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Five Year Review of Illinois' Water Management and Conservation and Efficiency Programs - Report to the Compact Council and Regional Body

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Water Management Program Report

The construction (circa 1900) of the Chicago Area Waterway System (CAWS) resulted in the reversal of the direction of flow of the Chicago and Calumet Rivers away from Lake Michigan. This project created a diverted watershed area of around 673 square miles, leaving a very small (around 75 square miles) area in Illinois that still drains to Lake Michigan. In both the diverted watershed and the watershed that still drains to Lake Michigan in Illinois, Lake Michigan water is the predominant water supply source.

No regional organization, municipality, political subdivision, agency or instrumentality, or any other organization, association or individual desiring to use water from Lake Michigan shall divert or use any such water unless it has previously obtained from the IDNR/OWR a valid allocation permit. In addition, since January 1, 2010, the State Water Survey's water use inventory program has required all high capacity (100,000 gpd or greater) surface intakes and groundwater wells to annually report water withdrawn to the State Water Survey.

Laws and Regulations

A U.S. Supreme Court Decree [Wisconsin v. Illinois, 388 U.S. 426 (1967), as modified, 449 U.S. 48 (1980)] limits Illinois' diversion of Lake Michigan water to an annual average of 3200 cubic feet per second (cfs) or 2.1 billion gallons per day. The Illinois law regulating this diversion is the "LEVEL OF LAKE MICHIGAN ACT" (615 ILCS 50). The Department of Natural Resources, Office of Water Resources (IDNR/OWR) implements this law using its Part 3730 Rules "ALLOCATION OF WATER FROM LAKE MICHIGAN". These rules can be found at <http://www.dnr.illinois.gov/adrules/documents/17-3730.pdf>.

The Illinois State Water Survey (ISWS) operates a surface and groundwater use reporting program. The "WATER USE ACT OF 1983" (525 ILCS 45/1) as amended by Public Act 096-0222, effective January 1, 2010 requires high capacity well owners and high capacity intake owners, defined as a withdrawal in excess of 100,000 gallons per day (gpd) to participate in the State Water Survey's Water Inventory Program.

Together these two statutes and the programs that implement them ensure that Illinois collects all the water withdrawal and diversion data needed to demonstrate compliance with the water use reporting protocols required under the Compact and Agreement (Compact Section 3.4/Agreement Article 300, and Compact Section 4.3/Agreement Article 301). In addition, the Level of Lake Michigan Act and implementing rules provide the necessary authority to establish a water conservation and efficiency program for all diverters of Lake Michigan water (Compact Sections 4.2(2), 4.2(4) and 4.2(5)/Agreement Article 304). Per Compact Section 4.14/Agreement Article 207(paragraphs 10-14), Compact Sections 4.3, 4.8, 4.9, 4.10, 4.11 and 4.13/Agreement Articles 200, 201, 206, 207 and 208 do not apply to Illinois and its' water management program.

Allocation Process

Illinois' Lake Michigan water allocation process consists of the following key elements:

- Applicants evaluate water supply options. Northeastern Illinois has three primary water supply sources – Lake Michigan, deep aquifer groundwater and shallow aquifer groundwater (and very limited other surface water supply). The administrative rules designate applicants who demonstrate that Lake Michigan water is the most cost-effective water supply source as a high priority.
- Evaluate water demands throughout the entire forecast period. This can include the use of a regression equation that utilizes historical water use and three primary variables – population, household size and employment. Applicants also develop their own water demand forecast. The forecast period currently extends out to the year 2030.
- Hold formal allocation hearings for all applicants. This process is administrative in nature, and a formal record is established for all applicants. The IDNR/OWR's decision is based on the record.
- Allocation permits are based on an annual average use for a given year, along with conditions/requirements that promote efficient use of the Lake Michigan water allocated.
- This process includes provisions for adjustments in water allocations. For most public water supplies, the primary data (population and employment projections) used to develop long-term demand forecasts carries a high degree of

uncertainty. The allocation program needs to be flexible to accommodate shifts in water demand as time goes on and conditions change.

- All applicants must submit annual water use audit reports to monitor compliance with allocation limits and track compliance with the Department's standard on water loss.

Lake Michigan water allocation applicants are divided into the following categories:

- **Category IA** – Applicants whose primary water needs are residential, commercial or industrial and whose future or continued use of Lake Michigan water is the most economical source of supply.
- **Category IB** – Applicants whose primary water demands are residential, commercial and industrial and whose use of Lake Michigan water would reduce regional use of the deep aquifer.
- **Category IIA** – Applicants whose primary water demands are for the minimum flows necessary to meet navigation requirements and minimum discretionary dilution flows necessary to maintain the CAWS in a reasonably satisfactory sanitary condition.
- **Category IIB** – Applicants whose water demands are for the minimum discretionary dilution flows necessary to meet water quality standards in the CAWS.
- **Category III** – Applicants whose water demands do not fall into Categories IA, IB, IIA, or IIB. Category III applicants do not qualify for an allocation of water from Lake Michigan.

In determining priorities within Categories IA and IB, the IDNR/OWR considers the following items:

- Adequacy of supply from sources other than Lake Michigan.
- Economics of alternative supplies.
- For new applicants, priority will be given to allocations for domestic purposes.
- For new applicants, the allocation of Lake Michigan water will be made with the goal of reducing the withdrawals from the Cambrian-Ordovician Aquifer (deep aquifer).

In determining priorities within Categories IIA and IIB, the Department will consider the following items:

- A limitation of 220 cubic feet per second for discretionary dilution for water quality purposes in the CAWS.
- The need to meet navigation requirements in the CAWS.
- The minimum discretionary diversion needed to meet water quality standards in the CAWS in a reasonable satisfactory sanitary condition.

The IDNR/OWR will normally make allocations to meet the full water needs of any category as determined by the Department before any water is allocated to applicants in categories of a lower priority.

In determining the amount of water available for allocations to Categories IA, IB, IIA and IIB, the Department will consider the amount of water that must be reserved for storm

water runoff, lockage and leakage and a reserve for future increases in demands and storm water runoff.

Sectors

- 1) **Public Water Supply:** All public water supplies which use Lake Michigan as their water supply are required to have a Lake Michigan water allocation permit, regardless of the amount needed (i.e. there is no minimum threshold). Currently, there are 217 public water supply systems using Lake Michigan water as their source of supply, serving over 7 million Illinois residents. In Calendar Year 2017, public water supply systems in Illinois withdrew and diverted approximately 803 million gallons per day (mgd).

There are no public water supplies within the Lake Michigan watershed utilizing a groundwater supply. If there were, and they withdrew at least 100,000 gpd, they would be required to report this water use to the ISWS.

- 2) **Self-Supply Commercial and Institutional:** Like public water supply, any self-supply commercial or institutional user requires a Lake Michigan water allocation permit if they are diverting Lake Michigan water. Currently there is only one active Lake Michigan water allocation permit in this sector, with an average water use of less than 10,000 gpd. There is also a military facility that withdraws and diverts Lake Michigan water (2017 reported use was 1.864 mgd). As a federal facility which directly withdraws Lake Michigan water, they are not covered by the U.S. Supreme Court Decree and are not included as an Illinois diversion.

There was no reported self-supply commercial/institutional users within the Lake Michigan basin that withdraw groundwater.

- 3) **Self-Supply Irrigation (Lake):** There are no Lake Michigan water allocation permits issued for this water use sector (irrigation water use is not a diversion). The ISWS collects data from one self-supply irrigation water user using Lake Michigan water for irrigation. In 2017 they reported a use of 4,000 gallons/day.

Self-Supply Irrigation (Ground): The ISWS collects data from two self-supply irrigation water users using ground water from the Lake Michigan Basin for irrigation. In 2017 they reported a total use of 52,000 gallons/day.

- 4) **Self-Supply Livestock:** There are no self-supplied livestock facilities in the Lake Michigan watershed either utilizing groundwater or Lake Michigan water.
- 5) **Self-Supply Industrial:** Requires a Lake Michigan water allocation permit if they are diverting Lake Michigan water. There is only 1 permit issued in this sector. They reported a 2017 diversion of 0.570 million gallons per day (mgd).

The ISWS lists 3 industries withdrawing Lake Michigan water for cooling/consumptive use. Total withdrawal in 2017 was 27.975 mgd.

- 6) **Self-Supply Thermoelectric Power Production (once through cooling):** This water use sector, by definition, does not result in a diversion; hence no Lake Michigan water allocation permit is required. The ISWS data base list includes 4 power

facilities that withdraw Lake Michigan water for once-through cooling. Total withdrawal in 2017 was 460.675 mgd.

- 7) Self-Supply Thermoelectric Power Production (recirculated cooling): There are no self-supply thermoelectric power production facilities that utilize recirculated cooling in the Lake Michigan watershed.
- 8) Off-Stream Hydroelectric Power Production: There are no off-stream hydroelectric facilities within the Lake Michigan drainage basin in Illinois.
- 9) In-Stream Hydroelectric Power Production: There are no in-stream hydroelectric facilities within the Lake Michigan drainage basin in Illinois.
- 10) Other: The Metropolitan Water Reclamation District of Greater Chicago has a Lake Michigan water allocation to divert Lake Michigan water to maintain navigation and water quality in the CAWS. Water is diverted into the CAWS at three lakefront locations. In 2017 a total of 179.667 mgd was withdrawn and diverted into the CAWS for these purposes. Water is also diverted into the CAWS to operate two lakefront locks. These locks are operated by the U.S. Army Corps of Engineers and thus don't have a Lake Michigan water allocation permit. However, this water is included in Illinois' allowable diversion. In 2017 the amount of Lake Michigan water diverted to operate the two lakefront locks was 52.993 mgd.

Reporting and Database

All Lake Michigan water allocation permittees are required to submit annual reports (LMO-2 Report) accounting for how Lake Michigan water is used within a public water supply system. In addition, all permittees with an intake structure on Lake Michigan or who are the first Illinois user of water diverted from Lake Michigan outside Illinois must report their water use both annually and monthly (LMO-3 Report) to the IDNR/OWR. The Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) submits monthly (LMO-6) reports for Lake Michigan water they divert for maintaining the Sanitary and Ship Canal. The IDNR/OWR maintains a database which stores this information going back to 1989 and has hard copies going back to the 1970s. The IDNR/OWR produces an annual report which summarizes water use by all permittees. This is distributed to all Lake Michigan water allocation holders with an annual newsletter. All pumpage numbers provided on the LMO-2 and LMO-3 reports are metered numbers. The MWRDGC diverts water into the Sanitary and Ship Canal using sluice gates and by opening the Chicago River Controlling Works and the O'Brien Locks. Therefore, the numbers they report on their LMO-6 reports are not metered but calculated.

For many years, the ISWS has maintained a voluntary reporting program for surface and ground water use. On January 1, 2010, that program became mandatory for all surface and groundwater withdrawals averaging 100,000 gallons/day or greater. The ISWS has its information in a database.

Initiatives

The ISWS and the IDNR/OWR have also been involved with the Chicago Metropolitan Agency for Planning in their ongoing work on the “Northeastern Illinois Regional Water Supply Plan”.

Water Conservation and Efficiency Program Review

A. Program Legal Basis

The U.S. Supreme Court Decree [Wisconsin v. Illinois, 449 U.S. 48 (1980)] that limits Illinois’ diversion of Lake Michigan water also contains language directing Illinois to implement a water conservation program. The Level of Lake Michigan Act [615 ILCS 50] incorporates the Decree language which states that:

“all feasible means reasonably available to the State and its municipalities, political subdivisions, agencies and instrumentalities shall be employed to conserve and manage the water resources of the region and the use of water therein in accordance with the best modern scientific knowledge and engineering practice.” [615 ILCS 50/5]

This is the operative judicial and statutory language that directs the Illinois Department of Natural Resources (Department) to develop and implement a water management and conservation program covering all permittees of Lake Michigan water.

B. Program Objectives

Illinois’ first report to the Compact Council and Regional Body (dated December 8, 2009) reviewed the water conservation requirements that all domestic users of Lake Michigan water must comply with as a condition of receiving a Lake Michigan water allocation permit. In 2010, the Department developed and posted on our website Illinois’ Lake Michigan Water Conservation Goals and Objectives, as required by the Compact and the Regional Agreement.

<http://www.dnr.illinois.gov/WaterResources/Pages/LakeMichiganWaterAllocation.aspx>

The Department’s water conservation and efficiency program objectives are:

- Enforce the adoption of standards that require the efficient use and conservation of Lake Michigan water by the end user (homeowner, business/industry).
- Establish standards for good water system management and leakage control by the owner/operator of a water supply system.
- Ensure that Lake Michigan water diverted directly into the Chicago Waterway system for various purposes is kept to a minimum.
- Collect water use data annually; monitor changes in water use patterns. Encourage public water supply systems to evaluate the effectiveness of their conservation efforts.
- Prepare and maintain long-term water demand forecasts.
- Promote the adoption of water rate structures that encourage conservation and water efficiency.
- Encourage water suppliers to invest in water infrastructure and the use of innovative technology to improve water systems management.

- Encourage research, development and implementation of water efficient technologies. Develop linkages with organizations such as USEPA's WaterSense Program, the Alliance for Water Efficiency and others, to keep abreast of the latest conservation technologies.
- Inform, educate and increase awareness regarding water use, conservation and efficiency via newsletters and other such means of communication.
- Work with our Lake Michigan water allocation permittees and our Great Lakes basin partners to enhance information sharing.

C. Program Activity – Updated Administrative Rules

On November 18, 2014 the Department's updated Part 3730 administrative rules "ALLOCATION OF WATER FROM LAKE MICHIGAN" took effect.

The updated Lake Michigan water allocation rules will improve Illinois' water conservation and efficiency program. Here is a very brief summary of the substantive changes to the rules.

- Since 1977 the Department has had an 'Unaccounted-For-Flow' standard for all domestic Lake Michigan water supplies. This standard will be replaced with a 'Non-Revenue Water' standard, which will allow public water supplies to utilize the water audit methodology recommended by the American Water Works Association (AWWA M36 water audit methodology), and to better track the value of water loss.
- Water systems not in compliance with the non-revenue standard will be required to prepare and submit a water system improvement plan.
- Local/Municipal plumbing codes/ordinances will be updated to require that new and replacement plumbing fixtures be a labeled WaterSense product.
- The classification system has been revised so that a water applicant that utilizes deep aquifer groundwater is a higher priority use than the use of water from Lake Michigan to meet navigation requirements and minimum discretionary dilution flows necessary to maintain the CAWS in a reasonably satisfactory sanitary condition.
- Additional guidelines for lawn sprinkling have also been included, as well as recommendations for sub-metering in new multi-family building construction where practicable and feasible and setting water rates to reflect full cost pricing.

D. Program Activity – Develop Linkages with other Conservation Organizations

Over the past 5 years the Department's has developed several new partnerships with other groups/organizations to further our water conservation program efforts. These include:

- Becoming a USEPA 'WaterSense Partner' and updating our rules to require the use of 'Water Sense' labeled plumbing fixtures in our standard for water efficient plumbing fixtures.
- Working with regional organizations such as the Chicago Metropolitan Agency for Planning, the Northwest Water Planning Alliance, the Northeastern Illinois Regional Water Supply Planning Group, the Center for Neighborhood Technology and the Metropolitan Planning Council to further our outreach to communities in the areas of water supply planning, drought management, water

- loss control and sustainable water resource management.
- Work with the AWWA - Illinois Section to develop and hold water loss control workshops in Northeast Illinois.

E. Program Activity – Water Rate Survey

The Department recommends that Lake Michigan water providers adopt water rate structures that 1) are based on metered water use, 2) discourage excessive water use, and 3) reflect the full cost of water, including the long-term cost to properly maintain and operate the water supply distribution system in such a manner as to keep system losses to a minimum.

Our long-term practice has been to undertake a water rate survey of all Lake Michigan water providers every 5 years. Our last water rate survey was published in 2015. Our next 5-year water rate survey will be in 2020.

F. Program Activity – Water Use and Water Loss Monitoring

Throughout the last 5 years we have continued to collect, analyze and regulate the reported water loss of all our domestic Lake Michigan water suppliers. In Water Year 2015 (October 1, 2014 – September 30, 2015) the Department modified its LMO-2 form to reflect the AWWA's Water Loss Audit Software which measures water loss in the form of Non-Revenue Water (NRW). Since Water Year (WY) 2015 the Department's regulatory threshold for NRW to Water Supplied is 12%, reducing to 10% in WY 2019. All Category IA and IB permittees that exceed the Department's NRW threshold are required to submit a Water System Improvement Plan that outlines actions the permittee plans to undertake, along with a timeframe, to reduce NRW to less than the Department's threshold. In WY 2017 93 permittees had a percent NRW at or above 12%. In WY 2017, the average NRW in the Lake Michigan water service region was about 12.8%.

G. Program Activity – Control of Direct Diversion into Chicago Waterway System

The total amount of Lake Michigan water diverted into the Chicago Waterway System for discretionary diversion and navigation makeup flow was 176.493 cubic feet per second (cfs) in water year 2017. At the end of the 2017 water year, the five-year running average of these two components of direct diversion stands at 240.707, or 64.294 cfs below the combined allocation (305 cfs) for these two components of direct diversion. The Metropolitan Water Reclamation District of Greater Chicago (MWRD) holds the Lake Michigan water allocation for both discretionary diversion and navigation makeup. In February of 2018 MWRD's combined allocation for discretionary diversion and navigation makeup was reduced to 255 cfs.

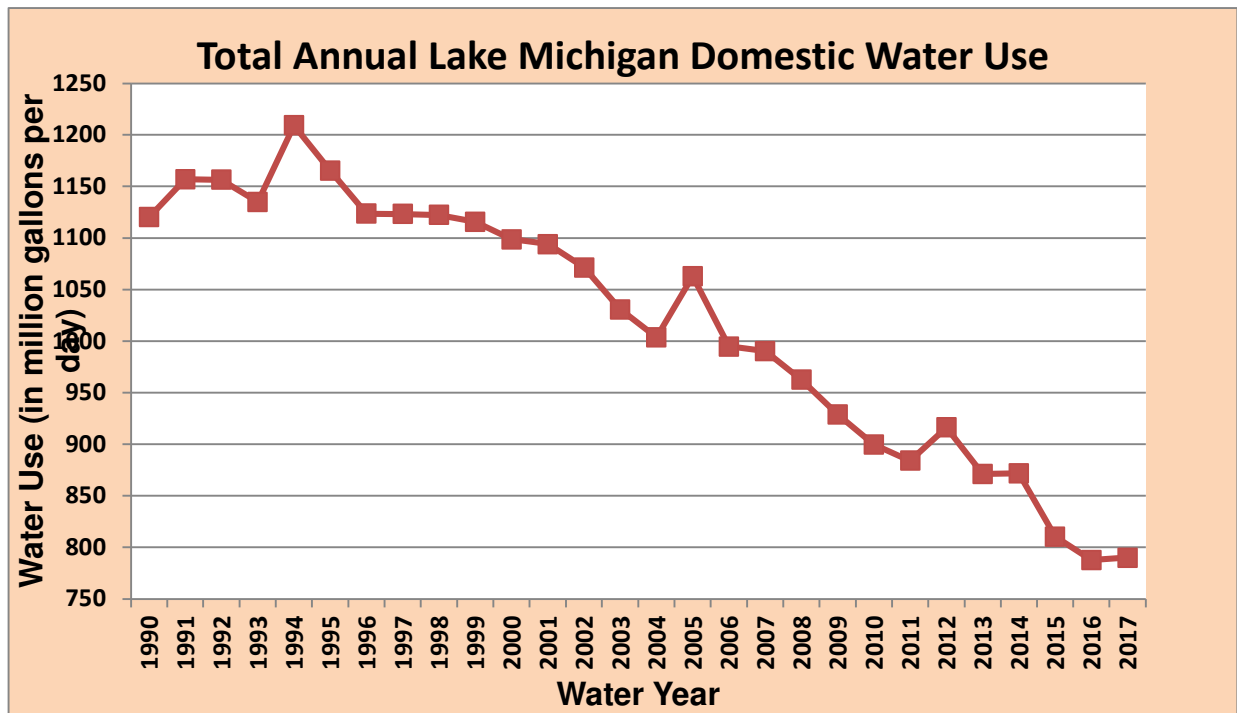
The other primary use of Lake Michigan water diverted directly into the Chicago Waterway System is to operate the navigation locks at the mouth of the Chicago River and on the Calumet River. Both lock facilities are operated and maintained by the U.S. Army Corps of Engineers. Illinois does not have any control over the amount of water diverted for lockage or for leakage through these structures, although this water is included in the accounting for Illinois' diversion under the U.S. Supreme Court Decree. Lake Michigan water levels have a significant impact on the amount of water diverted for the operation of the navigation locks.

H. Project Activity – Status of Water Demand Forecasts and Water Use

In 2008, the Department completed a comprehensive water reallocation for all our water supply permittees. As part of this reallocation, water demand forecasts for each year, out to the year 2030, were developed and ultimately included in the Department's updated Lake Michigan water reallocations. A primary reason for this long timeframe is to ensure that the Department's water allocation program is sustainable over the foreseeable future and will continue to keep Illinois' total diversion below the authorized U.S. Supreme Court Decree limit of 3200 cfs. The Department will begin a new comprehensive water allocation review in mid-2019. This re-allocation will extend allocations out to at least the year 2050.

Over the last 5 years, the Department has issued a total of four new water allocations.

Water use summaries for the 2010 through 2017 Water Years are on our website: <http://www.dnr.illinois.gov/WaterResources/Pages/LakeMichiganWaterAllocation.aspx>. This information was obtained from the Annual Water Use Audit Reports (LMO-2). In Water Year 2017 total domestic Lake Michigan water use was 790 million gallons per day (mgd).



This table clearly shows the long-term decline in total domestic use of Lake Michigan water. While the drought years of 1994, 2005 and 2012 are clearly visible, this downward trend in water use that has occurred over the last 20 years is significant, a 330 mgd reduction since 1992. In 2017 the annual precipitation was 34.03 inches, 3.53 inches below 2016's 37.56 inches.

I. Project Activity - Water Infrastructure

In WY 2017, the City of Chicago continued to pursue several initiatives to upgrade their water, wastewater and stormwater infrastructure. In 2016 the City of Chicago reported the installation of approximately 15,000 new water meters and proposes to replace an additional 15,000 meters in 2018. Since the inception of Chicago's Volunteer Metering Program in 2009 the City has installed over 118,000 new water meters. This is a great accomplishment and shows Chicago's commitment to conserving Lake Michigan water. In the last 10 years Chicago has terminated 24,749 unused water services (1,892 in 2017) and replaced 647 miles of old water main (90 miles in 2017).

Several other Lake Michigan communities have also developed or are working on conservation/sustainability initiatives. The northeastern Illinois region has several organizations who work with local government to help them become more sustainable. These initiatives are also moving outside the Lake Michigan water service region.

Conclusion

Illinois has had a Lake Michigan water conservation and efficiency program for over 30 years. Our program is consistent with and fully supports the Great Lakes-St. Lawrence River Basin Water Conservation and Efficiency Objectives. The unique nature of Illinois' Lake Michigan water use, and diversion as allowed under a U.S. Supreme Court Decree has resulted in a water conservation and efficiency program that is implemented primarily as a regulatory program, with additional measures, such as conservation pricing, conservation education and information sharing, implemented through a non-regulatory effort.