
Water Management and Diversion Accounting Activities

2015 Annual Report

(October 2014 – September 2015)



**Hydrology and Hydraulics Section
Design Branch
Technical Services Division
Chicago District
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of Engineers** ®

2015 ANNUAL REPORT
WATER MANAGEMENT AND DIVERSION ACCOUNTING ACTIVITIES
(OCTOBER 2014 – SEPTEMBER 2015)
GREAT LAKES AND OHIO RIVER DIVISION
CHICAGO DISTRICT

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Chapter 1 – Introduction

Each year the Districts within LRD generate an annual report that provides pertinent information about the operation and activities of their reservoirs and similar projects within their boundaries for the reporting period, October 1 of the previous year through September 30 of the current year. This period is consistent with the USGS water year (WY) period. Although the Chicago District does not have any reservoirs within its boundaries, it is responsible for the Lake Michigan Diversion Accounting program. Accordingly, the Chicago District's annual report will reflect the implementation and activities of this program; the format for the report will deviate from that which is typically seen from the other Districts.

The Water Year (WY) 2015 Annual Report on Lake Michigan Diversion Accounting presents activities by the Corps of Engineers in accounting for the diversion from Lake Michigan by the State of Illinois. The accounting of the diversion is performed according to the guidelines established in the 1980 modified Supreme Court Decree concerning the diversion.

Presented in this report is the history of the diversion and its accounting, a description of the sources of the diversion, a description of the accounting procedures, and a summary of all significant activities that occurred during WY 2015.

Under the provisions of the U.S. Supreme Court Decree in the *Wisconsin, et al v. Illinois et al*, 388 U.S. 426, 87 S Ct. 1774 (1967) as modified 449 U.S. 48, 101 S. CT. 557 (1980), the Corps of Engineers monitors the measurement and computation of Lake Michigan diversion by the State of Illinois. The terms of the modified decree require the Corps of Engineers to prepare an annual report on the accounting of the Lake Michigan water diverted by the State of Illinois and actions taken by the involved agencies.

Chapter 2 – History of the Diversion

Water was first diverted from Lake Michigan at Chicago into the Mississippi River Basin with the completion of the Illinois and Michigan (I&M) Canal in 1848. The I&M Canal was primarily for transportation and diverted up to 500 cubic feet per second (cfs).

Development of the Chicago sewer system led to severe sanitation problems in the Chicago River by the mid to late 1800's. The newly constructed sewers moved water and wastes into the Chicago River, which until 1900 drained to Lake Michigan. The water quality of Lake Michigan deteriorated and contaminated the city's primary water supply.

As a solution to the sanitation and flooding problems, the Chicago Sanitary and Ship Canal (CSSC) was built. The construction reversed the flow direction of the Chicago River, as shown in Figure 2-1. The CSSC was completed in 1900 by the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC, formerly the Metropolitan Sanitary District of Greater Chicago, MSDGC). The CSSC followed the course of the older I&M Canal. This canal is much longer than the I&M Canal and can handle the Chicago River flow in addition to increased shipping. The Chicago River Controlling Works (CRCW) were constructed at the mouth of the Chicago River in the 1930s. The lock and sluice gates regulates the amount of Lake Michigan water allowed to pass into the river and restricts river flooding from entering Lake Michigan. The Lockport Lock and Dam controls the water level in the CSSC.

Between 1907 and 1910, the MWRDGC constructed a second canal called the North Shore Channel. It extended from Lake Michigan at Wilmette in a southerly direction 6.14 miles to the north branch of the Chicago River. The Wilmette Pumping Station, also known as the Wilmette Controlling Works, regulates the amount of Lake Michigan flow allowed down the channel through the use of one vertical lift gate, one 250 cfs pump (refurbished in 2002), and one 150 cfs pump (installed in 2010 during the rehabilitation of the structure). The MWRDGC uses the pumps to take discretionary flow from Lake Michigan due to the concern over Asian carp.

Construction of a third canal, the Calumet Sag Channel, was completed in 1922. The canal connects Lake Michigan through the Grand Calumet River to the CSSC. The Calumet Sag Channel was constructed to carry sewage from South Chicago, Illinois and East Chicago, Indiana. The Blue Island Lock and Dam controlled flow through the canal. The O'Brien Lock and Dam, which replaced the Blue Island Lock and Dam, was completed in 1967 and is located on the Calumet River. The O'Brien Lock and Dam regulates the flow of Lake Michigan waters down the Calumet Sag Channel.

Figure 2-1 shows the affected watershed. Figure 2-2 shows the location of the lakefront structures relative to the boundary of the diverted portion of the Lake Michigan watershed.

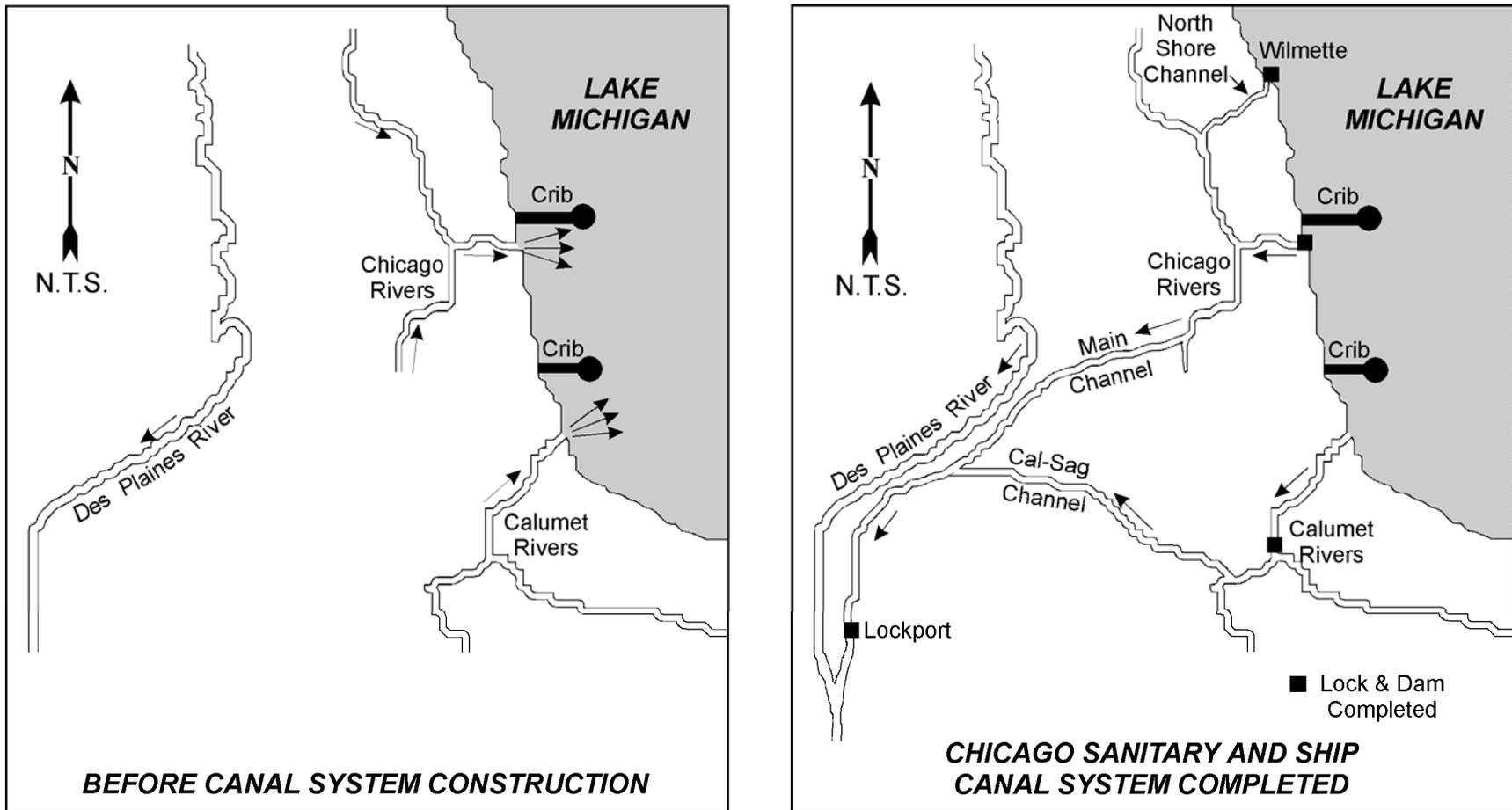


FIGURE 2-1 DEVELOPMENT OF THE CHICAGO SANITARY AND SHIP CANAL SYSTEM

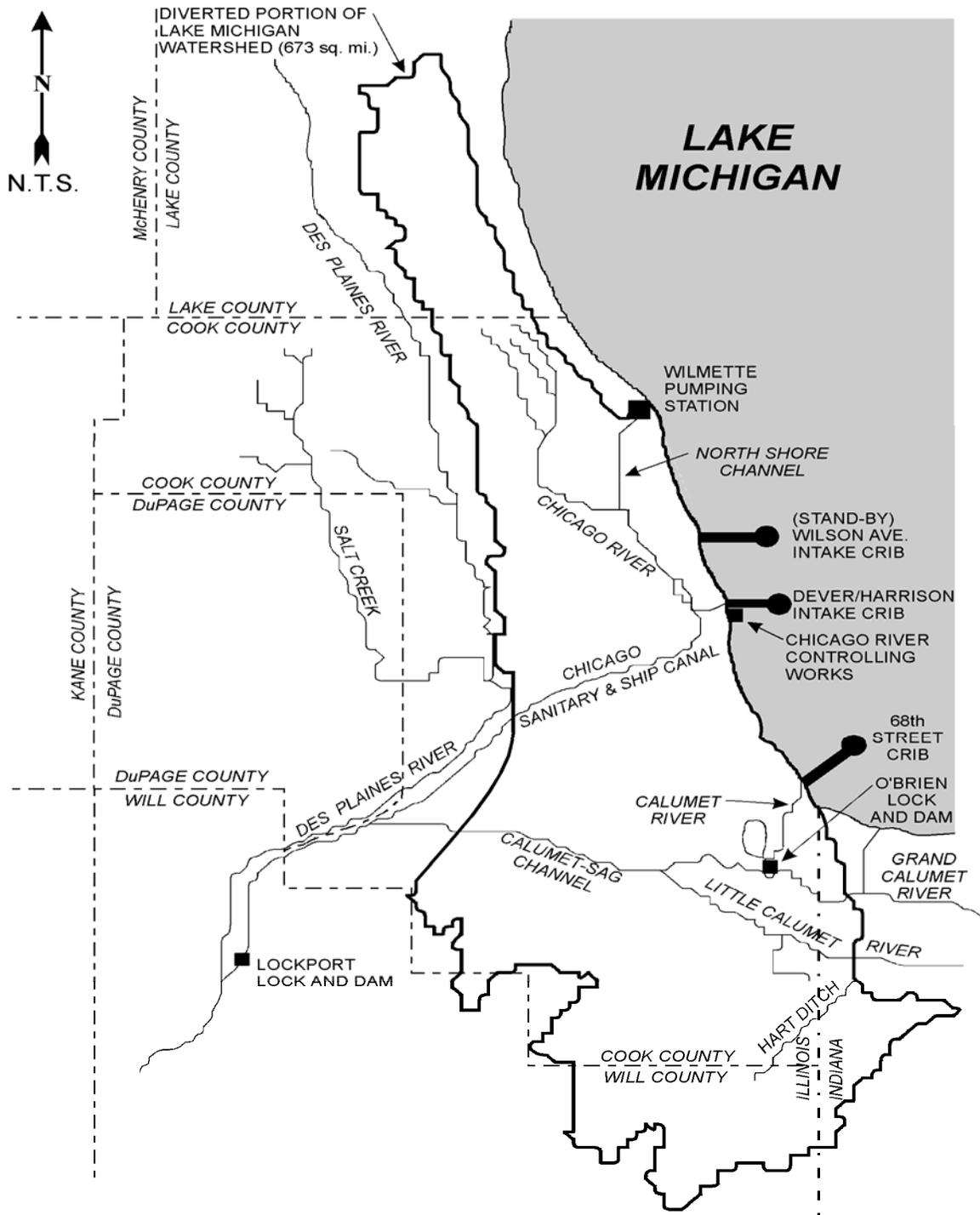


FIGURE 2-2 LOCATION PLAN - LAKE MICHIGAN DIVERSION AT CHICAGO

Chapter 3 – Significant Hydrologic Events

During WY 2015, an average total of 32.30 inches of precipitation fell at the 25 Illinois State Water Survey (ISWS) raingages that make up the Lake Michigan Diversion Accounting raingage network (Westcott, 2015). The WY 2015 average total precipitation of 32.30 inches was about 88 percent of the 25-year (1990-2014) average of 36.83 inches for the 25 raingage network. Table 3-1 tabulates the recorded monthly rainfall data during WY 2015, and the deviation from the ISWS 25-year annual and monthly average precipitation.

Table 3-1 WY 2015 Monthly and Annual Precipitation (inches)
Illinois State Water Survey Average Across the 25 Raingage Network

Month	2015	1990 - 2014	Deviation	Average
	Precipitation	Precipitation		
Oct-14	3.54	3.12	0.42	114%
Nov-14	1.50	2.67	-1.17	56%
Dec-14	0.85	2.07	-1.22	41%
Jan-15	1.40	2.11	-0.71	66%
Feb-15	1.49	1.91	-0.42	78%
Mar-15	0.76	2.37	-1.61	32%
Apr-15	3.07	3.65	-0.58	84%
May-15	3.73	4.03	-0.30	93%
Jun-15	6.26	3.98	2.28	157%
Jul-15	2.18	3.65	-1.47	60%
Aug-15	3.19	4.27	-1.07	75%
Sep-15	4.33	3.01	1.31	143%
Annual	32.30	36.83	-4.54	88%

There were 98 precipitation events in Water Year 2015. Of the 98 precipitation events, eight included at least one site at which the storm total exceeded one-year recurrence.

During WY 2015, one backflow event occurred, as described in Table 3-2.

Table 3-2 WY 2015 Backflows to Lake Michigan through Lakefront Structures

Date	O'Brien		CRCW		Wilmette P.S.		Total Backflow	
	(MG)	(cfs)	(MG)	(cfs)	(MG)	(cfs)	(MG)	(cfs)
6/15/2015	0.0	0.0	997.5	1543.4	167.2	258.7	1164.7	1802.1

Chapter 4 – Status of Accounting Reports

Lake Michigan diversion flow data is summarized in accounting reports prepared on an annual basis as flows are certified. Since implementation of the modified Supreme Court Decree of 1 December 1980 and before this report, the Corps of Engineers has certified diversion flows for WY 1981 through WY 2013. The computations for WY 2014 and WY 2015 are currently underway, although are currently delayed pending the receipt of additional observational data from the State of Illinois. An anticipated time of completion is not available as of the time of publication of this report.

The running average diversion for the period WY 1981 through WY 2013 is 3,095 cfs, 105 cfs less than the 3,200 cfs 40 year average diversion specified by the modified decree. Also, the annual average diversion has exceeded the 3,680 cfs annual limit three times, once more than the maximum number of times allowed in the decree. Additionally, the absolute annual maximum of 3,840 cfs has been exceeded during the WY93 accounting period. The cumulative deviation, the sum of the differences between the annual average flows and 3,200 cfs, is 3,474 cfs-years at the end of WY 2013. The positive cumulative deviation indicates a cumulative flow surplus. The decree specifies a maximum allowable deficit of -2,000 cfs-years over the first 39 years of the 40-year averaging period.

Data collection and compilation for the WY 2014 and WY 2015 accounting report were done by the Corps. Hydrologic and hydraulic modeling and diversion accounting for WY 2014 and WY 2015 were also performed by the Corps. Data collection and compilation for this report began in Fiscal Year (FY) 2014.

Chapter 5 – Data Collection Program

a. Cooperative Streamgaging Program

Based on project needs, the existing streamgaging network was maintained through FY 2015.

Chapter 6 – Activities for FY 2015

a. LMDA Data Collection & Computations

During FY 2015, the processing of the data collected for WY 2012 and 2013 continued through December 2014. Upon completion, the diversion accounting computations for WY 2012 and 2013 began. Although sufficient data was available to begin the computations for WY 2013, further progress was eventually hindered while awaiting responses from several local municipalities. The decision was made to split the publication of the two water years, moving forward with the WY 2012 accounting and publication. The final column computations for WY 2012 were completed in May 2015, while the review of the WY 2012 report was completed in September 2015. The final column computations for WY 2013 were completed in September 2015.

b. Supporting Studies

The USGS published the report “Analysis of Regional Rainfall-Runoff Parameters for the Lake Michigan Diversion Hydrological Modeling”. This report provides a summary of the analysis undertaken by USGS and Chicago District, U.S. Army Corps of Engineers to assess the predictive accuracies of selected parameter sets. Recalibration of the parameters based on updated inputs was completed on two representative watersheds models.

c. Technical Review Committee

No activities relating to the Technical Review Committee occurred during FY 2015.

d. Water Control Manual

The ATR for the Chicago Harbor Lock’s water control manual was completed in February 2015.