

**Strategy for Evaluating and Improving the
Rules for Managing Releases from Lakes
Ontario and Superior**

Original Strategy Developed September 1, 2020

Updated October 7, 2024



Cover Photo: Grimsby, Ontario – (photo credit Daniel Leger)

Great Lakes – St. Lawrence River Adaptive Management Committee

(Status as of September 18, 2024)

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Great Lakes - St. Lawrence River Adaptive Management Strategy

Executive Summary

The International Joint Commission (IJC) issued updated Supplementary Orders of Approval for the structures used to regulate releases on Lake Superior in 2014 (Plan 2012) and Lake Ontario in 2016 (Plan 2014). Both orders require the IJC to conduct a review of the results of regulation under each order within 15 years of issuance. The IJC created the Great Lakes-St. Lawrence River Adaptive Management (GLAM) Committee in 2015 to fulfill this obligation.

This paper describes a flexible strategy developed by the GLAM Committee for the ongoing evaluation and improvement of the regulation plans through adaptive management. Adaptive management is a structured, iterative cycle for improving actions through long-term monitoring, modelling, and assessment. The GLAM Committee is responsible for implementing many components of the adaptive management cycle, providing scientifically sound data, knowledge, and technologically advanced tools for supporting management decisions. Based on the information and tools provided by the GLAM Committee, the International Lake Ontario-St. Lawrence River (ILOSRLB) and the International Lake Superior Board of Control (ILSBC) may recommend to the IJC that revisions to the regulation plans be made. The IJC, with public input and government concurrence, will decide whether to modify the regulation plans. The GLAM Committee also supports the International Niagara Board of Control as necessary.

With the goal of further moderating flooding that occurred because of record water supplies to the Lake Ontario-St. Lawrence River system in 2017 and 2019, the IJC asked the GLAM Committee to review Plan 2014 sooner than the 15 years specified in the Order. Phase 1 of this expedited review was a 20-month effort that focused on assessing flow releases with high-water supplies under ILOSRLB deviation authority and was completed in November 2021. Phase 1 provided the ILOSRLB with better information to help them explore alternative deviation decisions should extremely high water as seen in 2017 and 2019 be repeated in the coming years. The GLAM Committee gathered information on the impacts to various interest groups and integrated that information into an interactive decision support tool that demonstrates how outflow adjustments might change water



levels and impacts to interests and regions under certain weather conditions to help better inform the ILOSLRB on whether an outflow strategy might improve or harm the situation in one area versus another.

Phase 1 also established a Public Advisory Group to help the GLAM Committee seek potential improvements to regulation by contributing knowledge about local water level impacts and input on the assessment methods used in the review.

Phase 2 of the expedited review includes a three-year review of Plan 2014 rules and operations. Phase 2 will provide a comprehensive assessment of Plan 2014 under many possible water supply and level extremes, both high and low, as well as considering impacts from climate change, to determine the risks and implications to all interests of changes to plan rules and limits. The GLAM Committee is working with the ILOSLRB to identify decision factors for assessing whether changes to the regulation plan are warranted. The ILOSLRB's recommendations will be sent to the IJC for consideration in the Spring 2025.

The GLAM Committee will renew its focus on the review of Plan 2012 in 2025 as staff and resource commitments from the expedited review allow. The renewed emphasis is expected to focus on filling gaps and updating tools from the International Upper Great Lakes Study (IUGLS), with significant effort on improving the understanding of regulation impacts in the St. Marys River and Rapids. Lessons learned from the expedited review of Plan 2014 and scientific developments since the implementation of Plan 2012, including climate science, will be incorporated into the review of Plan 2012.

Following the expedited review, the GLAM Committee will also leverage data, information and tools gained through the review to improve the decision support tool. Longer term, the GLAM Committee will continue to review Plans 2012 and 2014 under a full range of conditions and multiple objectives on a timetable that is consistent with GLAM's directive and considers findings from the expedited review of Plan 2014 to frame an appropriate level of effort. This ongoing effort will incorporate new and evolving science, continuous monitoring, and any other physical, economic, environmental or social changes that might influence regulation decisions.



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Great Lakes - St. Lawrence River Adaptive Management Strategy

Background: Origin and Purpose of the GLAM Committee

The International Joint Commission (IJC) was created by the Boundary Waters Treaty of 1909 between Canada and the United States, which share the Great Lakes. The IJC is responsible for the regulation of outflows from Lake Superior and Lake Ontario. The IJC issued updated Supplementary Orders of Approval for the structures used to regulate releases from those two lakes—Lake Superior in 2014 (Plan 2012) and Lake Ontario in 2016 (Plan 2014).

The revised Orders stipulate that releases from Lake Superior and Lake Ontario be made according to the rules governing releases, better known as regulation plans, approved by the IJC and consistent with criteria contained in the Orders. Both Orders require the IJC to conduct a review of the results of regulation under each Order within 15 years of it being issued (mid-2029 for Plan 2012 and the end of 2031 for Plan 2014) and report its findings to Canada and the United States. The IJC created the Great Lakes-St. Lawrence River Adaptive Management (GLAM) Committee in early 2015 to fulfill this obligation. In the 2015 directive that established the GLAM Committee, the IJC assigned the Committee with ensuring the monitoring, modeling, and assessment required for an ongoing evaluation of the regulation plans is undertaken. Further, the GLAM Committee was tasked with providing information to the Boards on how Plan 2012 and Plan 2014 affect uses and interests in their respective systems, with a particular emphasis on mid-term to long-term assessments. The GLAM Committee also reports to and is available to provide support to the International Niagara Board of Control as requested¹.

In February of 2020, following record high water levels on Lake Ontario in 2017 and 2019, the IJC ordered an expedited review of Plan 2014 by the GLAM Committee. That review had two phases with [Phase 1](#) completed in November 2021 and [Phase 2](#) to be completed in the Spring of 2025. This expedited review has significantly altered the timelines of the ongoing review of Plan 2014 and has also impacted the review of Plan 2012. The implications of the expedited review of Plan 2014 are reflected in this Strategy.

¹ A partial structure also exists above Niagara Falls on the Niagara River, known as the Chippawa-Grass Island Pool (CGIP) Control Structure. This structure does not regulate the outflows of Lake Erie and therefore while the GLAM Committee does also report to the International Niagara River Board of Control, because this Board does not regulate outflows from Lake Erie, it is not included in this strategy.



Adaptive Management and Regulation Plan Assessment

Adaptive Management is a process for continual learning and improvement

Adaptive management allows decisions to be reviewed, adjusted and revised as new information and knowledge becomes available and/or as conditions change (IUGLS, 2012). This thoughtful, deliberative assessment is informed by long-term monitoring and modelling. It is an especially effective strategy for making informed decisions about managing natural resources that are affected by uncertain factors such as weather and future climate. This structured, repetitive cycle for improving actions is necessary to ensure outflow from Lake Ontario and Lake Superior meets established goals of the regulation plans.

The regulation plans for Lake Ontario- St. Lawrence River outflows (Plan 2014) and Lake Superior outflows (Plan 2012) were each selected based on evaluations using simulations of their potential benefits and impacts relative to the regulation plans that were previously in place. Adaptive management compares actual, observed outcomes to expected results to improve and re-calibrate predictive impact models and reduce uncertainties. The improved simulation models can then be used to assess the ongoing performance of the regulation plans and formulate and evaluate proposed improvements.

Figure 1 depicts the adaptive management cycle and highlights the importance of collaboration and institutional arrangements for linking the science and evaluations to the decision makers.

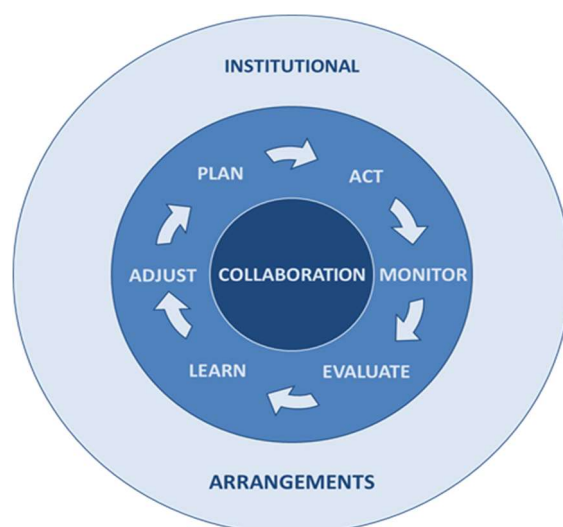


Figure 1: Adaptive management function diagram (IJC, 2008)



The GLAM Committee’s Role

Ultimately, the GLAM Committee provides the science and information necessary to assist those who are making the decision on whether to make changes to the regulation plan.

The GLAM Committee is responsible for fulfilling a significant portion of the adaptive management cycle, but not all of it. The GLAM Committee must rely on collaboration with others. Because the GLAM Committee is not a decision-making body, it must work with the decision-makers — the IJC and its Boards, specifically the International Lake Ontario-St. Lawrence River Board (ILOSRLB) and International Lake Superior Board of Control (ILSBC) – in reviewing and evaluating the regulation plans. Ultimately, the GLAM Committee provides the science and information necessary to assist those who are making the decision on whether to make changes to the regulation plan.

For its part, the GLAM Committee is responsible for providing scientifically sound data, knowledge, and technologically advanced tools for making management decisions. Based on this information, the Boards may recommend revisions to water flow/level regulation plans to adapt to new or evolving ecological, socio-economic and climate-induced changes within the system over time. In effect, the GLAM Committee is responsible for ensuring the “Monitor”, “Evaluate” and “Learn” components shown in Figure 1 are implemented and that options for the “Adjust” component are provided to the Boards to consider. Based on this information, the Boards may recommend to the IJC that revisions to the regulation plans be made. The IJC, with public input and government concurrence, will decide whether to modify the regulation plans. It is important to recognize that adaptive management must be collaborative and that it relies on many organizations, levels of government and the public to complete the cycle.

Adaptive Management Strategy: Overview

To undertake its portion of the adaptive management cycle, the GLAM Committee reviews the six components of the analyses used in the design and selection of Plans 2012 and 2014 that make up the adaptive management framework (see Figure 2):

1. **Understand and Assess Future Hydrologic Conditions** – assess and prepare a range of hydrologic conditions to effectively test regulation plans.
2. **Calculate Water Levels and Flows** – accurately model water levels and flows through the simulation of how water travels through the system and how regulation rules, water supplies and weather conditions (e.g. ice factors) impact water levels and flows.



3. **Impact Assessment and Predictive Models** – improve and reduce uncertainties inherent in the models that relate water levels and flows produced by regulation plans to socio-economic and environmental impacts (using performance indicators). Determine whether monitoring shows a need to redesign the models of performance and select which of these performance indicators should be used in an update of the integrated modelling framework.
4. **Plan Formulation and Evaluation** – test changes to both the deterministic rules of Plan 2012 and Plan 2014 and protocols for deviations from these rules, simulate the performance of the changes, integrate results and compare them to what is done now.
5. **Decision Support** – visualize and present an array of performance evaluation data to assist the Boards in understanding and weighing tradeoffs and support its efforts to make recommendations for possible changes to the plans or deviation strategies.
6. **Cross-cutting Items** - These include items that apply across both the Plan 2014 and Plan 2012 adaptive management components and include:
 - 6.1 Project Management, including longer term succession planning and strategic efforts,
 - 6.2 Information Management,
 - 6.3 Peer Review,
 - 6.4 Institutional Arrangements including partner collaboration
 - 6.5 Indigenous Engagement, and
 - 6.6 Stakeholder Engagement and Outreach

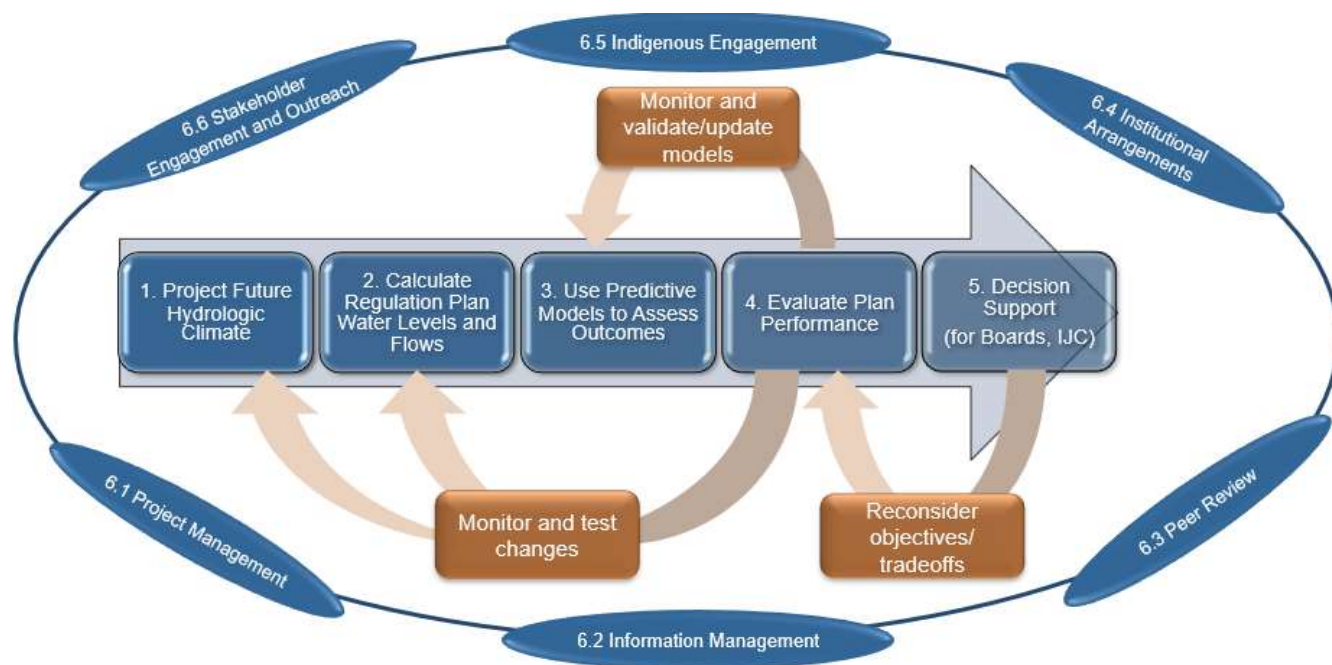


Figure 2: General overview of plan evaluation under an adaptive management approach (Adaptive Management Framework)



Long-Term: Ongoing Review of Lake Superior and Lake Ontario-St Lawrence River Regulation Plans

The full analysis will build on what the GLAM Committee has completed so far. It will include everything completed in Phases 1 and 2 of the Plan 2014 expedited review and also look at broader plan performance when supplies are less extreme but when releases can still influence future high and low water risks.

The 15-year review of Lake Superior and Lake Ontario regulation plans, covering a full range of conditions and multiple objectives, is consistent with the time horizon within the IJC Orders that will run from now through mid-2029 for Lake Superior and the end of 2031 for Lake Ontario. However, the expedited review of Plan 2014, which was initiated to address the impacts of extreme hydrologic conditions, may result in modifications to this timeline. The ongoing reviews of both Plan 2014 (or potentially updated plan) and Plan 2012 consider an assessment of the broad plan performance covering a full range of possible water supplies, including possible extremes and climate change effects as well as performance during less extreme periods but when releases can still have impacts. These less-extreme hydrological conditions are much more common, and they have an influence on the plan evaluations and require a full assessment of plan performance over the longer term.

The ongoing review of both the Lake Superior and Lake Ontario regulation plans is expected to cost \$1.275 million per country per year through the IJC to cover both Plan 2012 and Plan 2014 (or its successor following the expedited review of Plan 2014). The longer-term analysis has the advantage of more careful pacing and the inclusion of important monitoring data acquired during and after the expedited review of Plan 2014.

The ongoing analysis and review of both the Lake Superior and Lake Ontario outflow regulation plans require components of the adaptive management framework to be completed. Some items support the Lake Superior regulation review, some the Lake Ontario review, while others are applicable to the entire Great Lakes- St. Lawrence River system. Some aspects of the Lake Superior and upper lakes work, such as the hydroclimate analysis and flow modeling, are also required for the Lake Ontario-St. Lawrence River plan review, whether for the expedited review or post expedited review. These analyses will build on what has been done so far for the Plan 2014 expedited review and Plan 2012.



The expedited review provides the potential benefit of staggering the 15-year review deadlines between the two regulation plans which are currently set only 2 years apart. A more evenly spaced review period would certainly benefit the GLAM Committee so that resources could be concentrated more intensely on one effort or the other, depending on the timeline of the review. For example, following the completion of the expedited review in 2025, the GLAM Committee will be shifting attention to provide greater focus on the Plan 2012 review due by mid-2029. Of course, ongoing monitoring and model maintenance and improvements would continue for Lake Ontario outflow management in support of longer-term requirements of the ongoing review but the deadline or expectations for the ongoing review could be adjusted following Phase 2 providing additional years between when the Plan 2012 and Plan 2014 (or successor) reviews would occur.

- The IJC has asked the GLAM Committee to conduct a review of Plan 2014 sooner than the required 15 years.
- A two-phase approach for this expedited review has been implemented, with the second phase expected to be complete in Spring 2025.
- The expedited review of Plan 2014 has already begun fulfilling portions of the adaptive management cycle.

Evolution of the Adaptive Management Strategy

Lessons Learned from the Expedited Review

Due to extremely high-water levels on Lake Ontario and the St. Lawrence River (LOSLR) in 2017 and again in 2019, the IJC requested the GLAM Committee to begin preparing a work plan for an expedited review of Plan 2014. In October 2019, the GLAM Committee submitted a two phased approach to the ILOSLRB and IJC with the first phase focused on providing information as quickly as possible to help the ILOSLRB with near-term decisions on deviations from the regulation rules during this high-water level event. The second phase builds on Phase 1 by looking for possible improvements in how Plan 2014 addresses extreme highs and lows under many different water supply scenarios, including climate change, and over the longer-term. The [first phase of the expedited review](#) was completed in November 2021 and included the development of a Decision Support Tool (DST), which blends information on outflow scenarios and potential outcomes to help inform Board decisions when it is authorized to deviate from Plan 2014's prescribed outflows during times of extreme high water. Phase 1 and the DST were focused on providing information to help the Board with the short-term, real-time high-water deviation decisions.



Phase 2 is expected to be essentially complete by April 2025 with the final report and recommendations by the ILOSLRB on whether improvements to Plan 2014 might be possible, submitted to the IJC following a public comment period. In addition to the Plan 2014 review, the GLAM Committee is also funded to begin its review of Plan 2012, the outflow management strategy for Lake Superior, although most of the attention is currently focused on the expedited review of Plan 2014.

The expedited review of Plan 2014 provides a basis for updating the long-term approach that the GLAM Committee needs to take to successfully evaluate regulation plans on a regular basis. The adaptive management effort has benefited greatly from the influx of resources in support of the expedited review. The GLAM Committee has made significant progress on enhancing capacity, developing modelling tools and gathering validation data that would not have been possible without the added resources and will support adaptive management going forward. That said, the expedited review has also been resource intensive, and the GLAM Committee expects to use experience from the expedited review to reassess and modify the adaptive management process going forward to align with available capacity and anticipated benefits. Some of the lessons that have already become apparent or been reinforced through the expedited review are:

- 1. Information management and model maintenance is essential to an adaptive management approach and a coherent and enduring solution is not readily apparent.** The ability to collect, process, analyze and communicate data over years and decades and collaboratively model, analyze, and review data across the international border is a vital element of the GLAM Committee's adaptive management process. The GLAM Committee has successfully gathered extensive data and created sophisticated, complex models to allow the evaluation of a myriad of plan options. Failing to maintain and update these data and tools is costly, and results in models and tools that are built for a one-off purpose without a means to support ongoing use and development. Time rapidly erodes the ability of staff to locate and access data and tools developed, irrespective of their usefulness, and there are challenges in maintaining institutional knowledge and capacity. Consequently, the GLAM Committee, the two Boards and the IJC have been forced into the old way of doing things – starting over without the advantage of being able to fully leverage prior investments. The IJC's commitment to the adaptive management process and the GLAM Committee's position on the leading edge of adaptive management within the IJC, means that the GLAM Committee is covering new ground with the supporting agencies to find an acceptable solution. The binational nature of the GLAM Committee's work means the IJC must also reconcile its approach for information management with the new era of complex models, very large data sets, and a need to manage and store them for both archival and developmental purposes in a manner



that is accessible to both sides of the border. Successful long-term adaptive management requires a concerted effort by both the IJC and GLAM Committee in identifying and implementing appropriate sustainable information management solutions. Following the expedited review, up front resource investment is likely required to support the information management requirements and that is accounted for in the proposed budget, though some future reductions may be possible.

2. **Specific monitoring data that provides the information required to evaluate the impact of regulation plans are not always collected by other entities.** Ecosystem response, in particular, requires longitudinal data sets that capture specific parameters to tease out the differences between regulation plans. Data for wave runup and other coastal processes is needed to refine and validate the models used to assess property and shore protection damages at specific locations. Other processes, such as changes in economic or social metrics may have available data, but finding and aggregating data into usable information will require sustained efforts as it is not easily accessible. Considerable progress was made during the expedited review and further targeted monitoring will be required moving forward.
3. **The evaluation and testing of regulation plans is as much a communication challenge as a technical one.** While the GLAM Committee has made a concerted effort to support communication, outreach and engagement, and has made progress in establishing relationships with various interests and regions, public buy-in and understanding remains one of the chief challenges of regulation plan review. The supporting agencies are filled with technical experts but distilling the deeply technical information to something usable for the general public remains a challenge. Equally so, gathering feedback from the public, building stakeholder trust, and establishing and maintaining relationships through which communication happens remains a challenge over the 15-year review period.

The challenges of long-term communication, outreach, and engagement for the purposes of building public trust and improving understanding is best led by the Boards themselves in concert with the GLAM Committee as a sub-committee to the Boards. The work of the GLAM Committee can, and should, provide the technical basis of public communications regarding regulation plan review efforts while the Boards and IJC need to be at the forefront of the broader communication strategy, methods, and engagement process. The GLAM Committee expects to lead development of communication products, either directly or through contractor support, that lean heavily on the Committee's technical expertise and activities (such as videos, story maps, and fact sheets). The proposed GLAM Committee funding would support such efforts as well as targeted outreach with



relevant agencies and technical experts by the Committee to deliver on projects and studies.

Broader communication and engagement on the role and limits of regulation would best be led by the Boards through direct engagement in virtual and in-person meetings with a more general audience. The GLAM Committee will help, where possible, to support the Boards in maintaining relationships established during the expedited review and continue to communicate what has been learned during the expedited review and post expedited review.

4. **Indigenous engagement must happen on a continuous and relationship basis.** The initial hope of the expedited review of Plan 2014 was to incorporate Indigenous perspectives into the plan review process. Through the GLAM Committee's work with an Indigenous liaison on the lower lakes and concurrent outreach to Indigenous communities with interests in the St. Marys River, the complexity and required care to develop collaborative and productive relationships with Indigenous communities cannot be overstated. While the GLAM Committee welcomes input from these communities, the practical aspects of how to do so in an appropriate manner present difficulties when the GLAM Committee has finite resources and is following a compressed timeline that might not fit well with those of the Indigenous Communities. In addition, it is clear that capacity within these communities is a limiting factor to their ability to engage with the GLAM Committee.

5. **There are real limitations to the long-term development and ongoing availability of technical expertise within the contributing agencies to support adaptive management.** The nature of adaptive management relies on expertise derived from working within and with a number of agencies who have mandates related to binational water management. In the case of regulation plan review, the Regulation Representative offices are forced to balance the adaptive management work of the GLAM Committee and the regular operational requirements of the Boards. These offices have expert knowledge on the regulation plans, operational constraints, and other aspects of the Board's operations, which is developed over many years and not easily supplemented by short-term funding of temporary positions for GLAM efforts. Ensuring sufficient and consistent capacity is critical for long-term adaptive management success, as is aligning GLAM Committee activities to available capacity. This tension is compounded by the review cycle for Plan 2012 and Plan 2014 being currently offset by just two years. The plan review process entrusted to the GLAM Committee would benefit greatly from increasing the offset of the review cycles for Plan 2012 and Plan 2014 (or its successor). By allowing even spacing between the reviews, supporting agencies can staff and plan support more effectively. Even spacing also allows the lessons from one review to carry over more effectively to the next by providing time to apply them.



6. **Improvements to resiliency will have a larger effect on the uses and interests of the Great Lakes than regulation plans.** The GLAM Committee does not have authority to direct resiliency efforts of external jurisdictions. However, there may be opportunities to articulate the role resiliency plays in outflow management activities in the Lake Ontario and St. Lawrence River system. The GLAM Committee can also work with responsible authorities and partners and use the opportunity to share the tools and information developed for the plan review is something that should be a part of the communications and outreach efforts that the GLAM Committee conducts in the future after Phase 2 of the expedited review. Such efforts would assist those who are responsible for building resiliency to water level changes.

The current regulation plans and outflow control structures have a relatively small influence on lake levels in comparison to natural hydrologic factors and a changing climate. The available climate change science provides cause for concern and the Board as well as responsible authorities should prepare for conditions beyond what has been experienced in the past. The information and tools that the GLAM Committee develops with a binational basin-wide perspective offer a unique opportunity to be used to help improve resilience within the Great Lakes Region. Improved understanding of hydroclimatic drivers of lake levels and the subsequent impacts is a necessary part of the GLAM Committee's work and have the potential to inform decision makers and practitioners from the local to federal levels about the risk and potential consequences of changing water levels and flows.

Ongoing work to identify appropriate pathways and partners for sharing the work products the GLAM Committee produces is expected to be a part of the Committee's efforts following the expedited review of Plan 2014. This would be a two-way effort, with the GLAM Committee also looking to integrate relevant work by other agencies where possible. Details on how this process will evolve are expected to be identified following the expedited review of Plan 2014 based on guidance and direction from the ILOSLRB.

The GLAM Committee has used the Lessons Learned to guide its budget outline within the strategy document. In some cases, the lessons reflect how the GLAM Committee will need to do its work moving forward. In other cases, the lessons are more related to adaptive management outcomes. Resources identified in the proposed budget reflect the lessons. For example, Lessons 1 through 4 require resources and capacity that are not typically available directly through supporting agency staff. The proposed budget includes funds to ensure the GLAM Committee has the resources to direct focused attention on those items while it moves ahead with adaptive management priorities. In the case of Lesson 5, for maintaining agency



technical capacity, the GLAM Committee is directly looking at how available resources can be most effectively used to supplement agency capacity over the long-term. Consistent funding will allow for appropriately trained staff to support the adaptive management effort. Finally, in the context of Lesson 6, the GLAM Committee will continue to look at how to better support the Board's communication regarding the limits of regulation in the context of its short-term activities. The ongoing plan review efforts will incorporate new and evolving science, continuous monitoring, and any other physical, economic, environmental or social changes that might influence regulation decisions. This more complete review of both the Lake Superior and Lake Ontario plans is expected to require \$1.275 million per country per year following the expedited review of Plan 2014.

Short-Term: Priorities for 2025-2030

In the context of the overall adaptive management strategy, the GLAM Committee has identified four strategic short-term priorities that require particular attention from 2025 through 2030:

- Finish the expedited review of Plan 2014, including supporting the ILOSLRB in implementing any potential modifications to the regulation plan and providing technical communications support to the ILOSLRB and IJC. *(supports Lesson 3 and Lesson 4)*
- Identify opportunities to share knowledge, data, information and tools developed through the adaptive management process. *(supports Lesson 3, Lesson 5, and Lesson 6)*
- Establish a strategy to guide the necessary ongoing monitoring and decision support process for the LOSLR system, including redeveloping the Phase 1 Decision Support Tool (DST) based on tools and data developed during Phase 2 and initiate that work. *(supports Lesson 2 and Lesson 5)*
- Execute a comprehensive review of Plan 2012 within the four year window.
- Support the cross-cutting issues that are important to the adaptive management efforts established by the IJC including the evolution of communication, outreach and engagement efforts. *(Supports Lesson 1, Lesson 3, Lesson 4, and Lesson 5)*

These strategic short-term priorities are further outlined in the sections below. Note that requirements for completing the expedited review and establishing a long-term monitoring and decision support process for the LOSLR system are captured under the broader Plan 2014 review heading. Integration of Lessons Learned as outlined previously are woven into the Plan 2014, Plan 2012 and Cross-cutting items identified below.



- Over the next 5 years, work remains to complete the expedited review of Plan 2014, shift efforts to the review of Plan 2012, and address critical issues for GLAM Committee’s sustained success.
- The lessons of the expedited review of Plan 2014 highlight the need for improved commitment to a long-term process and to sustaining and improving the data, models and tools as well as the relationships developed.

Short-Term Priorities: Plan 2014 Review

For the Lake Ontario – St. Lawrence River system, the GLAM Committee continues to prioritize completing its requirements for expedited review of Plan 2014. The final year of the expedited review will be an iterative process in which several components of the GLAM Committee’s adaptive management framework cycle back as the Committee works to meet the ILOSLRB’s request to review a few different options. Repeated interaction and engagement with the ILOSLRB will be required for the GLAM Committee to provide Plan 2014 modifications that have tradeoffs the ILOSLRB is willing to consider and represent them in a way that the ILOSLRB can use to make their recommendation.

In the coming years, the Committee will transition from the expedited review of Plan 2014 to its longer-term LOSLR monitoring and modelling requirements as part of the 15-year review time period. Priorities for 2025 through 2030 include:

- Supporting the Board in implementing any potential modifications to Plan 2014.
- Refining understanding of potential future water supply sequences used to test regulation plan performance, considering the uncertainty of future water supplies linked to a changing climate.
- Continuing to update and maintain the performance indicators, plan formulation and evaluation models and tools, and data developed during the expedited review, in support of long-term adaptive management requirements with a priority on the most sensitive and critical indicators emerging from the expedited review and in line with available resources.
- Transitioning to more refined monitoring based on lessons learned from the expedited review,
- Redeveloping the Phase 1 Decision Support Tool (DST) using ISEE output and other information generated during the expedited review to align with Board decision-making requirements.
- Annual tabletop practice decision-making exercises with the Board using the DST and updates provided through the AM process to prepare for an uncertain future.
- Maintaining relationships with key partners that were developed during the expedited review.



Short-Term Priorities: Plan 2012 Review

The review of the Lake Superior outflow regulation (Plan 2012) is expected to be complete by mid-2029, consistent with the review period outlined in the supplementary order. The ability to conduct ongoing work in support of the review of Plan 2012 had been hampered by the intensity of the expedited review of Plan 2014. Some data collection and ongoing work has occurred, or is under contract, but the bulk of the analysis remains to be done. The GLAM Committee expects to make progress in the coming years on further advancing work on future hydroclimate scenarios and developing performance metrics in the St. Marys River and the rapids due to the degree of influence that outflow regulation has in those areas relative to Lakes Superior and Michigan-Huron. The remainder of the effort will include extending plan simulation and formulation tools developed during the Expedited Review to the upper Great Lakes, and will consider modernizing the Shared Vision Model from the International Upper Great Lakes Study (IUGLS) and development of an ISEE for the St. Marys River to aid the ILSBC in deviation decisions and the review of Plan 2012. The Committee will also be working to refine the reporting process for the 15-year review.

Short-Term Priorities: Cross Cutting Items

In addition to the technical work of the plan review and evaluation process described previously for both the Plan 2014 and Plan 2012 reviews, the GLAM Committee remains committed to effectively addressing the internal and external cross-cutting items identified within the adaptive management framework. While these cross-cutting items apply to both reviews, their implementation will vary based on the needs and expectations of each system. From a Communications, Outreach and Engagement perspective, efforts on the Lake Ontario and St. Lawrence River system will be focused on the expedited review and any follow up including the maintenance of relationships developed in recent years. Attention will also be placed on sharing results from the expedited review with practitioners that may benefit from the information. On the upper Great Lakes, the GLAM Committee intends to work with the ILSBC on a coordinated strategy to reach interested constituents across the large and diverse geographic region.

Indigenous engagement is a related, but distinct, component of the GLAM Committee's Communications, Outreach, and Engagement activities. Such engagement needs to align with Board and IJC activities to ensure consistency and efficiency. The Committee recommends building on its recent Indigenous engagement activities, both in the Lake Ontario – St. Lawrence River basin and also the St. Marys River in the coming years. A primary component is relationship building, which takes time. Another consideration is the wide range of engagement requests that Indigenous communities receive. The GLAM Committee intends to coordinate with other Board and IJC activities to increase efficiencies for communities.



Project management and information management are two critical cross-cutting items that will require Committee attention in the 2025 through 2030 period. From a project management perspective, resource and time management, continued leadership, coordination of expertise among agencies and organizing of work plans and reporting requirements will continue to be necessary components of an effective adaptive management process. For information management, the vast amount of data and information gathered through the expedited review and the adaptive management process as well as the multi-agency collaboration has highlighted gaps and challenges in the Committee’s processes. Given the essential role that information management plays in adaptive management and the new era of digital information and large data, the GLAM Committee needs to coordinate the development of a comprehensive and sustainable information management plan for both the ongoing Plan 2012 and Plan 2014 review efforts.

Linking the Adaptive Management Strategy to the Annual Work Plans

The adaptive management strategy reflects the overarching framework guiding the work of the GLAM Committee in meeting its directive requirements. The strategy provides high-level priorities and expectations for effectively implementing an adaptive management process for outflow regulation plans in the Great Lakes basin as well as some short-term priorities in the coming two to five years. In any given year, the GLAM Committee prioritizes specific activities and tasks to reflect available resources through its annual work plan, which is a requirement of the GLAM Committee directive. Typically, the annual work plans follow the U.S. fiscal year of October 1 to September 30. The annual work plan for 2025 (October 1, 2024 to September 30, 2025) is included in Appendix A and will be updated on an annual basis.

Estimated Costing Table for Ongoing Adaptive Management

The funds for the expedited review of Plan 2014 have been fully received and are being expended. Table 1 below provides an outline of the expected costs by component per year per country that would be required for the future ongoing Lake Superior and longer-term LOSLR components. These costs are estimates that have been informed by Phase 1 and Phase 2 of the expedited review but the costs and activities may be refined slightly through the implementation process as the effort progresses and priorities and needs are clarified. The strategy is meant to be an evolving document that provides the context to complement the annual GLAM Committee work plan. GLAM Committee work plans provide greater details of priorities and past ones are available on the GLAM Committee website at <https://ijc.org/en/glam>.



Table 1: COST ESTIMATES BY COMPONENT (NEW FUNDS), FY2025-2030

Subject to approval by International Lake Ontario-St. Lawrence River Board, International Lake Superior Board of Control, and International Joint Commission

Great Lakes - St. Lawrence Adaptive Management Committee - Long-term Outlook - ONGOING PLAN REVIEW (DRAFT)

Long-term Outlook - ONGOING PLAN REVIEW	FY Ongoing Annual IJC amounts		Ongoing 7 Year Total, 2025 through 2031	
	US (\$K US)	Canada (\$K CDN)	US (\$K US)	Canada (\$K CDN)
COMPONENT 1 - UNDERSTAND AND ASSESS FUTURE HYDROLOGIC CONDITIONS				
1.1 Understanding Water Supplies	50	50	350	350
1.2 Projecting Future Water Supplies	50	65	350	455
1.3 Improving Forecasts	50	25	350	175
SUB-TOTAL 1 - Understand and assess future hydrologic conditions	150	140	1050	980
COMPONENT 2 - CALCULATING LEVELS AND FLOWS (Supports Lesson 5)				
2.1 Update and incorporate new routing models	30	30	210	210
2.2 Updating regulation plan simulation models	30	30	210	210
SUB-TOTAL 2 - Calculating Levels and Flows	60	60	420	420
COMPONENT 3 - IMPACT ASSESSMENT AND PREDICTIVE MODELS (Supports Lesson 5)				
3.1 Performance Indicators (ongoing monitoring) (Supports Lesson 2)	260	130	1820	910
3.2 Integrated Socio-Economic and Ecosystem (ISEE Model)	130	260	910	1820
SUB-TOTAL -3 Impact Assessment and Predictive Models	390	390	2730	2730
COMPONENT 4 - PLAN EVALUATION AND RANKING (Supports Lesson 5)				
4.1 Decision Support Tool	80	65	560	455
4.2 Plan Evaluation and Visualization of Results (Board Room)	40	65	280	455
SUB-TOTAL 4 - Plan Formulation and Evaluation	120	130	840	910
COMPONENT 5 - DECISION SUPPORT (Supports Lesson 5)				
5.1 Decision Support	25	25	175	175
5.2 Practice Decisions	25	25	175	175



SUB-TOTAL 5 - Decision Support	50	50	350	350
COMPONENT 6 - CROSS CUTTING ITEMS - PROJECT CONTROLS				
6.1 Project Management	50	50	350	350
6.2 Information Management (Supports Lesson 1)	230	100	1610	700
6.3 Peer Review	25	25	175	175
6.4 Institutional Arrangements	25	25	175	175
6.5 Indigenous Engagement (Supports Lesson 4)	100	200	700	1400
6.6 Communications, Outreach and Engagement (Supports Lesson 3 and Lesson 6)	75	105	525	735
SUB-TOTAL 6 - Cross cutting items - Project Controls	505	505	3535	3535
TOTALS	1275	1275	8925	8925

The ability of the GLAM Committee to undertake the proposed activities in any given year will depend on the availability of resources in that year, including both the availability of agency experts and the availability of financial resources, as well as the ongoing collaboration of partner agencies and organizations who contribute to the GLAM Committee.

The strategy assumes that adequate financial and human resources will be available and that partner agencies and organizations will be willing and able to work with and contribute to GLAM Committee efforts.

Summary

The GLAM Committee strategy provides a flexible approach for both the ongoing and expedited evaluation and improvement of the regulation plans using adaptive management. A priority for the coming year will be the completion of Phase 2 of the expedited review of Plan 2014, expected in the Spring of 2025 when the ILOSLRB delivers their recommendations to the IJC. Following that, the GLAM Committee expects to transition to a longer-term review framework for the ILOSLR system while focusing on the review of Plan 2012 for the upper Great Lakes. The GLAM Committee plans to leverage knowledge and expertise gained through the expedited review effort to guide future adaptive management planning. On an annual basis, the GLAM Committee will continue to develop and implement a work plan that addresses critical priorities. Given the importance of agency resources to support the adaptive management process, year to year activities aimed at delivering the GLAM Committee’s short and long-term priorities will be outlined in the annual work plan based on anticipated funding and in-kind contributions expected in that year.

Appendix A – FY24-25 GLAM Committee Work Plan



Annual
Work
Plan

Fiscal Year

2025

Annual Work Plan in support of a long-term adaptive management strategy for the on-going review and evaluation of the regulation plans and the expedited review of Plan 2014.

Covering
October 1, 2024 to
September 30, 2025

September 18, 2024

Appendix A - GLAM Committee Annual Work Plan for 2025

Purpose

This work plan identifies activities to be carried out or initiated by the GLAM Committee in the period covering October 1, 2024 through September 30, 2025. Tasks are primarily associated with completing Phase 2 of the expedited review of Plan 2014 and planning the transition to the Plan 2012 review as part of the longer-term adaptive management effort.

Great Lakes – St. Lawrence River Adaptive Management Committee

(Status as of September 18, 2024)

<i>United States</i>	<i>Canada</i>
Chris Warren, Co-Chair US Army Corps of Engineers – Detroit District	Wendy Leger, Co-Chair Environment and Climate Change Canada
Scudder Mackey Retired Ohio Department of Natural Resources	Isaac Noyes Ontario Ministry of Natural Resources
Mary Austerman New York Sea Grant	Patricia Clavet Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs du Québec International Lake Ontario - St. Lawrence River Board Member
Shannon Dougherty New York Department of Environmental Conservation	Pascal Marceau Ministère de la Sécurité publique du Québec
Vacant	Bernard Doyon Canadian Coast Guard - Fisheries and Oceans Canada
Lauren Fry Great Lakes Environmental Research Laboratory NOAA	Frank Seglenieks Environment and Climate Change Canada Burlington, ON
Bill Werick Retired US Army Corps of Engineers	Jean Morin Environment and Climate Change Canada Quebec City, QC
Lauren Schifferle US Army Corps of Engineers – Buffalo District International Lake Ontario - St. Lawrence River Board Alternate Regulation Representative	Jacob Bruxer Environment and Climate Change Canada Cornwall, ON

Appendix A - GLAM Committee Annual Work Plan for 2025

<p>Vacant</p>	<p>Linda Debassige M'Chigeeng First Nation</p>
<p>Melissa Kropfreiter, Co-Secretary US Army Corps of Engineers – Detroit District</p>	<p>Mike Shantz, Co-Secretary Environment and Climate Change Canada Burlington, ON</p>

NOTE: The Great Lakes-St. Lawrence River Adaptive Management (GLAM) Committee was established by the International Joint Commission (IJC) as a sub-committee of the Boards and is comprised of an equal number of members from the United States and Canada. Members of the Committee serve at the pleasure of the IJC and are expected to be full participants in all activities of the Committee. As with all IJC Boards and Committees, the GLAM Committee members serve in their personal and professional capacity, not as a representative of their agencies or employers.

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Appendix A - GLAM Committee Annual Work Plan for 2025

Introduction

This document presents the tenth annual work plan of the GLAM Committee, as approved by the Boards, covering Fiscal Year 2025 (FY25) from October 1, 2024 through September 30, 2025 and coinciding with the United States fiscal year for federal agencies. It includes tasks to support GLAM Committee requirements for completing Phase 2 of the expedited review of Plan 2014 and the transition to the ongoing adaptive management requirements including the review of Plan 2012, the outflow strategy used by the International Lake Superior Board of Control to manage the flow through the St. Marys River from Lake Superior into Lake Michigan-Huron.

The FY25 GLAM Committee work plan builds on activities undertaken since the committee was formed in 2015 and addresses priority requirements resulting from the request in February 2020 by the IJC for an expedited review of Plan 2014 and the associated funding that has been identified. The work plan is organized around each component of the adaptive management framework as outlined in the main portion of the GLAM Committee Strategy for Evaluating and Improving the Rules for Managing Releases from Lakes Ontario and Superior (pages 1-16). The FY25 work plan includes some tasks initiated in FY24 (and sometimes earlier) and continuing into FY25 (i.e. tasks from a previous work plan that have not yet been completed, either as expected for multi-year tasks or in some cases due to delay) as well as newly identified tasks. Information on progress related to past work plan tasks can be found in previous GLAM Committee semi-annual reports, the GLAM Committee's Phase 1 report (ijc.org/sites/default/files/GLAM_ExpeditedReview_Phase1Report_2021-11-19.pdf) and more recently as updates in Board semi-annual reports. ***The tasks in the work plan are based on the resources that are expected to be available over the October 1, 2024 to September 30, 2025 period based on anticipated IJC Phase 2 expedited review funds (approximately \$1.275 million USD was requested for the year with matching Canadian funds) as well as in-kind agency support. FY25 funding amounts are not yet confirmed and are subject to change. As well, in-kind agency resources can vary throughout the year based on operational requirements in support of IJC regulation boards and may impact overall delivery.***

Component 1 – Project Future Hydrologic Climate (Hydroclimate Team)

Component 1 is designed to understand and model the full range of hydroclimate conditions that should be considered when evaluating regulation plan performance. It includes tasks that help to reduce uncertainties in the modelling of the water balance and tasks that help better project future water supply conditions to support outflow regulation decisions.

Activities for Component 1 are led by the Hydroclimate Team.

Theme	Task	Description	Status			Plan 2012 Review	Plan 2014 Review
			New	Continued	Expected Timeline		
Understanding Water Supplies	FY25-1.1	Prepare routine hydroclimate assessment for the 2018 through 2022 period to support tracking of hydroclimate conditions within the Great Lakes – St. Lawrence River Basin as they relate to outflow management plans (Plan 2012 and Plan 2014).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-1.1	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-1.2	Finalize summary documentation of key hydroclimate products developed and delivered to support Phase 2 of the expedited review of Plan 2014 for use in Phase 2 reporting. Topics of reference include documentation for: <ul style="list-style-type: none"> - Stochastic (statistical) water supply sequences. - Updated historical data required for evaluation of Plan 2012 and Plan 2014. - Climate change sequences - Approach used for including Ottawa River and other downstream tributary components 	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-1.2	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-1.3	Evaluate weather generator derived hydroclimate datasets for use in vulnerability analysis (Note: these datasets are being developed outside of GLAM for the “Framework for Resilient GLRI Investments” project).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-1.3	FY25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Appendix A - GLAM Committee Annual Work Plan for 2025

	FY25-1.4	Initiate analysis of trends in recent water supply components using the Canadian Reanalysis System (CaSR) covering 1980 to 2018 to better understand drivers of recent water balance changes in the Great Lakes.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Projecting Future Water Supplies	FY25-1.5	Continue to update climate change simulations for use in undertaking Plan 2012 and Plan 2014 (Phase 2) regulation plan forecasts and longer-term (decade) plan simulations to compare alternative plan and deviation strategies.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-1.6	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-1.6	Identify indicators of hydroclimate change to support dynamic decision making through collaborative academic partnership (Note: this is the implementation of FY23-1.9 and little progress is expected until the end of the Expedited Review)	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-1.7	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-1.7	Using information and findings from Phase 2 and guidance outlined in the GLAM Committee strategy, outline highest priority tasks to undertake in FY26 in support of transition from the expedited review of Phase 2 to the ongoing adaptive management effort including scoping of the Plan 2012 review and the continued review of Plan 2014. Work with other team leads and the GLAM Committee to capture these priorities in the FY26 work plan.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Component 2 – Calculate Regulation Plan Water Levels and Flows (Plan Simulation and Formulation Team)

To simulate the effects of a regulation plan and compare alternatives in a consistent way, the GLAM Committee must be able to accurately model how water travels through the system and how regulation rules, water supplies and other hydro-meteorological conditions (e.g. river ice conditions) impact water levels and flows.

The FY25 work plan focuses on ensuring effective simulations of alternative regulation plans, both for the Lake Ontario-St. Lawrence River system and the Lake Superior, St. Marys River, and Lake Michigan-Huron system. For Lake Ontario and the St. Lawrence River, simulation output will be linked with the Integrated Social, Economic and Environmental (ISEE) system to allow for calculation of impact indicators for use in the plan evaluation process.

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Activities for Component 2 are led by the Plan Simulation and Formulation Team.

Theme	Task	Description	Status			Plan 2012 Review	Plan 2014 Review
			New	Continued	Expected Timeline		
Calculate Regulation Plan Water Levels and Flows	FY25-2.1	In coordination with the working group leads of the other adaptive management framework components and particularly the Plan Evaluation and Ranking Team (Task FY25-4.1), continue to identify and align priorities.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-2.1	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-2.2	Finalize development of baseline or reference regulation plan simulations along with basis of comparison conditions within the new binationally coordinated regulation and routing model for the Great Lakes Basin.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-2.2	FY25 for Plan 2012	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-2.3	Coordinate with hydroclimate team to undertake 2024-25 annual updates and documentation of input databases and datasets required to include water supply conditions from the most recent years in simulations of outflows under a range of alternative regulation strategies	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-2.3	FY25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-2.4	Continue annual Plan 2012 and reference simulations (e.g. pre-project, Plan 1977-A) to support assessment of whether recent deviations have met intended Plan 2012 goals including simulations related to variable side channel capacity.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-2.4	On-going	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	FY25-2.5	Finalize the Phase 2 exploration, formulation, simulation and optimization of alternative outflow strategies for review of Plan 2014 performance, including the options identified through the Phase 1 effort. This includes coordination with the Plan Evaluation and Ranking Team.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-2.5	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-2.6	Finalize summary documentation on Phase 2 Plan Simulation and Formulation activities as contributions to the Phase 2 report and as reference documentation.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-2.6	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-2.7	Using information and findings from Phase 2 and guidance outlined in the GLAM Committee strategy, outline highest priority tasks to undertake in FY26 in support of transition from the expedited review of Phase 2 to the ongoing adaptive management effort including scoping of the Plan 2012 review and the	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Appendix A - GLAM Committee Annual Work Plan for 2025

		continued review of Plan 2014. Work with other team leads and the GLAM Committee to capture these priorities in the FY26 work plan.					
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Component 3 – Use Predictive Models to Assess Outcomes (Integrated Social, Economic and Environmental Team)

Component 3 relates to the development, monitoring and modelling of metrics and tools needed to support regulation plan evaluation. The GLAM Committee represents outcomes in different ways, including hydrologic attributes, performance indicators, and impact ranges. The aim of this component is to improve and reduce uncertainties inherent in the models and indicators that relate water levels and flows associated with regulation plans to socio-economic and environmental outcomes.

A primary focus for FY25 is to finalize the Integrated Social, Economic and Environmental System (ISEE) for use in the Phase 2 process. The ISEE system is the modelling framework for calculating performance indicators, the results of which can be represented through visualization tools to compare regulation plan alternatives. Indicators are being finalized for ecosystem, shoreline impacts, hydropower, and commercial navigation. In addition to performance indicators within the ISEE system, further progress is expected in FY25 on the additional hydrologic attributes and impact ranges which will support plan evaluation.

Activities for Component 3 are led by the Integrated Social, Economic and Environmental (ISEE) Team and a series of teams dedicated to Ecosystem, Shoreline Impacts (including Municipal and Industrial, shoreline property, recreational boating and tourism and social impacts), Commercial Navigation, Hydropower and Indigenous Communities indicator development.

Theme	Task	Description	Status			Plan 2012 Review	Plan 2014 Review
			New	Continued	Expected Timeline		

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Overarching	FY25-3.1	Maintain coordination with the working group leads of the other adaptive management framework components and particularly the Plan Evaluation and Ranking Team (PERT) (Task FY25-4.1). The intent is to ensure ISEE activities and indicators are directly linked to Phase 2 Plan 2014 review requirements and the on-going review of Plan 2012.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY23-3.1	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-3.2	Support the GLAM Committee in the interpretation of Performance Indicator and Impact Range results and in reporting of Technical Team progress to the Boards, the Public Advisory Group, the IJC and broader public.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	On-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-3.3	Using information and findings from Phase 2 and guidance outlined in the GLAM Committee strategy, outline highest priority tasks to undertake in FY26 in support of transition from the expedited review of Phase 2 to the ongoing adaptive management effort including scoping of the Plan 2012 review and the continued review of Plan 2014. Work with other team leads and the GLAM Committee to capture these priorities in the FY26 work plan.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Ecosystem Indicators	FY25-3.4	Complete evaluation of existing Meadow Marsh Algorithm using recent Lake Ontario and upper St. Lawrence River monitoring data. This task builds on previous GLAM Committee monitoring and modelling efforts and will include testing and verification of new modelling approaches (i.e. the Coastal Wetland Response Model) for a subset of Lake Ontario and Upper River wetland sites.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.3	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-3.5	Finalize ecosystem indicators and associated documentation for Lake St. Lawrence that are sensitive to critical Board operational decisions, particularly winter outflow adjustments, and low water levels in late-summer and early-fall during periods of high outflows. These includes winter survival of muskrat and three species of turtles as well as the area of exposed riverbed.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.4	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-3.6	Continue planning for the development of a Performance Indicator for the St. Marys Rapids that provides ecosystem benefits and impacts of gate changes and flow/water level fluctuations that can be integrated into a model framework for plan comparison. Previous St. Marys River IERM output can be used as a starting point and supplemented by additional field data collection which is expected to occur during the fiscal year. Feedback from further discussion with the Batchewana First Nation (see task FY23-6.6) and the Federally recognized US Tribes (See Task FY23-6.6) will be incorporated into this task.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.5	FY25 (subject to delays)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	FY25-3.7	Lake Ontario and upper St. Lawrence River coastal wetland monitoring (vegetation and ground truth data). The intent is to undertake monitoring,	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.6	On-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Appendix A - GLAM Committee Annual Work Plan for 2025

		using previous methods, at a suite of sites on both the Canadian and US shoreline of Lake Ontario and the upper St. Lawrence River.					
	FY25-3.8	Finalize ecosystem indicators and impact ranges for use within the ISEE model. Anticipated indicators (subject to change) include: <ul style="list-style-type: none"> - Wet meadow marsh (surface area) - Coastal wetland class distribution of large wetland classes (surface area) - Wild rice (survival probability) - Northern Pike (spawning habitat suitability and/or young of year recruitment) - Timing sensitivity of fish community (sensitive period of spawning) - Marsh birds community index (species richness, total abundance) - Spring migratory wildfowl (habitat suitability) - Least bittern/Black Tern (nesting habitat suitability) - Muskrat (lodge density or viability) - Turtles wintering habitat (survival probability) - Exposed River Bottom in winter (surface area of exposed riverbed) 	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.7	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-3.9	Finalize summary documentation on Phase 2 ecosystem indicators, including PI fact sheets and contribute to technical team summary report (see Task FY24-6.11).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.8	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Shoreline Riparian Indicators (includes Municipal and Industrial Water Users, Shoreline Property Owners, and Recreational Boating and Tourism)	FY25-3.10	Continue planning for the development of an initial flooding performance indicator for the Whitefish Island. For the current FY, this task will primarily focus on identifying data and model needs in the context of feedback from further discussion with the Batchewana First Nation and Indigenous Nations (see task FY25-6.6).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.11	FY25 (subject to delays)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	FY25-3.11	Finalize documentation for the integration of refined wave runup component within ISEE based on Phase 1 USACE effort and initiation of validation data collection and review.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.12	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-3.12	Ongoing development and refinement of water level impacts ranges and associated Story Maps for some sites to support both the Phase 1 Decision Support Tool as well as Phase 2 expedited review efforts. This includes seeking feedback and input on prototype versions.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.13	On-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-3.13	Finalize Phase 2 expedited review shoreline flooding indicators for both Lake Ontario and the St. Lawrence River downstream to Trois Rivières related to building, infrastructure, and agricultural inundation through:	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.14	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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		<ul style="list-style-type: none"> - Input and validation data acquisition. - Algorithm development. - Integration in the ISEE system along with validation. - Use of ISEE output to refine Phase 1 Decision Support Tool flood impacts. 					
	FY25-3.14	Finalize the Phase 2 development and testing of shore protection failure predictive tool for Lake Ontario through integration of NRC guidance from FY23.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.16	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-3.15	Continue implementation of GLAM Committee shoreline impacts questionnaire, finalize processing of all results from previous years, and development of a visualization product.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.17	On-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-3.16	Finalize high and low water impact indicators for municipal and industrial water users (water intakes and wastewater plants) within the ISEE for Phase 2 and complete documentation.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.19	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-3.17	Finalize Phase 2 recreational boating and tourism indicators for use in the ISEE model and complete documentation.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.20	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-3.18	Finalize summary documentation on Phase 2 shoreline indicators, including PI fact sheets and contribute to technical team summary report (see Task FY24-6.11).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.24	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hydropower	FY25-3.19	Finalize hydropower indicators and impact ranges for use in the ISEE system and DST and coordinate with ISEE team for integration into the model. Document PI fact sheets and indicator descriptions as well as critical thresholds and constraints and contribute to technical team summary report (see Task FY24-6.11).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.25	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Commercial Navigation	FY25-3.20	Finalize commercial navigation indicators and impact ranges for use in the ISEE system and DST (to include both the upper and lower St. Lawrence River) and coordinate with ISEE team for integration into the model. Document PI fact sheets and indicator descriptions as well as critical thresholds and constraints and contribute to technical team summary report (see Task FY24-6.11).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.26	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-3.21	Liaise with commercial navigation sector to seek input on identified indicators and modify indicators as necessary.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.27	On-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Appendix A - GLAM Committee Annual Work Plan for 2025

Indigenous Communities	FY25-3.22	Building on FY24 work in Indigenous Liaison for the Lake Ontario – St. Lawrence River system, seek to finalize Indigenous Research Plan and initiate implementation efforts where possible. This may include development of PIs or impact ranges that are relevant to Indigenous communities. It is expected that this work will extend beyond the expedited review of Plan 2014 and the expected timeline has been modified to reflect that.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.28	FY26	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Integrated Social, Economic and Environmental (ISEE) Tool Development	FY25-3.23	Finalize development of Integrated Social, Economic and Environmental (ISEE) system for use in Phase 2 of the expedited review.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.29	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-3.24	Continue developing and finalize interface and visualization dashboards for the purposes of ISEE simulation and review (ISEE Dashboard), connecting ISEE with the plan formulation process, and using ISEE output to support plan evaluation and ranking. This includes back-end development requirements to ensure effective and efficient data transfer.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.32	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-3.25	Establish and document procedures for comparing base ISEE hydrodynamic output with other tools and undertake validation.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.34	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-3.26	Finalize ISEE documentation as part of technical team report to support Phase 2 reporting and ensure longer-term reference material including validation methods and procedures.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-3.35	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Component 4 – Evaluate Plan Performance (Plan Evaluation and Ranking Team)

Component 4 tests changes to both the deterministic rules of Plan 2012 and Plan 2014 and protocols for deviations from these rules, by comparing results from the impact assessment tools (Component 3) for water levels and flows simulated using current rules and protocols (known as the base case) and comparing those to alternatives.

In FY25, the Plan Evaluation and Ranking Team will continue developing key visualization tools to represent hydrologic attributes, performance indicators and impact ranges to support the plan trade-off decision process. Over the longer-term, the ISEE output will also provide the basis for improvements to the Phase 1 Decision Support Tool though that is not expected to be a priority in early FY25 given commitments for Phase 2 of the expedited review of Plan 2014, and likely won't start until later in the fiscal year.

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Activities for Component 4 are led by the Plan Evaluation and Ranking Team, who also lead the Component 5 (Decision Support towards Board Recommendations) work.

Theme	Task	Description	Status			Plan 2012 Review	Plan 2014 Review
			New	Continued	Expected Timeline		
Evaluate Plan Performance	FY25-4.1	Continue to coordinate implementation of a Phase 2 strategy outlining overall requirements for Phase 2 of the expedited review of Plan 2014. The strategy development and implementation will be led by the Plan Evaluation and Ranking Team in collaboration with the other technical teams (see Tasks FY25-1.1, FY25-2.1, FY25-3.1 and FY25-5.1).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-4.1	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-4.2	Continue development of Phase 2 plan evaluation dashboard to support trade-off analysis and align with the plan evaluation and ranking framework	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-4.2	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-4.3	Ensure the Phase 1 LOSLR Decision Support Tool remains updated, operational and documented so it can be used for Board decisions while the next generation of the LOSLR Decision Support Tool is developed with output from the ISEE. (Progress is expected later in FY25, following the expedited review of Plan 2014, and will carry into future years.)	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-4.3	On-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-4.4	Upon completion of all PIs related to the Rapids (including Whitefish Island), compile data into cohesive tool to evaluate Plan 2012 over the course of a season (likely to include a forecast component) and the longer term. Initiate development of separate Shared Vision Model or Decision Support Tool for St. Marys Rapids area. (NOTE: this is a long-term requirement and work was largely deferred from FY23 and FY24 due to expedited review commitments).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-4.4	FY25 (subject to delays)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	FY25-4.5	Using information and findings from Phase 2 and guidance outlined in the GLAM Committee strategy, outline highest priority tasks to undertake in FY26 in support of transition from the expedited review of Phase 2 to the ongoing adaptive management effort including scoping of the Plan 2012 review and the	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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		continued review of Plan 2014. Work with other team leads and the GLAM Committee to capture these priorities in the FY26 work plan.					
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Component 5 – Decision Support (Plan Evaluation and Ranking Team)

The Decision Support component provides the visualization and presentation of an array of performance evaluation data (e.g. hydrologic attributes, performance indicators and impact ranges) to assist the GLAM Committee and Boards in understanding and weighing trade-offs and support efforts to make recommendations for possible changes to the plans or deviation strategies. This includes an iterative process of practice decisions to improve the decision-making process. All the output from the earlier components is consolidated within the Decision Support effort. Activities for Component 5 are led by the Plan Evaluation and Ranking Team, who also lead the Component 4 (Evaluate Plan Performance) work.

For FY25, the Decision Support Team will continue to work with the International Lake Ontario – St. Lawrence River Board to finalize recommendations as part of the Phase 2 final report.

The Decision Support Team also hopes to make some progress related to the upper Great Lakes through work with the International Lake Superior Board of Control, though progress is expected to be limited due to Phase 2 expedited review priorities.

Theme	Task	Description	Status			Plan 2012 Review	Plan 2014 Review
			New	Continued	Expected Timeline		
Decision Support	FY25-5.1	In coordination with the working group leads of the other adaptive management framework components and particularly the Plan Formulation and Simulation team (Task FY25-4.1), continue efforts to align outcomes of GLAM Committee decision support efforts. The intent is to ensure decision support activities are directly linked to Phase 2 Plan 2014 requirements and the on-going review of Plan 2012.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-5.1	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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	FY25-5.2	Engage with the International Lake Ontario – St. Lawrence River Board (ILOSLRB) on defining and implementing the Phase 2 plan evaluation and ranking framework and reaching agreement on Phase 2 findings and recommendations.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-5.2	On-going to FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-5.3	Lead the GLAM Committee through evaluation process using the Phase 2 plan evaluation and ranking framework, to ensure tested, robust, and documented options for consideration by the ILOSLRB and final Phase 2 findings and recommendations are identified. This includes coordinating evaluation workshops and utilizing/testing plan evaluation and ranking tools.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-5.3	FY25	<input type="checkbox"/>	<input type="checkbox"/>
	FY25-5.4	Using information and findings from Phase 2 and guidance outlined in the GLAM Committee strategy, outline highest priority tasks to undertake in FY26 in support of transition from the expedited review of Phase 2 to the ongoing adaptive management effort including scoping of the Plan 2012 review and the continued review of Plan 2014. Work with other team leads and the GLAM Committee to capture these priorities in the FY26 work plan.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Component 6 – Cross-cutting Items (Project Management, Public Engagement and Outreach, Peer Review, Information Management)

These tasks include project management and all aspects that help support and build trust in the simulations, including stakeholder involvement, Indigenous engagement, peer review, information management, partner collaboration, and succession planning. This component is led by the GLAM secretariat with support from the full committee.

In FY25, the GLAM Committee will continue implementation of a public engagement process for Phase 2 of the expedited review of Plan 2014. This will include supporting the Board in responding to the IJC’s request for a public comment period related to the Expedited Review report. While there is also interest in public engagement for the ongoing review of Plan 2012, the GLAM Committee does not expect to make much progress on the Plan 2012 component in FY25. The GLAM Committee will also continue

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to support ongoing Indigenous engagement related to the adaptive management effort to maintain connections made during recent years and build relationships to towards the effective involvement of Indigenous Communities to ensure that their unique perspectives, ways of knowing and traditional knowledge are a part of the on-going review of the regulation plans.

Theme	Task	Description	Status			Plan 2012 Review	Plan 2014 Review
			New	Continued	Expected Timeline		
Project Management	FY25-6.1	GLAM Committee Coordination, Management, and Reporting. This is an ongoing task but in FY25, there will be a priority on delivering Phase 2 requirements, updating the short and long-term strategy along with budgets/schedule for ongoing adaptive management requirements.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-6.1	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-6.2	Monitoring of current FY Work Plan delivery	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-6.2	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-6.3	In coordination with technical team leads for tasks FY25-1.7, FY25-2.7, FY25-3.3, FY25-4.5, FY25-5.4, use information and findings from Phase 2 and guidance outlined in the GLAM Committee strategy to outline highest priority tasks to undertake in FY26 in support of transition from the expedited review of Phase 2 to the ongoing adaptive management effort. This will include: <ul style="list-style-type: none"> - scoping of the Plan 2012 review, and - the continued review of Plan 2014. <p>Work with team leads and the GLAM Committee to capture these priorities in the FY26 work plan.</p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Information Management	FY25-6.4	Develop strategy to support Phase 2 and long-term GLAM Committee information management needs.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-6.4	FY25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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Communication and Engagement	FY25-6.5	Continue efforts to engage Indigenous Communities on impacts from changing water levels for Lake Ontario and the St. Lawrence River. The GLAM Committee is working with an Indigenous liaison for engagement efforts.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-6.5	On-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-6.6	Continue engagement with Batchewana First Nation related to indicators for the St. Marys Rapids and broader Indigenous Nation engagement related to Plan 2012 assessment in the St. Marys River and surrounding area. Work with the IJC Windsor Office staff and part of the IJC's Indigenous Collaboration Team to align efforts and establish long term engagements.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-6.6	On-going	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	FY25-6.7	Finalize implementation of a communications, outreach and engagement plan for Phase 2 effort and align with International Lake Ontario – St. Lawrence River Board communication strategy. This includes providing support to the ILOSLRB in seeking public input on draft Phase 2 recommendations prior to submitting report to the IJC (activities may include supporting Board public engagement strategy development and implementation). As well, support the IJC, as needed, in public roll out of final report.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-6.7	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-6.8	Support the Public Advisory Group (PAG) and seek PAG input on Phase 2 of the expedited review of Plan 2014 including ideas to support broader public engagement. The GLAM Committee has engaged a facilitator to support the PAG.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-6.8	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-6.9	Together with the ILOSLRB, the Public Advisory Group (PAG) and the IJC, finalize advice on advisory group needs following Phase 2 of the expedited review of Plan 2014.	<input type="checkbox"/>	<input checked="" type="checkbox"/> FY24-6.9	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY25-6.10	Continue development and initial implementation of a strategy for public engagement in Plan 2012 review. (note that progress is unlikely until late in FY25 and work will carry forward into FY26).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-6.10	FY25 (subject to delays)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	FY25-6.11	Finalize draft of the final report for Phase 2 of the expedited review of Plan 2014	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-6.13	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Peer Review	FY25-6.12	Support the IJC in any peer review processes in support of GLAM Committee activities.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-6.14	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GLWQA Liaison	FY25-6.13	Maintain engagement with the IJC's Great Lakes Water Quality Agreement (GLWQA) activities including the Science Advisory Board and the Water Quality Board (per GLAM Committee Directive).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-6.15	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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Resiliency Team	FY25-6.14	GLAM Resiliency Team will continue efforts to support and coordinate a review of the status of resiliency planning and implementation along the Lake Ontario and St. Lawrence River shoreline in Ontario, Quebec and New York taking into consideration, for example, public and private lands, ecosystems, recreational boating (yacht clubs and marinas) and tourism, major shoreline infrastructure (roads, piers, airports, nuclear plants etc.), municipal and industrial water uses. The Resiliency Team will work with the other GLAM technical teams to gather info on resiliency planning by the commercial navigation sector and hydropower sector.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY24-6.16	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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Work Plan Prerequisites and External Dependencies

Prerequisites required to ensure the success of this work plan include the on-going annual support of the agencies represented on the GLAM Committee along with additional staff support as identified by those agencies. It also requires that funds identified by the IJC for Phase 2 of the expedited review of Plan 2014 are made available to the GLAM Committee in a timely manner. It also assumes that necessary implementation and contract arrangements can be made for individual projects.

As this is an on-going effort, the priorities set and commitments made are estimates based on what the committee understands to be the resources available. The expertise available through the partner agencies continues to be evaluated relative to the priorities identified. There may in fact be a need to readjust proposed products depending on the expertise required and available to complete the task. These assessments will occur throughout the year as the work plan progresses. The GLAM Committee will keep the Boards aware of progress through semi-annual reporting.