



# Water Our Precious Resource

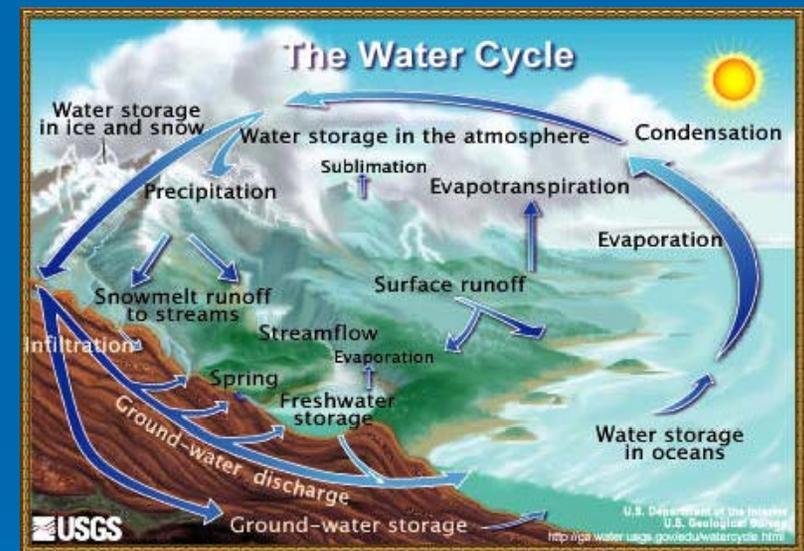
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# The Water Cycle



- Water is constantly being recycled through the earth's water cycle.
  - Human can consume fresh water faster than natural replenishment.
- We all use water, so we should do our part to protect and preserve it.
- Conserving water is beneficial to our community, because it:
  - Protects our water supply for the future, the environment, and natural ecosystems
  - Saves energy and money



**The same water  
that existed on Earth  
billions of years ago  
still exists today.**





**It covers most of the planet,  
but just 3% is freshwater.**



**(and most of that is ice)**

**Less than 1% of all freshwater  
is readily accessible  
for human use.**



**Less than 0.007%**  
of all the water on Earth  
is available  
to drink.



# The Great Lakes are key to regional water supply



- The Great Lakes are the largest system of fresh, surface water on earth, containing roughly 18% of the world fresh water supply.
- Lake Michigan is the second largest of the Great Lakes.

WATER SURFACE AREA: 22,300 sq. miles / 57,800 sq. km.

SHORELINE LENGTH (including islands): 1,638 miles / 2,633 km.

ELEVATION: 577 ft. / 176 m.

OUTLET: Straits of Mackinac to Lake Huron

LENGTH: 307 miles / 494 km.

BREADTH: 118 miles / 190 km.

AVERAGE DEPTH: 279 ft. / 85 m

MAXIMUM DEPTH: 925 ft. / 282 m.

VOLUME: 1,180 cubic miles / 4,920 cubic km.

# Protecting our Water Supply



- As Chicago grew during the second half of the 19th century, human and industrial waste openly flowed into the Chicago River. As the river (and Lake Michigan) became increasingly polluted a new solution was needed
- On August 2, 1885, more than 5 inches of rain fell in less than 24 hours, the deluge overwhelmed the inadequate sewage system, causing raw sewage to flow far out into Lake Michigan.

# Reversal of the Chicago River



- Fearing a public health disaster caused by unofficial public health records. The newly created Sanitary District of Chicago began planning a massive construction project that would permanently divert Chicago's sewage away from the lake and toward the Gulf of Mexico, connecting the Great Lakes and Mississippi River basins.
- Contrary to historical accounts claiming more than 90,000 deaths from typhoid fever and cholera. A current day review of health records show the death rate from typhoid was slightly above average and there were no deaths from cholera following the great downpour.

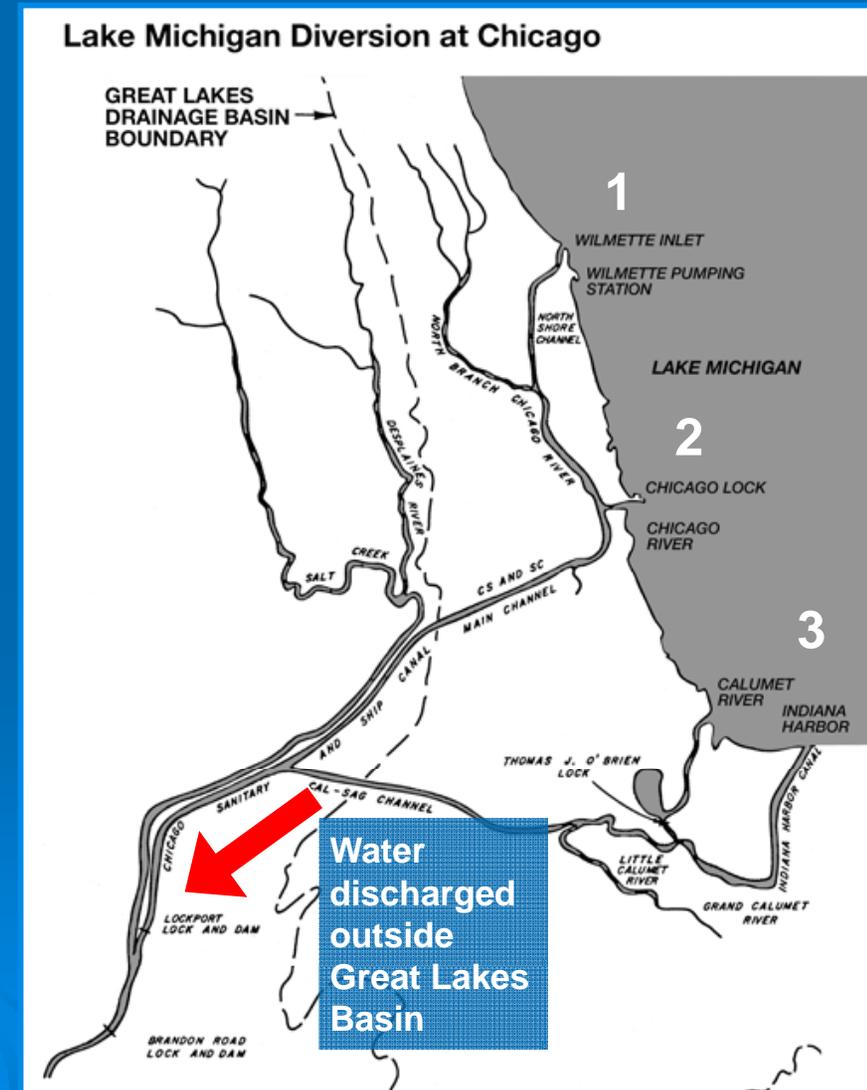
# Construction of the Chicago Sanitary and Ship Canal



- In 1892 construction of the \$31 million project had begun and is considered by some historians to be the largest public works excavation undertaken up to that time.
- On May 2, 1900, Admiral George Dewey dedicated the Chicago Sanitary and Ship Canal across the continental divide connecting the Chicago River to the Des Plaines River
- The resulting improvement in water quality was quickly apparent with a significant drop in the death rate from typhoid and similar water-borne diseases.
- In the 30 years following completion of the canal, death rates from contagious diseases were cut in half.

# Diverting Water from Lake Michigan

- A similar channel (the Cal-Sag) was constructed in 1922 to connect the Little Calumet River to the Sanitary canal and ultimately to the Mississippi River system
- In 1938, a controlling works and lock were built at the mouth of the Chicago River to limit direct diversions from Lake Michigan and to prevent the river from flowing back into Lake Michigan during significant storm events.



# Wilmette Pumping Station next to the Bahai Temple



# Chicago River Lock and Controlling Works



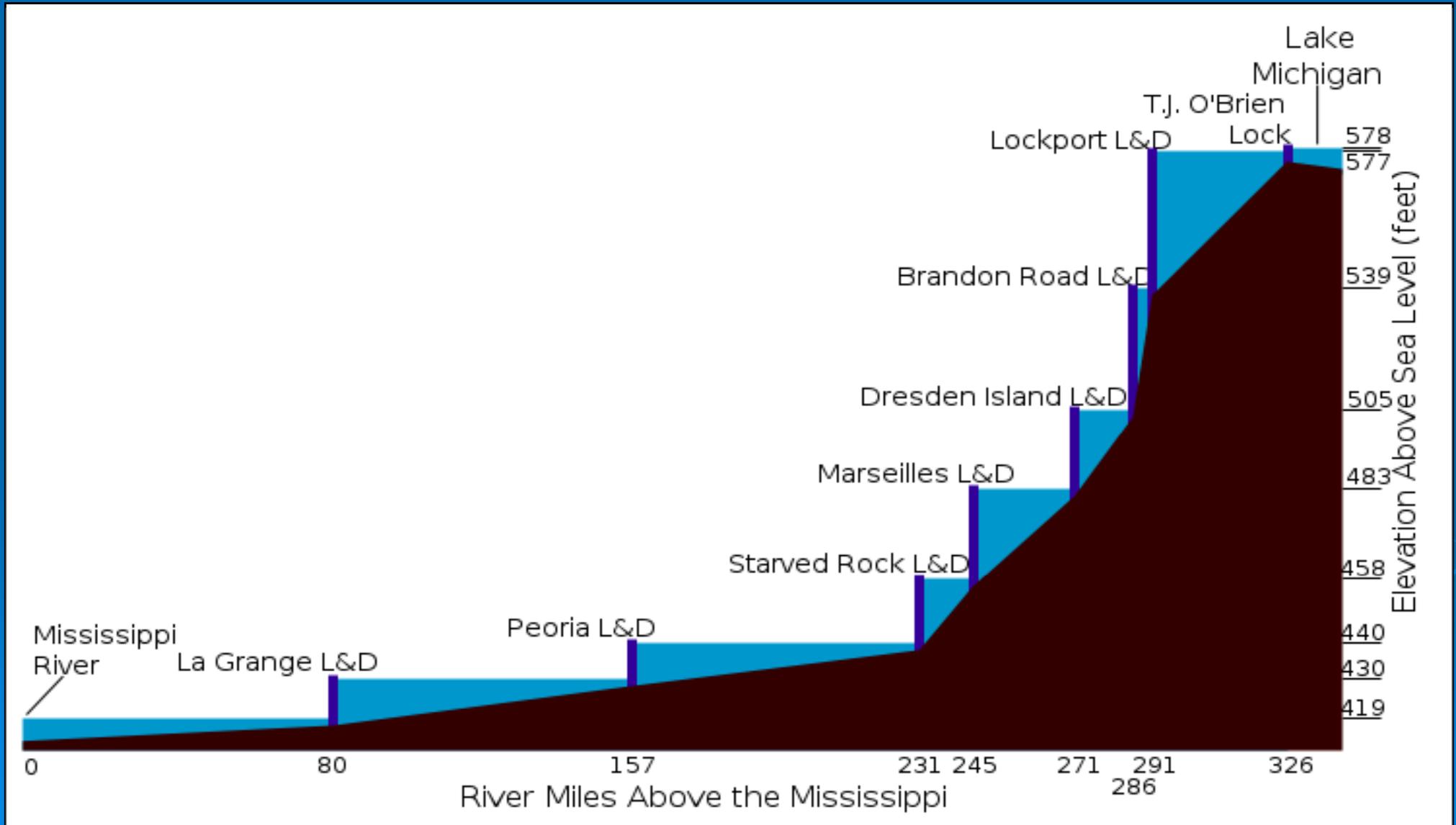
# O'Brien Lock and Dam in Calumet

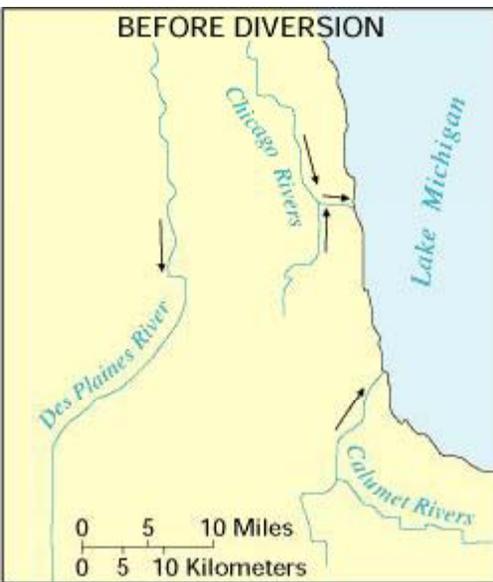


# Lockport Powerhouse and Lock

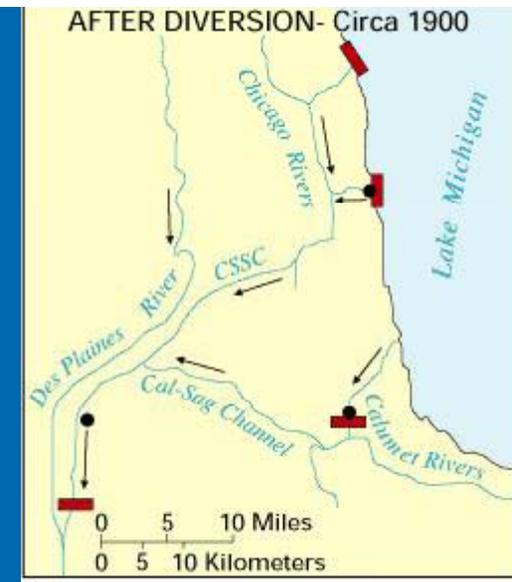


The water drops a total of 159 feet from 578 at Lake Michigan to 419 feet at the Mississippi River at Grafton, Illinois.



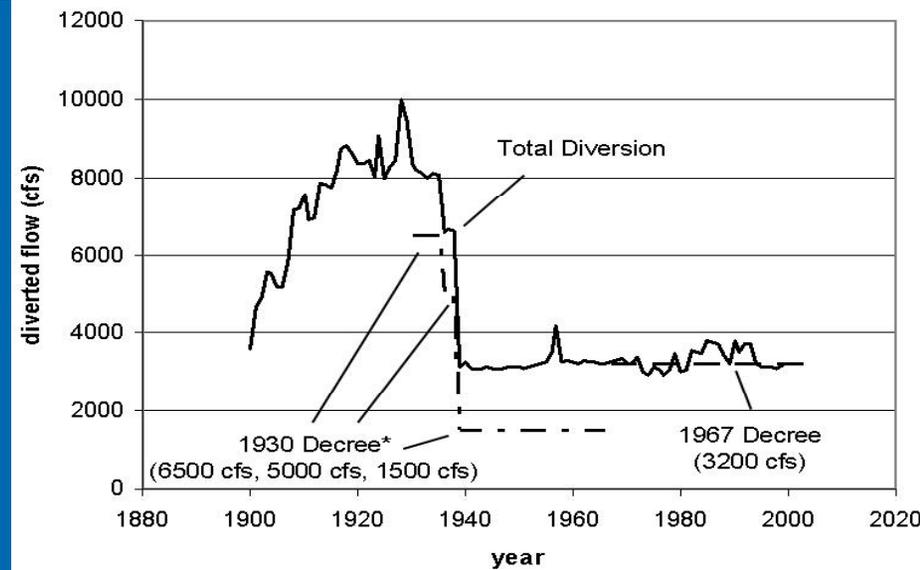


# The Chicago Diversion



- Starting after 1900 the mean annual diversion rates increased steadily to a maximum of 10,000 cubic feet per second (cfs). (6.4 billion gallons per day in 1928)
- Other Great Lakes basin states and Canada objected to the diversion, citing the impact on lake levels
- Starting in 1912, The U.S. Supreme Court issued a series of rulings that repeatedly lowered the allowable diversion (excluding domestic water pumpage) to 1,500 cfs (0.96 billion gallons per day) by 1938.
- In 1967, Illinois agreed to a consent decree that limited the total diversion for navigation, domestic water use, and sanitation to 3,200 cfs (2.06 billion gallons per day)

# The Chicago Diversion



\* The 1930 Supreme Court decree excludes domestic water pumpage.

- The decree was modified in 1980 to allow Illinois to provide water to additional communities.
- In 1996, Illinois reached an agreement with Michigan and other Great Lakes states to restore water taken in excess of 3,200 cfs (2.1 billion gallons/day) since 1980 to Lake Michigan
- The reversal of flow between basins and the diversion of Lake Michigan water has long been a source of contention among competing interests. Therefore, such flows are routinely measured and reported to provide policy makers and managers with important information for
- decision-making.
- Currently, water that flows directly from Lake Michigan through locks and controlling works accounts for between 10 and 15 percent of the total diversion

# Drainage Basin

## The Great Lakes Basin



# Great Lakes Compact Controls Water Use



Sources: Great Lakes Information Network; Bulletins E-1866-70, Sea Grant College Program, 1985.

➤ An agreement between the Great Lakes States and two Canadian Provinces to provide unprecedented protections for the Great Lakes–St. Lawrence River Basin

- Ban on new diversions, with limited exceptions
- States required to regulate in-basin water uses
- Uniform standard for evaluating withdrawal proposals
- States required to adopt water conservation plan
- Water shipped in small containers < 20 ℓ (5.28 gallons) not a diversion
- Waters of Great Lakes include rivers and groundwater
- Illinois diversion at Chicago exempted
  - Supreme Court ruling allows for 3,200 cfs (2.1 billion gallons per day) diversion for Chicago

# Lake Michigan Water Usage



- The Chicago Dept. of Water Management (CDWM) is the major supplier of Lake Michigan water, delivering close to 1 billion gallons of clean drinking water every day to more than 170 municipalities in the area.
- CDWM sells water directly to 49 neighboring communities, which then use a portion of the water, but also sell it to western neighbors. Lake Michigan water is used as far west as Plainfield, Ill., which straddles the borders of Will and Kendall counties, approximately 40 miles from the lake itself. CDWM's distribution system is made up of more than 4,200 miles of pipe for moving potable drinking water. All told, CDWM's distribution system ultimately serves approximately 5.5 million people

# Lake Michigan Water Outside the Basin

- An additional 1.5 million people receive Lake Michigan water from Chicago's northern suburbs who then sell water to western neighbors
- Ten southern suburbs of Chicago, including Calumet City and Chicago Heights receive their Lake Michigan water from Hammond, Ind.
- The Great Lakes Compact limits how much water can be taken and requires all water utilities to have a water conservation program.

