

Annual
Work
Plan

Fiscal Year

2019

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

Covering
October 1, 2018 to September
30, 2019

October 30, 2018

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) 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.

Purpose

This work plan includes the priority activities to be carried out by the GLAM Committee in the period covering October 1, 2018 through September 30, 2019 in support of a long-term adaptive management strategy for the on-going review and evaluation of the regulation plans for the outflows of Lake Superior and Lake Ontario.

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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 (Superior, Niagara and St. Lawrence (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. This document presents the fourth annual work plan of the GLAM Committee covering Fiscal Year 2019 (FY19) from October 1, 2018 through September 30, 2019 and coinciding with the U.S. fiscal year.

Purpose and Objectives

As outlined in the [January 2015 GLAM Directive](#), the overall objective of the GLAM Committee is to provide information to the Boards and advise them and the IJC regarding the effects that the control structures approved in the Commission's Orders of Approval and Directives have on levels and flows in boundary waters and the impacts the regulation plans have on the affected interests. This includes the on-going review and evaluation of regulation plans related to:

- a) the effectiveness of the existing regulation plans in managing water levels and flows in the Lake Ontario-St. Lawrence River system and Lake Superior.
- 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 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 these questions:

1. How well are the impacts of levels and flows 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 levels and flows?
3. How are other physical, chemical, biological, and/or socio-economic conditions of the system changing over time?
4. How can the management of levels and flows benefit other physical, chemical, biological and/or socio-economic conditions?

The 2019 GLAM work plan builds on activities undertaken since the Committee was formed in 2015.

Scope and Timeline

The adaptive management process undertaken by the GLAM Committee is an on-going effort that recognizes the dynamics of the large and complex Great Lakes – St. Lawrence River system. This work plan is based in the context of a long-term initiative and the 15 year reporting period. This is the fourth work plan prepared by the GLAM Committee and it builds on work initiated and information gained through implementation of the [2016](#), [2017](#), and [2018](#) work plans. Individual work plan tasks are selected to contribute to a particular aspect of the GLAM Committee’s overall Directive and long-term requirements. The FY19 work plan includes a mixture of carry over items from previous work plans as well as new and emerging activities based on our annual review of the water level and flow conditions in the 2017 calendar year. The tasks are designed to allow an assessment of critical aspects of plan performance on an as-needed basis in response to observed conditions while developing and improving a broad suite of information and tools in support of the 15 year plan review as outlined in the Directive. The number of tasks in the work plan is based on the resources that are expected to be available over the October 1, 2018 to September 30, 2019 period, both in-kind and otherwise. However, actual resources can vary throughout the year based on operational requirements in support of IJC regulation boards and impact overall delivery.

GLAM Organization, Roles, and Responsibilities

The GLAM Committee is organized based on the structure outlined in the [3-5 year mid-term strategy](#) in the committee’s first triennial progress report. There are three integrated working groups that lead specific activities (Figure 1). They include the following:

1. **Hydroclimate Working Group** – Focuses on understanding and reducing uncertainty in the primary “driver” of water level changes in the Great Lakes – St. Lawrence system, that being the dynamics of the hydroclimate system including water supplies and other secondary factors (i.e., winds, waves, etc.).
2. **Impact Assessment Working Group** – Structured to ensure outcomes of water level and flow scenarios on the various interests can be measured and assessed (i.e. modelled). These interest categories include commercial navigation, hydropower, municipal and industrial water uses, coastal, recreational boating and tourism, and environmental.
3. **Plan Review Working Group**: An integrating group, pulling together updated hydroclimate science and improved performance indicators along with outflow simulations to review and evaluate regulation plan

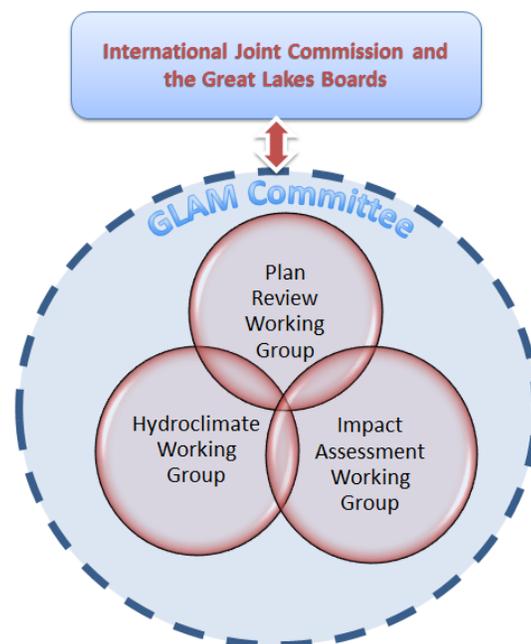


Figure 1: GLAM organizational and reporting structure

performance. Collectively, this working group supports the activities necessary to understand whether the management of levels and flows can benefit other physical, chemical, biological, and/or socio-economic conditions.

The GLAM Committee as a whole provides oversight to the working groups as well as guidance and support related to cross-cutting issues including:

- Reporting and communication between the Boards and GLAM, and the IJC and GLAM;
- Providing decision support to the Boards to articulate regulation plan objectives, and understand the implications of GLAM products and findings. This includes providing decision criteria for recommendations on when and how a decision should be made when proposing changes to the regulation plans to the IJC;
- Correspondence related to Great Lakes Water Quality Agreement (GLWQA) activities;
- Supporting external communications with key stakeholders through outreach and engagement, managing information, and ensuring quality control.

Fiscal Year 2019 Work Plan - Product Descriptions, Timelines and Resources

This work plan is divided into two sections as illustrated in Figure 2:

Section A identifies work projects assigned to one of the three working groups described above to support plan review and evaluation. The individual tasks are organized based on the tier and the working group. Tier 1 activities are referred to as foundational analyses (or annual review) and involve reporting to the boards on hydroclimate, impact assessment, and plan review information of importance based on conditions in the 2018 calendar year. Tier 2 activities are referred to as exploratory investigations (or special projects) and they represent targeted projects that support the GLAM Committee's long-term efforts to improve understanding regarding hydroclimate conditions in the basin, the impacts or benefits of changing water levels and flows, and the potential implications on plan operations. In many cases, these targeted tier 2 projects are identified based on knowledge gained from the review of conditions within the previous calendar year as part of the annual report development. Tier 3 is the strategic improvement studies (e.g. 15 year review) designed to accumulate the evolving understanding of the systems and performance indicators and offer recommendations to the Boards for consideration of plan modifications. There are no Tier 3 activities in the current annual work plan as initial data and information management components are still being developed.

Section B outlines GLAM oversight and administrative activities needed to manage the GLAM Committee and support all work projects and long-term efficiencies.

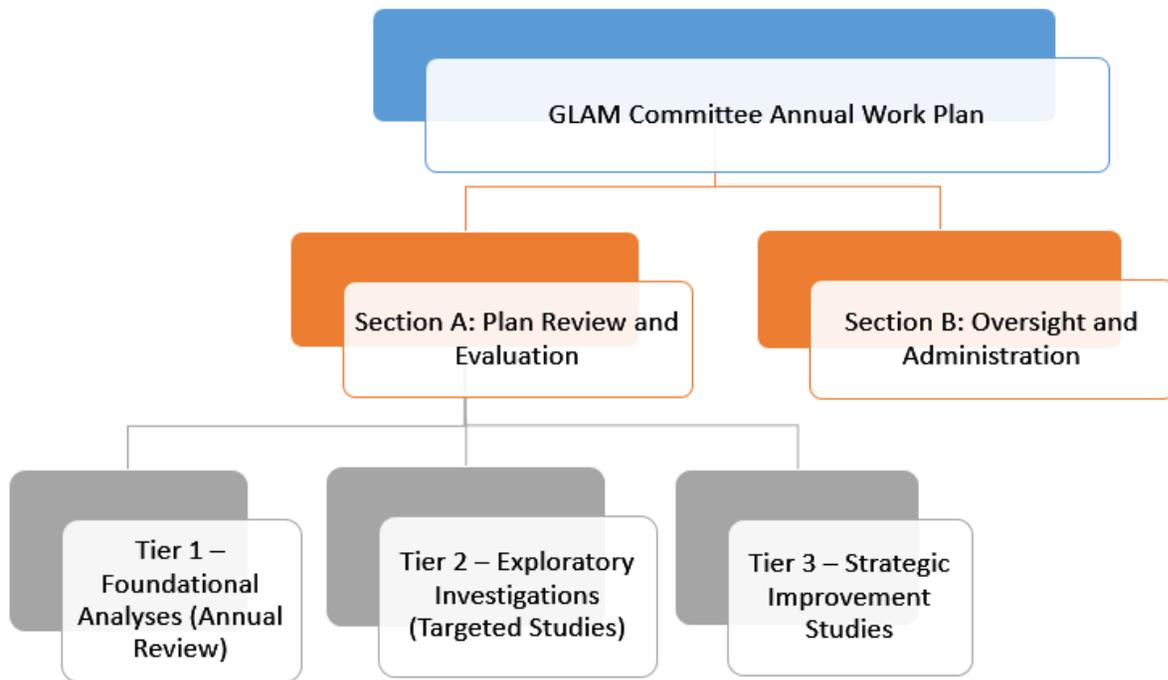


Figure 2: Organization of GLAM annual work plan

Specific tasks identified in the work plan represent activities the GLAM Committee has identified as priorities and which the GLAM Committee believes can be resourced with one of the following options:

- 1) Available committee membership, IJC staff and/or assigned agency resources given current expectations for the coming year, or
- 2) Are already receiving financial support through the International Watershed Initiative (IWI), or
- 3) Are the highest priority for seeking funding support through the IWI or other funding opportunities and are therefore dependent on the GLAM Committee’s ability to secure those funds.

In addition to the tasks falling within the previous three categories, there are a few specific projects being undertaken and resourced directly through partner agencies that are identified in the work plan. These projects are included in the work plan because their products directly support GLAM Committee objectives. However, the projects are primarily being managed, resourced and undertaken outside of the GLAM Committee and in support of other agency priorities. GLAM Committee members felt it was important to highlight these additional items in the work plan because of the relevance of the work to longer-term efforts but they are flagged because the committee has limited control on their overall delivery.

Table 1 shows expected resources available to the GLAM Committee in FY19. The resource levels include a number of IWI projects continuing from FY18 that were previously reported in the FY18 work plan. Some FY19 resources may not be implemented in FY19 if formal arrangement are not established in time

or the work to occur by September 2019. Table 1 does not include agencies in-kind staff contributions, nor does it include additional resources that may yet be acquired through the IWI program.

Agency	\$US	\$CDN
IJC support (includes proposals submitted under International Watersheds Initiative (IWI) ***)	\$158.2K	\$198.5K

Table 1: Summary of currently identified resources (\$) for GLAM activities in FY19 (** includes full support for tasks that may have been partially completed in FY18. Therefore these totals include support that was previously in FY18 work plan and not just the incremental FY19 component)

Section A – Plan Review and Evaluation

The GLAM Committee’s priority Tier 1 and Tier 2 Plan Review and Evaluation work plan tasks are identified in Table 2. Overall, the focus is on completing the annual review for 2018, undertaking targeted projects to validate or improve existing impact assessment tools, and establishing longer-term frameworks for guiding future hydroclimate, impact assessment, and plan review activities which will include a detailed review of existing performance indicators based on what was learned from the record high water levels in 2017.

Section B – GLAM Oversight and Administration

The GLAM Committee’s oversight and administration activities focus on overall management of committee and its activities. This includes guidance and implementation of overarching GLAM functions including information management as well as communications, outreach, and engagement activities. Specific oversight and administration tasks are identified in Table 3.

Table 2: Summary of GLAM FY19 Section A – Plan review and evaluation work plan activities

SECTION A: Plan Review and Evaluation					
Tier 1: Foundational Analyses (Annual review of 2018 conditions)					
Task	Task Title	Proposed Products	Description	Expected Resources	Estimated Delivery
Hydroclimate Working Group					
FY19-1.1	Prepare routine annual report material required for hydroclimate assessments	1) Draft year-end hydroclimate analysis to be incorporated into report for 2018 for Board review.	The summary will discuss relevant hydroclimate information that supports long-term GLAM plan review activities. The summary will cover the 2018 calendar year as well as relevant surveillance information reported on during the year and be completed ahead of spring (Mar 2019) Board meetings with a final version for the end of April 2019. Note: the level of effort on this will be much reduced from the 2017 calendar year review which covered record breaking water level conditions.	In-kind	Apr-19
Impact Assessment Working Group					
FY19-1.2	Prepare routine annual report material required for understanding baseline conditions and benefits of observed water levels and flows	1) Draft year-end impact assessment analysis to be incorporated into report for 2018 for Board review.	The summary will discuss relevant impact assessment information that supports long-term GLAM plan review activities. The summary will cover the 2018 calendar year as well as relevant surveillance information reported on during the year and be completed ahead of spring (Mar 2019) Board meetings with a final version for the end of April 2019. Sub-components include ongoing efforts to classify and store impact photos and information as well as tracking of media related to Great Lakes water level impacts. Note: the level of effort on this will be much reduced from the 2017 calendar year review which covered record breaking water level conditions.	In-kind	Apr-19
Plan Review Working Group					
FY19-1.3	Prepare routine annual report material required for ongoing evaluations of existing regulation plan performance	1) Draft year-end plan review and evaluation analysis to be incorporated into report for 2018 for Board review.	The summary will discuss relevant plan review information that supports long-term GLAM activities to assess regulation plan performance. The summary will cover the 2018 calendar year and include simulations of alternative outflow management strategies based on 2018 conditions and identified plan review activities in the work plan. The summary will be completed ahead of spring (Mar 2019) Board meetings with a final version for the end of April 2019. Note: the level of effort on this will be much reduced from the 2017 calendar year review which covered record breaking water level conditions.	In-kind	Apr-19

SECTION A: Plan Review and Evaluation					
Tier 2: Exploratory Investigations (Priority Projects)					
Task	Task Title	Proposed Products	Description	Expected Resources	Estimated Delivery
Hydroclimate Working Group					
FY19-2.1	Development of overall hydroclimate strategy to support long-term plan review and evaluation	1) High level strategy outlining long-term hydroclimate priorities and phased planning milestones for GLAM to meet 15 year review requirements	<p>The Hydroclimate working group will work with the Plan Review group to identify priority activities that will ensure appropriate hydroclimate information is available to support long-term GLAM requirements to meet the 15 year review.</p> <p>The hydroclimate effort will build on issues identified in the development of the report on 2017 conditions and will tackle critical questions such as:</p> <ul style="list-style-type: none"> - Does GLAM have the right hydroclimate sequences to test regulation plans? - Are the currently available historical, stochastic, and climate change sequences adequate? - How do we track changes over time to sure we continue to test regulation plans with appropriate sequences? - What’s needed to assess plan performance under extreme water supply conditions? - Who’s doing relevant work, what resources exist to undertake the work, and what are the priority gaps that the GLAM Committee should be targeting with its available resources? - Do the 2017 findings suggest the need to redefine the stochastic sequence used in the LOSLRS or IUGLS? If so, develop a strategy to update the stochastic sequence accounting for 2017 supplies. 	In-kind	June-19
FY19-2.2	Completion of NWS Multi-Precipitation Estimates (MPE)/CaPA merged baseline climatology development	1) Technical documentation presenting the method used to compute the climatology of a merged CaPA/MPE product and how to access on website	<p>This is a continuation of a portion of FY18-2.1. Funding arrangements have been made through the IJC as of September 2018. The intent is to develop a long-term climatology using the merged CaPA/MPE product to support comparisons of current rainfall conditions to past conditions. The project will also include provided website access to the data. The data is critical to better understand the contribution of overlake precipitation in the historical water balance of the Great Lakes and to support GLAM efforts to ensure appropriate water supply sequences are available to test regulation plans.</p>	IWI	Mar-19

Impact Assessment Working Group – Lake Ontario and St. Lawrence River (Ecosystem)					
FY19-2.3	Performance Indicator review and prioritization for Lake Ontario – St. Lawrence River Integrated Ecological Response Model (IERM)	1) Initiation of multi-phased review of Lake Ontario and St. Lawrence River IERM, its Performance Indicators, and prioritization for mid to long-term Performance Indicator and model improvements	<p>Since its inception in 2015, the GLAM Committee has placed significant emphasis on the Lake Ontario and upper St. Lawrence River meadow marsh wetland performance indicator due to its importance and measurability in understanding overall ecosystem response to changes in Lake Ontario outflow management. In preparing the annual report for 2017, it became evident that in addition to the ongoing work in support of the meadow marsh performance indicator, an overall status assessment of the additional ecosystem indicators was required to determine which ones were priority for monitoring, updating, and integration into a long-term adaptive management process. Given limited resources, the GLAM Committee cannot monitor all indicators and it is important to assess how the existing indicators can best be tracked, what external efforts are ongoing related to individual indicators, and how the GLAM Committee can best fill priority gaps.</p> <p>The GLAM Committee considers this a priority activity for FY2019 and will build on priorities and issues identified in the development of the report on 2017 conditions. It is expected that external resources will be required to support this review for some stakeholder groups. Coordination with the upper Great Lakes Performance Indicator review will likely be required. It is anticipated that this effort may carry over into future years and work plans. Only preliminary work will be able to be completed in 2019 and will build on priorities and issues identified in the development of the report on 2017 conditions. There is an ongoing need for learning, training, and simulations using existing models, which will be part of this effort.</p>	Managed through in-kind resources but specific aspects may require submission for IWI support	June-19
FY19-2.4	Continued Evaluation of Meadow Marsh Algorithm	<p>1) An updated report integrating 2017 (and possibly 2018) field data into the comparison of the wetlands algorithm along with a response to 2017 peer review</p> <p>2) Preliminary development of a longer-term coastal wetland monitoring strategy to support</p>	<p>This is a carry-over item from FY18 and is critical to support updating and validating the meadow marsh Performance Indicator. The GLAM Committee delayed work on this FY18 task until the 2017 field data was acquired and processed. That data was delivered in the late spring of 2018 and GLAM Committee resources are expected to be available for follow-up in FY19.</p> <p>Given the importance of the meadow marsh indicator to longer-term plan evaluation, the GLAM Committee will use the updated information to support the development of a monitoring strategy. To date, funding has been acquired through the IJC's IWI but a more strategic plan is required to ensure long-term</p>	In-kind	June-19

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		GLAM efforts along with implementation requirements.	sustainability. This includes identifying monitoring requirements including frequency and sample size, the contribution of remote sensing approaches, and potential resources to support the effort over the long-term. This task is critical for developing a <u>monitoring and validation protocol</u> .		
FY19-2.5	Monitoring of Lake Ontario Coastal Wetlands on the Canadian Shoreline	1) Summary report and monitoring data for use in long-term model validation efforts	This is a new item, but relates to FY18-2.6 and other past field sampling tasks. It is field <u>monitoring</u> of 16 Canadian wetland sites in late summer of 2018 by the Canadian Wildlife Service to support <u>model validation of the meadow marsh Performance Indicator</u> .	IWI	Mar-19
FY19-2.6	Follow up to State of Science Assessment of Remote Sensing for Great Lakes Coastal Wetlands - possible collaboration from Mar 2018 workshop	Specific products are TBD but relate to the testing of drone and high resolution satellite imagery to support wetland vegetation delineation.	In March 2018, a workshop was held to discuss a draft paper prepared on the application of remote sensing to support the delineation of wetland vegetation in support of validating the wetland vegetation model and associate meadow marsh performance indicator. There were a few items that come out of the remote sensing workshop that require follow up including the testing of high resolution optical imagery from drones coordinated with ongoing field vegetation sampling as well as testing of the use of high resolution satellite data and newly acquired (summer 2018) USACE hyperspectral data. In all cases, the tasks support performance indicator <u>monitoring and validation</u> .	TBD	Sept-19
**FY19-2.7 ¹	<i>Wetland monitoring and ecosystem indicator development (muskrat and Northern Pike)</i>	<i>1) This is part of a multi-year effort with only interim products expected in FY19</i>	<i>This is a multi-year item initiated in FY18 (was FY18-2.8) and contributes to ongoing efforts to support Performance Indicator <u>monitoring and validation</u> related to the wetlands, muskrat dens and Northern Pike indicators in the upper St. Lawrence River.</i>	<i>In-kind through partner agency activities</i>	<i>Multi-year</i>
**FY19-2.8 ²	<i>Wetland imagery interpretation</i>	<i>1) Distribution of processed and interpreted of high resolution aerial imagery for up to 17 Canadian wetland sites (e.g. vegetation delineation) done by the Ontario Ministry of Natural Resources</i>	<i>This is a multi-year item initiated in FY18 (was FY18-2.9) and contributes to the ongoing efforts to support Performance Indicator <u>monitoring and validation</u> related to the wetland indicator for Lake Ontario.</i>	<i>In-kind through partner agency activities</i>	<i>Multi-year</i>

¹ The project is being undertaken through partner agencies but directly contributes to long-term GLAM Committee objectives

² The project is being undertaken through partner agencies but directly contributes to long-term GLAM Committee objectives

Impact Assessment Working Group – Lake Ontario and St. Lawrence River (Socio-Economic)					
FY19-2.9	Socio-economic Performance Indicator review and prioritization for Lake Ontario – St. Lawrence River Shared Vision Model	<p>1) Initiation of multi-phased review of Lake Ontario and St. Lawrence River socio-economic Performance Indicators, and their prioritization for mid to long-term application and improvements</p> <p>2) 2019 priority is development of a PI review assessment plan including strategies, processes and milestones for updating or replacing PIs, as necessary.</p>	<p>Socio-economic performance indicators are measures that broadly represent impacts to various stakeholder groups within the Lake Ontario – St. Lawrence River system including:</p> <ul style="list-style-type: none"> - Commercial Navigation - Hydropower - Recreational Boating and Tourism - Municipal and Industrial Water Users - Coastal Riparian <p>PIs are critical for modelling potential outcomes under a range of potential regulation plans and water supply sequences.</p> <p>In preparing the annual report for 2017, it became evident that some of the current indicators are difficult to monitor or may not capture some of the critical sensitivities to the interest under extreme high water level or flow conditions. In response, the GLAM Committee is prioritizing the initiation of a detailed review of performance indicators for each stakeholder group which is critical to the development of plans to monitor, validate, and update the indicators going forward.</p> <p>This is a large effort and the GLAM Committee considers this a priority activity for initiation in FY2019 for priority indicators. It is expected that external resources will be required to support this review for some stakeholder groups. Coordination with the upper Great Lakes Performance Indicator review will likely be required. It is anticipated that this effort may carry over into future years and work plans. Only preliminary work will be able to be completed in 2019 and will build on priorities and issues identified in the development of the report on 2017 conditions. There is an ongoing need for learning, training, and simulations using existing models, which will be part of this effort.</p>	Managed through in-kind resources but specific aspects may require submission for IWI support	June-19

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FY19-2.10	Revisit shore protection that was surveyed by either NYDEC (2011) or USACE (2015) to assess response to high water conditions	1) An assessment of a subset of shore protection structures previously surveyed by NYDEC and/or USACE to determine condition following 2017 high water levels.	This is a carry-over item from FY18 and is critical to support Performance Indicator validation and potential future updating . It involves an assessment of a subset of shore protection structures previously surveyed by NYDEC and/or USACE to determine their conditions following 2017 high water conditions. IWI funds have been identified to support the effort and the funds have been appropriated to the USACE to carry out the work in FY19.	IWI	TBD once contract awarded
FY19-2.11	Implementation of Shoreline Damage Survey for the Canadian Shoreline of Lake Ontario and the Upper St. Lawrence River	1) finalize stand-alone report on all responses 2) Assess the usefulness of this information, does it supply GLAM with solid data to support PI evaluation? Which PIs?	This is the wrap-up for a project mostly undertaken in FY18 where Conservation Ontario implemented an online, self-reporting questionnaire for shoreline property owners. That information is largely summarized in the annual report for 2017 but there is some material that was not included in that report. As well, there is a need to identify whether there are questions that could be used as part of a long-term data collection effort being considered by USACE. In both cases, this task supports surveillance that ties back in to PI validation and potential future updating .	In-kind	Feb-19
FY19-2.12	Survey and review of operational impacts on marinas due to 2017 water levels	1) An assessment of marina impacts during 2017 high water levels.	This is a carry-over item from FY18 and is critical to support Performance Indicator validation and potential future updating . The GLAM Committee has received tentative approval of IWI funds to support this work and is currently (as of September 2018) undertaking an RFP process to find an appropriate supplier. The work will involve surveys of marinas on Lake Ontario and the St. Lawrence River impacted by high water levels in 2017.	IWI	May-19
FY19-2.13	Survey and review of operational impacts on M&I infrastructure due to 2017 water levels	1) An assessment of municipal and industrial infrastructure impacts during 2017 high water levels.	This is a carry-over item from FY18 and is critical to support Performance Indicator validation and potential future updating . The GLAM Committee has received tentative approval of IWI funds to support this work and is currently (as of September 2018) undertaking an RFP process to find an appropriate supplier. The work will involve surveys of municipal and industrial operators on Lake Ontario and the St. Lawrence River impacted by high water levels in 2017.	IWI	May-19
**FY19-2.14 ³	<i>Erosion and inundation vulnerability assessment along the lower St. Lawrence River</i>	<i>1) This is part of a multi-year effort with only interim products expected in FY19</i>	<i>This is a multi-year item being undertaken through partner agencies. The project results will contribute to ongoing efforts to support Performance Indicator monitoring and validation related shoreline erosion and inundation vulnerability along the lower St. Lawrence River between Montréal and Trois Rivières and will include a climate change component.</i>	<i>In-kind through partner agency activities</i>	<i>Multi-year</i>

³ The project is being undertaken through partner agencies but directly contributes to long-term GLAM Committee objectives

Impact Assessment Working Group – Upper Great Lakes					
FY19-2.15	Upper Great Lakes Integrated Ecological Response Model and Shared Vision Model Performance Indicator status review and prioritization	<p>1) Initiation of multi-phased review of Upper Great Lakes Integrated Ecological Response Model and Shared Vision Model and prioritization for mid to long-term PI and model improvements</p> <p>2) 2019 priority is development of a PI review assessment plan including strategies, processes and milestones for updating or replacing PIs, as necessary.</p>	<p>Upper Great Lakes socio-economic and ecosystem performance indicators are measures that broadly represent impacts to various stakeholder groups within the Lake Ontario – St. Lawrence River system. They are critical for modelling potential outcomes under a range of potential regulation plans and water supply sequences.</p> <p>In preparing the annual report for 2017, it became evident that some of the current indicators are difficult to monitor or may not capture some of the critical sensitivities to the interest under extreme high water level or flow conditions. In response, the GLAM Committee is prioritizing the initiation of a detailed review of performance indicators for each stakeholder group which is critical to the development of plans to monitor, validate, and update the indicators going forward.</p> <p>This is a large effort and the GLAM Committee considers this a priority activity for initiation in FY2019 for priority indicators. It is expected that external resources will be required to support this review for some stakeholder groups. Coordination with the lower Great Lakes Performance Indicator review will likely be required. It is anticipated that this effort may carry over into future years and work plans. Only preliminary work will be able to be completed in 2019 and will build on priorities and issues identified in the development of the report on 2017 conditions. There is an ongoing need for learning, training, and simulations using existing models, which will be part of this effort.</p>	Managed through in-kind resources but specific aspects may require submission for IWI support	June-19
FY19-2.16	St. Marys River IERM Rapids Data	1) Improved substrate data for the St. Marys Rapids to support IERM2D model development.	This is a carry-over item from FY18 and is critical to support Performance Indicator and model development within the St. Marys River IERM. The project will involve data collection of substrate data in the St. Marys Rapids area to support IERM validation. The USACE has set aside funds to contribute to the project should IJC IWI funds be made available. The project was previously approved for IWI support in FY18 but the IJC requested the project be put off to FY19. This project is combined with FY19-2.16.	IWI and in-kind	Sept-19
FY19-2.17	St. Marys River IERM Expansion	1) Additional data downstream of the St. Marys Rapids to expand IERM2D model domain	This is a carry-over item from FY18 and is critical to support Performance Indicator and model development within the St. Marys River IERM. The project will involve data collection downstream of the rapids to expand IERM to other	IWI and in-kind	Sept-19

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			sensitive areas of the river. The USACE has set aside funds to contribute to the project should IJC IWI funds be made available. The project was previously approved for IWI support in FY18 but the IJC requested the project be put off to FY19. This project is combined with FY19-2.15.		
FY19-2.18	Assimilate St. Marys River IERM into SVM	1) IERM2D integrated within the upper Great Lake SVM.	This is a carry-over item from FY18. The newly developed IERM2D for the St. Marys River will need to be converted to an operational plan evaluation tool for use by the regulation offices. This task support GLAM Committee Plan Review requirements.	In-kind	Sept-19
FY19-2.19	Development of initial flooding performance indicator for the St. Marys River	1) Preliminary development of flooding performance indicator for the St. Marys River.	This is a carry-over item from FY18. During high flows through the St. Marys River, local flooding can occur at various locations in the river. No performance indicator was developed during the IUGLS for this area and one is now required. This effort will initiate the Performance Indicator and model development for application in future plan review activities.	In-kind	Sept-19
Plan Review Working Group					
FY19-2.20	Review of Plan 2014 operations in 2018 (including high outflow/low Lake St. Lawrence conditions)	1) Reporting in the 2018 summary based on a review of how Plan 2014 responded during 2018 conditions	A review of Plan 2014 performance will be performed comparing actual flows and water levels observed in 2018 to how Plan 2014 was expected to respond under similar conditions. This will include looking at previous plan simulations to identify similar years with high inflows, outflows, low Lake St. Lawrence levels, etc. and identifying any common factors that might be leading to observed regulation plan response and how that plays into long-term plan operation. A priority is to consider whether actual operations are consistent with expected plan response under observed conditions and critical drivers and also understand the source of any potential inconsistencies, should they be identified. This review would be primarily based on existing water level and flow simulation information and the results will be included in the committee's report to the Board.	In-kind	May-19
FY19-2.21	Plan Review gap analysis	<ol style="list-style-type: none"> 1) A gap analysis of critical plan review issues 2) Prioritization and scoping of identified issues 3) Initiation of follow up to priority plan items identified in the gap analysis (reported in 2018 summary) 	The report on 2017 conditions identified a number of short and long-term plan review requirements, with varying levels of priority. As well, there may be further plan review components raised from the review of 2018 operations that require further investigation. However, the GLAM Committee must also consider longer-term requirements to perform a broader review of plan performance, integrating multiple individual components.	In-kind	May-19

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			As a priority and to help make the best use of limited available resources, the GLAM Committee needs to do a gap analysis and prioritization of the gaps found to ensure critical issues are identified. In some cases, it may be possible to address these issues with available information (e.g. from the Lake Ontario – St. Lawrence River Study) relatively quickly. In other cases, further simulations or more detailed analysis may be required. Some of the outstanding items may be addressed within FY19 but this will not be determined until after the gap analysis and prioritization has taken place.		
FY19-2.22	Routing model update	1) Model code. 2) Final summary report including executive summary and lessons learned.	<p>This is a carry-over item from FY18. The IWI funds to support the effort were allocated in FY18 and the bulk of the work was completed. Final updates will be provided early in FY19. These funds are being used to develop front end data handling routines as part of a larger project being done by the Coordinating Committee to re-code the coordinated routing model used to translate water supplies into water levels and flows on the Great Lakes and St. Lawrence River.</p> <p>The new model will be used by GLAM committee members to simulate Great Lakes water levels and flows under alternative regulation strategies, future water supply scenarios and changing climate conditions and evaluate their impacts, all of which are key provisions of GLAM’s Directive from the IJC.</p>	IWI	Dec-18

Table 3: Summary of GLAM FY19 Section B – oversight and administration work plan activities

Section B: GLAM Oversight and Administration					
Task	Task Title	Proposed Products	Description	Expected Resources	Estimated Delivery
FY19-3.1	GLAM Committee Coordination, Management, and Reporting	1) Annual work plan for FY19 for submission to the Boards. 2) Semi-annual progress reports for submission to the Boards in March 2019 and September 2019. 3) Coordination and oversight of	This is an on-going task that includes the coordination, management operation and oversight of GLAM Committee activities and working groups. It includes primarily the work of the co-chairs, secretaries and their staff who help support the operation of the GLAM Committee. This activity is supported primarily through USACE and ECCC with some operation and maintenance funds provided by IJC-Ottawa.	In-kind	Sept-19

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		draft annual report for 2018 preparation.	There are three specific products for this task including the development of an annual work plan for submission to the boards, semi-annual progress reports in March and September of 2019, and coordination and oversight of the annual report for 2018. The first two items are requirements of the IJC Directive to the GLAM Committee and the third item has been identified as a priority by the GLAM Committee to support long-term planning and coordination.		
FY19-3.2	Monitoring of Work Plan Delivery	1) Task descriptions and periodic updates on progress that contribute to semi-annual reporting.	The GLAM Committee secretaries in conjunction with the GLAM Co-chairs will track work plan progress. This is an ongoing committee requirement and contributes to semi-annual progress reporting.	In-kind	Sept-19
FY19-3.3	GLAM Information Management Needs including file sharing and data/model management strategies.	1) Analysis of GLAM IM/IT opportunities and needs within the context of available IJC IM/IT resources and capacity.	This is a carry-over items from the GLAM Committee’s FY18 work plan. While it is considered a high priority, work was deferred due to resource limitations while completing the annual report for 2017. The GLAM Committee currently relies on IJC support for a high level website as well as file transfer systems such as Sharepoint and File Transfer Protocol (FTP) resources to communicate internally and manage products and information. GLAM continues to face challenges collaborating between agencies when using larger datasets and models as well as some files and documents already managed through existing IM/IT infrastructure. Further direction is needed to identify appropriate approaches for handling future IM requirements and data acquired through the development of the annual report for 2017 will be utilized as test material to develop appropriate standards and approaches (e.g. oblique imagery analysis, wetland monitoring data, etc.) The GLAM Committee hopes to make further progress on defining IM/IT needs and solutions in the coming FY and will leverage other IJC opportunities where appropriate.	In-kind	Sept-19
FY19-3.4	Maintain engagement with GLWQA activities	1) Ongoing GLAM co-chair participation in meetings of the IJC’s WQB and SAB. 2) Interaction with GLWQA annexes to further potential common objectives.	The IJC Directive to the GLAM Committee specifically highlights the importance of ensuring coordination and liaison between the Great Lakes Control Boards and the Boards created by the Great Lakes Water Quality Agreement (GLWQA) – the Great Lakes Water Quality Board (WQB) and Science Advisory Board (SAB). To better link water levels and flows regulation with water quality considerations, the GLAM Committee is requested to engage in outreach activities with the WQB and SAB. The GLAM Committee co-chairs are participating in joint meetings of the WQB and SAB.	In-kind	Sept-19

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FY19-3.5	Develop and initiate an engagement plan for advisory networks	1) Proposed engagement strategy of GLAM advisory networks.	This is a carry-over item from FY18. The GLAM Committee will continue efforts to develop a long-term communication and engagement strategy to support its work. The GLAM Co-chairs and secretaries participate on the International Lake Ontario – St. Lawrence River Board Communications Committee to support coordination where necessary.	In-kind	Sept-19
FY19-3.6	Development of 12-year strategy	1) An overview strategy document outlining a longer term strategy for ensuring 15 year review of regulation plans	Both the Lake Superior and Lake Ontario outflow strategies must be reviewed within 15 years of implementation. The GLAM Committee is looking to prepare an overall framework of critical activities that must take place prior to the 15 year review date to guide efforts over the next number of years. The strategy will also identify potential resource gaps.	In-kind	June-19

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 assumes that necessary implementation and contract arrangements can be made for IWI-endorsed 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.

Revision History

Date of next revision:

Revision Date	Previous Revision Date	Summary of Changes	Changes Marked