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US Army Corps of Engineers
Detroit District

Great Lakes Update

2009 Annual Summary

Lake Superior and Lake Michigan-Huron remained below their historical averages during 2009. Lake Superior continued its longest stretch of below average levels, while Lake Michigan-Huron continued its second longest stretch. Only the period from 1930 to 1942 was a longer stretch of below average water levels on Lake Michigan-Huron. While both lakes were below average for the duration of 2009, they were above the levels of 2008 for most of the year. Only the months of July and August were below 2008 on Lake Superior. Lake Michigan-Huron was as much as a foot above 2008 water levels. Lakes St. Clair, Erie and Ontario were above or near their historical averages during 2009. These lakes were also above or near their levels of 2008.

Figure 1 shows the snow water equivalent (SWE) across the Lake Superior basin during March 2009. The National Weather Service conducts snow surveys using low flying aircraft over the northern Great Lakes each year to help with Great Lakes water supply predictions. The amount of water contained in the snowpack can vary throughout the year and is a large part of the seasonal rise of Lake Superior. The SWE shown in figure 1 is 70% of average, though a major storm did bring upwards of 20 inches of snow to the Lake Superior basin in mid-April. This snow quickly melted providing more recharge to the lake.

Even with the below average SWE, Lake Superior rose 13 inches in 2009, while on average the seasonal rise is 12 inches. Lake Michigan-Huron's seasonal rise was 19 inches versus an 11 inch average rise.

Hydrology

The larger than average rises on Lake Superior and Lake Michigan-Huron can be attributed to a combination of factors. Precipitation at the end of 2008 was much above average across the entire Great Lakes basin, causing a slower than average decline on Lake Superior and a slight rise in level on Lake Michigan-Huron. December also saw a large runoff event as warm temperatures melted a large snowpack. Lakes St Clair, Erie and Ontario began their seasonal rises in January following a very wet and warm end of December. Lake St. Clair and Lake Erie remained a few inches above average throughout 2009. Lake Ontario was as much as 9 inches above average, before falling to an inch below average by November.

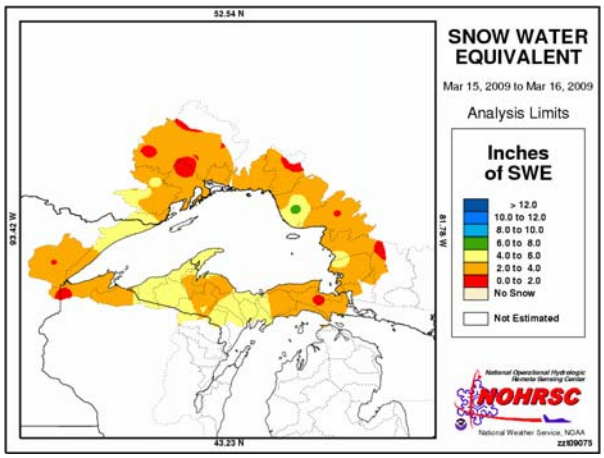

Figure 1: 2009 Snow Water Equivalent

During March, the Great Lakes had their maximum extend of ice cover for the winter of 2008 – 2009, as shown in Figure 2. Very cold winter temperatures lead to a thick ice cover on most of the Lakes, with Lake Superior freezing completely over for the first time in a number of years. A solid ice cover limits evaporation from the lakes. During the ice free months evaporation was slightly above average on all the lakes due to colder than average temperatures. Current ice cover on the lakes is shown in Figure 3.

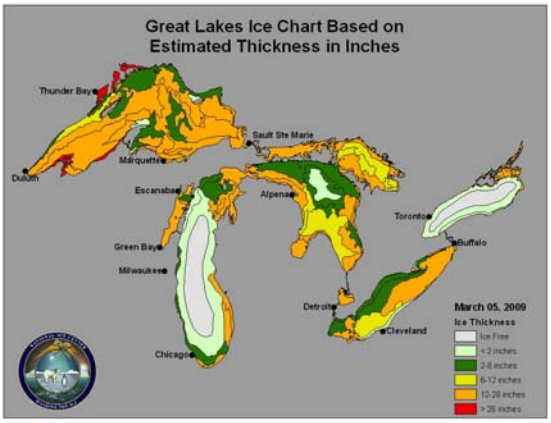

Figure 2: Great Lakes Ice Cover, March 2009

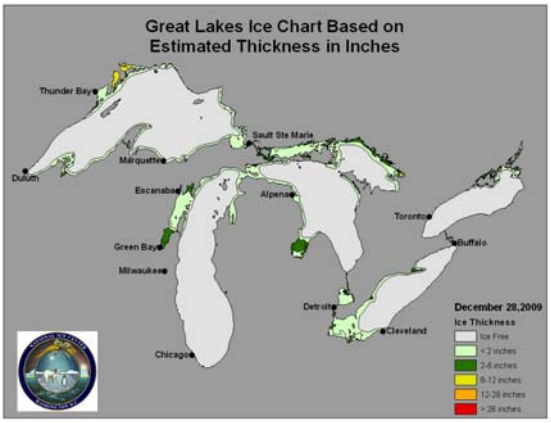

Figure 3: Current Great Lakes Ice Cover

Forecast

The latest *Monthly Bulletin of Lake Levels for the Great Lakes* projects water levels on all of the Great Lakes through June of 2010. Lake Superior is expected to remain 3 to 4 inches below its long term average, but a few inches above the levels of 2009. Lake Michigan-Huron is also forecasted to remain below average through June, but above or near 2009's levels. Lake Michigan-Huron's December monthly mean level of 572.22 feet is the highest end of year level since December of 1998. With very wet conditions during the next few months, both Lake Superior and Lake Michigan-Huron could reach their long-term averages. Lake Superior and Lake Michigan-Huron have not had a monthly-mean level at or above average since February of 2005 and December of 1998 respectively.

The forecast for Lake St. Clair shows water levels 4 to 6 inches below last year and near average through June. Lake Erie is predicted to be 3 to 9 inches below last year and near its average during the next 6 months. Lake Ontario is projected to be 2 to 6 inches below average and 8 to 15 inches below last year through June.

Water Levels

The *Monthly Bulletin of Lake Levels for the Great Lakes* displays water levels on the Great Lakes for the years 2008 and 2009. The following discussion is based on monthly mean levels.

Lake Superior levels started 2009 at 600.85 feet, about 8 inches below its January long-term average (LTA). Levels peaked in September at 601.74 feet, about 5 inches below its September LTA. Lake Superior normally peaks in August or September. Lake Superior levels ended the year at 601.38 feet, about 4 inches below its December LTA.

Lakes Michigan-Huron began the year at 577.46 feet, about 12 inches below its January LTA. The lakes peaked at their normal time in July at 578.87 feet, about 5 inches below the July LTA. The year ended with the level at 578.15, about 5 inches below the December LTA.

Lake St. Clair levels started the year at 573.98 feet, about 4 inches above its January LTA. Levels peaked in June, at 574.97 feet, about 3 inches below the July LTA. Levels ended the year at 573.72 feet, about 2 inches below the December LTA.

Lake Erie began 2008 at 571.03 feet, about 2 inches above its January LTA. Levels peaked in May, at 572.38 feet, about 6 inches above its May LTA. Levels ended the year at 570.93 feet, about 1 inch higher than the December LTA.

Lake Ontario started the year at 245.28 feet, about 8 inches higher than its January LTA. Levels peaked in May at 246.79 feet, about 7 inches above the May LTA. The year ended with the level at 244.23 feet, about 4 inches below the December LTA.

Lake Superior Regulation

In 2009 Lake Superior water levels ranged from 4 to 7 inches below LTA. Outflows continued to be set by the International Lake Superior Board of Control (Board) using Regulation Plan 1977-A. The Board is a bi-national body, reporting to the International Joint Commission (IJC) on boundary water issues including the management of Lake Superior outflow. Flow changes resulting from monthly Lake Superior regulation are accomplished by varying the amount of water allocated to hydropower production and, when necessary, opening or closing gates in the Compensating Works at the head of the St. Marys Rapids.

Overall, water supplies to Lake Superior were below average for 2009. While January through April, and August supplies were above average, the remaining months had below average supplies. Annual precipitation over the Lake Superior basin was below average during 2009. While April, August and October were above average, precipitation was below average for the other months. Total 2009 Lake Superior basin precipitation was 23.67 inches, 6.78 inches below the usual annual amount.

A one-half gate open setting was maintained during 2009 in the Compensating Works in order to maintain minimum flow requirements in the St. Marys Rapids and to support spawning in the fishery. To facilitate the refurbishment of Canadian Gates 6 and 8, Gates 7, 8, 9 and 10 were closed and Gates 2, 11, 13 and 15 were opened on June 17 to 8 inches each in order to maintain the one-half gate open equivalent.

Flow variations due to peaking and ponding operations by the hydropower plants at Sault Ste. Marie, Michigan and Ontario cause St. Marys River water levels downstream from the plants to fluctuate. When Lake Superior levels and outflows are below average, these fluctuations can be of concern to commercial navigation. When water levels at the U.S. Slip Gauge fall below 577.72 feet (IGLD 1985) ponding by the hydropower entities is suspended on weekends and holidays with an 8-hour window of peak flow required for each weekend and holiday day. Water levels were high enough that starting with the March 25, 2009 opening of the Soo Locks ponding was allowed on weekends and holidays by the Board for the entire 2009 shipping season.

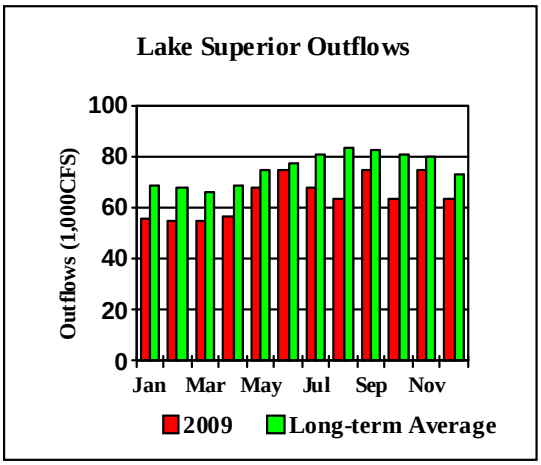

Figure 4: Lake Superior Outflows

Outflows were 84% of average in 2009, ranging from a low of 54.7 tcfs in February to a high of 74.9 tcfs in June. Figure 4 above compares the monthly Lake Superior outflows in 2009 to long–term average flows for the 1900-1999 period of record.

Lake Ontario Regulation

On December 11, 2008 the International St. Lawrence River Board of Control (Board) reviewed Lake Ontario – St. Lawrence River system conditions and determined that Lake Ontario levels were within Plan 1958-D limits. The Board decided to continue outflow releases in accordance with Plan 1958-D as had been done since June 7, 2008. However, to assist in ice formation in the river the Board decided that outflows could be varied from those called for by the plan depending on whether or not ice was forming. Provision was also made for outflow variation in the event that a critical situation arose. As of December 12, 2008 Lake Ontario's water level was at its long-term-average (LTA) of 244.52 feet, 9 inches above the year ago level, with no water stored on, or removed from, Lake Ontario relative to Plan 1958-D.

Ice formation began on the Beauharnois Canal near Montreal on December 21. Lake Ontario outflows were reduced starting December 22 to promote formation of a smooth stable ice cover on the St. Lawrence River. An unexpected melt and runoff in the last week of December increased inflow to Lake St. Louis and caused Lake Ontario levels to rise 7 inches during the month to a level of 245.08 feet at the end of December. On average (1918 – 2008) Lake Ontario doesn't rise in December. Accumulated outflow deviations from Plan 1958-D as of January 2,

2009 were equivalent to about 0.6 inches of water removed from Lake Ontario relative to Plan 1958-D.

Ice cover began developing in key reaches of the International Section of the river upstream of the Moses-Saunders Dam on January 5. January flows were varied from Plan 1958-D flows as needed to promote formation of a smooth ice cover in both the International Section and the Beauharnois Canal.

Attempts to prevent premature ice bridging at the Iroquois Dam by increasing flows above Plan 1958-D flows and suspending peaking were unsuccessful and by January 22, even with the resultant higher velocities from the increased flows, the ice had bridged across the openings between the Iroquois Dam piers, thus preventing ice floes from passing downstream to form cover in the Ogden Island channels. On January 12 the Board decided to reduce the flow back to Plan Flow, and to resume peaking. Total accumulated deviations were equivalent to 0.9 inches of water removed from Lake Ontario relative to the Plan. Beauharnois Canal ice formation was essentially complete on January 14 and in the International Section of the river by January 19.

During the month of January Lake Ontario's level rose about 4 inches to 245.37 feet. On average Lake Ontario rises 2 inches in January. During the last week of January outflows were increased gradually to the expected Plan flow for February resulting in an over-discharge during the month and accumulated deviations from Plan 1958-D of about 1 inch of water removed from Lake Ontario.

Due to a January snowmelt and runoff the water supply to Lake Ontario basin was above average in February for the fourth consecutive month. Lake Ontario's level had risen continuously since its seasonal low in late November 2008. During February the level rose 3 inches, while on average it only rises 1 inch. The accumulated outflow deviations were equivalent to 0.4 inches of water removed from Lake Ontario and the level had risen to 245.60 feet, 9 inches above average and 2 inches above a year ago.

On March 4 the Board reviewed conditions and elected to continue following Plan 1958-D flow specifications, adjusting as needed for ice operations and critical needs. Ice cover melted rapidly during the first week of March and had dissipated from the system by March 21. Ice booms in the International Section were removed March 26. During the month Lake Ontario's level rose 5 inches, due to snowmelt and precipitation, to 245.96 feet, 8 inches above average and 0.8 inches above year ago levels. On average the level rises 6 inches in March.

On March 31 the Board met and decided to continue with Plan specified flows allowing for adjustments as needed. It was agreed to keep the Lake St. Louis level at Pointe Claire below the flood alert level of 72.5 feet. As of March 31 accumulated Lake Ontario deviations were equivalent to about 0.3 inches of water removed. The first spring snowmelt freshet of the Ottawa River had begun.

By April 4 a combination of the Ottawa River freshet and significant precipitation had resulted in the level of Lake St. Louis at Pointe Claire rising to 71.9 feet. On April 5 the Board decreased the Lake Ontario outflow to prevent flooding Lake St. Louis. On April 7 Lake Ontario outflows were further reduced as the level of Lake St. Louis was estimated to have risen above the 72.5 foot flood alert level and was continuing to rise slowly. It reached a peak of 72.90 feet on April 7, 5 inches above flood alert level but 4 inches below flood threshold. Decreased Lake Ontario outflows coupled with westerly winds caused Lake St. Lawrence levels upstream of the Moses-Saunders Dam to rise above the flood alert level of 242.35 feet on April 8 but remained below flood stage. From April 8 – 11 the Iroquois Dam gates were partially closed to help suppress high Lake St. Lawrence levels.

By July 1 Lake Ontario's level was at 246.55 feet, 4 inches above its LTA and 0.4 inches below year ago levels. On July 15 the Board reviewed conditions in the Lake Ontario-St. Lawrence River system. Monthly Lake Ontario water supplies had been above average since December but lake levels remained within the range specified by the IJC's criteria. St. Lawrence River levels were above average but within normal ranges. Lake Erie's level was about 4 inches above average indicating the possibility of above average supplies in the near future. Little risk existed that either the upper or lower Lake Ontario level criteria would be exceeded in the next six months.

The Board decided to release plan specified outflows with adjustments as needed to meet hydropower maintenance and Port of Montreal needs. As of September 14 Lake Ontario's level had fallen to

245.40 feet, 2 inches above its LTA and 2 inches below year ago levels. There was no accumulated outflow deviation from Lake Ontario.

The board met on September 15 to review conditions. Monthly water supplies to Lake Ontario had been above average for the past 10 months and Lake Ontario levels had also been above average but within the range specified by the Orders of Approval. There had been no deviations since May 1. Lake Ontario and Lake St. Lawrence levels had declined at a steeper rate than usual due to dry weather and in response to Plan 1958-D requirements. Short term deviations to raise Lake St. Lawrence levels to facilitate boat haul-out were discussed but it was decided that deviations would only be considered under critical conditions.

On September 21 the Board received two requests (one from each side of the border) to reduce outflows to assist with boat haul-out. The first three weeks of September had been very dry resulting in a sharp drop in water level. Lake Ontario's level was at 245.11 feet, at its LTA, slightly below year ago levels at that time. Water levels in the International Section of the St. Lawrence River had generally been above average the past several months, but fell below average at the end of August. Levels in the St. Lawrence River near Montreal had been fluctuating near average during the summer.

The Board decided to continue releasing outflows in accordance with the Plan, but authorized release of lower outflows over the September 25-27 weekend to help recreational boaters on Lake St. Lawrence with haul-outs. This reduction was expected to cause levels in the St. Lawrence River in the Montreal area to be up to 4 inches lower over that weekend.

By the end of September Lake Ontario's level was 244.98 feet, falling 11 inches during the month. Lake Ontario normally falls 5 inches in September. Except for the September 25-27 reduction, outflows were as specified by Plan 1958-D in September and October.

On October 27 the board met to review conditions. As of October 26 Lake Ontario's level was at 244.58 feet, 2 inches below average. The Board decided to continue releasing plan specified outflows but permit over-discharges to allow incoming vessels to reach the Port of Montreal, or to meet critical hydropower needs. Lower outflows were also authorized if needed to avoid flooding Lake St. Louis or other unforeseen critical conditions. Total accumulated deviations remained equivalent to 0.1 inch of water stored on Lake Ontario. It was decided to retain this small amount of water on the lake until late December when over-discharges are typically needed to smooth transition into winter-time Plan 1958-D limits.

Outflows during November were as specified by Plan 1958-D, except for an unintentional deviation the week of November 6. At the end of the month Lake Ontario's level was at 244.32 feet, 2 inches below average. Lake Ontario fell 4 inches during November, while on average it falls 1 inch.

As of the end of December Lake Ontario's level was at 244.36 feet, 2 inches below its LTA and 3 inches below its year ago level.

Figure 5 compares 2009 Lake Ontario outflows with period of record (1900-1999) monthly LTA outflows. Further information on ISLRBC activities can be found on the internet at: *http://www.islrbc.org*.

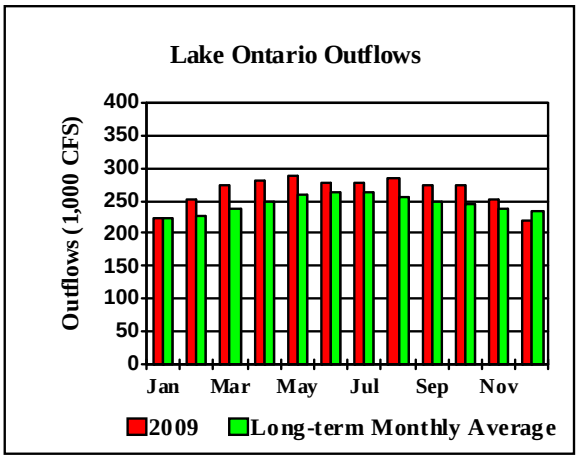

Figure 5: Lake Ontario Outflows

Public Concerns

While water levels were less of a concern during 2009, and continued below average levels on Lakes Superior and Michigan-Huron caused some concern to shipping, the weak economy had a significant impact on the volume of goods being transported on the lakes. Potential impacts due to climate change and variability, commercial bottling of water, regulatory practices, concern about erosion in the St. Clair River and control of invasive species continued to draw public attention.

International Upper Great Lakes Study

Since 2007, a bi-national team of experts, with extensive public input, has been investigating whether there are ongoing changes in the St. Clair River that might be affecting water levels in the upper Great Lakes. In its final Phase 1 Report that was released on December 15, 2009, the International Upper Great Lakes Study Board found that:

- There has been no significant erosion of the channel in the upper reach of the St. Clair River bed since at least 2000.
- Based on 15 different analyses, an increase in the river's conveyance capacity accounts for 2.8 to 5.5 inches of the decline in head difference between Lakes Michigan-Huron and Erie from 1963 to 2006; however, this change is not ongoing and there has been a slight decrease in conveyance capacity since 2000.
- Climate is the main driver of lake level relationships over time and accounts for 3.5 to 6.7 inches of the decline in head difference. In particular, hydroclimatic change contributed to a substantial decline in net water supplies to Lake Michigan-Huron in the most recent decade.

Overall, the Study Board also found that the difference in water levels between Lake Michigan-Huron and Lake Erie (head difference) declined on average by about 9 inches between 1963 and 2006. They also found that shifts in the earth's crust as it continues to adjust to the retreat of glaciers account for 1.6 to 2 inches of the decline in head difference with the apparent resulting decrease in water levels being more pronounced in the Georgian Bay region of eastern Lake Huron.

As directed in its mandate, the Study Board also reviewed past proposed remedial works and new innovative approaches to modifying flows in the St. Clair River and identified a range of options that might be employed if remediation were deemed necessary. The Study recognizes that there have been a number of dredging projects in the past and the governments made commitments for remediation. The implications of these past dredging projects are beyond the scope of the Study. The complete scientific report and a summary for the public are posted at: *www.iugls.org*. The 34 scientific reports that form the foundation for the main report are also available online.

Key Recommendations

Given that the change in conveyance capacity is not ongoing, is small relative to the degree of scientific uncertainty associated with the various analyses and data measurements and appears to be decreasing, the Study Board did not recommend remedial measures in the St. Clair River at this time. The Board also recommended that the governments of Canada and the U.S. undertake cooperative efforts to improve the monitoring and analysis of Great Lakes water supplies and connecting channel flows.

Independent Peer Review

Throughout the Study, both methodological plans and technical work products including key chapters and the full draft report were reviewed by independent experts chosen by the American Society of Civil Engineers - Environmental and Water Resources Institute and the Canadian Water Resources Association. These expert reviewers have given generally positive ratings and provided many constructive recommendations that have resulted in improvements to the final report, ranging from the need for additional analysis to the need to better quantify scientific uncertainty. All reviews and Study Board responses are available at the ASCE website,

http://content.ewrinstitute.org/committees/IUGLS.cfm

Public Input

A bi-national Public Interest Advisory Group (PIAG) with expertise from a wide range of interests has provided advice to the Study Board on public involvement and outreach issues. The U.S. and Canadian co-chairs of PIAG both serve on the Study Board, providing direct involvement by the public in key decisions. Since 2007, the Study has held 34 public meetings hosted by PIAG members throughout the upper Great Lakes basin, including 17 meetings during a 90-day consultation period following release of a draft report on May 1, 2009.

All public comments received by the August 1 deadline and Study Board responses are posted on the Study website as well as a detailed report on PIAG activities over the past two years, including a synthesis of the public views provided during the consultation. Generally, it appeared that the public found that Study outcomes were acceptable with

respect to the mandate, resulted from an open and unbiased process and reflected sound science. However, it should be noted that many comments from the Georgian Bay area expressed disagreement with the Study's recommendation against remediation. The International Joint Commission has announced it will hold public hearings regarding the report in 2010, allowing the public ample time to review the report, related technical studies and the independent peer reviews.

Phase 2 – Development of Lake Superior Outflow Management Alternatives

The examination of the St. Clair River is part of a broader evaluation of the regulation of Lake Superior outflows that is expected to produce recommendations in 2012 regarding improvements to the control orders for the international compensating works and power dams on the St. Marys River at Sault Ste. Marie. Many activities related to Phase 2 took place during 2009 including data collection and the development of draft performance indicators for all interests. These indicators will be used in a shared vision model to evaluate alternatives to the present Lake Superior regulation plan, Plan 1977-A. The Study Board recommends that this phase of the Study also examine whether mitigation measures in the St. Clair River might be necessary based on its assessment of the potential future impacts of climate change on upper Great Lakes levels.

More information about the Study can be found on its Web Site at *www.iugls.org*.

Working Group to discuss future regulation of Lake Ontario-St. Lawrence River water levels and flows

During the past year, the IJC put together a process to seek consensus among governments in the Lake Ontario-St. Lawrence River basin on the future regulation of water levels and flows. The process involves an ad hoc group, called the Lake Ontario-St. Lawrence River Working Group, with members from the federal governments of Canada, the United States, the governments of Quebec, Ontario and New York, and the IJC. During its first meeting in Ottawa, Ontario in December, the Working Group reviewed the regulation of the system, discussed potential goals for regulation and agreed to meet again in early 2010.

The IJC approved the construction and operation of the Moses-Saunders Dam, located at Massena, New York and Cornwall, Ontario and oversees the flows through the project under the Boundary Waters Treaty of 1909. Regulation of the flow of water through the dam affects levels and flows on Lake Ontario and the St. Lawrence River downstream to Trois Rivières, Quebec. The basin is home to 12 million people and a diverse range of interests that are affected by water levels and flows, including ecosystem health, commercial shipping, power generation, shoreline landowners, recreational users of the waters, and municipal, industrial and domestic water users.

The current approach to regulating levels and flows is more than 50 years old. In 2000, the IJC established a study board to consider whether regulation should be modified to address a range of new issues, including changing stakeholder needs, environmental concerns, recreational boating, climate change and improvements in technology. Since receiving the study findings, the IJC has been working to find an approach to regulating levels and flows that takes all interests – environmental, social and economic – into account. The IJC will consider the Working Group's advice in formulating its approach for future regulation. It will also seek public comment and the concurrence of the two federal governments on any proposal to change the current regulation approach.

Meetings with the Public

The International Lake Superior Board of Control held its annual public meeting on June 4, 2009 at Lake Superior State University's Walker Cisler Center in Sault Ste. Marie, Michigan.

The International Niagara Board of Control met with the public on September 16, 2009 at the St. Catherines Museum in St. Catherines, Ontario.

The International St. Lawrence River Board of Control held two meetings with the public. The first was a workshop held in Oswego, New York on March 17-18, 2009. The second was held in Burlington, Ontario on September 15, 2009. Both meetings featured public teleconferences. More information on the activities of this Board can be found on their website: http://www.islrbc.org/

Commercial Navigation

The Soo Locks opened the 2009-2010 shipping season on March 25, 2009 as scheduled and will close on January 15, 2010. The 2008 – 2009 shipping season saw a total of 78.47 million short tons (MST) pass through the locks down 3.9% from the 2007 – 2008 season's 81.68 MST.

Through November 2009, the estimated total tonnage passing through the Soo Locks at Sault Ste. Marie, MI was about 46.33 MST down 35.7% from the comparable 2008 tonnage of about 72.08 MST. U.S. and Canadian vessels carried 31.34 MST and 13.31 MST of cargo respectively, as compared to respective 2008 tonnages of 54.04 MST and 16.01 MST. Foreign flagged vessels carried about 1.67 MST, down from the 2008 tonnage of 2.03 MST.

An estimated total of 6,613 vessels transited the locks through November as compared to 7,108 vessels the previous year. Cargo vessels totaled 2,641 compared to 3,898 in 2008. There were 1,350 U.S. flagged vessels, 1,083 Canadian flagged vessels and 208 foreign flagged vessels (ocean going or "salties"). Other vessels transiting the locks such as pleasure craft, tour boats, Coast Guard and scientific research vessels numbered 3,972. The U.S. Locks are scheduled to close on January 15, 2010 and reopen on March 25, 2010.

The opening of the Canadian lock at Sault Ste. Marie, Ontario was delayed until August 2, 2009 following a malfunction of the lock gate closure system on October 1, 2008. A mechanical failure of the lock's two upstream valves resulted in a closure from August 25 until September 4. The lock closed for the season on October 15. A total of 767 vessels carrying 25,325 passengers transited the locks this season. Primary users include tour boats and pleasure craft, as well as some commercial and government vessels. The lock is expected to reopen on May 15, 2010.

Preliminary figures through November 2009 indicate the tonnage passing through the Lake Ontario-Montreal section of the St. Lawrence Seaway was down about 32.8% from 2008 at about 18.31 million metric tons (MMT). Vessel traffic was down about 14% from 2008 at 2,156 total lake and ocean vessels.

Preliminary data on the type of cargo transiting the Seaway through November 2009 include iron ore down 59.57% to about 3.495 MMT; iron and steel down 55.56% to about 0.728 MMT; grain up 6.29% to about 6.966 MMT; coal down 26.39% to 0.685 MMT; general cargo down 51.93% to about 0.874 MMT; and petroleum products down 36.71% to about 0.997 MMT. For additional details on Seaway activities visit their website at http://www.greatlakes-seaway.com/. The St. Lawrence Seaway Development Corporation provided these figures.

New Lock

A new "Poe-sized" lock is proposed to replace the existing Davis and Sabin Locks at the Soo Locks complex at Sault Ste. Marie, MI. The purpose of this project is to provide for more efficient movement of waterborne commerce. The Water Resources Development Act of 2007 directs that construction of the new lock shall be at Federal expense. In FY 2009 funds in the amount of $17,000,000 were appropriated. A ground breaking ceremony marking the initiation of construction was held June 30. Funds were used to award two construction contracts one for the cofferdam construction and one to deepen the downstream approach channel. Additionally, design continued on the plans and specifications for the guide walls/upstream channel excavation and the lock chamber. In FY 2010 the two construction contracts will be completed. Also, design efforts on the plans and specifications for the guide walls/upstream channel excavation and lock chamber are scheduled to be completed.

2009 Great Lakes Updates

2008 Annual Summary, Vol. No. 174, January 2009.

Diversions in the Great Lakes Basin, Vol. No. 175, April 2009.

The Boundary Waters Treaty of 1909 100 Years of Cooperation, Vol. No. 176, July 2009.

Great Lakes Information Available on the Detroit District Website, Vol. No. 177, October, 2009.

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 at: *http://www.lre.usace.army.mil/glhh*