

Annual Work Plan

Fiscal Year

2023

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, 2022 to
September 30, 2023

January 31, 2023

GLAM Committee Annual Work Plan for 2023

WORK PLAN

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Blue text identifies other International Joint Commission Board and Committee affiliations

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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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Purpose

This work plan identifies the priority activities to be carried out or initiated by the GLAM Committee in the period covering October 1, 2022 through September 30, 2023. Tasks are focused on supporting Phase 2 of the expedited review of Plan 2014, with additional tasks related to the Plan 2012 deviation review and the longer-term adaptive management effort.

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Introduction

On January 16, 2015 the International Joint Commission (IJC) issued a Directive establishing the Great Lakes-St. Lawrence River Adaptive Management (GLAM) Committee which reports to the three Great Lakes-St. Lawrence River Boards (the International Lake Superior Board of Control (ILSBC), the International Niagara Board of Control (INBC), and the International Lake Ontario – St. Lawrence River Board (ILOSRLB), collectively referred to in this document as Boards). The GLAM Committee is to carry out the required monitoring, modelling and assessment related to on-going evaluation of the regulation plans and address other questions that may arise due to changing conditions, in consultation with the Boards.

In the summer of 2019, the IJC requested the GLAM Committee begin planning for an expedited review of Plan 2014 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 GLAM Committee proposed a two-phase approach. Phase 1 of this expedited review was officially launched by the IJC in February 2020 and ended with a report from the GLAM Committee to the Commission in November 2021. The first phase focused on information to support the International Lake Ontario – St. Lawrence River Board when they must make high water deviation decisions. Phase 2 will more closely evaluate options over a longer period to determine whether changes can be made to Plan 2014 or its limits to reduce the impact of extreme conditions and is scheduled for completion by the end of 2024.

This document presents the eighth annual work plan of the GLAM Committee, as approved by the Boards, covering Fiscal Year 2023 (FY23) from October 1, 2022 through September 30, 2023 and coinciding with the United States fiscal year for federal agencies. It prioritizes GLAM Committee requirements for Phase 2 of the expedited review of Plan 2014 and associated funding for ongoing review of recent deviation approaches for Plan 2012, the outflow strategy used by the ILSBC to manage the flow through the St. Marys River from Lake Superior into Lake Michigan-Huron.

Purpose and Objectives

As outlined in the [January 2015 GLAM Committee Directive](#), the objective of the GLAM Committee is to provide information to the Boards and advise them and the IJC regarding the effects control structures (approved in the Commission's Orders of Approval and Directives) have on the flows and levels in boundary waters and the impacts the regulation plans have on

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the affected uses and interests. This includes the on-going review and evaluation of regulation plans related to:

- a) the effectiveness of the existing regulation plans in managing outflows in the Lake Ontario-St. Lawrence River system (Plan 2014) and the Lake Superior, St. Marys River and Lake Michigan-Huron system (Plan 2012).
- b) examining how the system may be changing over time and whether any modifications to the regulation plan(s) may be warranted; and
- c) any other questions requested by the Boards and/or IJC that may affect the Boards' water management decisions over the long-term.

The 2015 Directive tasks the GLAM Committee to design a work plan for review and approval by the Great Lakes Control Boards and the IJC that supports long-term efforts to address the following questions:

1. How well are the impacts of flows and water levels represented by current data and models used in the evaluation?
2. How will future water supplies differ from those used to test the current management of outflows?
3. How are other physical, chemical, biological, and/or socio-economic conditions of the system changing over time?
4. How can the management of outflows benefit other physical, chemical, biological and/or socio-economic conditions?

The FY23 GLAM Committee work plan builds on activities undertaken since the committee was formed in 2015 and addresses new requirements resulting from the request in February 2020 by the IJC for an expedited review of Plan 2014 and the associated FY23 funding that has been identified. The committee has developed its [short-term and long-term strategy](#) (covering 1 to 15 years, consistent with the timelines of the updated Orders), to deliver on the requirements in the directive and the expedited review.

Through its strategy document, the GLAM Committee has identified various components of the broader adaptive management framework to support review of the regulation plans (Figure 1).

The core components relate to

- (1) hydroclimate conditions;
- (2) calculating water levels and flows (regulation plan simulation);
- (3) developing and using predictive models to assess outcomes;
- (4) evaluating plan performance, and;
- (5) supporting the IJC and boards in making decisions based on the available information.

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The feedback aspects of these core components include monitoring and testing changes, validating and improving impact models, and re-considering assessments of plan performance if key objectives change.

Overarching components that apply to all aspects of the framework (6) include broader engagement and outreach, peer review, information management, institutional arrangements, and project management.

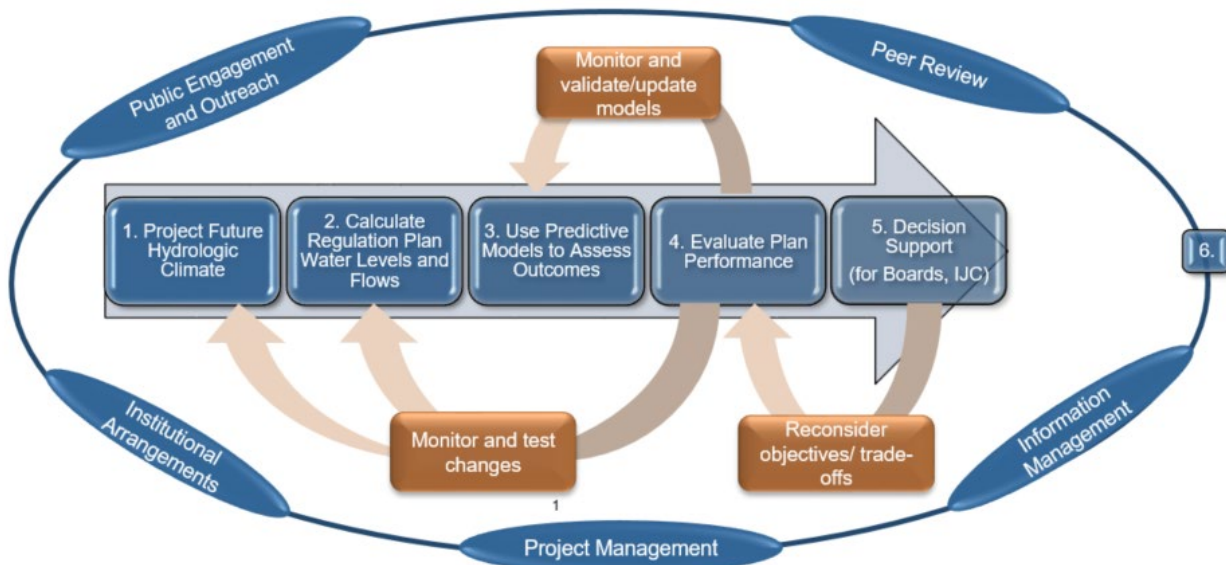


Figure 1: Illustration of the GLAM Committee's adaptive management framework

Scope and Timeline

The adaptive management process undertaken by the GLAM Committee is part of a long-term and on-going effort that recognizes the dynamics of the large and complex Great Lakes – St. Lawrence River system. This includes the regulation plans currently in use by the International Lake Superior Board of Control (Plan 2012) and the International Lake Ontario – St. Lawrence River Board (Plan 2014). Within this long-term context, the GLAM Committee must also address the immediate requirements of the expedited review of Plan 2014 as requested by the IJC in response to the 2017 and 2019 flood events on Lake Ontario and the St. Lawrence River. Following the high water events, the IJC asked the GLAM Committee to work with the International Lake Ontario – St. Lawrence River Board to undertake an expedited review of Plan 2014 with the goal of finding the best solutions possible for managing outflows, especially during

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periods of extreme conditions while recognizing that no regulation plan will be able to prevent extremely high water levels and flows or eliminate their impacts.

Practically speaking, the expedited Plan 2014 review reflects an adaptive management approach for ensuring the effectiveness of Lake Ontario outflow management, albeit at a shorter time frame from the 15 year review outlined in the updated 2016 Orders of Approval. As part of the committee's short and long-term strategy, a phased expedited review process was outlined:

Expedited Review Phase 1 - An 18-24-month (20 month) effort specific to Lake Ontario – St. Lawrence River, ending fall 2021, focused on flow releases under **board deviation authority** recognizing recent conditions and high inflows in the foreseeable future. *Phase 1 is complete*

Expedited Review Phase 2 – An additional 3 year assessment of the regulation plan(s) under **many possible extremes**, both high and low, and combinations of extremes, to assess the risk and implications of changes to limits, triggers and Board deviations decisions over the longer term (beyond the current/near term conditions). *Funding has been made available for much of Phase 2.*

This FY23 work plan, therefore, is based both in the context of the immediate requirements of the expedited review and the long-term initiative for the 15 year reporting period within the IJC Orders for the International Lake Superior Board of Control and the International Lake Ontario – St. Lawrence River Board. Outflows from Lake Superior through the St. Marys River into Lake Michigan-Huron are managed in accordance with Plan 2012, whose 15 year review period ends in 2030. Outflows from Lake Ontario into the St. Lawrence River are managed in accordance with Plan 2014, whose 15 year review period ends in 2032.

This is the eighth work plan prepared by the GLAM Committee and it builds on work initiated and information gained through implementation of the [2016](#) through 2022 work plans with a focus on Phase 2 of the expedited review of Plan 2014. Individual work plan tasks contribute to a particular aspect of the GLAM Committee's overall Directive and the six components of the adaptive management framework (see Figure 1) as they relate to the long-term requirements as well as the short-term needs of the expedited review. Tasks specific to the Lake Ontario – St. Lawrence River basin are generally being done in support of Phase 2 of the expedited review or as follow up to recommendations from the Phase 1 report. Tasks specific to the Lake Superior, St. Marys River and Lake Michigan-Huron system as well as Great Lakes – St. Lawrence River basin-wide tasks generally support the long-term adaptive management needs. Many hydroclimate and cross-cutting tasks apply more generally basin-wide.

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The FY23 work plan includes some tasks initiated in FY22 (and sometimes earlier) and continuing into FY23 (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 the GLAM Committee's past semi-annual reports. ***The tasks in the work plan are based on the resources that are expected to be available over the October 1, 2022 to September 30, 2023 period based on approved IJC Phase 2 expedited review funds (approximately \$1.495 million USD for the year with matching Canadian funds) as well as in-kind agency support. Actual resources (particularly in-kind) can vary throughout the year based on operational requirements in support of IJC regulation boards and may impact overall delivery.***

Expedited Review of Plan 2014 – Phase 2 Framework

The FY23 work plan is consistent with a Phase 2 Expedited Review of Plan 2014 Strategy that has been developed by the GLAM Committee and will be subject to Board approval, review by the Public Advisory Group (PAG) and will undergo official peer review by outside experts before being posted publicly on the GLAM Committee website.

Phase 2 of the Expedited Review is expected to be mostly complete by the end of December 2024 with the final report submitted to the IJC by April 2025. At the end of Phase 2 the Board will recommend to the IJC whether improvements to the regulation plan are warranted. In addition to the Plan 2014 review, the GLAM Committee is also funded to support the on-going review of Plan 2012 the outflow management strategy used by the ILSBC to manage the flow through the St. Marys River, from Lake Superior into Lake Michigan-Huron. As a first priority, the GLAM Committee is directed by the Board to focus on the review of recent deviation decisions for Plan 2012. This work plan covers activities to be carried out in FY23 in support of these two efforts. Progress on the on-going review of Plan 2012 may be delayed due to the pressing deadlines of the expedited review of Plan 2014.

As with all GLAM Committee work, the Phase 2 Expedited Review strategy is consistent with the overall Adaptive Management Strategy outlined in [GLAM's Short and Long Term Strategy](#) shown in Figure 1. The strategy is designed to give the Board what it needs to feel confident that it has made a good recommendation, and to give others the information they need to understand why the Board made the recommendation. The strategy begins with the Plan Evaluation and Ranking Framework which is grounded in the assessment of whether a regulation plan meets the Boundary Water Treaty of 1909, can comply with the existing 2016 Supplemental Order, has the best mix of preferred outcomes in terms of trade-offs, is robust in the face of climate changes and is easily understood and transparent to the public. The strategy will evolve over the next

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two years as the Board and stakeholders react to interim results. The Board will apply the strategy during its development in a number of practice plan evaluation and ranking workshops over the next two years in preparation for recommending whether to change the Plan 2014.

The GLAM Committee has established a number of technical teams (also referred to as working groups) to support their efforts in the on-going review of Plan 2012 and the expedited review of Plan 2014 for the outflows of Lake Ontario that is consistent with the overall AM Framework outlined in Figure 1. Figure 2 below shows the GLAM Committee structure and the associated components identified in the AM Framework from Figure 1.

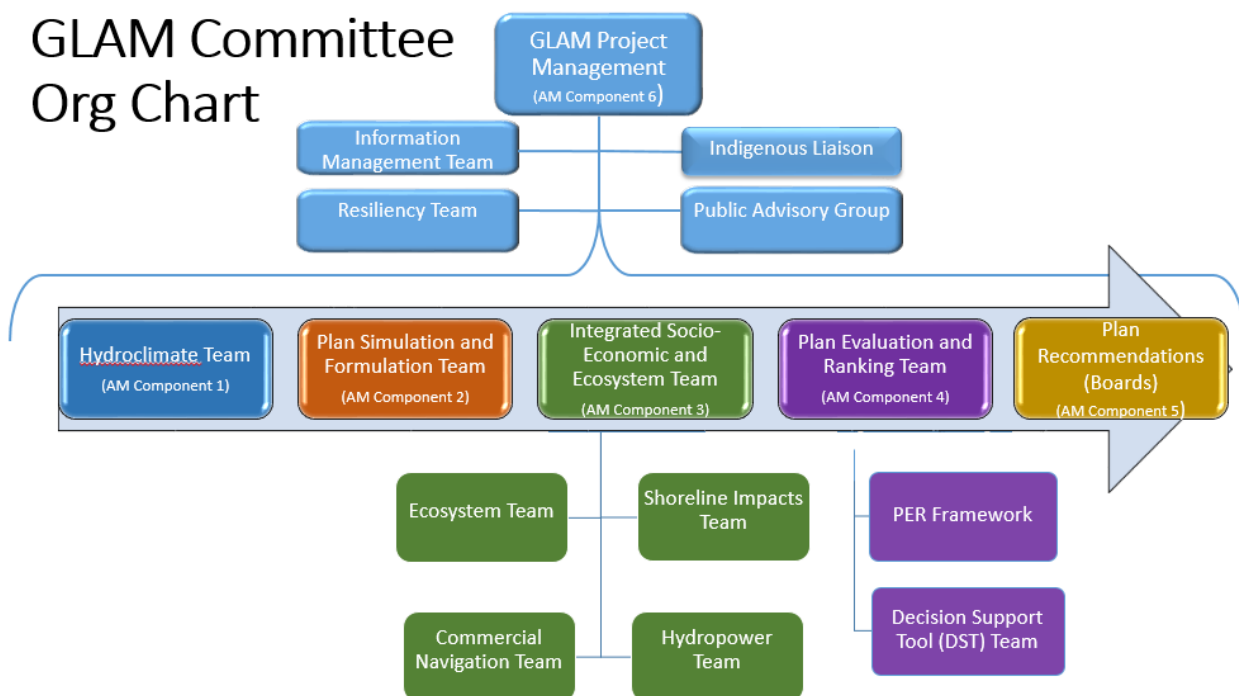


Figure 2: GLAM Committee team structure to support Phase 2

FY23 Work Plan Task Descriptions

The GLAM Committee has organized priority FY23 tasks based on each component of the adaptive management framework identified in Figure 1 and discussed in the Phase 2 expedited review strategy. These tasks are further separated as ones that apply to the Plan 2012 review (ILSBC), the Plan 2014 review (ILOSRLB) and/or broadly across the full Great Lakes – St. Lawrence River basin (i.e. both systems). Individual tasks may be supported through in-kind resources, identified funding, or a combination. Remaining sections of the work plan briefly highlight critical

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tasks for the coming year. In a number of cases, these tasks are continued from those previously described in the FY22 work plan and are noted as such. These continued tasks are typically expected as tasks were planned for multiple years though in some cases they are due to delayed implementation and had to be pushed forward.

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 the performance of the regulation plans or alternatives to them. 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	FY23-1.1	Prepare routine hydroclimate assessment for the 2018 through 2021 period to support tracking of hydroclimate conditions within the Great Lakes Basin as they relate to outflow management plans (Plan 2012 and Plan 2014). (Note: this task extends the FY22-1.1 task to include 2021 in the assessment).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY21-1.1	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-1.2	Initiate analysis of trends in recent water supply components using Regional Deterministic Reforecast System (RDRS) developed by the Canadian Meteorological Centre covering 1980 to 2017 to better understand drivers of recent water balance changes in the Great Lakes and the St. Lawrence River.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-1.4	FY24	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-1.3	Continue development of new stochastic (statistical) water supply sequences for the Great Lakes – St. Lawrence River Basin with a focus	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-1.5	FY24	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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		on inclusion of the Ottawa River to support ILOSLRB outflow regulation decisions.					
	FY23-1.4	Update and document historical data required for evaluations of Plan 2012 and Plan 2014.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-1.5	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 checked="" type="checkbox"/>	<input type="checkbox"/>	FY24	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-1.6	Initiate analysis of future ice conditions under a changing climate for the St. Lawrence River between Lake Ontario and Montreal for use in updates to the Lake Ontario-St. Lawrence River (Phase 2) regulation plan.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-1.7	Initiate analysis of method to extend the Regional Deterministic Reforecast System (RDRS) back to 1950 (currently 1980) to better understand long term drivers of water balance changes in the Great Lakes and St. Lawrence River.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY24	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Projecting Future Water Supplies	FY23-1.8	Update climate change sequences using CMIP5 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 checked="" type="checkbox"/>	<input type="checkbox"/>	FY23	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-1.9	Identify indicators of hydroclimate change to support dynamic decision making (Note: this is a reformulation of FY22-1.7, following guidance from FY22-1.1 efforts to align outcomes of hydroclimate priorities with plan review and decision support requirements).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-1.7	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-1.10	Develop Ottawa River model to support GLAM Committee efforts related to climate change and stochastic analyses in the context of plan evaluation requirements. (Note: builds on FY22-1.8)	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-1.8)	FY23	<input 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, it is imperative that the GLAM Committee 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. This is a complicated system and calculating water levels and flows requires simulations that include certain assumptions about how the system works. This effort aims to reduce the uncertainty in those assumptions and improve simulation modelling tools so that they can readily be used to undertake evaluations of alternative regulation strategies.

The FY23 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. Simulation output will be linked with the Integrated Social, Economic and Environmental (ISEE) Response Model to allow for calculation of impact indicators for use in the plan evaluation process.

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	FY23-2.1	In coordination with the working group leads of the other adaptive management framework components and particularly the Plan Evaluation and Ranking Team (Task FY22-4.1), continue planning effort to identify and align outcomes of GLAM Committee water level and flow simulation priorities with plan evaluation and ranking	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-2.1	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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		requirements. The intent is to ensure regulation plan water level and flow simulation activities are directly linked to Phase 2 Plan 2014 review requirements and the on-going review of Plan 2012.					
FY23-2.2		Finalize development of regulation plan simulations within the new binationally coordinated regulation and routing model for the Great Lakes Basin. This will include coordination with the Plan Review and Decision Support Teams to facilitate compatibility between the regulation and routing model and the Integrated Social, Economic and Environmental (ISEE) Response Model and Shared Vision Model (SVM) software framework.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-2.2	FY23 for Plan 2014 FY 25 for Plan 2012	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FY23-2.3		Undertake annual updates to 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, including establishing basis of comparison conditions to support simulations. For the Lake Ontario-St. Lawrence River system, this includes assumptions about simulated releases when outside Criterion H14 trigger levels. Coordinate with hydroclimate team to link efforts and priorities.	<input type="checkbox"/>	<input checked="" type="checkbox"/> On-going	FY24	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FY23-2.4		Ensure Plan 2014 simulation code (from LOSLR Study) is operational to allow for multi-year plan simulations and ensure baseline simulation is defined.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-2.4	FY23	<input type="checkbox"/>	<input checked="" type="checkbox"/>
FY23-2.5		Continue Plan 2012 simulations to support assessment of whether recent deviations have met intended Plan 2012 goals. This includes coordinating input datasets (i.e. comprehensive range of potential hydropower capacity scenarios and range of potential water supplies) and Coordinated Great Lakes Regulation and Routing Model (CGLRRM) code.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-2.5	On-going	<input checked="" type="checkbox"/>	<input type="checkbox"/>
FY23-2.6		Simulate alternative outflow strategies for review of Plan 2014 performance. This will include providing input data, simulations and	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-2.6	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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		coordination with the Plan Evaluation and Ranking Team to test alternative rules, limits and triggers.					
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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 performance indicators needed to support regulation plan evaluation. The aim of this component is to improve and reduce uncertainties inherent in the models that relate water levels and flows associated with regulation plans to socio-economic and environmental impacts (using performance indicators). These tasks help the GLAM Committee in determining whether monitoring shows a need to redesign the models of performance indicators and select which of these performance indicators should be used in an update of the integrated modelling framework.

The primary focus for FY23 is to initiate development of indicators within the Integrated Social, Economic and Environmental System (ISEE) for use in the Phase 2 process. The ISEE is the modelling framework for calculating performance indicators whose results can be represented through a Shared Vision Model (SVM) framework to compare regulation plan alternatives. This includes the development and integration of indicators for ecosystem, shoreline impacts, hydropower, and commercial navigation. For all groups, there will be data collection and organization as well model algorithm development for the identified indicators. Indicator work is likely to continue into the FY24 work plan starting in October 2023.

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, Commercial Navigation and Hydropower indicator development.

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Theme	Task	Description	Status			Plan 2012 Review	Plan 2014 Review
			New	Continued	Expected Timeline		
Overarching	FY23-3.1	Maintain coordination with the working group leads of the other adaptive management framework components and particularly the Plan Evaluation and Ranking Team (PERT) (Task FY23-4.1) and undertake planning effort to identify and align outcomes of GLAM Committee impact assessment priorities with PERT requirements. 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 FY22-3.1	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Ecosystem Indicators	FY23-3.2	Work with ecosystem experts to review existing performance indicators and prioritize indicators for ongoing monitoring, modelling, and use in comparison of regulation plan alternatives and deviation. Initiate development of new PIs as necessary.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-3.2	FY23	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-3.3	Continue 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 FY22-3.3	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-3.4	Further develop priority ecosystem indicators 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.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-3.4	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-3.5	Initiate planning for the development of a flow change Performance Indicator for the St. Marys Rapids that provides a numerical representation of ecosystem benefits and impacts of gate changes and flow/water level fluctuations that can be integrated into a model	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-3.5	FY24 (subject to delays)	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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		framework for plan comparison, using previous St. Marys River IERM output as a starting point. Feedback from further discussion with the Batchewana First Nation (see task FY23-6.6) will be incorporated into this task.					
	FY23-3.6	Lake Ontario and upper St. Lawrence River coastal wetland monitoring (vegetation and ground truth data). The intent is to undertake monitoring, using previous methods, at a suite of sites on both the Canadian and US shoreline of Lake Ontario and the upper St. Lawrence River.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-3.6	On-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-3.7	Hold an expert workshop on Ecosystems Pls update, selection, development and use by the board.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY23	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Shoreline Riparian Indicators (includes Municipal and Industrial Water Users, Shoreline Property Owners, and Recreational Boating and Tourism)	FY23-3.8	Finalize consolidated baseline datasets of critical shoreline characteristics and vulnerabilities for Lake Ontario and the St. Lawrence River as well as a data visualization framework. These datasets would include public and private infrastructure at risk of impact under various water level and flow sequences. Specifically, datasets should include: <ul style="list-style-type: none"> - Building footprints - Building use classification (basic) - Road locations - Shore protection locations, type, and characteristics - Shoreline use (broad classification) 	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-3.8	FY23	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-3.9	Finalize indicator selection for shoreline component of Phase 2, ensuring coordination with ISEE developers and PERT members. This includes indicators for municipal and industrial water users, shoreline property owners and recreational boating and tourism.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY23	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-3.10	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 (see task FY23-6.6).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-3.10	FY24	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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FY23-3.11	Support ISEE development through evaluation and integration of refined wave runup component based on Phase 1 USACE effort and initiation of validation data collection and review.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>
FY23-3.12	Ongoing development and refinement of water level impacts zones and associated Story Maps within the Phase 1 Decision Support Tool. This includes seeking feedback and input on prototype versions.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-3.12	On-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>
FY23-3.13	Continue to develop shoreline flooding indicators for both Lake Ontario and the St. Lawrence River downstream to Trois Rivières related to building, infrastructure, and agricultural inundation through: <ul style="list-style-type: none"> - Input and validation data acquisition - Algorithm development - Integration in the ISEE model along with validation. - Use of ISEE output to refine Phase 1 Decision Support Tool flood impacts. 	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-3.13	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>
FY23-3.14	Develop shore protection failure predictive tool for Lake Ontario through: <ul style="list-style-type: none"> - Consolidated inventory of shoreline protection assets - A review of overtopping failure modelling approaches - Input and validation data acquisition - Possible integration (subject to findings) in the ISEE along with validation 	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-3.14	FY24 and on-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>
FY23-3.15	Improve predictive capacity for Lake Ontario shoreline bluff recession (erosion) associated with changing water level conditions by testing applicability of new approaches for monitoring bluff recession and undertaking a review of existing cohesive sediment erosion tools.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-3.15	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>
FY23-3.16	Continued implementation of GLAM Committee shoreline impacts questionnaire, processing of all results from previous years, and development of a visualization product.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-3.16	On-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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	FY23-3.17	Undertake detailed data collection and consolidation for Lake St. Lawrence impact zone refinement, including detailed database for priority metrics.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-3.17	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-3.18	Review high and low water impact indicators for municipal and industrial water users within the ISEE by supporting facility-specific data acquisition on vulnerabilities and identification of critical thresholds.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-3.19	Develop preliminary recreational boating and tourism indicators for use in the ISEE model, through <ul style="list-style-type: none"> - Consolidated inventory of recreational boating and tourism assets such as marina/yacht club locations, dock locations, dock elevations and draft, slip usage information, public beaches, etc. - Identification of response to high and low water levels through direct engagement with facilities and extrapolation of previous response functions (e.g. 2017 survey responses) - Field validation for a sub-set critical data needed for ISEE application 	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-3.18	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-3.20	Seek subject-matter expert input on proposed Municipal and Industrial Water Use, Shoreline Property Owner, and Recreational Boating and Tourism indicators and ISEE integration through a workshop, virtual engagement sessions, or similar.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hydropower	FY23-3.21	Develop hydropower indicators for use in the ISEE model and DST and coordinate with ISEE team for integration into the model. Document critical thresholds and constraints.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-3.19	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Commercial Navigation	FY23-3.22	Develop commercial navigation indicators for use in the ISEE model and DST (to include both the upper and lower St. Lawrence River) and coordinate with ISEE team for integration into the model. Document critical thresholds and constraints.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-3.20	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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	FY23-3.23	Liaise with commercial navigation sector to seek input on identified indicators and modify indicators as necessary.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	On-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Integrated Social, Economic and Environmental (ISEE) Tool Development	FY23-3.24	Initiate development of Integrated Social, Economic and Environmental (ISEE) response tool including: <ul style="list-style-type: none"> - Database structure - DEM development - Updated hydrodynamics - Wind parameters - Wave runup 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY24 and on-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-3.25	Collaborate with Ecosystem, Shoreline Impacts, Hydropower and Commercial Navigation teams to ensure indicator development is aligned with ISEE requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-3.26	Work with the Plan Simulation and Formulation Team to ensure plan simulations can be integrated into the ISEE.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-3.27	Coordinate with the Plan Evaluation and Ranking Team (PERT) to test ISEE output for use in Phase 2 decision framework including visualization approaches.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-3.28	Establish and document procedures for comparing base ISEE hydrodynamic output with other tools and undertake validation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY24	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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

Component 4 allows for the testing of changes to both the deterministic rules of Plan 2012 and Plan 2014 and protocols for deviations from these rules, by integrating the results from the simulations of various alternatives with results from the outcomes of impacts through the impact assessments allowing for the visualization of outcomes and comparison of those to the current rules and protocols (known as the base case).

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In FY23, the Plan Evaluation Ranking Team will focus on the linking the Lake Ontario – St. Lawrence River Integrated Social, Economic and Environmental (ISEE) response model with key visualization tools required for the trade-off decision process. The ISEE output will also provide the basis for improvements to the Phase 1 Decision Support Tool.

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. Component 4 includes activities in support of the Phase 2 Integrated Social, Economic and Environmental (ISEE) system and upgrades to the Phase 1 Decision Support Tool (DST).

Theme	Task	Description	Status			Plan 2012 Review	Plan 2014 Review
			New	Continued	Expected Timeline		
Evaluate Plan Performance	FY23-4.1	Develop and 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 FY23-1.1, FY23-2.1, FY23-3.1 and FY23-5.1).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-4.1	FY23 and on-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-4.2	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.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-4.2	On-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-4.3	Prioritize potential deviation options identified through Phase 1 effort for assessment over long-term simulations (including limits and triggers) and work with the Plan Simulation and Formulation Team to ensure effective testing in the evaluation process for Phase 2 of the Plan 2014 review.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-4.3	FY24 and on-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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	FY23-4.4	Initiate development of separate Shared Vision Model or Decision Support Tool for St. Marys Rapids area. Upon completion of all PIs related to the Rapids (including Whitefish Island), compile data into cohesive tool to support Board when making gate change decisions from month-to-month and over the course of a season (likely to include a forecast component). (NOTE: This task will only be initiated in the current FY, with more progress expected in future years).	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-4.7	FY25 (subject to delays)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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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 to assist the Boards in understanding and weighing trade-offs and support its 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 FY23, the Decision Support Team will be actively working with the International Lake Ontario – St. Lawrence River Board to develop a plan evaluation and ranking framework and undertake practice decision workshops to improve the Board’s understanding of their future decisions and to provide a feedback mechanism to the broader Phase 2 effort. For the upper Great Lakes, work will continue on the deviation review summary and working with the International Lake Superior Board of Control.

Theme	Task	Description	Status			Plan 2012 Review	Plan 2014 Review
			New	Continued	Expected Timeline		
Decision Support	FY23-5.1	In coordination with the working group leads of the other adaptive management framework components and particularly the Plan Formulation and Simulation team (Task FY23-4.1), continue efforts to	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-5.1	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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		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.					
FY23-5.2		Continue to engage with the International Lake Ontario – St. Lawrence River Board (ILOSLRB) on defining the Phase 2 decision and their input on a new Shared Vision Model through the co-development of a plan evaluation and ranking framework. Undertake practice decisions with the ILOSLRB to test and improve the plan evaluation and ranking framework.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-5.2	On-going to FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
FY23-5.3		Undertake practice decisions with the International Lake Ontario – St. Lawrence River Board (ILOSLRB) using the Phase 1 Decision Support Tool	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-5.3	On-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>
FY23-5.4		Develop a summary report on deviation analysis for Plan 2012	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-5.4	FY25 (subject to delays)	<input checked="" type="checkbox"/>	<input 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.

A requirement for FY23 is the implementation of a public engagement process for both Phase 2 of the expedited review of Plan 2014 as well as the ongoing review of Plan 2012. These processes will likely differ based on the needs and characteristics of the two

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systems. However, public input is critical on both processes. The GLAM Committee will also be supporting ongoing Indigenous engagement related to the adaptive management effort to maintain connections made during recent years.

Theme	Task	Description	Status			Plan 2012 Review	Plan 2014 Review
			New	Continued	Expected Timeline		
Project Management	FY23-6.1	GLAM Committee Coordination, Management, and Reporting	<input type="checkbox"/>	<input checked="" type="checkbox"/> On-going	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-6.2	Monitoring of Work Plan delivery	<input type="checkbox"/>	<input checked="" type="checkbox"/> On-going	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Information Management	FY23-6.3	Move GLAM Committee resources to new GLAM Sharepoint site hosted by the IJC and operationalize.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY23	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-6.4	Develop strategy to support Phase 2 and long-term GLAM Committee information management needs.	<input type="checkbox"/>	<input checked="" type="checkbox"/> On-going	FY24 and on-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Communication and Engagement	FY23-6.5	Continue initial efforts to engage First Nations, Tribal Nations, and Métis People on impacts from changing water levels for Lake Ontario and the St. Lawrence River with support from an Indigenous liaison. Work with the IJC to better define how Indigenous Nations are considered in future plan evaluation processes and integrated with the development of the Phase 2 Shared Vision Model.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-6.4	On-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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	FY23-6.6	Continue engagement with Batchewana First Nation related to indicators for the St. Marys Rapids and initiate broader First Nation, Tribal Nation and Métis Nation engagement related to Plan 2012 deviation strategy assessment.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-6.4	On-going	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	FY23-6.7	Develop and initiate implementation of a communications plan for Phase 2 effort and align with International Lake Ontario – St. Lawrence River Board communication strategy.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY23 and on-going	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-6.8	Work with the IJC to re-establish 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 will seek to engage a facilitator to support the PAG	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-6.6	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	FY23-6.9	Continue development and initial implementation of a strategy for public engagement in Plan 2012 deviation review.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-6.7	FY24 (subject to delays)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	FY23-6.10	Work with IJC staff to ensure GLAM Committee website is updated and key Phase 1 products are made available through the site.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY23	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Peer Review	FY23-6.11	Support the IJC in any peer review processes in support of GLAM Committee activities.	<input type="checkbox"/>	<input checked="" type="checkbox"/> See FY22-6.8	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GLWQA Liaison	FY23-6.12	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"/> On-going	On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Resiliency Team	FY23-6.13	Establish a Resiliency Technical Team to initiate a review of the status of resiliency planning along the Lake Ontario and St. Lawrence River shoreline in Ontario, Quebec and New York taking into consideration, for example, public and private lands, recreational boating resiliency planning (yacht clubs and marinas), major shoreline infrastructure (roads, piers, airports, nuclear plants etc.), and resiliency planning for municipal and industrial water uses. Work with the other GLAM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FY25	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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		technical teams to gather info on resiliency planning by the commercial navigation sector and hydropower sector.						
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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 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.