



# ASIAN CARP AND SEPARATION OF THE WATERSHEDS

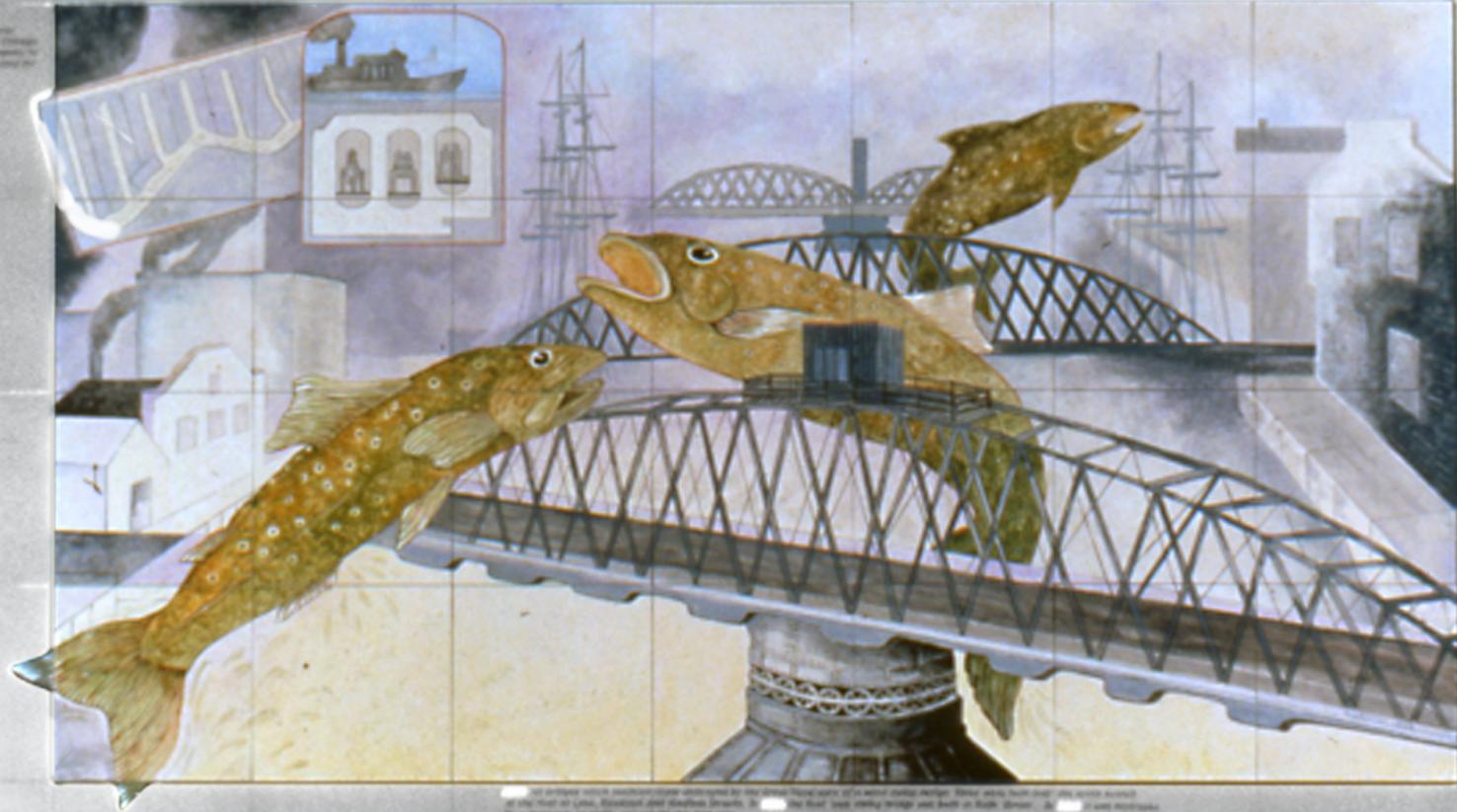
MWRD M&R SEMINAR  
JANUARY 27, 2012

Dick Lanyon thanks the MWRD for the use of many of these slides.  
Opinions expressed by Dick are not necessarily those of the MWRD.

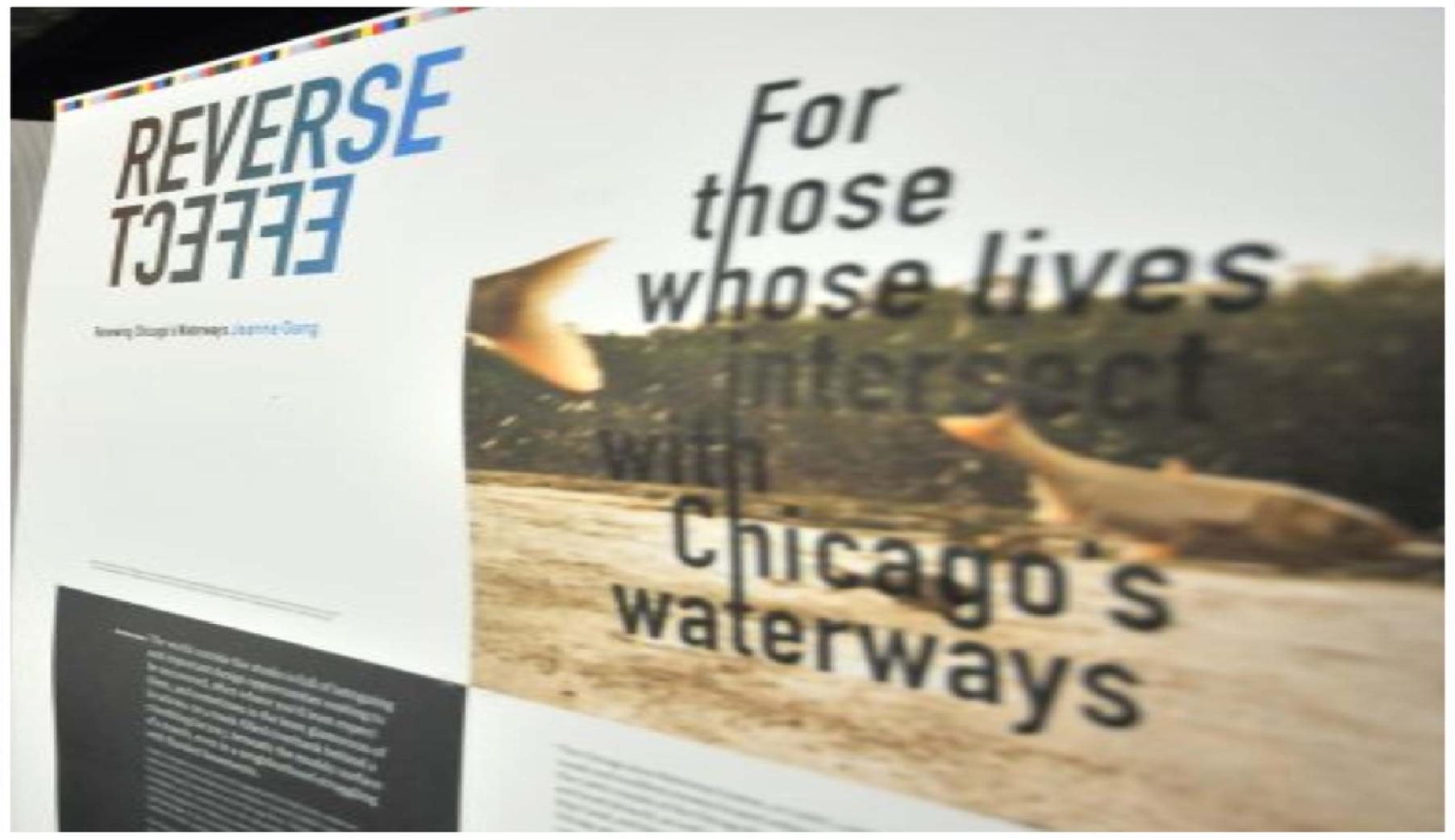


1889 - The first water treatment plant in Chicago was built at the intersection of Lake Street and Madison Street.

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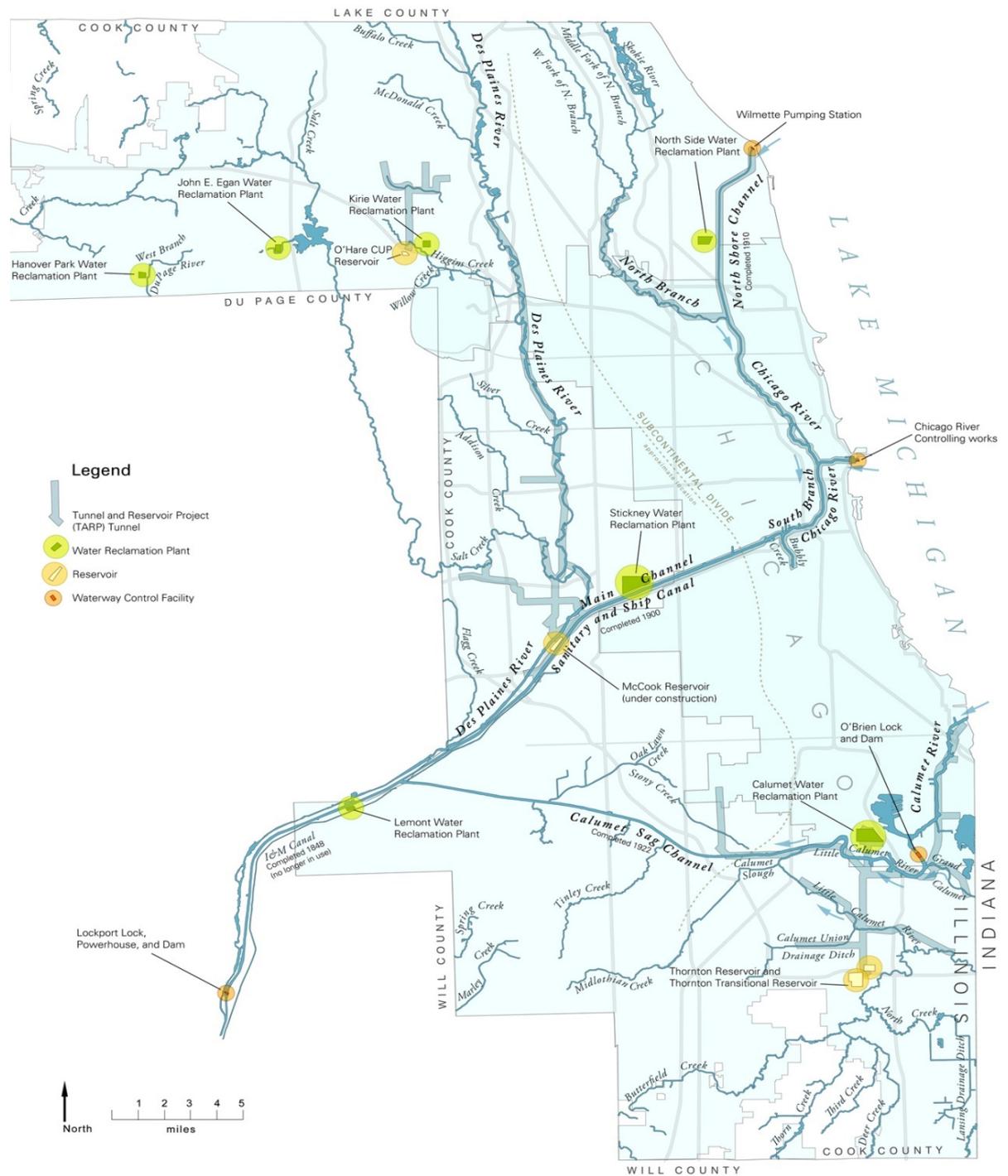
*Now that he had conquered the Chicago River, Carl set his sights higher up the food chain.*



# ILLINOIS WATERWAY

Pool	Length in river miles	Distance from Grafton
<u>Lock 26</u>	80	80
<u>LaGrange</u>	77	157
<u>Peoria</u>	74	231
Starved Rock	14	245
Marseilles	26	271
Dresden Island	15	286
<u>Brandon Road</u>	5	291
<u>Lockport</u>	35	326

# CHICAGO AREA WATERWAYS (CAWS)





# CAWS+ eDNA DATA

[www.asiancarp.org](http://www.asiancarp.org)

Period	Total Samples	Positive	Percent
8/09 – 6/10 NDU	2232	60	2.6
6/10 – 8/11 COE	1268	17	1.3



# 2011 CAWS eDNA DATA

May 10 through October 18

## Upstream of Barrier

- Total samples collected 1,864
- Test positive for Bighead carp 0
- Test positive for Silver carp 7+11

## Downstream of Barrier

- Test positive for either species 0

[www.lrc.usace.mil/asiancarp/eDNAresultsmap.pdf](http://www.lrc.usace.mil/asiancarp/eDNAresultsmap.pdf)



# CAWS ASIAN CARP (AC) MONITORING

- Two events in December 2009 and May 2010 using Rotenone to determine presence of AC. One dead AC found downstream of electrical barrier near Lockport. No analysis of specimen performed. Thousands of fish sacrificed.
- Routine monitoring involves electro-shocking and/or use of nets to find AC on a predetermined schedule or when a positive eDNA test is reported. One AC was found lakeward of the O'Brien Lock in Lake Calumet in June 2010. Analysis indicated it was a six-year old specimen that probably lived its entire life in Lake Calumet.



# 2011 ASIAN CARP MONITORING

13 weekly periods April through November

- CAWS upstream of barrier – none found
- CAWS downstream of barrier – none found
- Brandon Road Pool – one Bighead observed, not caught
- Dresden Island Pool and downstream pools - frequently found in big numbers
- Marseilles Pool – greatest abundance found
- Des Plaines River – none found



to Arctic Ocean

Hudson Bay

PACIFIC OCEAN

ATLANTIC OCEAN

Gulf of Mexico



# WATERSHED COMPARISONS

	Great Lakes	Mississippi River
Watershed area, sq. mi.	300,000	1,200,000
Outflow, BGD	170	385
Length of main rivers	Small	Large
Volume of natural lake storage	Large	Small



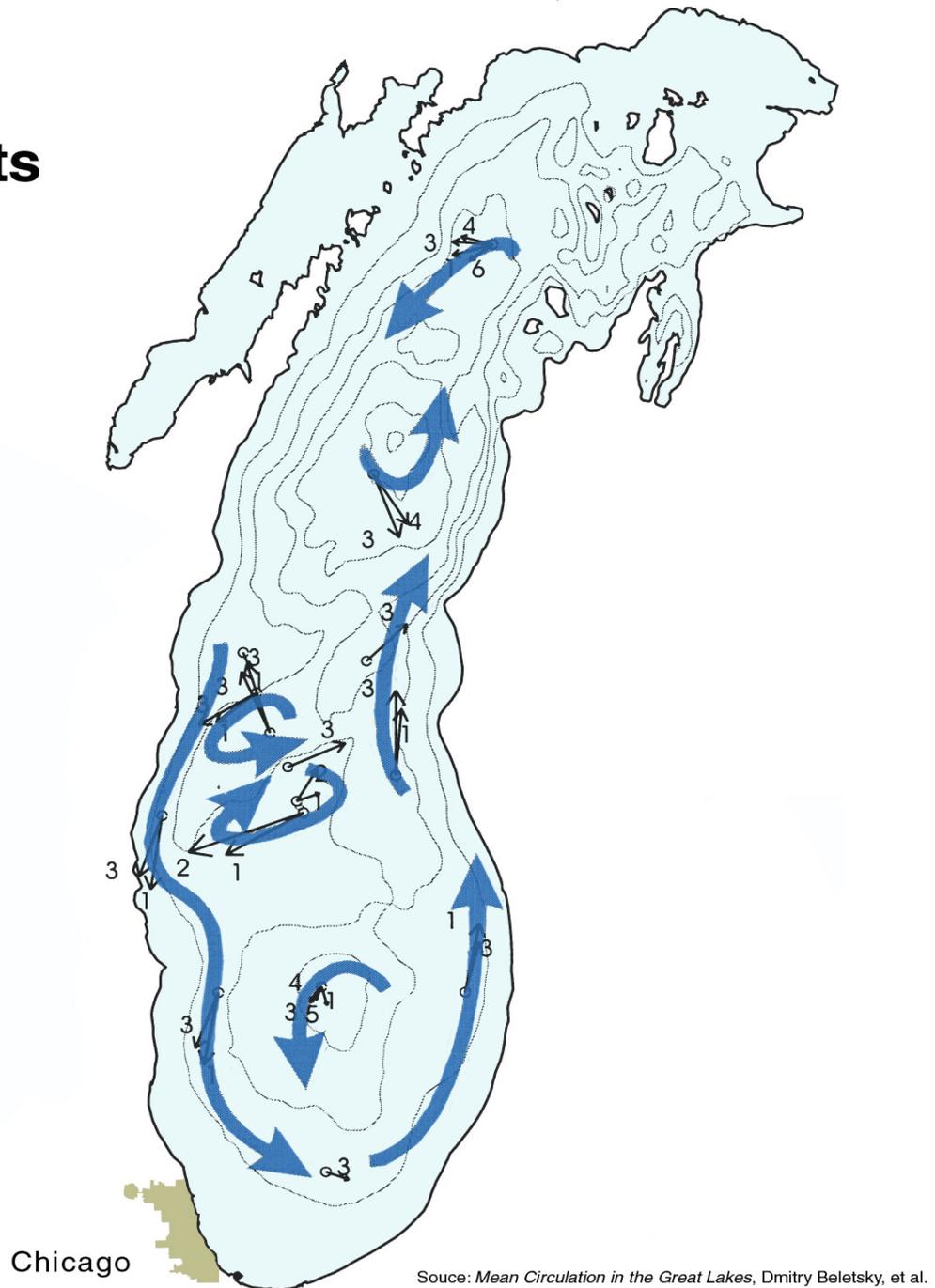
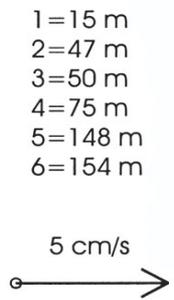
# LAKE RESIDENCE TIME

Lake	Years
Ontario	6
Erie	3
Huron	22
Michigan	99
Superior	191

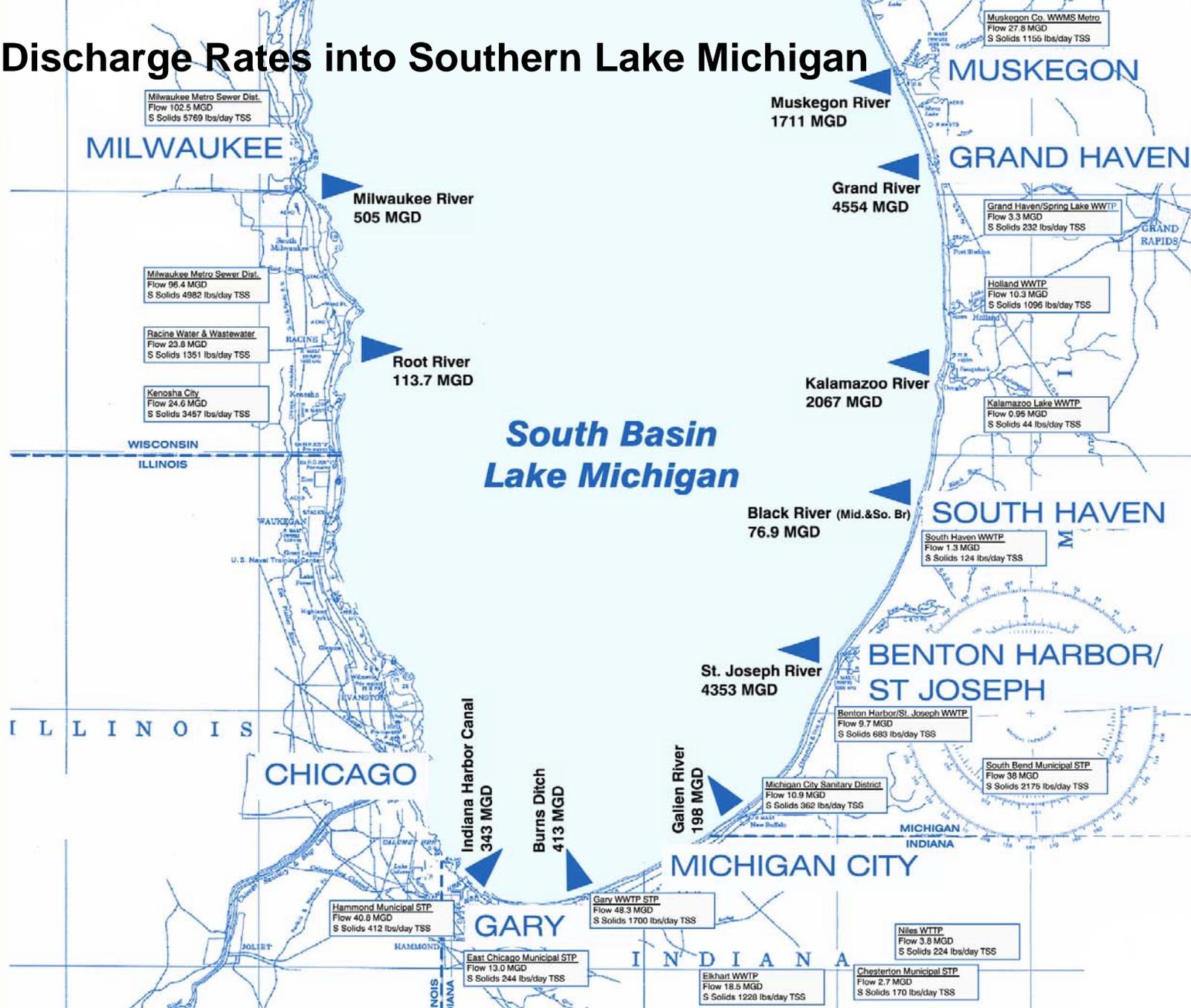
# Lake Michigan

## Averaged Annual Currents

1982-83



# Discharge Rates into Southern Lake Michigan





## DISCHARGE IN/OUT OF SOUTHERN LAKE MICHIGAN (mgd)

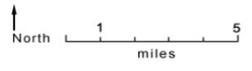
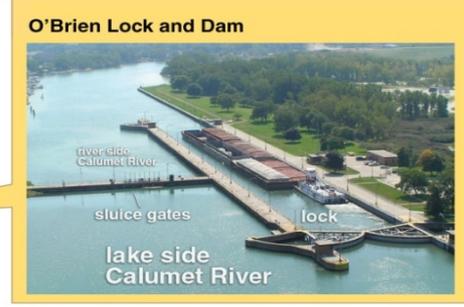
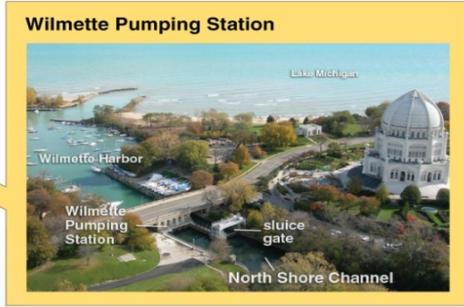
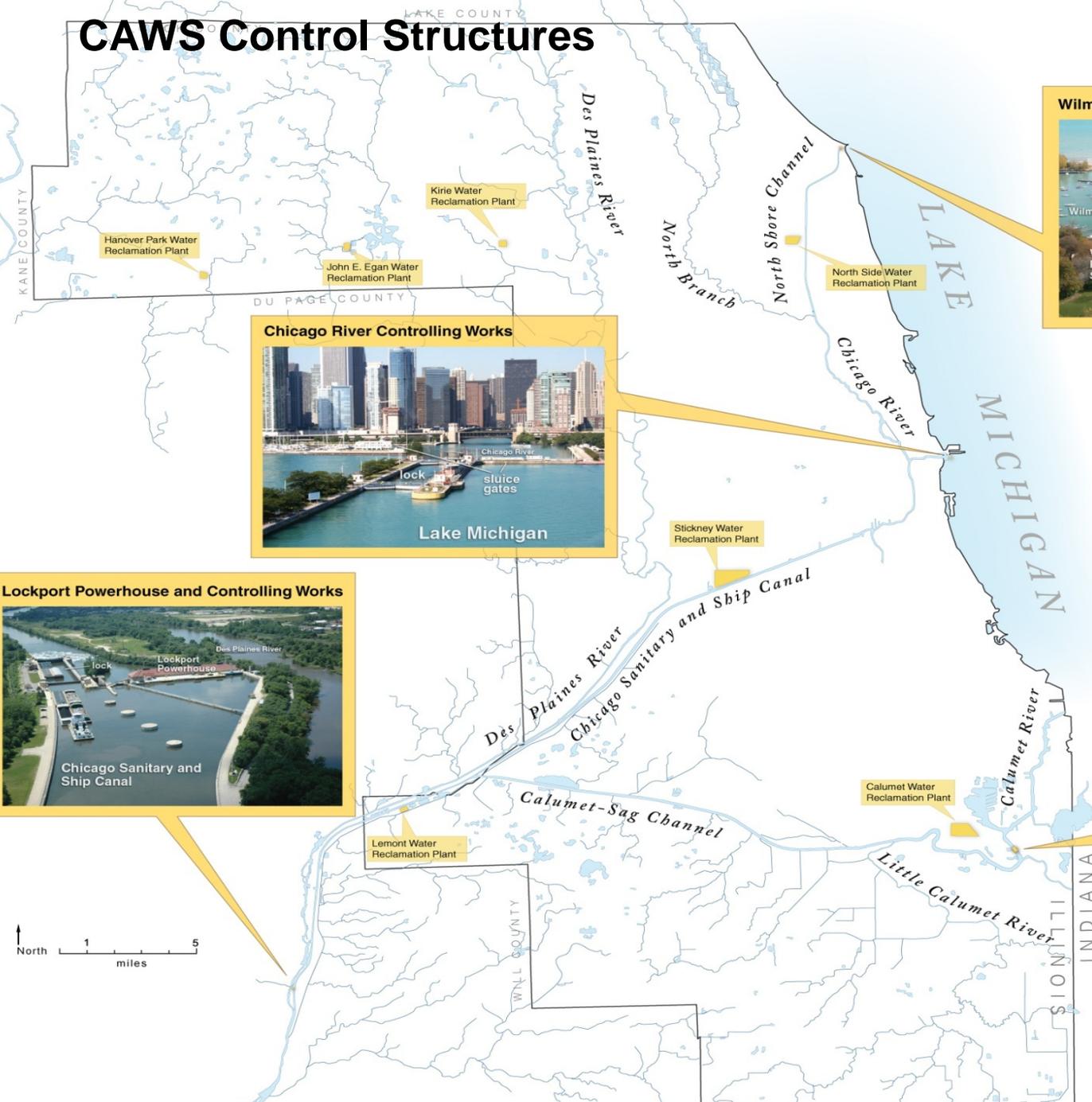
Area/State	Total Flow In	Treated Wastewater Flow In
SE/WI	620	247
NW/IN	760	121
SW/MI	13,000	148
Total	14,400	516
	Allowed Diversion	Net Extraction
NE/IL	2,080	1,560



## **70 ILCS 2605/7aa**

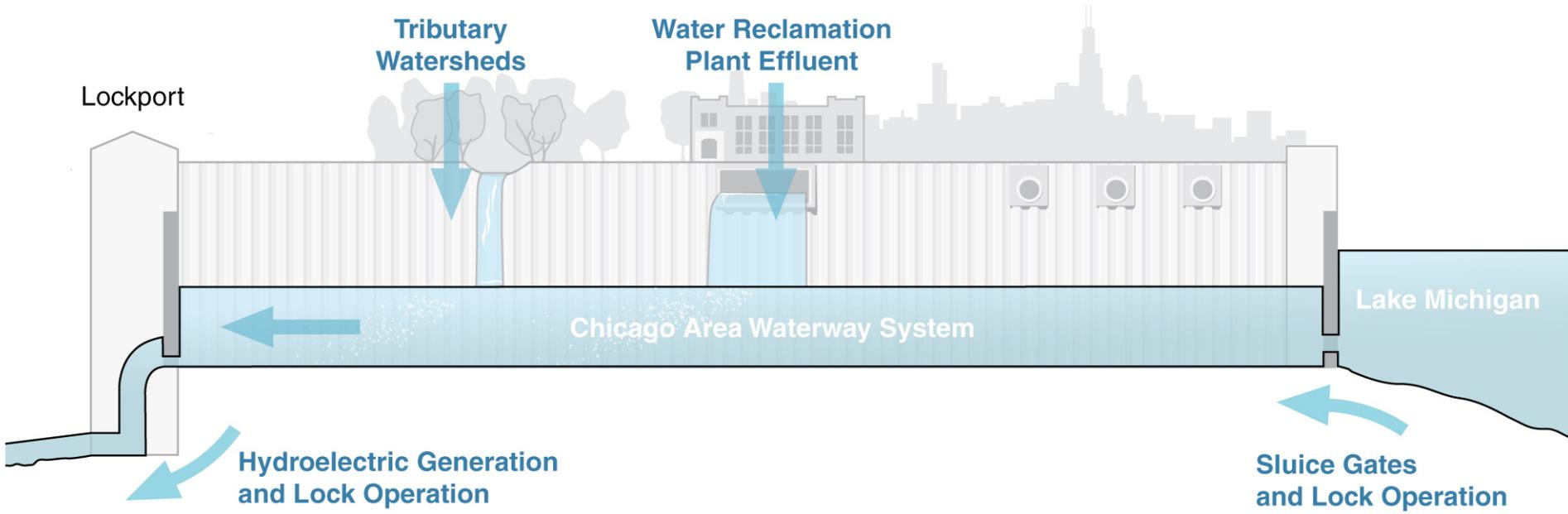
**“THE SANITARY DISTRICT HAS THE POWER AND AUTHORITY TO PREVENT THE POLLUTION OF ANY WATERS FROM WHICH A WATER SUPPLY MAY BE OBTAINED BY ANY CITY, TOWN OR VILLAGE WITHIN THE DISTRICT.” 1889**

# CAWS Control Structures



# Chicago Area Waterway System

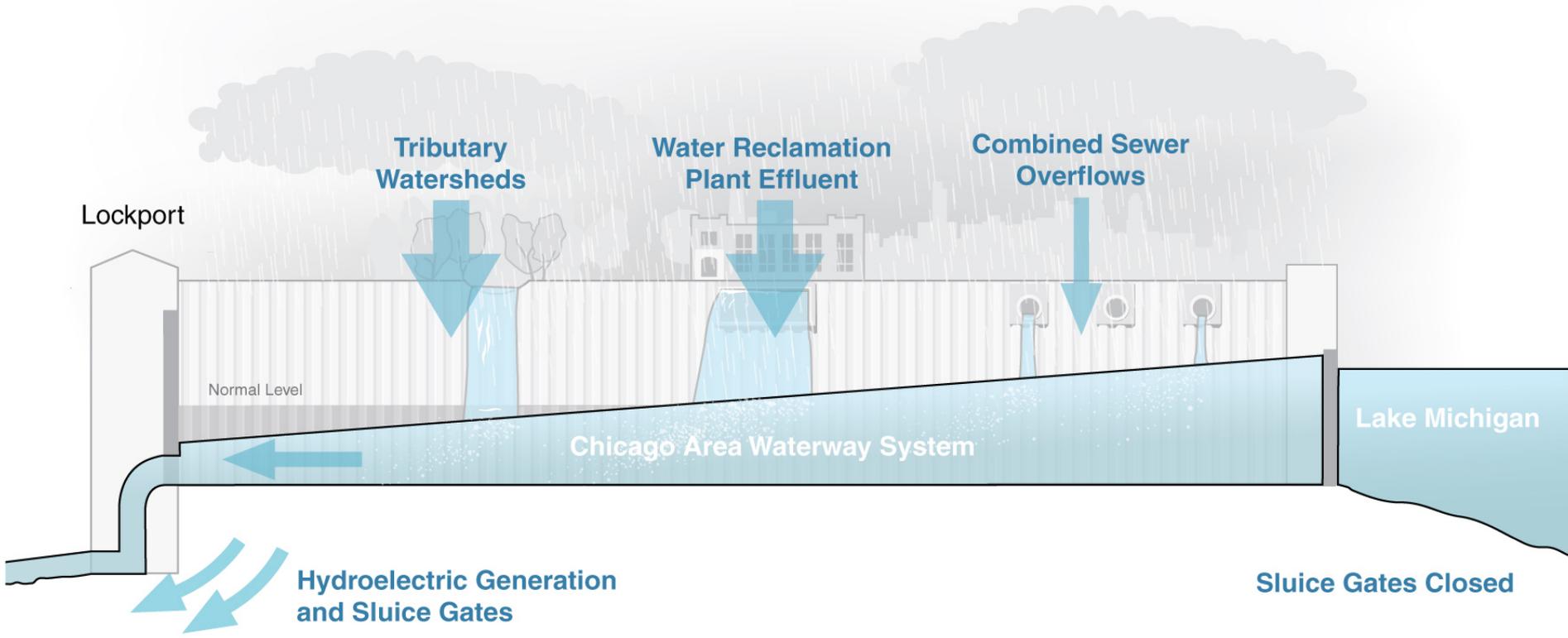
## Normal Condition



*diagram not to scale*

# Chicago Area Waterway System

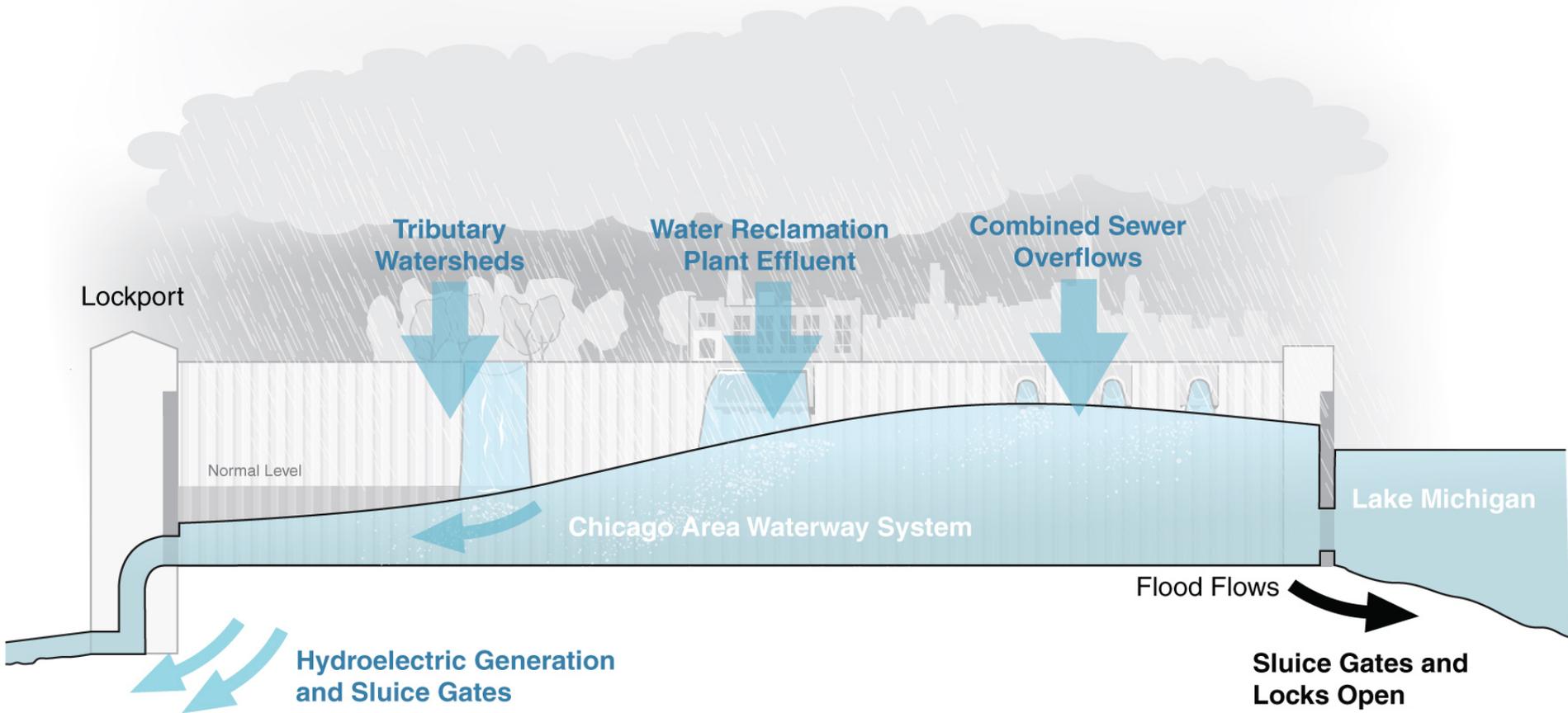
## Moderate Storm Condition



*diagram not to scale*

# Chicago Area Waterway System

## Severe Storm Condition



*diagram not to scale*



# FLOODWATER DISCHARGE TO LAKE 2001 - 2011

Location	Frequency		Average Volume per Event (MG)	
	All Events	Exclude 9/08	All Events	Exclude 9/08
Chicago	5/11	4/11	3,024	2,420
O'Brien	1/11	0/11	2,670	0
Wilmette	13/11	12/11	469	262

- Most events occur in July or August, 6 of 13
- Number of events variable from year to year, 0 to 3
- Total volume discharged = 23.9 billion gallons
- Equivalent to 18.4 days discharge from three large plants
- Floodwater contains, but is not sewage



# FLOODWATER LOADING TO LAKE MICHIGAN

## Typical concentration in floodwater discharged to the lake

Parameter	Units	Range
BOD	mg/L	5 to 20
SS	mg/L	50 to 200
VSS	mg/L	20 to 45
Fecal Coliform	cts/100ml	30,000 to 200,000

## Floodwater loading discharged to Lake Michigan 2001 - 2010

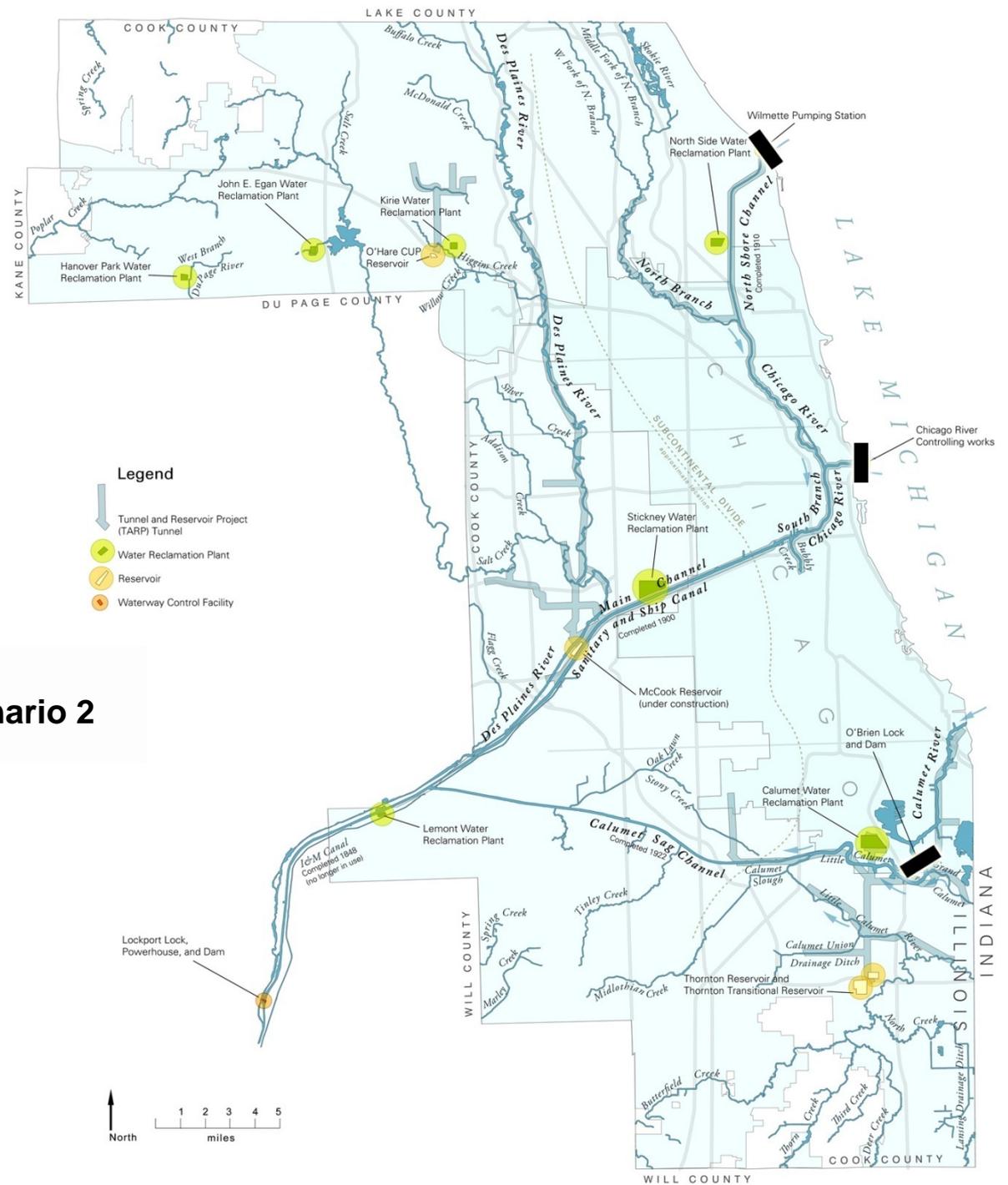
Parameter	Loading in pounds	Equivalent Total Plant Flow
BOD	2,000,000	3.6 days or 1 percent
SS	21,000,000	42 days or 12 percent



## FLOOD AND POLLUTION CONTROL BENEFITS OF CAWS

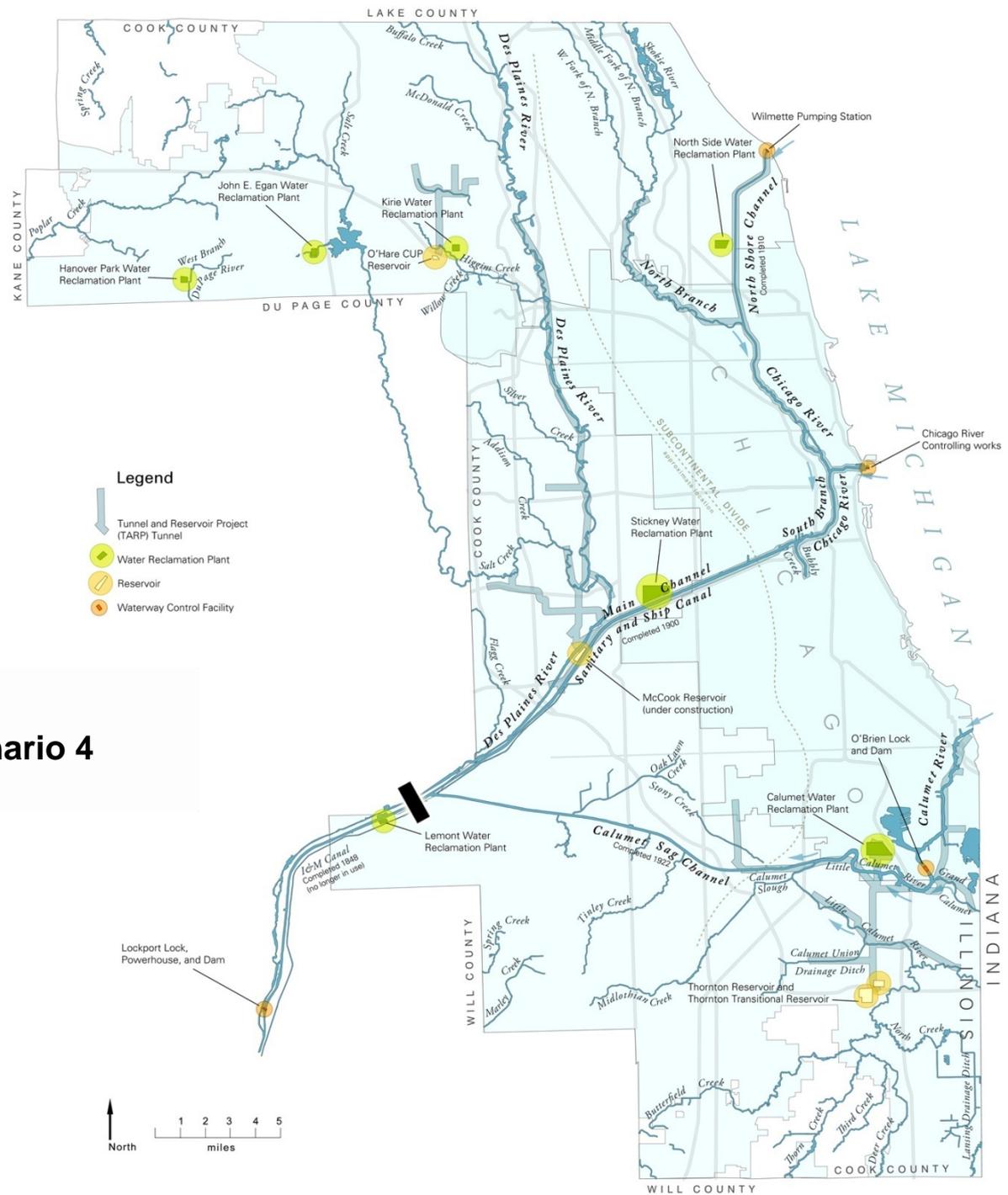
- Hydraulically isolated from Lake Michigan
- Water level kept below lake level
- Temporarily stores 2.4 BG of floodwater
- Reduces pollutant load to lake
- Floodwater released to lake only to protect public health and reduce flood damages





## Watershed Separation Barriers; Scenario 2





- Legend**
-  Tunnel and Reservoir Project (TARP) Tunnel
  -  Water Reclamation Plant
  -  Reservoir
  -  Waterway Control Facility



## Watershed Separation Barriers; Scenario 4

# GLC/GLSLCI

## Envisioning A Chicago Area Waterway System For The 21<sup>st</sup> Century

### Potential Barrier Locations

October 19, 2011





## WATER RECLAMATION PLANT POLLUTANT LOADINGS

Plant	Parameter	Annual Load in Pounds
Calumet	BOD	3,600,000
	SS	4,300,000
North Side	BOD	3,400,000
	SS	3,400,000
Stickney	BOD	14,600,000
	SS	10,500,000



# BIOACCUMULATIVE CHEMICALS OF CONCERN

(BCCs) for the Lake Michigan Basin, as designated by the IEPA

BCCs with  
existing standards  
for the Lake  
Michigan Basin

Chlordane

Mercury

DDD (Dichlorodipenyldichloroethane)

DDE (dichlorodipenyldichloroethylene)

DDT (dichlorodipenyltrichloroethane)

Dieldrin

Hexachlorobenzene

PCBs (polychlorinated biphenyls)

Toxaphene

Dioxin

Lindane (gamma- Hexachlorocyclohexane)

Hexachlorobutadiene

Hexachlorocyclohexanes

alpha- Hexachlorocyclohexane

beta- Hexachlorocyclohexane

delta- Hexachlorocyclohexane

Lindane (gamma- Hexachlorocyclohexane)

Mirex

Octachlorostyrene

PCBs (polychlorinated biphenyls)

Pentachlorobenzene

Photomirex

1,2,3,4-Tetrachlorobenzene

1,2,4,5-Tetrachlorobenzene

Toxaphene

**This list is not all inclusive and will likely grow over time.** Regulations state that any chemical that is found by a specified methodology to accumulate in aquatic organisms by a human health bioaccumulation factor greater than 1000 could also be a BCC.



# BIOMONITORING COST

Discharging to the Great Lakes may include a special condition NPDES permit biomonitoring requirement for acute (48-96 hour) and chronic (7 day) testing at Stickney, North Side, and Calumet WRPs

Assuming quarterly acute and chronic biomonitoring tests at the three WRPs, and including a required concurrent quality control reference toxicity test for each test performed.

## 48 Additional Biomonitoring Tests/year

24 chronic tests x 7 days = 168 days x 8 hours = 1,344 hours

24 acute tests x 3-4 days = 96 days x 8 hours = 768 hours

**Estimated Total Annual Cost: \$300,000**

The current staffing levels are not adequate to handle the increased workload of performing these tests.

The estimated annual cost includes a Lab Tech III level staff member.



## **COST OF TREATING BIOACCUMULATIVE CHEMICALS OF CONCERN**

	<b>Capital</b>	<b>Annual O&amp;M</b>
Stickney WRP	\$8,022,857,000	\$294,813,000
North Side WRP	\$2,507,143,000	\$81,810,000
Calumet WRP	\$2,395,714,000	\$86,970,000
<b>Total</b>	<b>\$12,925,714,000</b>	<b>\$463,593,000</b>

Treatment consists of microfiltration, reverse osmosis, ultraviolet light, and hydrogen peroxide.

BCC Treatment would preclude the need for nutrient removal and disinfection.



## CSO OUTFALLS DISCHARGING TO THE CAWS

Chicago	200
Suburbs	89
MWRDGC	27
<b>Total</b>	<b>316</b>



# TREATMENT OF CSO OUTFALLS

There are a total of 316 CSO sites, but treatment is not feasible at 63 of them.

**Treatment is feasible at an estimated 253 CSO sites.**

CSO Sites

**253**

Capital

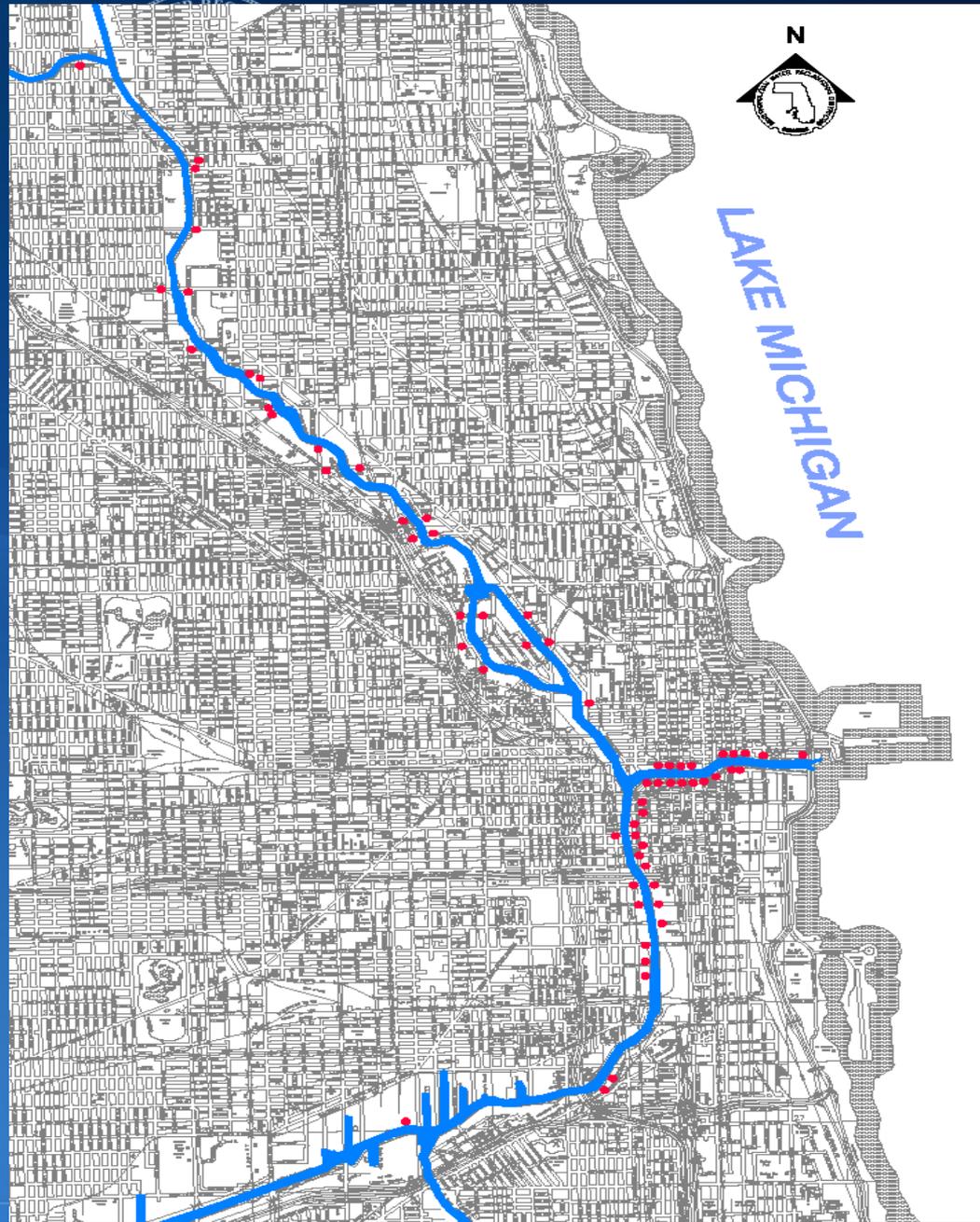
**\$2,864,513,000**

Annual O&M

**\$14,092,000**

Treatment consists of Vortex Separation and Disinfection.

**CSOS FOR WHICH  
END OF PIPE  
TREATMENT IS  
NOT FEASIBLE**





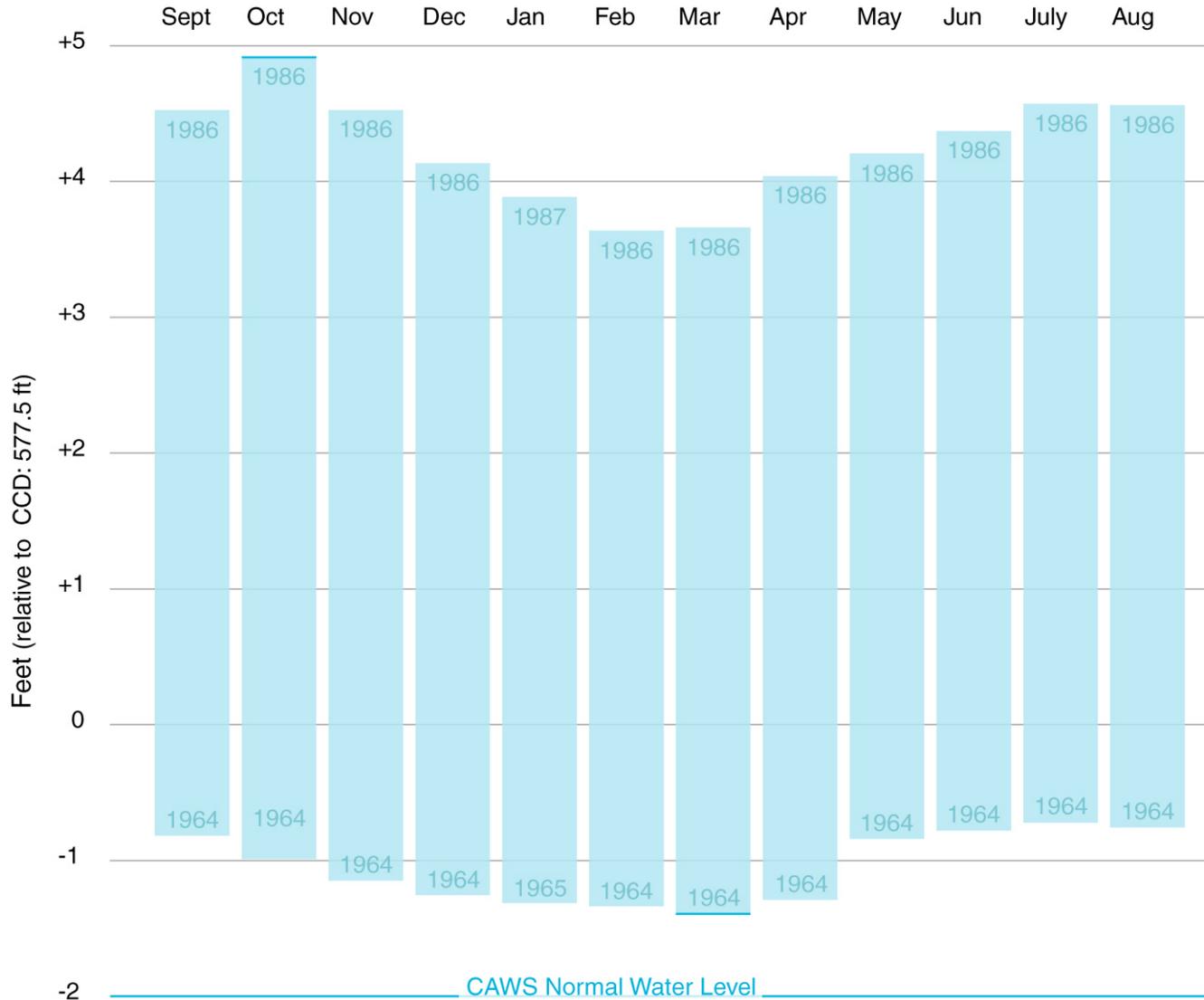
## CSO TREATMENT AT MAJOR PUMPING STATIONS

Pumping Station	Capital	Land	Annual O&M
Racine Ave.	\$229,000,000	\$13,500,000	\$2,600,000
North Branch	\$67,200,000	\$9,450,000	\$783,000
95 <sup>th</sup> Street	\$32,900,000	\$3,150,000	\$62,000
122 <sup>nd</sup> Street	\$15,620,000	\$1,800,000	\$2,000
125 <sup>th</sup> Street	\$47,810,000	\$4,500,000	\$330,000
<b>Total</b>	<b>\$392,530,000</b>	<b>\$32,400,000</b>	<b>\$3,777,000</b>

Treatment consists of Vortex Separation and Disinfection.

# Lake Michigan and Lake Huron

## Average Monthly High and Low Water Levels 1918-2009



Due to the effects of wind, lake water levels in Chicago can occasionally vary two feet or more from the monthly average lake levels shown here.



# SEPARATION ISSUES

- Pollution of Lake Michigan
- Threat to diversion continuation
- Floodwater relief in extreme storms
- Stability of riparian structures
- Stagnant canal reaches



# SEPARATION POSITION

- Protect Lake Michigan
- No continuous discharge of rivers to lake
- Allow infrequent floodwater discharges
- Maintain U.S. Supreme Court diversion
- Federal cost responsibility



**Contact the MWRD:**

**Internet: [www.mwrdd.org](http://www.mwrdd.org)**

**Telephone: 312-751-5600**

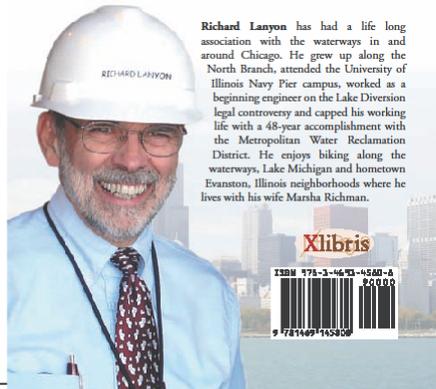
**Contact Dick Lanyon**

**Email: [dicklanyon@sbcglobal.net](mailto:dicklanyon@sbcglobal.net)**

**Telephone: 312-307-8855**



To accomplish the reversing of the flow of a river wouldn't be possible today. But to Chicago near the end of the 19th Century it became a matter of survival. It is an unlikely place for a large city, with flat topography, poor drainage, next to a lake and next to a river into the continent. Those conditions in the 1800s appealed to westward expansion pioneers who traveled by water. A city was born, the railroads replaced water transport, population surged, and the lake was both water supply and toilet. The river became overwhelmed with the commerce of a port city and with sewage. It stank at times. Flooding from the interior tore through the city to get to the lake. What to do? Without sewage treatment it was decided to breach a sub continental divide, send the sewage away and save the lake. It received legislative blessing with the promise of a navigable canal. Chicago's own shoulder-to-the-wheel determination made it work. The river was transformed into a canal flowing the other way.



Richard Lanyon has had a life long association with the waterways in and around Chicago. He grew up along the North Branch, attended the University of Illinois Navy Pier campus, worked as a beginning engineer on the Lake Diversion legal controversy and capped his working life with a 48-year accomplishment with the Metropolitan Water Reclamation District. He enjoys biking along the waterways, Lake Michigan and hometown Evanston, Illinois neighborhoods where he lives with his wife Marsha Richman.

Xlibris



\$6.00 x \$9.00

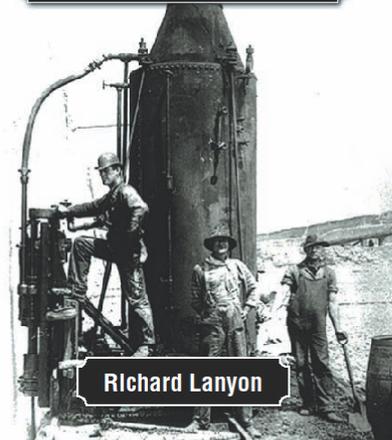


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BUILDING THE CANAL TO SAVE CHICAGO

LANYON

# Building The Canal To Save CHICAGO



Richard Lanyon

\$6.00 x \$9.00

Comment Type: B&W  
Paper Type: Creme  
Page Count: 200  
File Type: InDesign  
Request ID: CSBF200848

Building the Canal to Save Chicago  
Available in March 2012  
[www.buildcanalsavechicago.com](http://www.buildcanalsavechicago.com)

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