GREAT LAKES LEVELS
UPDATE NO.18
ANNUAL SUMMARY, 1986
1 JANUARY 1987

The past year has been a record breaker for all the Great Lakes except Lake Ontario. Continuing a record high level trend that began in 1985, Lakes Michigan-Huron and St. Clair saw a completely new set of record high monthly levels established for every month of the year in 1986. Forty-three out of a possible sixty monthly records were broken. In some cases, this meant reaching higher levels than the records just established in 1985. In the few months when Lakes Superior and Erie did not establish record levels in 1986, those records were set in 1985. Lake Ontario, which must convey the outflow of all the other lakes, also stands to approach record levels in the coming months (See the Levels Bulletin). However, it is noted that the Bulletin projection cannot foresee the amount of Lake Ontario's overdischarges which, to date, have lowered that lake's level by more than three feet. These overdischarges will continue to occur in 1987, but their frequency and amounts during the winter will be dependent on ice conditions in the St. Lawrence River.

Precipitation

The unprecedented high lake levels are the result of above normal precipitation on the Great Lakes basin in 13 of the past 15 years, combined with lower than normal evaporation rates due to cooler air temperatures over the lakes. The chart below Table 1 shows the annual precipitation above or below normal for the Great Lakes basin. Normal precipitation, based on the period from 1900 to the present, is 31.9 inches.

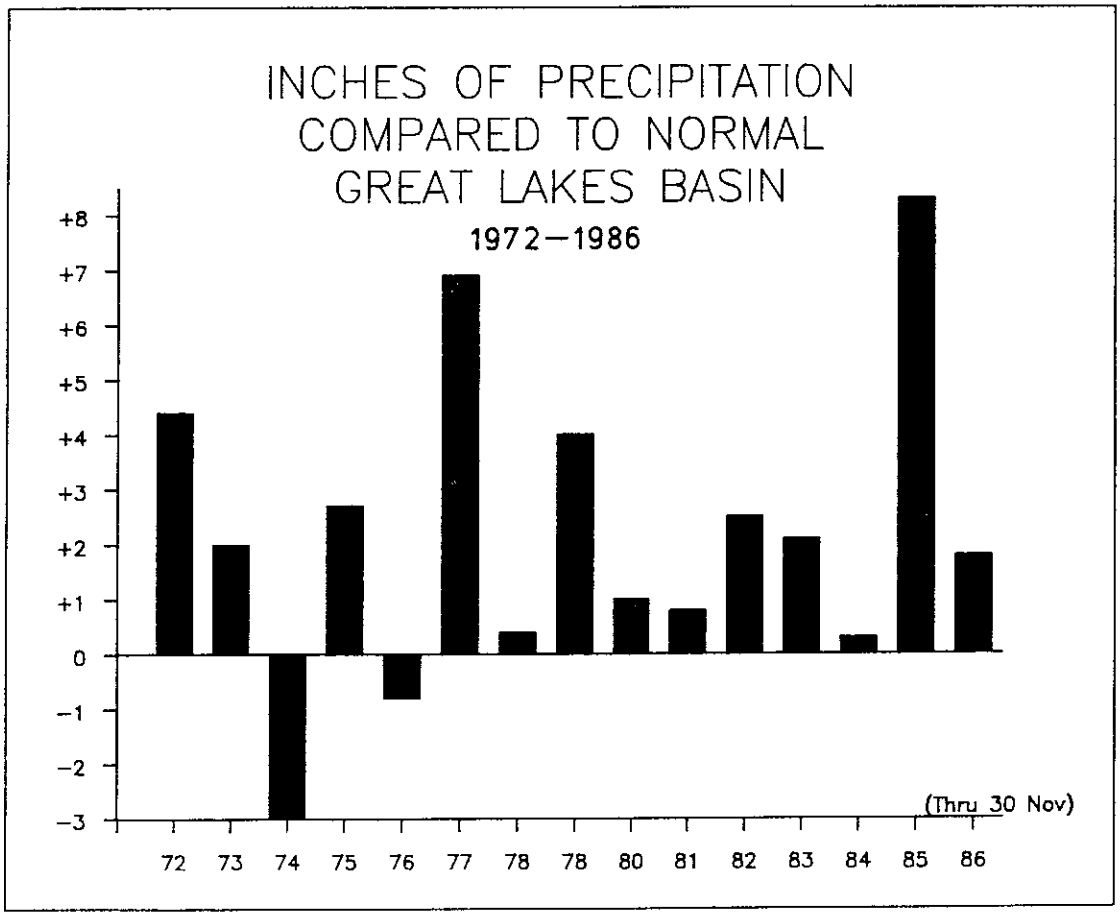


Table 1

Because of an extremely wet fall in 1985, Lakes Michigan-Huron, St. Clair and Erie did not follow the normal seasonal decline. Thus, 1986 began with levels that were close to the summer peak levels. Slightly below average precipitation during the first five months of 1986 helped slow the seasonal rises of Lakes Michigan-Huron, St. Clair and Erie. However, above normal precipitation in June combined with waters accumulated over the previous years to send the lake levels of these lakes to new highs. Above normal rainfall continued during the summer, as most basins received more than twice the normal amount during September.

Storms

The extremely heavy rainfall in September caused extensive flooding on rivers tributary to the Great Lakes. Twenty-two counties in central Michigan and three counties in northeastern Illinois were declared by President Reagan to be a Federal Disaster Area. With this rain, Lakes Michigan-Huron, St. Clair and Erie rose to about ½ foot higher than the previous records for September. In fact, all of the Great Lakes were rising daily, (except Lake Superior which was holding steady) at a time they would normally be in their seasonal declines. From then on, Lakes Michigan-Huron, St. Clair and Erie continued to rise to set new monthly records more than a foot higher than the previous records for October! For Lakes Michigan-Huron and St. Clair the October levels of 581.62 and 576.69 feet (IGLD 1955), respectively, were new all-time record highs for the period from 1900 to the present. (Although Lakes Michigan-Huron have been measured higher prior to 1900, at 581.94 feet in June, 1886, the earlier levels record is not compatible with present conditions. The channels of the St. Clair and Detroit Rivers were different from those of today and the water level recording instruments and techniques were, in may cases, less accurate.)

On December 1st, the most damaging storm occurred. The west end of Lake Erie sustained flooding of more than 400 homes. The Illinois and Wisconsin shores of Lake Michigan also had some flooding. It is estimated that the Corps of Engineers Advance Measures at the west end of Lake Erie prevented damages during this one storm that more than repaid the $5.5 million cost of building them.

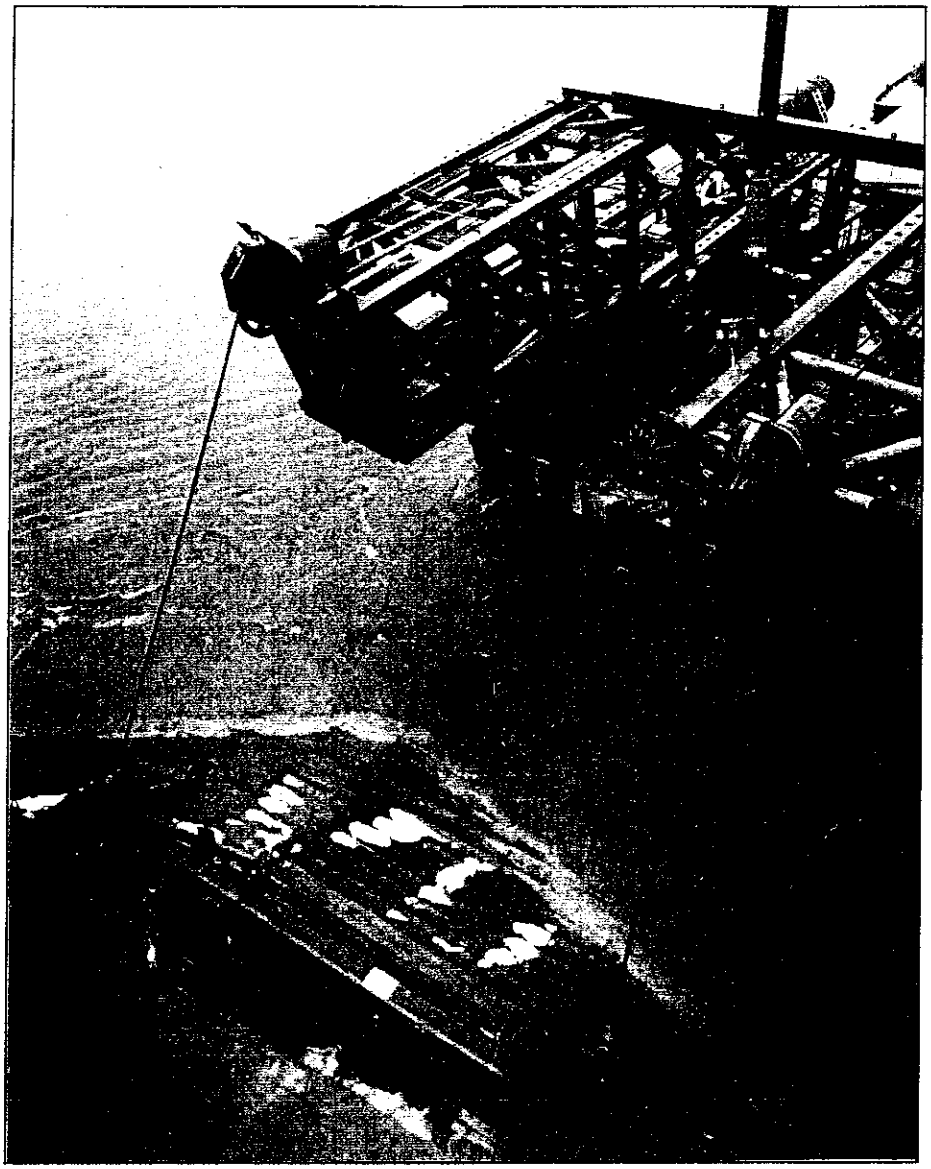
Despite the storms mentioned above, we have been quite fortunate during this year of high lake levels, in that fewer and less severe storms have occurred than might have been expected. A very rough analysis was made by my office of the temporary storm-driven rises at 14 water level gaging sites on the U.S. shores of Great Lakes. It showed that, compared to 30 years of records, relatively few above average rises occurred during 1986. A storm rise depends on which shoreline the wind is blowing against. On Lake Superior, nine storm events above average (greater than 50 percent frequency of occurrence) were noted. Lakes Michigan-Huron had six such events. On Lake St. Clair, none of the storm rises were above average. Lake Erie had three and Lake Ontario had six. These estimates show that we were probably lucky in 1986 as far as damaging wind storms are concerned.

Corps-built dike at Estral Beach project during December 1 storm.

Other matters

On August 1, 1986, the Governments of Canada and the United States issued a new Reference to the IJC for a comprehensive, multi-year study of methods to alleviate the adverse consequences of fluctuating Great Lakes water levels. The Governments asked for an interim report by one year after the study begins and for a final report by May 1, 1989. In September, IJC assigned an **ad hoc** committee to begin work on the interim report, which it plans to complete prior to the one year specified in the Reference. Further information on the Reference can be obtained from the IJC.

On August 7, a tugboat/barge accident in the Niagara River resulted in a barge being lodged against the center pier of the Peace Bridge. The barge impeded the flow of the river by 6,000-7,000 cfs, having a small effect on the levels of Lakes Erie, St. Clair and Michigan-Huron. The barge was abandoned by its owners so the Buffalo District, Corps of Engineers, used an emergency authority to contract with a private salvage company for its removal. A specially equipped lift barge had to be mobilized on the site. The difficulty of the task, severe weather and equipment problems caused several delays. However, on 19 December, the barge was removed, restoring the normal Niagara River flow.



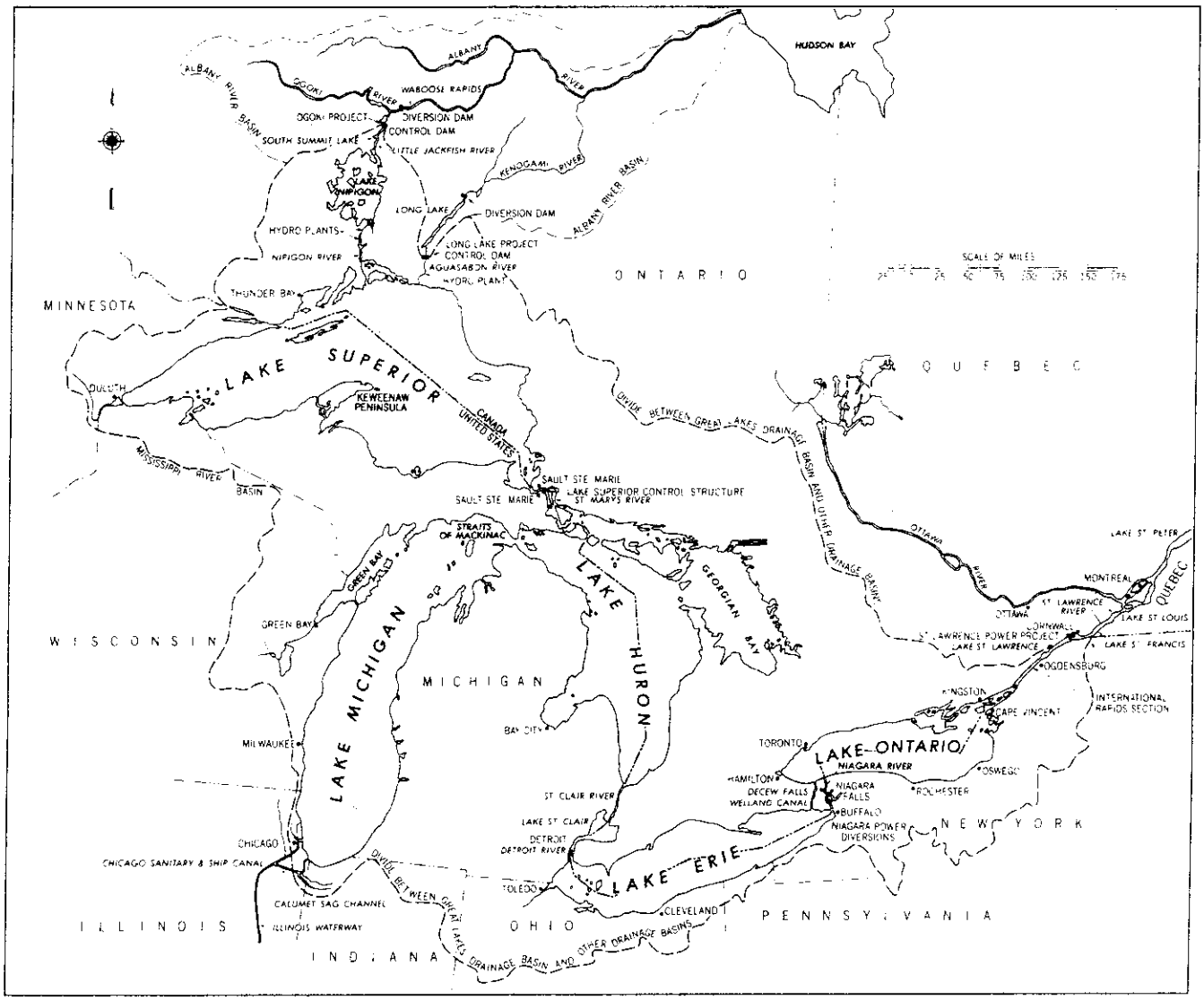
Lift barge prepares to remove abandoned Niagara River barge. Cables from the Lift barge (right) are attached to the abandoned barge (left) in preparation for the salvage operation.

Lake regulation

Throughout 1986, the International Joint Commission (IJC) continued to direct the outflows for the two Great Lakes that are regulated. The Lake Superior outflow was at its specified Plan 1977 outflow setting from mid March through December 1986.

The discharges from Lake Superior through the U.S. and Canadian powerplants and the Compensating Works gates were augmented on occasion by releasing additional water through the culverts of the U.S. navigation locks (Sabin and Davis Locks). This is a usage for which locks were not designed, but it allowed high discharges while still being able to respond quickly to high water conditions in the Soo Harbor and lower St. Marys River.

The Lake Ontario outflow was regulated under an emergency action known as Criterion (k) in the IJC's Orders of Approval. The emergency action through November had reduced the Lake Ontario level by about three feet. Water has been spilled over the Long Sault Dam, which has no turbines for generating electricity, whenever the Lake Ontario discharge exceeded the powerhouses capacity of about 320,000 cfs. During 1986, the spillage was as much as 35,000 cfs and equalled a 1,700 cfs annual rate. Shipping interests were informed of the higher St. Lawrence River velocities and strong cross-currents created by the overdischarges dictated by the emergency action.



The Corps of Engineers has authority under Public Law 84-99 to carry out preventive work prior to a flood threat to life and improved property. This program, known as Advance Measures, is applicable to areas threatened with innundation. There is no similar authority applicable to shore erosion threats. In Michigan, six emergency levee and dike projects for threatened communities along the western shores of Lake Erie, Lake St. Clair and St. Clair River have been completed. These are: Luna Pier, Estral Beach, Detroit Beach in Frenchtown Township, Grodi Road in Erie Township, and Labo Island and Milleman in Brownstown Township. In Ohio, the projects at Eastlake and Bayview on Lake Erie are complete. Effort at three other sites, the Village of Quanicassee, Michigan, Wightmans Grove, Ohio, and the Edgewater area of Chicago, Illinois, are continuing but no construction has started. No projects were found to be viable in New York on Lakes Erie or Ontario.

The Corps is also authorized to assist local communities in responding to actual flooding situations, to supplement maximum state and local efforts. Requests for assistance should be directed through local and state disaster assistance agencies. For Great Lakes basin technical assistance or information, please contact one of the following Corps of Engineers District Offices:

For New York, Penn & Ohio:

Colonel Daniel R. Clark
Cdr, Buffalo District
1776 Niagara Street
Buffalo, NY 14207-3199
(716) 876-5454,Ext.2201

For Mich., Minn. & Wisc.:

Colonel Robert F. Harris
Cdr, Detroit District
P.O. Box 1027
Detroit, MI 48231-1027
(313) 226-6440 or 226-6441

For Ill. & Indiana:

LTC Frank R. Finch
Cdr, Chicago District
219 S. Dearborn St.
6th Floor
Chicago, IL 60604-1797
(312) 353-6400

Waves hit dike at Stoney Point, Michigan on Lake Erie.

The "Help Yourself" brochure is still available from the District Offices listed above or from this office: North Central Division, 536 South Clark Street, Chicago, Illinois 60605-1592, telephone: (312) 353-6364.

The record high Great Lakes levels prompted the Corps of Engineers to also initiate a "Self-Help" program. Using the Advance Measures Authority, the Assistant Secretary of the Army for Civil Works, Mr. Robert K. Dawson, on October 23rd approved the new program for Great Lakes shoreline communities affected by the record-high water levels. The program includes distribution of sandbags, sand and plastic sheeting to enable threatened communities to construct protective diking against flooding. The Corps of Engineers' Buffalo, Chicago and Detroit Districts held meetings with the states and affected counties to explain the program and obtain commitments for participation. The communities interested in participating were advised to contact their county disaster assistance personnel through whom the materials would be distributed and technical assistance offered. A summary of distributions follows:

	Sand Bags	Sand (tons)	Plastic Sheeting rolls
Buffalo District	1,700,000	21,000	400
Chicago District	200,000	375	60
Detroit District	1,100,000	12,300	850
Total	3,000,000	33,675	1,310

(Quantities estimated through December 31.)

With lakes levels already the highest they have been this century, it appears that they may be as bad, if not worse, in 1987. New records surely will be set, at least in the early part of the year. One can only hope that cold temperatures this winter will provide a strong lake ice cover to dampen the wave effects along the shoreline. Shoreline residents should pay attention to the weather situation. If severe storms occur this winter and next spring, the amount of damage could be severe. Properties never damaged before may now be subject to damage. Again, I cannot over-emphasize the need for shore property owners to take immediate steps to be prepared for any major storm events.

I will continue to issue monthly updates to accompany the Levels Bulletins in the coming year, until the lakes return to safe levels. That this may be soon is my New Year's wish for all of you.

US Army Corps of Engineers
North Central Division

Joseph Pratt
JOSEPH PRATT
Brigadier General, USA
Commanding