Chicago Area Waterways System Water Quality in 2031

April 2024 by Richard Lanyon

One reason Lake Michigan is a sustainable source of good quality municipal drinking water is Illinois's diversion of lake water to the Mississippi River Basin. There is no discharge of treated wastewater effluent from Illinois into the lake. The 3,200 cubic feet per second (CFS) of water diverted is authorized by US Supreme Court Decree on a 40-year running average and is based on the needs of navigation to maintain the Illinois Waterway, a federal navigation project. In more familiar terms, 3,200 CFS is equivalent to 2.1 billion gallons per day

Diversion is categorized in three ways: Domestic and industrial water supply; precipitation runoff from the 673-square-mile diverted watershed that formerly was tributary to Lake Michigan; and discretionary diversion. The first two categories comprise the major quantity of diversion and the third is small, about 10 percent or less. Although small, part of the discretionary diversion is vital to maintain compliance with water quality standards in the Chicago Area Waterway System (CAWS).

The Illinois Office of Water Resources (IOWR) allocates diversion used for domestic and industrial water supply, and the discretionary diversion used by the Metropolitan Water Reclamation District for maintenance of water quality in the CAWS. The twenty-first century began with a MWRD water allocation of 270 CFS. The allocation was scheduled to be reduced to 101 CFS in 2015 based on the expectation that the McCook and Thornton Reservoirs, which are used to control combined sewer overflow (CSO), would be completed and in operation by the end of 2014.

MWRD uses its discretionary diversion during the warm weather months, diverting lake water into the Chicago River, Little Calumet River, and North Shore Channel at controlled rates to supply dissolved oxygen (DO) in the lake water to maintain compliance with Illinois water quality standards for DO. During cold weather months, the lower ambient water temperatures in the CAWS allows compliance with the DO standard to be maintained.

In 2014, MWRD petitioned the IOWR for an extension in time of the 270 CFS allocation because reservoir completion was delayed. Following a prolonged proceeding, the IOWR issued a modified allocation in 2016 extending the 270 CFS allocation through 2017, allocating 220 CFS in 2018 through 2030, and allocating 101 CFS thereafter. The Thornton Reservoir was placed in service in 2015, the first stage of the McCook Reservoir was placed in service in 2018, and the second stage is expected to be in service by the end of 2029.

During the proceeding, the MWRD water quality expert witness testified that based on water quality modeling of the CAWS, a DO compliance rate of 95.8 percent could be expected. However, an allocation of 101 CFS would result in a DO compliance rate of 66.8 percent. The Illinois Environmental Protection Agency also testified that they had reviewed and accepted the modeling results, and that a 95 percent rate of compliance was acceptable.

Will water quality degrade in the CAWS in 2031? Probably not in the Little Calumet River and Calumet-Sag Channel reaches because of the five Sidestream Elevated Pool Aeration (SEPA)

Stations along these two reaches, but this needs to be verified by water quality modeling. Probably not in the Chicago River neither because during warm weather months commercial and recreational boating causes frequent operation of the Chicago River Lock, bringing in copious amounts of lake water, and frequent boat traffic aerates the river. However, the North Shore Channel, North Branch, South Branch, and Sanitary & Ship Canal will certainly be stressed and fall significantly below the IEPA-acceptable 95 percent compliance level.

Can this future disappointment be averted? Yes it can, but the window of opportunity is closing and it is clearly the MWRD's responsibility. If the MWRD does not act expeditiously, it will certainly be subjected to enforcement action by the IEPA. Lacking enforcement action, a citizen suit can be filed. Either of these actions would be embarrassing to the MWRD and a betrayal of public trust to care for the environment.

Two MWRD Instream Aeration Stations, one on the North Shore Channel at Devon Avenue and the other on the North Branch at Webster Avenue may need to be upgraded to help supply needed additional DO. Additional water quality modeling must be performed to determine where else and how much additional DO is needed to maintain at least 95 percent compliance throughout the CAWS.

The two instream aeration stations have been in service for 50 years and it may be appropriate to revisit the use of the submerged diffuser technology employed at these two stations. The reduction in buoyancy in the zone of the rising bubble curtain is a hazard to recreational paddle-craft and smaller motorboats. At the Devon Avenue location, the vertical rusted steel sheet-pile walls are a visual distraction when compared with the adjoining vegetated sloping channel banks.

SEPA technology can be employed on the remainder of the canal system, but limited availability of land may not allow use of large ponds. SEPA Station 2 on the Little Calumet River along 127th Street between State Street and Wentworth Avenue is a good example of the supplemental aeration technology that could be employed on the remainder of the canal system. With a footprint roughly 250-feet by 100-feet, a small SEPA station could be sited at several locations along the CAWS, possibly in conjunction with a public space, where the cascades would offer an attractive and interesting amenity.

If any capital improvements are needed to provide supplementary aeration, like SEPA stations, it will take at least three years for design and acquisition of land rights followed by three years of construction. Adding six years to 2024 puts the MWRD at the threshold of water quality noncompliance. However, at this writing there appears little or no interest at MWRD in moving forward.