Troubled Waters in DuPage County: Salt Creek and the East Branch of the DuPage River

A Report By
The Sierra Club, River Prairie Group
River Monitoring Project

Sierra Club
Founded 1892

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The reduction in pollution of Illinois' waters over the last three decades has been a tremendous achievement. Thanks to the federal Clean Water Act, and investments in pollution control by industries and local governments, the rivers and streams of the Chicago area are significantly cleaner. These past successes give us confidence that we can, in fact, confront complex environmental problems and make a difference for the future.

However, despite this progress, it is clear that the streams of DuPage County are far from being safe, inviting places for recreation, for fishing, and for wildlife habitat. The purpose of our volunteer monitoring project on two of the county's major waterways is to determine what pollution problems remain, keeping these two streams from being significant assets to the communities along their banks.

This report summarizes the conclusions from monitoring by Sierra Club volunteers in DuPage County. It is offered in a spirit of cooperation with all the public and private efforts to control pollution in these streams, and in hopes of building public support for continued and expanded efforts.

THE SIERRA CLUB, RIVER PRAIRIE GROUP'S RIVER MONITORING PROJECT

This project was formed by local Sierra Club leaders in 1999. Led by River Prairie Group Chair Frank Orto, a leadership team recruited approximately 30 volunteers who live near one of the two streams to collect stream samples on specified dates. In addition, a few volunteers comfortable with basic laboratory practices evaluated the samples on a water testing machine certified by the U.S. Environmental Protection Agency.

WHEN AND WHERE WE MONITORED

River Prairie Group members collected samples of water from both the East Branch of the Dupage River and Salt Creek. Samples were collected twice monthly from six different sites, four located on the East Branch and two on Salt Creek.

The East Branch is one of the two main branches that comprise the DuPage River. The DuPage River Watershed covers major portions of DuPage and Will counties, and minor portions of Cook, Grundy, Kane and Kendall Counties. The total drainage area of the watershed covers approximately 353 square miles. The East Branch runs from as far North as Bloomingdale to Bolingbrook, where it converges with the West Branch in Will County South of the Will-DuPage County line, and covers 82 square miles of drainage area. The river runs through areas such as Churchill Woods Forest Preserve and The Morton Arboretum. The Illinois Environmental Protection Agency issues permits to 14 industrial and municipal dischargers of treated wastewater on the East Branch.

Salt Creek originated from the melted waters of the Wisconsin Glaciers 15,000 years ago. It was populated by the Potawatomie, who used the river for fishing and transportation. Today it runs from Palatine down to Lyons, covering approximately 40 miles before joining the Des Plaines River. It runs through areas such as Busse Woods and the Ned Brown Forest Preserve. The Illinois Environmental Protection Agency issues permits to 88 industrial and municipal dischargers on Salt Creek.

The sites monitored on the East Branch of the DuPage River were:

- Churchill Woods Forest Preserve, located on the south side of St. Charles Rd. just west of Rt. 53 over the tollway
- Butterfield Rd., located on the north side of Butterfield Rd. just east of Rt. 53

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- Ogden/Burlington, located on the north side of Rt. 34 just west of Rt. 53
- St. Joseph's Creek, a tributary of the East Branch, located on St. Joseph Rd. by the pedestrian bridge across the street from 4731 St. Joseph Road.

The Salt Creek sites were:

- Prairie Path Bridge, located over Salt Creek near West Avenue and Randolph St. in Elmhurst
- Eldridge Park, located near Spring and Butterfield Roads in Elmhurst.

The samples were collected in jars between 6 a.m. and 3 p.m. on the designated day and dropped off at a predetermined location for analysis.

The water samples were analyzed for the presence of four pollutants using a Hach DR/2010 spectrophotometer (Hach Co., Loveland, CO.), a microprocess or controlled, single beam instrument precalibrated for calorimetric measurements.

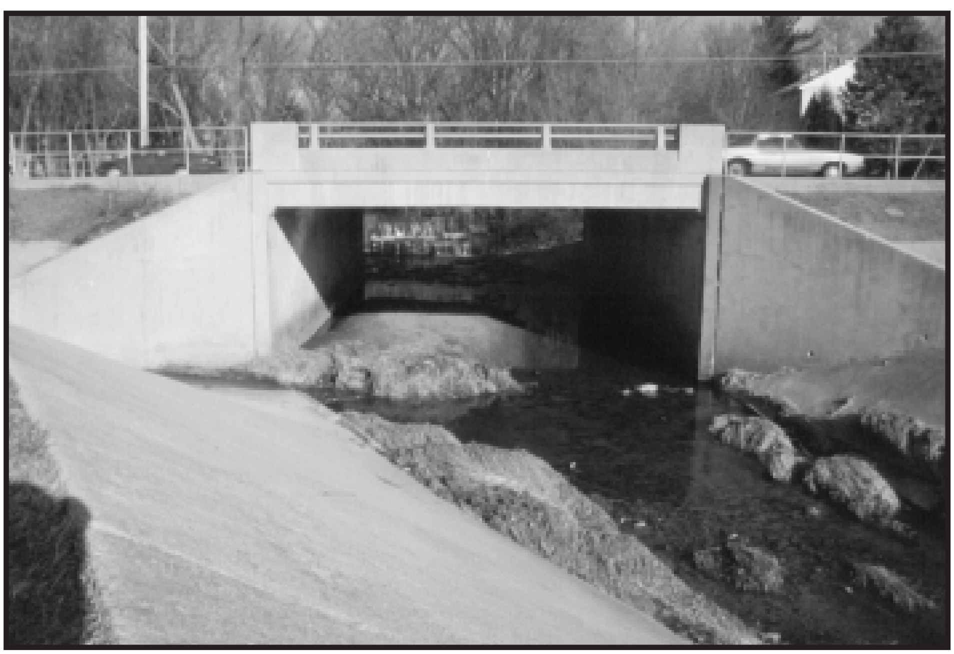
POLLUTANTS OF CONCERN

Samples were tested for a handful of conventional pollutants that are typically found in streams that run through urbanized areas and receive substantial discharges of treated wastewater. We tested for the following pollutants:

PHOSPHOROUS

Phosphorous is one of the key elements necessary for animal and plant growth. Phosphates (PO4—) are formed chemically through the oxidation of this element. Phosphates exist in three forms: orthophosphate, polyphosphate and organically bound phosphate, with varying formulations involving phosphorous. Ortho forms are formed naturally, and are a major constituent of human sewage. Poly forms are used in detergents and in the treatment of boiler water. Organic phosphates may result from the breakdown of organic pesticides containing phosphorous. In addition to human sewage, rainfall causes varying amounts of phosphates and phosphorous to wash from farm soils and soils treated with certain pesticides into waterways. The total phosphorous level is obtained by dividing PO4 (the initial level taken in our samples) by three.

At normal levels, phosphates stimulate the growth of algae and aquatic plants that provide food for fish. This may cause an increase in the fish population, benefiting aquatic life forms. Excess phosphates, however, may cause an excessive growth in algae and aquatic plants, choking waterways and using up large amounts of oxygen. This problem is referred to as eutrophication. The death of the algae and aquatic plants results in the consumption of oxygen. The decrease in oxygen levels can result in the death of aquatic life. Many species of fish cannot survive in streams with low oxygen conditions, including game species such as smallmouth bass.



Parts of these streams have lost much of their natural character and ability to absorb pollution and provide wildlife habitat.

According to the United States Environmental Protection Agency, 0.07625 mg/L is the "reference condition" for streams in the part of the country that includes DuPage County. According to the *Illinois Water Quality Report 2000*, prepared by the Illinois Environmental Protection Agency, streams that are found to have total phosphorus levels greater than 0.61 mg/L are considered to be impaired by phosphorus. Other states in the Midwest and substantial scientific literature consider waterways to be impaired when total phosphorous concentrations exceed 0.1 mg/l.

CHLORIDES

Chlorides are salts resulting from the combination of the gas chlorine and various metal ions. Chlorine alone as Cl_2 is very toxic. In combination with a metal ion, such as sodium (NA+), it becomes essential for life. Small amounts of chlorides are essential for normal cell function. Despite their beneficial impacts on cell function, chlorides can contaminate fresh water streams and lakes. Fish and other aquatic life forms cannot survive in high levels of chlorides. Chlorides may enter surface water from sources such as : (1) rocks containing chlorides; (2) agricultural runoff; (3) industrial wastewater; (4) oil well wastes; (5) wastewater treatment plant effluents; and (6) road salts.

The Illinois general use water standard for chlorides is 500 milligrams per liter (mg/L) for chronic (long-term) exposures (not to be exceeded by the arithmetic average of at least four consecutive samples collected over any period of at least four days).

NITRATES

Like phosphorous, nitrogen-containing compounds act as nutrients in streams, rivers, and reservoirs. The major sources of nitrogen in water are municipal and industrial wastewater, septic tanks, feedlot discharges, animal wastes (livestock, birds, mammals, and fish), fertilized field and lawn runoff, and vehicle exhausts (exhausts are sources of N2 and oxides of nitrogen). Nitrogen in water can be oxidized to nitrites (NO2-). Bacteria in water converts nitrites to nitrates (NO3-) through a process which ties up the available oxygen in water.

Nitrate levels in water fluctuate by season, with Spring concentrations usually higher after snowmelt. Higher nitrate levels also occur following heavy rainfall.

The major impact of nitrates and nitrites on fresh water bodies is that of fertilization leading to possible eutrophication. Nitrates stimulate the growth of algae and plankton, but excessive levels of nitrogen can cause overproduction of algae and plankton. When the algae and plankton die, they decompose and consume oxygen. The consumption of oxygen can lead to the deaths of other organisms. A major impact to humans of nitrates in ground water is levels in excess of 10 mg/l can cause methemoglobinemia or “blue-baby syndrome,” which is an inability to fix oxygen in the blood. According to the *Illinois Water Quality Report 2000* impaired streams with total nitrate levels >7.8 mg/L are considered impaired by N03.

It should be noted that we did not attempt to test for all potentially harmful pollutants in these streams. There are many pollutants, such as heavy metals, organic chemicals, endocrine-disrupting chemicals, and others, which may cause serious problems in these waterways, but that require more sophisticated and expensive testing methods than our volunteer effort is capable of.

PROBLEMS WE FOUND

Our analysis shows major threats to these streams for phosphorous, nitrates, and chlorides.

PHOSPHOROUS AND NITRATES

— Total Lack of Regulation Leads to Nutrient Saturation

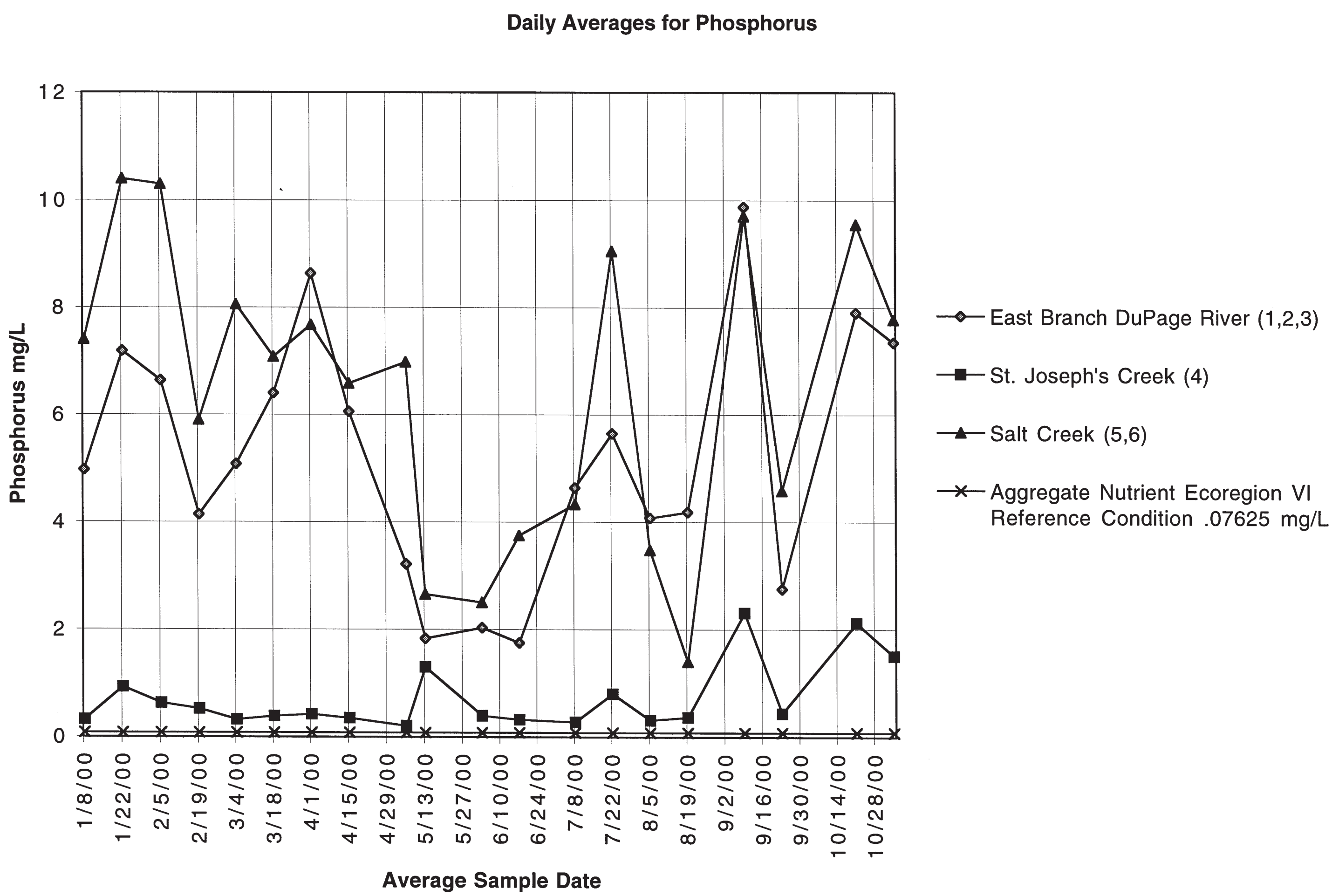
Our findings clearly show that Salt

Creek and the East Branch of the DuPage River are carrying levels of phosphorous that are nearly always well above any standard for a healthy waterway. The most pronounced problems appear to be with phosphorous, which were nearly always above harmful levels.

As discussed above, different government agencies have chosen different thresholds for phosphorous pollution. Every sample we collected on the East Branch and Salt Creek exceeded any known standard for healthy levels of phosphorous. When compared to the “reference condition” that USEPA has established for streams in this region (0.07625 mg/l), levels in these streams were occasionally 100 times higher than desirable. Even when compared against the level at which Illinois EPA considers a waterway to be impaired by phosphorous (0.61 mg/l), all the sites sampled on the East Branch and Salt Creek exceeded even this liberal standard each time. However, samples collected on the St. Joseph’s Creek tributary to the East Branch were substantially cleaner — below 0.61 mg/l on all but four occasions.

These consistently elevated levels of nutrients can contribute to dangerously low levels of oxygen in the water for fish and other aquatic life, and contribute to aesthetic problems that make the streams unpleasant for neighbors and recreation in the summer months — a pea-green color, unpleasant odors, and a buildup of muck on the bottom, blocking canoes and kayaks.

While phosphorous can come from both wastewater plants and polluted runoff, a key trend in our data points to wastewater discharges in particular as a problem for this pollutant. That trend is in St. Joseph’s Creek, which drains into the East Branch, through an urbanized area much like the rest of the local watershed. However, St. Joseph’s Creek does not have significant wastewater dischargers. Therefore, we would expect St. Joseph’s Creek to have similar problems due to polluted runoff, but not suffer from problems caused by wastewater discharges. In the case of phosphorous, this leads us to believe that while St. Joseph’s Creek is receiving nutrient pollution from fertilizer runoff, it is substantially cleaner for the lack of wastewater discharge. The data strongly suggest



that wastewater plants without phosphorous controls on Salt Creek and the East Branch are causing extremely high levels of phosphorous pollution on these streams.

CHLORIDES

— In the Wake of the Snowfall, Unhealthy Salt Levels for Fish

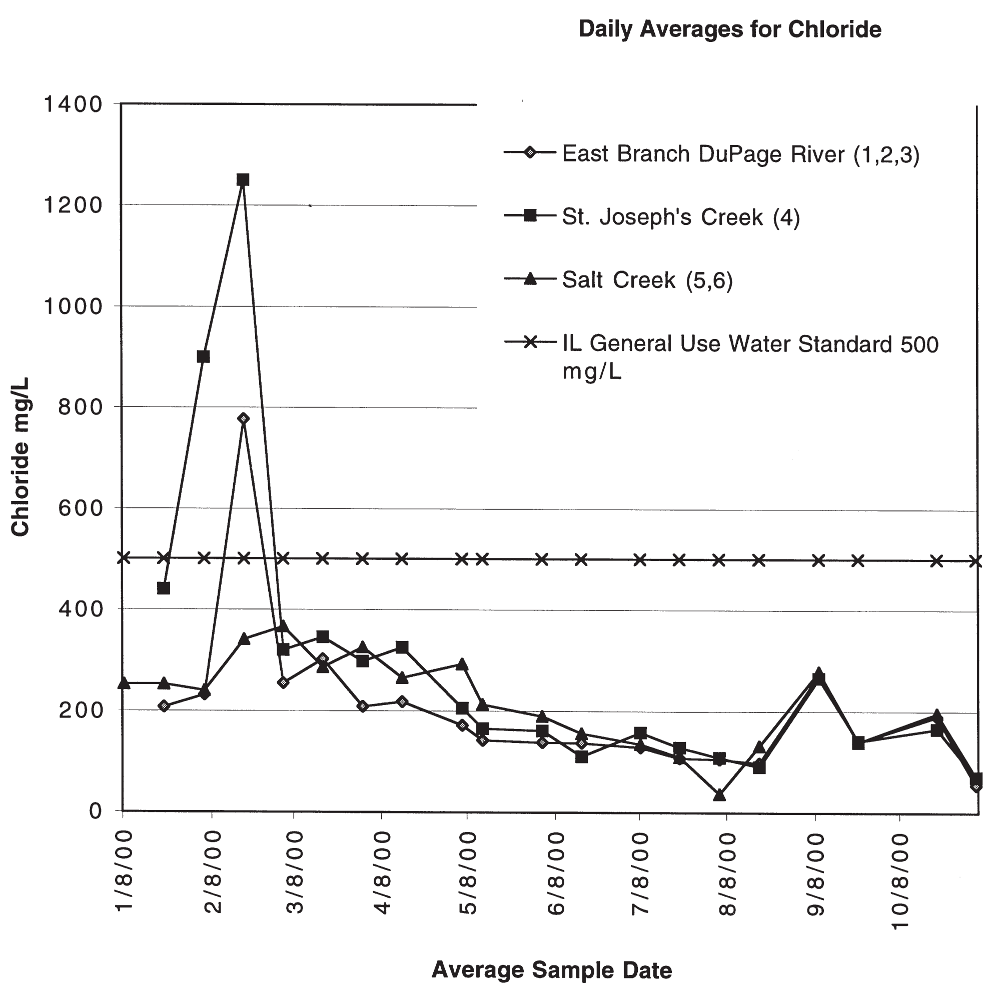
Sampling sites on the East Branch showed a pronounced increase in chlorides on February 19th, 2000. This spike is presumed to be the effect of road salt. The spike on February 19, 2000 is possibly the result of the 11.1 inches of snow which fell on DuPage County on February 18, 2000. This 11.1 inches of snow translates into 1.13 inches of water in a single day, compared to the monthly total of 1.17 inches of water.

The samples for February 19, 2000 did exceed the Illinois general use standard of 500 mg/L. Samples collected at Churchill Woods exceeded the standard by 25 mg/L, while those at Butterfield exceeded the limit by 130 mg/L. The Rive''s chloride level at Ogden/ Burlington's on February 19 was 1075 mg/L, more than double the standard.

St. Joseph's Creek exceeded the standard beginning on the sample date of February 5, where the chloride level was at 900 mg/L. On February 19, St. Joseph's Creek had the highest chloride level we detected in DuPage county at 1250 mg/L, or150% above the Illinois standard.

At all other times of year, the average chloride levels were much healthier, around100-300 mg /L. Salt Creek chloride levels remained below the Illinois general use standard of 500 mg/L throughout the year 2000. The Prairie Path Bridge sampling site had a year high chloride level of 470 mg/L on February 19, 2000 and the Eldridge Park site had a high of 417.5 mg/L on February 5, 2000. These readings approached, but did not exceed, the water quality standard.

Given the tremendous spike in chloride levels at all monitoring locations on February 19, 2000, we are led to conclude that the runoff of road salt into the water is the cause for these alarmingly high levels. This conclusion is further supported by the fact that the elevated levels were also detected in St. Joseph's Creek, which normally tested much cleaner than the main stem of the East Branch and Salt Creek. This would suggest that even waters such as St. Joseph's Creek, which do not suffer from major municipal or industrial discharges, cannot escape the potentially lethal loads of chloride pollution carried by runoff. While chloride levels found in Salt Creek were higher than at other times, they did not

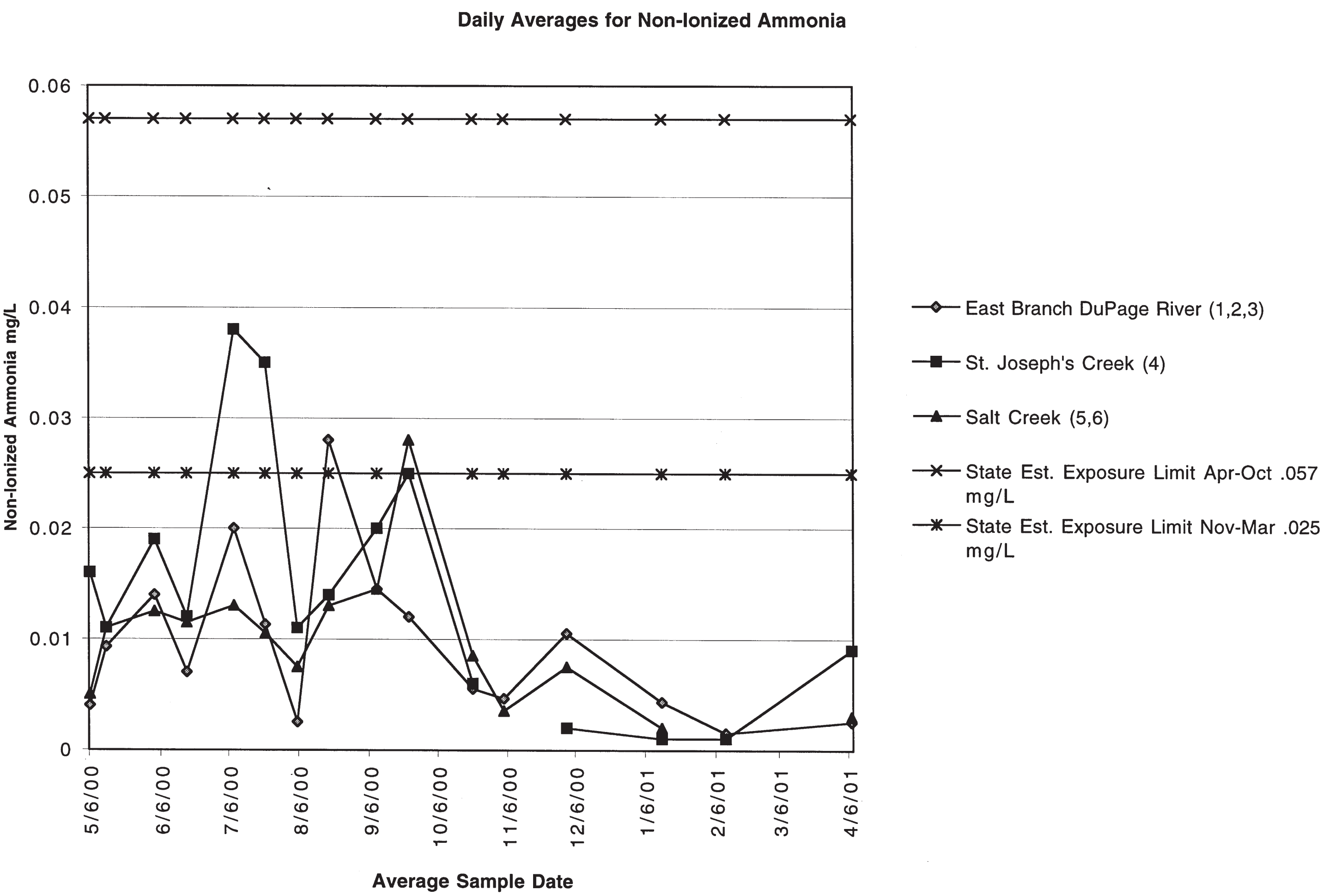


exceed this standard. One possible explanation for this is that our sampling locations on Salt Creek were not immediately downstream of any road crossings, unlike our sites on the East Branch.

It is interesting to note that we did not detect any violations of water quality standards for ammonia. This very good news leads us to conclude that wastewater treatment plants on the whole are doing a competent job of removing this potentially toxic chemical from their discharges. Ammonia is present in domestic wastewater, so watersheds such as these, with many large municipal dischargers, could easily suffer from toxic ammonia levels if wastewater plants did not control for ammonia effectively. We congratulate and thank treatment plant operators for the fine job they appear to be doing, on the whole, to protect the East Branch and Salt Creek from ammonia. Efficient controls on ammonia are probably also responsible for tolerable levels of nitrates in these waters as well, since ammonia controls have this side benefit.

In addition, state water quality standards for ammonia have been revised in recent years to reflect current science and offer stronger protections. We applaud the Illinois EPA for implementing these improved standards. The fact that dischargers appear to be meeting protective ammonia standards in this watershed give us reason to be optimistic that similar progress may be made on the major nutrient problems that remain.

In conclusion, it is clear that unhealthy levels of nutrients (particularly phosphorous) and, at times, chlorides, remain major barriers to Salt Creek and the East Branch of the DuPage River becoming clean streams once again.



— SUCCESSFUL EXAMPLES OF PHOSPHOROUS CONTROL —

A major source of phosphorous in waterways is wastewater from municipal dischargers. One solution for these dischargers is better phosphorous controls. Elsewhere in the Midwest, hundreds of publicly owned treatment works (POTWs) have advanced phosphorous wastewater treatment. Illinois has 17 plants (POTWs) that discharge into lakes and which are therefore required to remove phosphorous. Phosphorous does not have to be removed in Illinois if it is discharged into a stream. In Illinois' neighbor states, hundreds of wastewater plants are removing phosphorous, including 336 in Michigan, 245 in Wisconsin, 119 in Ohio, 79 in Indiana, and 68 in Minnesota.

AVAILABLE METHODS FOR NUTRIENT REMOVAL

There are a number of methods available to remove phosphorus from wastewater within the treatment facility. The concentration of phosphorus (P) in untreated wastewater typically ranges from 4-8 mg/L but can reach 10 mg/L (raw sewage + P based detergents). Nitrogen (N) concentrations can reach 40 mg/L (NH3-N). Conventional removal methods, such as chemical precipitation, remove only about 20% P and 30% of the NH3-N from the wastewater. Advanced methods, such as biological phosphorus removal, have been shown to remove up to 90% P from the wastewater influent. A recommended effluent standard for P is 1.0 mg/L for environmental health. The level of nutrients in the receiving waters necessary to trigger algae blooms are as low as 0.01 mg/L P and 0.1 mg/L for N.

Conventional removal of phosphorus has been accomplished by adding chemical agents to the influent wastewater stream to precipitate salts containing dissolved forms of phosphate. The precipitate contributes to the sludge produced at the plant. The salts of calcium, iron and aluminum are commonly used in this process. This type of treatment removes only about 20% P from the influent. For the typical waste stream containing 4-8 mg/L P, the resulting effluent concentrations are well above the recommended standard of 1.0 mg/L. In addition to poor removal rates, chemical precipitation increases the amount of sludge produced at the plant. Depending on the point of application for the metal salts the increase ranges from 10% to 70%. Chemical precipitation also reduces the dewatering capability of the sludge, therefore increasing sludge handling costs. The major costs associated with chemical precipitation are for sludge handling and purchase of the chemicals for precipitation.Advanced methods of phosphorus removal include biological phosphorus removal (BPR) also known as enhanced phosphorus removal. In this process a continuous flow activated sludge process is used. The essential components in this method are an anaerobic phase, followed by an anoxic phase, followed by an aerobic phase. BPR has been shown to remove up to 90% of the phosphorus from the wastewater influent, in some cases achieving an effluent concentration of 0.12 mg/L. From an environmental health point of view this is obviously the better method, achieving effluent concentrations below the recommended 1 mg/L in most cases. BPR has a number of other advantages over conventional treatment as well. These advantages include reduced sludge production, improved sludge settling and dewatering, lower oxygen requirements, reduced alkalinity requirements. Construction costs for BPR systems are about $2.3 million per MGD. A popular deterrent to BPR has been the often expensive piloting process, however the Wisconsin Department of Natural Resources in conjunction with the University of Wisconsin has developed a computer program which aids in the design.

EXAMPLES OF ADVANCED PHOSPHORUS REMOVAL

Metropolitan Council Environmental Services (MCES) in St. Paul, Minnesota has installed phosphorous controls at its Metropolitan Wastewater Treatment Plant (MWWTP). The MWWTP is the largest of eight facilities controlled by MCES in the seven counties of the Twin Cities area.
The treatment plant has been using a Nitrifying Activated Sludge (NAS) step feed secondary treatment system to date. Due to the change on their 1998 National Permit Discharge Elimination System (NPDES) permit from the Minnesota Pollution Control Agency, the plant plans to convert the entire facility to a biological phosphorous (bio-p) removal system. The new permit limits the total phosphorous in treated effluent to an annual average of 1.0 mg/l versus previous limits of 4.0 mg/l based on a maximum month criterion (Wilson, 1999).

The results of the tests conducted on the new system found an annual phosphorous level of 0.55 mg/l, indicating, "In contrast to previous planning proposals, the full-scale process proving programmed related work activities at the Metro Plant demonstrated that biological phosphorous removal can be successfully implemented to satisfy the current NPDES permit requirements of 1.0 mg/l annual average phosphorous concentration with seasonal nitrification requirements" (Wilson, 1999). In addition, these requirements were met utilizing only modifications to the already existing secondary treatment tankage, and no reduction of the Metro Plant capacity (Wilson, 1999).

There are also examples from smaller systems, including these:

1. Havre De Grace, Maryland - The Havre De Grace Wastewater Treatment Plant was upgraded for Biological Nitrogen Removal (BNR) and on-site industrial pretreatment. The rated plant capacity is 1.9 MGD. BNR is similar to BPR in that anaerobic and aerobic processes are used for nutrient removal. Construction cost was $4.64 million ($2.44 million per MGD).
2. Onodaga County, New York - The Metropolitan Syracuse Wastewater Treatment Plant was upgraded for ammonia and phosphorus removal using tertiary biological aerated filters. Effluent concentrations were 2 mg/L NH3-N and ranged from 0.12 - 0.6 mg/L P. The rated plant capacity is 80 MGD, with peak flows reaching 240 MGD. The cost of the project was not available.
3. Rouse Hill, New South Wales, Australia - The wastewater treatment plant used BPR to achieve 90% nutrient removal. Effluent concentrations were 0.3 mg/L P and 5.0 mg/L N. The cost of the project was about $150 million (US).

MULTI-FACETED APPROACHES TO NUTRIENT REMOVAL

During the course of researching available methods for phosphorus removal the necessity of approaching nutrient reduction from many sources was raised many times. While wastewater effluent streams are a primary contributor to nutrient loads in receiving waters there are several other significant contributors. Wastewater treatment facilities are point sources.These other contributors are non-point sources, which does not permit us to identify specific amounts of pollution from specific sources. Some non-point sources known to contribute to nutrient loads in rivers, streams and ponds are storm water runoff, atmospheric deposition, and agricultural lands. Protection of watershed areas and Best Management Practices of farm lands have been shown to improve water quality. Two examples that support a comprehensive approach to nutrient removal follow:

1. Bull Run Watershed, VA - In 1971 the Virginia State Water Control Board ordered the replacement of 11 small wastewater treatment facilities in the Bull Run watershed with a single advanced treatment plant that would remove 99% of the influent phosphorus. A consultant's study had concluded that these 11 small plants had been the source of eutrification; however, following construction of the plant nutrient concentrations in the receiving waters remained high. It was later determined that runoff from nearby urban areas was also a major contributor of phosphorus. In order to improve water quality it was necessary to implement other watershed protection measures, including rezoning to reduce the volume of runoff.
2. West Falmouth Harbor Watershed, MA - The West Falmouth Harbor watershed receives significant nitrogen loadings from several point and non-point sources. In order to improve the quality of the watershed, a wastewater management facilities plan and a nitrogen management plan were developed.

POTENTIAL SOURCES OF POLLUTION

NUTRIENTS — PHOSPHORUS AND NITRATES

Nutrients enter the aquatic environment from a number of different sources and processes, but two major categories of nutrient loading that we can address are those being discharged directly by sewage treatment plants, and those being carried into streams with rainwater as polluted runoff.

Nutrients from Sewage Treatment Plants

Phosphorous and nitrates are a major component of the human waste flowing into the wastewater treatment plants that discharge into DuPage's streams on a daily basis. While these plants are required to control for many different pollutants, Illinois does not require plants discharging into rivers and streams to control or even monitor the levels of these pollutants. Without nutrient controls, wastewater treatment plans are clearly a major source of nutrient pollution in the county.

Nutrients from Fertilizer Runoff

Nutrients are major components of agricultural, lawn, and garden fertilizers. Since the watersheds of these streams have been almost entirely urbanized, we can assume that the major sources of nutrients from runoff are fertilizers applied to lawns, golf courses, and other landscaped properties.

CHLORIDES

While chlorides are part of the wastewater discharged by sewage treatment plants, the dramatic spike seen in chloride levels, even in St. Joseph's Creek, is very strong evidence that road salt is to blame.

HYDROLOGICAL MODIFICATION

Both of these streams have been seriously changed from their natural courses. By taking out the natural twists and turns, gravel bottom, riparian wetlands and streamside vegetation, we have taken away, in many parts, the streams' ability to cleanse itself of pollution and provide wildlife habitats.

SAVING THESE STREAMS IS UP TO ALL OF US!

HOW EACH OF US CAN DO OUR PART TO CLEAN UP WATER POLLUTION IN DUPAGE COUNTY

The actions of many different players will determine whether these streams can recover and become community assets, or whether they will continue to suffer from pollution overload. Government agencies, private industry, individual citizens

— ALTERNATIVES TO ROAD SALT —

A large contributor to water quality degradation in the Midwest region, and around the East Branch of the DuPage River and Salt Creek is road salt. Runoff from road de-icing operations can cause high sodium and chloride concentrations in waterways, such as after the Chicago snowstorm on February 19, 2000. These chloride surges can cause changes in water chemistry and fish kills.

One remedy to this problem would be to use substances that work as well as salt, but do not cause degradation to the nearby waterways. Changes in the rate, timing, and method of application of salt could also result in less damage to water quality.

The Michigan Technological University in Houghton, MI provides an example. The University developed a recipe to use instead of salt. It consists of fermented potato peelings, setting the vinegar aside, mixed with limestone dust to form calcium magnesium acetate, and ground up beer bottles. All of these are combined and spread on a road before a snowstorm. This mixture works by preventing the ice from sticking to the ground. In addition, this substance is much less corrosive on cars than the salt. Currently, the recipe is still being studied. Tests indicate dissolved oxygen levels are reduced, therefore the environmental record is not perfect. However, this recipe illustrates that safer, yet effective alternatives to road salt can be found, helping to lessen the degradation of the waterways.

Other alternatives, like the mixture from The Michigan Technological University, are still in the developmental and trial stages. Calcium Chloride is the second most commonly used de-icing chemical that is more effective at lower temperatures, compared to salt. The disadvantages to Calcium Chloride include the higher cost, difficult handling and storing capabilities, possibility of contributing to "black ice," and the presence of chloride ions which make it as corrosive as regular road salt to structural materials and as toxic to aquatic life.

Abrasives, such as sand, are an alternative to salt, providing traction, not the ability to melt snow and ice.

The chemical alternative to salt with the most potential is calcium magnesium acetate (CMA), an ingredient in the recipe the Michigan Technological University has developed. It is made from limestone and acetic acid. "CMA is less damaging to soils, less corrosive to concrete and steel, and non-toxic to aquatic organisms. It is also benign to roadside vegetation. The components of CMA are not harmful to groundwater, although CMA, like salt, has the potential to mobilize trace metals (Fe, Al, Zn, Cu) through cationic exchange reactions in soil." (New Hampshire Department of Environmental Services.) The downside of CMA is a price that is fifteen times that of salt ($600/ton versus $40/ton), but the long-term result will likely be longer lasting structures and cars, and less environmental damage which saves money in the end. Perhaps CMA could be used on bridges and other areas where the road drains directly into a stream.

Since it takes much less salt to prevent icy road conditions than it does to treat them, there are alternatives in the road salt application process. Computerized sprinkling controls on road salt spreaders that can be calibrated for different temperature and snow conditions is one idea that is being developed in Canada. The Canadians have also experimented with road embedded weather monitoring sensors, known as Road Weather Information Systems (RWIS) that can predict icing conditions, so crews can know where and when to treat before the ice bonds to pavement.

and landowners can all help out. Here are some specific recommendations for action by different actors in the County:

THE STATE OF ILLINOIS

The Illinois Environmental Protection Agency (IEPA) is responsible for enforcing the Clean Water Act in Illinois, and therefore issues permits to all dischargers to Illinois waterways, develops water quality standards, and is responsible for the preparation of cleanup plans for impaired waters like those in DuPage County. Using these authorities, IEPA could take the following steps to begin rapid cleanup of DuPage County's streams:

— Prepare and Implement Effective Total Maximum Daily Load Studies for DuPage Streams

The East Branch of the DuPage River and Salt Creek are on a list of 336 watersheds across the state recognized by IEPA as in need of a Total Maximum Daily Load study, or TMDL. A TMDL is required by the Clean Water Act for any stream that is not meeting water quality standards, such as the ones in this study. The goals of a TMDL are to determine what problem pollutants are, what capacity the stream has to absorb them without harm (or, the total maximum daily load it can assimilate), how much pollution the stream is currently carrying, where it is coming from, and, most importantly, how to reduce the pollution to tolerable levels. We congratulate IEPA for undertaking TMDLs for Salt Creek and the East Branch of the DuPage River this year. How these studies are done and implemented will probably determine whether or not DuPage's streams improve in the decade ahead.

— Move Toward Nutrient Controls for Sewage Treatment Plants

The evidence in DuPage clearly demonstrates that nutrient pollution is causing major impairments in water quality. However, there are no limits on nutrient discharges to our waterways. Other states, including here in the Midwest (see above), have moved to address these problems by establishing a water quality standard for phosphorous, in particular, and requiring controls for nutrients where problems exist. Illinois should follow these examples as quickly as possible and, in the meantime, ask dischargers to at least monitor their discharges for phosphorous so that the precise sources of phosphorous problems can be identified.

— Issue More Protective Permits to Dischargers

Water pollution permits come up for renewal every five years. IEPA, when renewing permits to dischargers in the watershed, should include lower limits on regulated pollutants where better pollution controls or alternatives are available, and address nutrient pollution as described above.

SEWAGE TREATMENT PLANTS

The operators of wastewater treatment plants are primarily responsible for the progress we have seen in improving Illinois water quality to date. They provide an essential public service with limited budgets. However, because problems clearly remain even with current treatment standards and technologies, further investments in wastewater treatment will be necessary if we are to restore DuPage County's streams. In particular, treatment plant operators should begin evaluating the costs of nutrient controls at their facilities, and include these costs in planning future capital and operations budgets. Elected officials responsible for overseeing the operations of sanitary districts should embrace this challenge.

Treatment plants that receive wastewater from industrial facilities should also review their "pre-treatment" programs, to make certain that their industrial customers are sending them the cleanest possible wastewater. Industries should be required to conduct pollution prevention audits, to identify opportunities to reduce toxic chemicals in their processes, and to reuse waste products.

LOCAL GOVERNMENTS

Governments that oversee wastewater treatment plants can help by making investments in better pollution controls. Those that own parks, golf courses, or other public properties along these streams can help by reducing the application of fertilizers and pesticides near the water, and by using native vegetation to improve habitat and reduce maintenance costs.

Public landowners should also explore projects to restore natural stream conditions, such as adding stream meanders, riparian wetlands, vegetative buffer strips along waterways, and other beautification projects that will help the stream cleanse itself.

Governments responsible for snow removal should also look into alternatives to current road salt use along roads that drain directly into these streams. Alternatives can include alternative de-icing chemicals and the amount and timing of salt spreading. (See above.)

PRIVATE INDUSTRY

Businesses in the watershed can help by reviewing their discharges, either directly to these streams or to wastewater treatment plants and evaluate alternatives to toxic chemicals used in their processes. In addition, businesses with property near these streams can help by using native vegetation in drainage areas, reducing fertilizer applications, and exploring alternatives to keep parking lot road salt out of the streams.

CITIZENS OF THE WATERSHEDS

Individuals living in these watersheds can play an important part in their recovery in many ways. Streamside landowners can consider native vegetation for a beautiful, low-maintenance garden that will attract wildlife and keep pollution out of the water. Citizens everywhere can get involved in the public processes that determine the quality of sewage treatment, land use planning along these streams, and state and federal legislative efforts regarding water pollution. Volunteers are always needed for groups working to improve the rivers, such as the Sierra Club and the DuPage River Coalition, coordinated by the Conservation Foundation.

CONCLUSION

DuPage's streams are definitely cleaner than they were 30 years ago, but our water quality monitoring on the East Branch of the DuPage River and Salt Creek demonstrate that serious problems remain, and suggest that new pollution controls may be necessary, particularly for phosphorous, and that road salt runoff is causing toxic conditions after heavy snows.

Different actors can help address these problems. The Illinois EPA can help by finishing and implementing Total Maximum Daily Load studies for these streams, and by moving toward requiring phosphorous controls on wastewater treatment plants. The federal government can help by continuing to support TMDL development by states such as Illinois, and by continuing the national movement toward nutrient pollution controls. Local governments and treatment plant operators can begin planning for phosphorous controls. Streamside landowners should seriously consider restoring natural stream channel conditions, adding vegetative buffers along waterways, and reducing fertilizer and pesticide use near the water. Citizens can help advocate for all of these improvements, and consider and reduce the impacts of their own property on these waters.

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A Special Report on the Health of Salt Creek and the East Branch of the DuPage River