the installation of rain gardens on their properties. www.rigov.org/citydepartments/publicworks/raingarden.html

Sierra Club recommends that DuPage County and its municipalities consider a ban on the use of lawn fertilizer containing phosphorus.

Illinois soils typically contain sufficient phosphorus for turf grass growth, and phosphorus-free fertilizers are available. In recent years, more and more areas have limited the use of phosphorus in lawn fertilizers to prevent its runoff to streams and lakes. These include the State of Minnesota, Dane County, Wisconsin, and numerous villages and homeowner associations in Illinois. Sierra Club is interested in helping municipalities work with the Department of Agriculture to put these plans in place.

Sierra Club supports increasing the size and span of conservation buffers along DuPage County streams.

Conservation buffers are strips of permanent vegetation that are meant to intercept nutrients and sediments carried by surface waters. These buffers capture pollutants, regulate stream temperature, and stabilize stream banks after rain events, which helps avoid erosion. In DuPage County much of the stormwater is piped directly into the stream, so pollutant capture by buffers is more limited than in less developed areas, but buffers provide critical habitat for wildlife, especially macroinvertebrates. Studies have shown, depending on the type of riparian ecosystem present along the river, that a buffer width between 15 and 100 feet is effective in improving river water quality. See http://www.illinoiscbmp.org/Practices/Buffers/ for additional information about conservation buffers.

It is imperative that the county and municipalities do their utmost to control stormwater runoff from construction sites.

Construction sites have a high potential for soil erosion and runoff of sediment into storm sewers and ultimately into DuPage County streams. Under the Illinois EPA's municipal storm water management program, each town is required to develop, implement, and enforce a program to reduce pollutants in any storm water runoff from construction activities. Each town must see that construction site operators implement appropriate erosion and sediment control best management practices, which they have described in the Storm Water Pollution Prevention Plan (SWPPP) developed for the site. Each town must also have procedures for accepting concerns about poor construction site practices from the public. Sierra Club encourages towns to vigorously enforce the DuPage County Storm Water Management Plan and to provide residents with an opportunity to help monitor construction sites.

You Can Help Reduce Pollution

Residents of DuPage County can help restore the quality of local waterways by reducing the use of pollutants that end up in the streams. Homeowners play a critical role in reducing nonpoint source pollution runoff from lawns, houses, parking lots, and streets by remaining mindful that runoff into storm drains flows directly to rivers without treatment. Thus, the most effective means of reducing nonpoint source pollution is to minimize your use of pollutants such as fertilizers, cleaners, and road salt.

Reduce salt use: Merely using less road salt on your property in the winter months reduces excess chloride in surrounding watersheds. Gravel, sand, and kitty litter are alternatives which can be safely swept onto lawns in the spring.

Use only asphalt or water-based driveway sealants: Or better yet use no sealant at all. There is no evidence that sealing a drive does anything to prolong the useful life of the drive.

Reduce fertilizer use: Many people over-fertilize simply because they are unaware of the existing health of their lawn. Get your soil tested at the DuPage County or Kane County Farm Bureau or use a home test kit and find an environmentally friendly fertilizer that is right for your lawn. You can also use natural fertilizers such as compost, manure, bone meal, or peat. The 2010 Lawn Care Act bans the use of phosphorus-containing fertilizer for hired applicators unless you have a soil test which says your lawn is deficient in phosphorus. Sierra Club recommends that residents follow similar guidelines and purchase phosphorus-free fertilizer.

Capture rooftop runoff: Collecting the rainwater that falls on your home's roof is another way to reduce stormwater run-off to streams. Rainwater diverted from gutter downspouts can be collected in rain barrels for use in plant and garden watering or can be directed to a rain garden.

The Sierra Club has helped produce a how-to manual on rain gardens for homeowners: https://vault.sierraclub.org/greatlakes/downloads/RainGardenGuide.pdf

Rain barrels can be ordered from The Conservation Foundation, which is a local organization and also has information about constructing a rain garden (www.theconservationfoundation.org). Rain barrels also can be purchased online or at many of your local home and garden stores.

Grass cycle: Grass cycling is the practice of leaving clippings on the lawn when mowing. The clippings quickly decompose, returning nutrients to the soil. This reduces water loss from the lawn and reduces the need for phosphorus and nitrogen-containing fertilizer.

Use native landscaping: Native plants, which are adapted to Illinois's climate and soils, require no fertilizer and can withstand drought conditions without being watered. Information on native species can be found at the following websites:

The Morton Arboretum's (https://www.mortonarb.org)
The Conservation Foundation (https://www.theconservationfoundation.org)
The DuPage Wild Ones (https://www.dupage.wildones.org)

Proper disposal: Generally, anything that enters a storm drain flows directly, without treatment, into local creeks, streams, rivers, and eventually, the ocean. In DuPage County, to dispose of household hazardous wastes (HHW) such as oil, fertilizer, pesticides, paints, and solvents, visit https://www.naperville.il.us/services/garbage-and-recycling/household-hazardous-waste-facility/. For other locations, check the internet for your local HHW location. Most Illinois counties now have permanent drop-off locations.

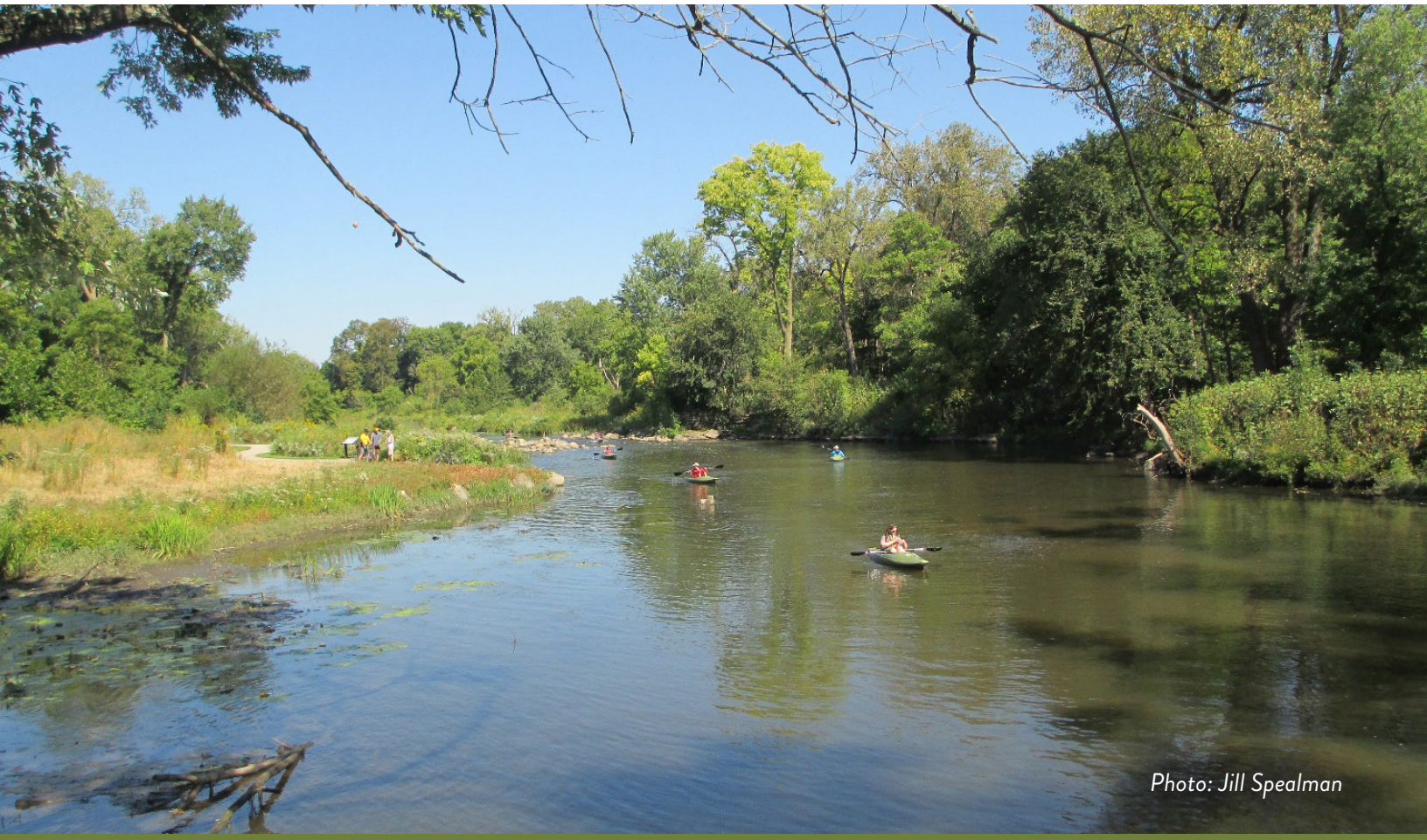


Photo: Jill Spealman

Conclusion

There have been many positive changes in the DuPage River-Salt Creek Watershed since the River Prairie Group began monitoring in 2000, but there is still work to be done to improve water quality. The group looks forward to seeing decreases in nutrient levels as green infrastructure becomes more widespread and wastewater treatment facilities are upgraded to increase nutrient removal from effluent. Chloride reduction measures, improved fertilizer guidelines, and dam removal will also lead to healthier waters in DuPage County. In the meantime, the group will continue advocating for cleaner water and maintaining the river monitoring program. River Prairie Group is always looking for volunteers for monitoring and advocacy work in DuPage County. Contact us at: https://www.sierraclub.org/illinois/river-prairie/contact-us

Sierra Club Water Sentinels

The River Prairie Group has one of many Sierra Club Water Sentinel teams in Illinois. Water Sentinels work to protect, improve, and restore our waters by fostering alliances to promote water quality monitoring, public education, and citizen action. The Illinois groups monitor water quality parameters including nutrients, dissolved oxygen, chloride, and coal mining related pollutants. Water Sentinels believe that the best way to defend our waterways from misuse and pollution is to empower local activists with accurate information and train them in water quality monitoring techniques and grassroots advocacy.

To learn more about the River Prairie Group and the Water Sentinels program visit:
https://www.sierraclub.org/illinois/river-prairie.

Not in DuPage County but want to get involved in Water Sentinels?
Visit: https://www.sierraclub.org/illinois/our-work/water/water-sentinels

This report would not be possible without the work of the following volunteers who collected and tested water samples at specific sites along the Salt Creek, the East Branch of the DuPage River, and West Branch of the DuPage River.

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Testers:
Bob Barbieri (program administrator), Bonnie Blake (co-adminstrator), Mary Ann (monitoring assistant), Kate LaGory, Luke Novak, John Zalasco, Jon Shuptar, Alison LaBarge, and John Cooper

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Sierra Club thanks the Frank Family Environmental Fund and the Grand Victoria Foundation for their support of this work.

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