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US Army Corps of Engineers
Detroit District

Great Lakes Update

2001 Annual Summary

Below average water supplies over each of the Great Lakes continued throughout 2001. Water levels have remained significantly below average on lakes Michigan, Huron, St. Clair and Erie for the entire year. Water levels on Lake Superior recovered somewhat over the year, but still remain below average. Water levels on Lake Ontario are the only exception to these conditions, with most of the year being close to long-term averages.

The year 2001 started out cold and dry across most of the Great Lakes, with near average snowpack across the Lake Superior basin. Precipitation and temperature varied considerably across the region from January through August. By the end of 2001, lakes Superior and Michigan-Huron levels were higher than the beginning of the year, while lakes St. Clair, Erie and Ontario levels were nearly the same.

Hydrology

During 2001, weather conditions were generally erratic across the Great Lakes. As a result, precipitation was not evenly distributed – spatially or temporally. Overall, the western and southern Great Lakes (western Lake Superior, Lake Michigan, St. Clair and eastern Erie) received the greatest amounts and most frequent rains. The lakes Huron and Ontario basins endured moderate to severe drought throughout the warmer months.

On Lake Superior, near average snowpack and a record setting wet April on the basin (270% of average precipitation) provided sustaining groundwater and streamflow for the basin through the spring. The water level remained approximately 6 inches below average until the latter half of the summer. Almost 4 inches of precipitation in October and over 3 inches in November resulted in a temporary halt to the normal seasonal decline of levels.

Typically snowpack over the basin is at its peak in early March, averaging near 6 inches of snow water equivalency (SWE). The U.S. National Weather Service conducts snow surveys using low-flying aircraft across the Lake Superior drainage basin each year to help in predictions of water supplies to each of the Great Lakes. The results of these surveys for February 2001 are shown in Figure 1.

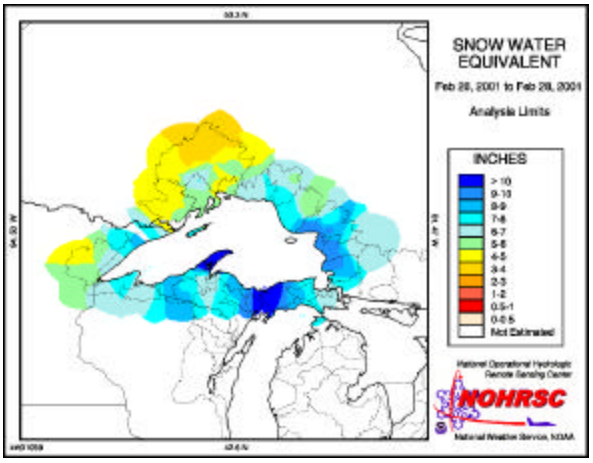

Figure 1

A similar survey will be made this winter and the results will be used to forecast water levels for the Great Lakes for the spring-autumn period.

During 2001, rainfall across the Lakes Michigan-Huron basin was quite irregular. During the spring and summer, a storm track took up residence across the northern plains then curved southward through Wisconsin. This sent waves of storms that rarely pushed east of Lake Michigan.

The heaviest rainfall occurred mostly in the western half of the Lakes Michigan-Huron basin during this period. Duluth, MN experienced 8.18 inches of rain in April 2001; Grand Rapids, MI received 10.01 inches of rain in May; Green Bay, WI received 5.17 inches of rain in June; Ft. Wayne IN received 6.70 inches of rain in July, and Chicago, IL received 12.25 inches of rain in August. Meanwhile, most of the Lake Huron basin continued in a drought pattern well into September, negating the impact of the localized heavy rains elsewhere in the basin.

Lake St. Clair also experienced sporadic precipitation through the year. Heavy snowmelt in January and rain in February helped the lake to rise to 4 inches below long-term average. Periods of intermittent spring showers transitioned into weeks of hot, dry conditions from mid June through late July minimizing the normal seasonal rise for the lake. Rainfall returned in September and October bringing some relief to the lake.

The Lake Erie basin received substantial spring rains in 2001 following a fairly wet late summer and autumn in 2000. The summer of 2001, however, was quite hot and dry around the lake, reducing the benefit gained from the previous rains. The eastern half of the Lake Erie basin was hardest hit and was considered to be in the "moderate to extreme drought" category by August. A shift to a wetter pattern began in August peaking in October when 6.03 inches of rain (220% of average) fell on the basin. The lake level should begin a slow seasonal rise in January 2002.

The Lake Ontario basin spent most of 2001 in moderate drought, after getting a fair amount of spring snowmelt and near-average spring rains. The lake stayed near its long-term average levels throughout the year, being substantially affected by below normal inflows from Lake Erie and reduced outflows through the St. Lawrence River.

Precipitation and Temperatures

Based on preliminary data from the U.S. National Weather Service and the Canadian Atmospheric Environment Service, precipitation over the Great Lakes basin for 2001 was 34.14 inches, exceeding the long-term basin-wide average of 32.4 inches.

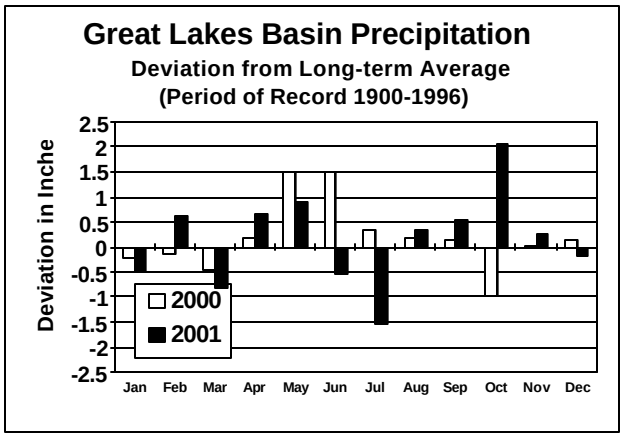

Figure 2

Figure 2 compares the monthly deviation of precipitation from long-term averages for each month of the year for 2000 and 2001 over the Great Lakes basin. This figure shows that precipitation patterns can be quite variable in any given year. Precipitation is usually the best indicator of net water supplies to the Great Lakes, but can be misleading at times.

During 2001, significantly above average air temperatures across the region for most months have caused dramatic changes in the hydrologic cycle of the region. Figure 3 shows the departures from average for temperature across the basin.

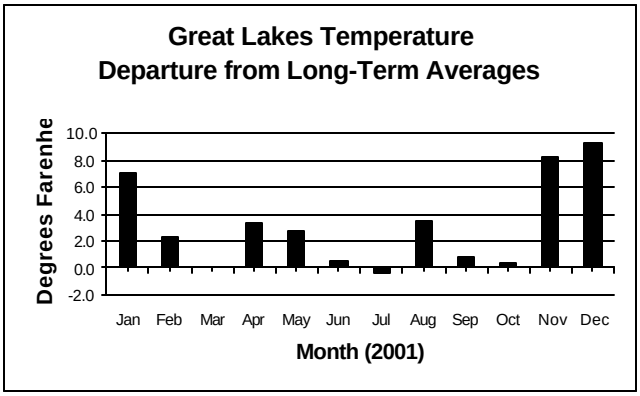

Figure 3

The first two weeks of January were bitterly cold and dry across most of the Great lakes. By mid-January, a warming trend caused early snowmelt and ice break-up on all of the Great Lakes. February saw very warm temperatures with flooding rains; then March was near-record dry across the entire region. In April, the Lake Superior basin experienced record precipitation (5.31 inches), aided by 8.18 inches of rainfall at Duluth, MN and warmer than average temperatures.

Near average rain continued through mid-June with above average temperatures across the basin. A hot, dry pattern set in for late June. July would have set regional records for drought, but rain the last days of the month temporarily broke the dry spell. Heavy rains fell over the basin during late August, resulting in above average rainfall accompanied by very warm temperatures. Temperatures were near normal for September and October, but both months were relatively wet. Rainfall recorded for October was 4.87 inches of rain, just 0.13 inches below the record.

November and December were abnormally warm across the basin setting new record highs for many locations. For the year, the basin average temperatures were well above average, causing the lakes to be warmer than average going into the winter. As of the end of 2000, ice cover was confined to only small, protected bays on the northern shores of Lakes Superior, Michigan and Georgian Bay. These ice conditions are two-three weeks late for ice to begin forming.

Lake Levels

The *Monthly Bulletin of Lake Levels for the Great Lakes* graphically shows the water levels on the Great Lakes for 2000 and 2001. The following discussion uses monthly mean levels.

Lake Superior levels started 2001 at 600.33 feet, 15 inches below its January long-term average (LTA). Following its normal seasonal pattern, levels started rising in March, peaking in August at 601.67 feet, 7 inches below the LTA. From August through December levels fell, ending the year at 601.38 feet, 5 inches below its LTA for the month and 13 inches higher than the year before.

Lakes Michigan-Huron levels began the year at 576.67 feet, 23 inches below its January LTA. These lakes peaked in June at 577.62 feet, 21 inches below the LTA. Levels then declined through December ending the year at 577.59 feet, 13 inches below the LTA for the month and 11 inches higher than the year before.

Lake St. Clair levels started the year at 573.23 feet, 5 inches lower than its January LTA. The seasonal rise peaked in June at 573.79 feet, 11 inches below the LTA. Levels fell through December ending the year at 573.29 feet, 7 inches below its LTA for December and 1 inch higher than the year before.

Lake Erie levels began the year at 570.11 feet, 9 inches below its January LTA. The levels peaked in June at 571.19 feet, 9 inches below the LTA. Levels declined through December, ending the year at 570.47 feet, 4 inches below its December LTA and 4 inches higher than the year before.

Lake Ontario started the year at 244.39 feet, 2 inches below its January LTA. The lake levels peaked in June at 246.03 feet, 2 inches below its June LTA. Levels declined through December, ending the year at 244.49 feet, at its LTA for the month, and 1 inch higher than the year before.

The historic ranges between extreme highs and lows for lakes Superior, Michigan-Huron, St. Clair, Erie and Ontario are 3.9, 6.3, 6.8, 6.1, and 6.6 feet respectively.

Lake Superior Regulation

During 2001, the International Lake Superior Board of Control (ILSBC) continued to use Regulation Plan 1977-A as the basis for determining Lake Superior outflows. The ILSBC is a bi-national body that reports to the International Joint Commission (IJC) on boundary water management issues including the management of outflows from Lake Superior.

Flow changes resulting from the monthly regulation of Lake Superior are accomplished by varying the amount of water allocated to hydropower production, and when necessary, by opening or closing gates in the Compensating

Works at the head of the St. Marys Rapids.

Except for April and May water supplies to Lake Superior were generally below average for the year. In April a record 5.31 inches of rain fell over the Lake Superior basin. Overall for the year supplies to Lake Superior were 109% of average.

Levels on Lake Superior but were higher than 2000 levels from May onward. A one-half open gate setting was maintained in the Compensating Works throughout 2001 to support fishery spawning in the St. Marys Rapids.

Outflows ranged from a high of 80,500 cubic feet per second (cfs) in July to a minimum flow of 54,000 cfs in April. A survey crew conducted measurements of the flow rates through the Compensating Works in late July. The planned July Lake superior outflow was not affected by these surveys. Figure 4 compares the monthly

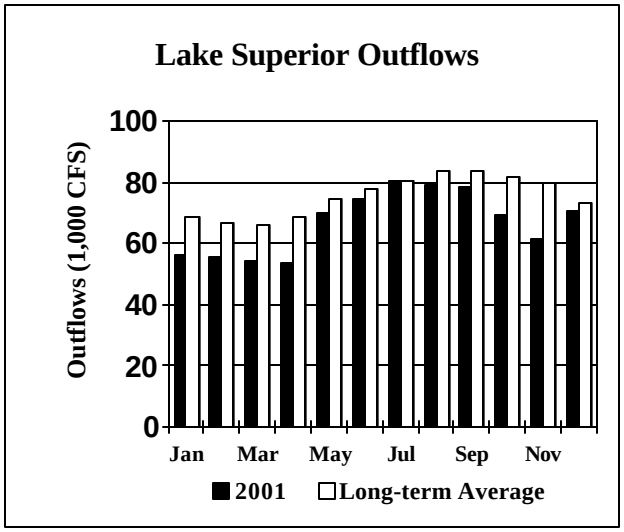

Figure 4
Lake Superior outflows in 2001 with long-term average flows for the 1900 - 1989 period of record.

Further information can be found on the Internet at *http://huron.lre.usace.army.mil/ijc/superior.html*.

Lake Ontario Regulation

In response to continued dry conditions on the upper Great Lakes basins, the International St. Lawrence River Board of Control (ISLRBC) directed Lake Ontario outflows to be less than those specified by the Regulation Plan 1958-D whenever possible in 2001. This strategy of conserving water on Lake Ontario proved valuable later in the summer and early fall of 2001, providing relief to downstream users affected by low water levels on the St. Lawrence River.

Just prior to the winter of 2000-2001, the amount of water conserved on Lake Ontario was 1.7 inches. Near the end of 2000 Lake Ontario reached its lowest level on November 25th, and again on December 11th, at 244.19 feet, 4 inches below its respective long-term averages.

Ice cover began forming on the St. Lawrence River in late December 2000. During each winter and immediately after the closing of the navigation season on the St. Lawrence Seaway, the ISLRBC typically reduces outflows to help form a stable ice cover throughout the river. Due to this action, the amount of water conserved on Lake Ontario increased to 2.8 inches by early January, 2001, helping to ease low water problems on the lake.

Snow surveys conducted around the Lake Ontario and Ottawa River basins showed greater than average snow water content for January through March 2001. Water supplies to Lake Ontario and downstream areas (including the Port of Montreal), however, continued to be well below average through the year.

From mid-summer through early fall, much of the conserved water on Lake Ontario was used to provide relief to users along the St. Lawrence River. This included short-term flow increases to assist navigation around Montreal, extra discharges for hydropower generation during the August heat wave, and increases to maintain sufficient water levels on Lake St. Louis and in the Montreal area.

By mid-September, abundant rainfall returned to the Lake Ontario basin, the St. Lawrence River Valley and the Ottawa River basin. As a result, water levels in the Montreal area rose mainly due to increased Ottawa River inflows. By mid-October, it was no longer necessary to release outflows from Lake Ontario above those specified by the regulation plan. In fact, it was possible to slightly reduce the outflows in order to conserve additional water on the lake.

As of December 14, 2001, the level on Lake Ontario was 244.46 feet, 0.8 inches below its long-term average. Currently, about 1.1 inches of conserved water remains on Lake Ontario. Figure 5 compares the 2001 monthly Lake Ontario outflows with the long term-average flows (1900 - 1989 period of record). Further information on

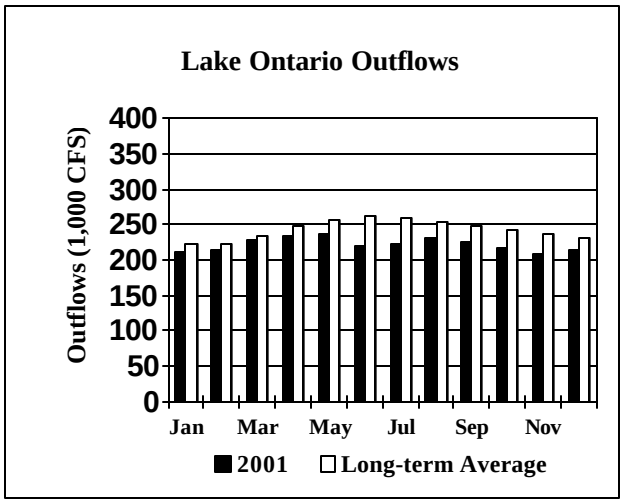

Figure 5

ILSBC activities can be found on the Internet at: http://www.islrbc.org./

Public Concerns

During the year, concerns about low lake levels continued to be received by the U.S. Army Corps of Engineers and Environment Canada staff. Many calls were from the news media interested in low levels and their effects on the economics and ecology of the region.

The IJC established the **International Lake Ontario - St. Lawrence River Study** (ILO-SLRS) in early 2001 to determine how management of the water levels in the lake and river can be improved. As part of this study, a Public Interest Advisory Group (PIAG) was formed to further public participation in the evaluation of options for regulating levels and flows in the Lake Ontario - St. Lawrence River system. For more information about the current status of the study's activities visit the following web site: http://www.losl.org/.

"Ripple Effects", a newsletter covering current activities of the ILO-SLRS is now available. To learn more about this publication and to subscribe please read the ILO-SLRS letter on page 7 and fill out the information request form by February 15, 2002 to insure receipt of the next edition.

In August 2001, IJC assembled a binational team to develop a Plan of Study (POS) to review the current outflow regulation from Lake Superior. This study would identify the needs of the interest groups and users affected by water levels and flows on the upper Great Lakes from Lake Superior through Lake Erie and identify potential improvements to regulation. This study is referred to as the Upper Great Lakes Study (UGLS).

The POS team held eight public meetings between October 31 and November 15, 2001. The meetings were held at various locations around the basin to inform the public of the study and to solicit comments on its draft report. The POS team will submit its final report to the IJC on January 11, 2002. Information on the UGLS can be found at: http://huron.lre.usace.army.mil/ijc/uglpos/.

In December 2001 the IJC directed the ILSBC to study fluctuating St. Marys River water levels. The objective of this study is to assess impacts of daily and weekly flow variations at the hydropower plants at Sault Ste. Marie on St. Marys River users and interest groups. Public hearings will be held on January 28, 2001 at 3:00 PM in the Walker Cisler Center, Lake Ontario Room, Lake Superior State University, Sault Ste. Marie, Michigan; and on January 28, 2001 at 7:00 PM at the Holiday Inn Waterfront, Thompson Room A& B, 208 St. Mary's River Dr., Sault Ste. Marie, Ontario

Meetings with the Public

The ILSBC held its annual public meeting on June 27, 2001 in Port Severn, Ontario. The Board plans to hold its 2002 public meeting at Paradise, Michigan in June 2002. Information on this meeting will be posted on the ILSBC's web site at: http://huron.lre.usace.army.mil/ijc/superior.html.

The ISLRBC held a public hearing at Kingston, Ontario on June 19, 2001. It also held two multi-city conference calls for the public on March 20th and September 17th. The cities included Montreal, Quebec; Cornwall, Ontario; Toronto, Ontario;

Alexandria Bay and Rochester, New York. For information please visit: http://www.islrbc.org/

The International Niagara Board of Control (INBC) held its annual public meeting on September 19, 2001 at Fort Erie, Ontario. For information on activities of the INBC please visit: http://huron.lre.usace.army.mil/ijc/niagara.html.

The U. S. Army Corps of Engineers (USACE) conducted a half-day workshop on the Lake Michigan Potential Damages Study (LMPDS) as part of the State of the Lake Michigan conference in Muskegon, Michigan on November 6, 2001. The workshop was well attended by interested members of the public and participating groups. Further information on this study is available at: http://huron.lre.usace.army.mil/coastal/LMPDS/.

Commercial Navigation

The Soo Locks opened the 2001 shipping season as scheduled on March 25, 2001. Through November 2001, the estimated tonnage passing through the Soo Locks at Sault Ste. Marie, MI was about 1% below the comparable 2000 tonnage. U.S. and Canadian vessels carried 16.0 and 52.2 million short tons of cargo respectively, while foreign vessels carried about 6.9 million short tons. Foreign cargo tonnage was up 13% over comparable 2000 tonnage.

Through November, an estimated total of 4,320 cargo vessels had transited the locks, as compared to 4,322 passages the previous year. Of these, 2,270 passages were U.S.-flagged vessels, 1,250 were Canadian, and 800 were foreign vessels (ocean going or "salties"). In addition to the cargo vessels, there were 2,470 transits through the Soo Locks by other types of vessels, such as pleasure craft, tour boats, Coast Guard, and scientific research vessels. The USACE can keep the locks open until January 15, 2002 should shipping interests request it.

The Canadian lock at Sault Ste. Marie, ON reopened on May 15, 2001. By season-end on October 15, 2001, a total of 3,215 vessels (primarily pleasure craft and tour boats, commercial and government vessels) carrying 109,380 passengers had transited the lock. It is expected to reopen in mid-May 2001.

According to preliminary figures through November 2001, tonnage passing through the Lake Ontario-Montreal section of the Seaway was down about 15.5% over 2000 at about 27.4 million metric tons (MMT). Vessel traffic was down about 14.6% over 2000 at 2,353 (combined lake and ocean vessels). These figures are provided by the St. Lawrence Seaway Development Authority.

Preliminary data on the type of cargo transiting the Seaway through November 2001 include: iron and steel (down 46.0% to about 2.4 MMT); grain (down 11.8% to about 9.7 MMT); coal (up 9.4% to about 0.36 MMT); general cargo (down 42.4% to about 2.9 MMT); and petroleum products (up 1.5% to about 1.5 MMT). For additional detail on Seaway activities visit: http://www.greatlakes-seaway.com/.

2001 Great Lakes Updates

These reports were published in 2001:

2000 Annual Summary, Vol. No. 142, January 5, 2001.

Nature's Effect on Great Lakes' Water Levels, Vol. No. 143, April 5, 2001.

"Tall Ships" on the Great Lakes, Vol. No. 144, July 3, 2001.

Current Great Lakes Studies, Vol. No. 145, October 5, 2001.

Previous Update articles are available at: http://huron.lre.usace.army.mil/updates/

General Notes

All elevations shown in this article are referenced to the IGLD 1985 datum.

Information about the Great Lakes water levels outflows, and weather is available on the Internet. Please visit: http://huron.lre.usace.army.mil/. Other important Internet sites are referenced here.

International Lake Ontario - St. Lawrence River Study

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January 2002

Dear Friend of the Great Lakes,

The purpose of this insert is to introduce you to a new study important to anyone living around Lake Ontario and the St. Lawrence River. The **International Lake Ontario-St. Lawrence River Study** officially began in early 2001. It was established by the International Joint Commission to determine how the management of the water levels in the lake and river can be improved. The levels have been managed since 1960 after the construction of the St. Lawrence Seaway and Power Project. The study will seek to improve conditions for shoreline residents, recreational boaters and the environment while continuing operations at domestic, municipal, and industrial water intakes; commercial navigation; and hydroelectric power production.

The first issue of the study newsletter, ***Ripple Effects***, is available on our web site at http://www.losl.org. Once on our web site, you can register to receive notification of meetings and our newsletter by e-mail.

To be added to our mailing list, please detach this page from the newsletter, fill in the information requested below, fold this sheet on the fold lines in the listed order, tape the top edge closed, and place a first-class postage stamp on the outside. In order to have our mailing list updated for the next edition, we would appreciate your response before February 15, 2002.

Please pass this information on to anyone interested in improving the management of levels on Lake Ontario and the St. Lawrence River. Thank you for your interest.

Sincerely,

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