
Great Lakes-St. Lawrence River Adaptive Management Committee (GLAM)

Semi-Annual Progress Report to the Great Lakes Boards of Control and the
International Joint Commission
Covering the period March 1st, 2016 to August 31st, 2016

October 7th, 2016



Contents

Contents.....	2
GLAM Committee Membership	3
Executive Summary	4
1.0 Introduction.....	5
2.0 Progress on 2016 work plan.....	5
2.1 Verification of models used to assess water levels and flow benefits and impacts	6
2.2 Water supply tracking	7
2.3 Physical, environmental and socio-economic system changes and impacts	7
2.4 Regulation plan improvements	8
2.5 Management and administration.....	9
2.6 Communication, outreach and engagement.....	9
3.0 Future Work.....	10
3.1 Upcoming International Watersheds Initiative projects.....	11
4.0 Funding and Resourcing	12
Appendix A: Summary of Work Plan Progress.....	13

Cover photo: St. Marys River rapids (photo credit: Jacob Bruxer, Environment and Climate Change Canada - Cornwall)

GLAM Committee Membership

U.S.	Canada
Kyle McCune, U.S. Co-Chair Member of Research Coordination Committee – Great Lakes Science Advisory Board	Wendy Leger, Canadian Co-Chair
Don Zelazny	Jonathan Staples International Niagara Working Committee
David Hamilton	Patricia Clavet St. Lawrence Board Member
Fred Luckey	Gavin Christie Co-chair of Research Coordination Committee – Great Lakes Science Advisory Board
Drew Gronewold	Frank Seglenieks International Niagara Working Committee
Bill Werick	Jean Morin
Keith Koralewski St. Lawrence Board Regulation Representative	Rob Caldwell St. Lawrence Board Regulation Representative
John Allis Superior Board, Alt. Regulation Representative	Jacob Bruxer Superior Board Regulation Representative
<i>Arun Heer, U.S. Secretary</i> U.S. Secretary – Great Lakes Boards of Control	<i>Mike Shantz, Canadian Secretary</i>

Executive Summary

The International Joint Commission (IJC) established the Great Lakes – St. Lawrence Adaptive Management (GLAM) Committee through an IJC directive on January 16, 2015, to provide monitoring and evaluation of regulation plans in support of the three Great Lakes-St. Lawrence River Boards of Control (the Boards). This report is the second semi-annual report to the IJC and the Boards and it highlights the work completed between March 1 and August 31, 2016 as the GLAM Committee continued to implement its 2016 work plan.

The committee continued a number of projects designed to validate and improve existing tools used to simulate the potential impacts and benefits of alternative water level management strategies. Particular focus was on the shore protection and wetlands models for Lake Ontario as these played predominately in the plan evaluation from the Lake Ontario – St. Lawrence River (LOSLR) study and subsequent follow-up efforts. GLAM made progress on its plan to improve understanding of hydroclimate conditions in the Great Lakes – St. Lawrence basins and the ability to simulate historical conditions.

The committee placed particular emphasis during the reporting period on developing a proposed framework to guide future plan review and evaluation activities. The proposal is being integrated into the committee's mid-term strategy which will be shared with the Boards for review in the coming months. The committee intends to use the mid-term strategy to provide overall guidance to the more detailed annual work plans that will be developed each fall.

The committee continues to appreciate the support of the IJC, particularly the conditional approval of a number of projects through the International Watersheds Initiative (IWI). Detailed funding arrangements have been made for projects related to baseline monitoring of Common Reed on Lake Ontario; an improved hindcast of precipitation, evaporation, and runoff in the Great Lakes basin; and new or updated ecohydraulic models for the St. Marys and St. Lawrence rivers. Committee members continue to work with the IJC to finalize funding details for the remaining projects approved through the IWI, including additional Lake Ontario wetlands monitoring and hydroclimate activities. Many of these projects approved through the IWI will be implemented as part of the fiscal year 2017 work plan.

1.0 Introduction

A directive signed January 16, 2015 by the International Joint Commission (IJC) established the Great Lakes – St. Lawrence Adaptive Management (GLAM) Committee to undertake monitoring and assessment of Lake Superior, Niagara River, and St. Lawrence River Boards' regulation plans and activities, as well as coordinate with the Water Quality and Science Advisory Boards on issues of common interest. The GLAM Committee (committee) is comprised of a Canadian and US co-chair, as well as members from government agencies, the Great Lakes Boards of Control (Boards), and technical experts. The committee also previously appointed a Canadian and US secretary to provide ongoing support.

The GLAM Committee was initiated to establish a structured, iterative process of robust evaluation in the face of uncertainty, with an aim to reduce uncertainty over time via system monitoring and feedback to the decision-making framework based on knowledge gained. The overall objective of the GLAM Committee is to provide information to the Boards and the IJC while advising them on the effects that the control structures approved in the IJC's Orders of Approval and directives have on levels and flows in boundary waters. GLAM also captures the benefits and impacts that the regulation plans have on the affected stakeholders and communicates this to the Boards and the IJC. 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 the outflows of Lake Superior in the past and into the future;
- b) examining how the system may be changing over time and whether any modifications to the regulation plan(s) may be warranted to address what is learned over time, including emerging issues and/or to address changing conditions; 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 GLAM Committee's 2016 work plan, covering the period from October 1, 2015 to September 30, 2016, was approved by the IJC in October 2015 and outlines a number of proposed activities in support of overall GLAM objectives. This semi-annual report will highlight GLAM progress and accomplishments in continuing to implement the work plan for the latest six-month reporting period of March 1, 2016 to August 31, 2016.

2.0 Progress on 2016 work plan

The 2016 work plan has laid out 25 specific tasks to support GLAM's mission. Individual tasks are organized around four key questions as outlined in the GLAM directive. They include:

1. How well are the impacts of levels and flows represented by current data and models used in the evaluation of the management of levels and flows?
2. Will future water supplies be different 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?

In addition to tasks related to these four questions, the 2016 work plan also identifies basic management and administrative tasks, as well as those related to outreach and engagement. The following sections briefly describe the committee's progress in these areas during the current reporting period, with the table in *Appendix A* outlining task-specific details.

2.1 Verification of models used to assess water levels and flow benefits and impacts

The GLAM Committee made progress on three projects related to model verification, which will support further understanding of how well the benefits and impacts of levels and flows are represented in the current evaluation models originally developed for the International Upper Lakes Study (IUGLS) and Lake Ontario St-Lawrence River (LOSLR) study.

Two of the projects relate to modelling wetland vegetation along the Lake Ontario shoreline and both have received approval through the International Watersheds Initiative (IWI). During the reporting period, staff from the Canadian Wildlife Service of Environment and Climate Change Canada (ECCC) completed the first project by submitting their final report which summarized the data and results of monitoring wetland vegetation in eight Lake Ontario wetland sites during the 2015 growing season. This IWI Project is titled "Monitoring of Lake Ontario coastal wetland habitat in support of adaptive management." Then, as part of a second IWI project, experts began to process the 2015 monitoring data along with previously collected Canadian and US data going back to 2009 to support a comparison of field data with output from the Lake Ontario wetlands model. This second IWI project is titled "Comparison of modeled and monitored outcomes of Lake Ontario wetland habitat in support of adaptive management." GLAM members and support staff worked with wetland experts and conducted sensitivity testing using an Excel-based model designed to replicate the output of the original Lake Ontario wetlands model in parallel with field data processing to support the wetland algorithm validation component of the project which is now under way. GLAM expects to continue this wetland algorithm validation task into the fall of 2016.

For the third project, the GLAM Committee is testing assumptions within the Flooding and Erosion Prediction System (FEPS) related to shore protection crest elevations for Lake Ontario. During the reporting period, the U.S. Army Corps of Engineers (USACE) updated the FEPS database with new shore projection elevation information obtained through post-LOSLR field surveys. ECCC staff worked with USACE staff to provide training on using the FEPS model and initial model runs were completed using the original model and the updated shore protection elevation information. The project team plans to prepare a summary document for review by the GLAM Committee in the fall of 2016.

2.2 Water supply tracking

The GLAM Committee's 2016 work plan included four separate tasks designed to help improve understanding of water supplies in the Great Lakes basin. One of the tasks was a project funded through the IWI and led by Dr. Vincent Fortin from ECCC representing one stage of a multi-year effort to generate a 30-year hindcast of precipitation, evaporation and runoff for all Canada/US transboundary watersheds. The hindcast will be particularly useful in the Great Lakes basin where lake based influences (e.g. on precipitation) are considered to be well captured by the model used to develop the hindcasts. The report was provided in May 2016 and summarizes the progress made in testing approaches and synthesizing key datasets required for the hindcast analysis. Given the extensive supercomputing requirements for such simulations, considerable care is required to establish the most appropriate and efficient methods and approaches before actually running the simulations.

Continued collaboration with the Coordinating Committee on Great Lakes Basic Hydrologic and Hydraulic Data (Coordinating Committee) plays an important role in ensuring coordination with agencies related to net basin supply (NBS) and connecting channel hydraulics information for the Great Lakes basin. The GLAM Committee continues to rely closely on the Coordinating Committee to track improvements in these areas and is working on arrangements with the Coordinating Committee to receive regular updates that will help guide GLAM work. During the reporting period, GLAM Committee and Coordinating Committee members made progress on a collaborative task to inventory available NBS-component information in the Great Lakes basin. Project members are on track to finish a summary report in the fall of 2016 documenting currently-available NBS-component data in the basin.

The GLAM Committee also continued to update historical hydrologic and hydraulic datasets required for simulations of water levels and flows in the Lake Ontario – St. Lawrence River system. Many of these datasets were fundamental to the simulations produced during the LOSLR study, but have not received as much attention since then, notably the area of the lower St. Lawrence River around Lake St. Louis and Montreal. Through this effort, these critical datasets are being reviewed, updated and documentation is being developed. It will then also be possible to begin extending these datasets and related products (i.e., ice and weed roughness factors) through the present to support further simulations of alternative management strategies. The committee remains on track to have an initial summary document completed in the fall of 2016. Initial in-kind contributions were also made to lay the groundwork for an IWI approved project, aimed at developing a statistical model to help close the water balance of the Great Lakes. Pending finalization of funding sources, this project will be expanded and pursued as part of GLAM's FY 2017 work plan.

2.3 Physical, environmental and socio-economic system changes and impacts

The GLAM Committee uses the term “monitoring” to refer to a focused act of making real-world observations linked explicitly to performance indicators through the performance indicator algorithm, and “surveillance” to refer to the act of identifying and synthesizing information that could help improve regulation outcomes. During the reporting period, contractors finalized reports summarizing a baseline surveillance assessment related to physical changes and environmental changes in the Great Lakes system. The reports identified a number of items that

have emerged since the end of the IUGLS and LOSLR studies that the committee should be aware of as it plans future activities. Committee members continue to work with the contractor for the socio-economic component to finalize the last report. All three contracts were funded through the Canadian Section of the IJC.

The committee intends to develop a sustainable long-term surveillance strategy that will support efforts to stay informed of new and emerging issues that could impact GLAM activities and priorities. Work was expected to begin on the development of that strategy during this reporting period but progress was delayed due to other priorities. The committee expects to proceed on this task in the fall of 2016.

2.4 Regulation plan improvements

The committee invested considerable time and energy in developing a framework and strategy to support on-going review and evaluation of the existing and alternative regulation plans. A March 2016 workshop focused discussion in this area and initiate priority activities including the familiarization with existing plan evaluation tools. A plan evaluation team was established and they developed a proposal for a tiered framework to guide much of the committee's efforts regarding plan review and evaluation. The proposal is being incorporated into the committee's draft mid-term strategy, which will be going to the Boards for review in the fall of 2016.

Progress was made on two 2016 work plan tasks in support of the International Lake Superior Board of Control, looking at specific operational issues identified in recent years following the implementation of Plan 2012. The Coordinated Great Lakes Regulation and Routing Model (CGLRRM) was updated to allow for simulations under varying side-channel capacity scenarios in the St. Marys River and testing of strategies to address the effects these scenarios have on the St. Marys Rapids. Also, with the support of the International Lake Superior Board of Control, additional flow measurements at the Compensating Works were collected this year and these are being used in the development of flow rating equations under partially open gate settings and the evaluation of this new operational approach. Continued commitment to these tasks will be required as part of the committee's 2017 work plan, as progress is expected to continue in parallel with a number of complimentary initiatives.

Through the work done so far, the project team has noted that there are few performance indicators or evaluation tools that focus on the St. Marys rapids area. This has been identified as a potential gap for completing these tasks, and development of these indicators has been identified as a priority item required to support future plan evaluations. To this end, the USACE Detroit District continued to refine its new hydraulic model of the St. Marys rapids over the past several months, and this will be critical to assess the impacts of water levels and flows under various Compensating Works gate setting scenarios. In addition, these hydraulic modelling efforts may be used to develop an ecohydraulic model in the St. Marys River. The proposed model would be similar to a previous 2-Dimensional Integrated Ecological Response Model (IERM2D) prepared for the lower St. Lawrence River. This project has been identified in GLAM's 2017 work plan and a proposal has been submitted through the IWI to support this effort.

The two St. Marys River evaluation projects as well as the wetlands and FEPS model update projects described in *Section 2.1* have provided practical scenarios to initiate learning activities amongst ECCC and USACE agency staff and pass on knowledge and experience to a new generation of modellers. The objective is to ensure ongoing, within-agency capacity to apply existing and newly developed plan evaluation tools. A few webinar training sessions were hosted related to the FEPS model during the reporting period and agency staff have also initiated testing with the IUGLS models. Maintaining operational capacity with plan evaluation tools will be an ongoing requirement of the committee and its supporting technical staff. The committee's 2017 work plan will incorporate such follow up activities.

2.5 Management and administration

The committee's 2016 work plan includes a number of activities categorized as management and administration. During the reporting period, particular effort was placed on the development of a mid-term strategy. This effort aligns closely with the regulation plan improvement work described in Section 2.3 and has resulted in the development of a tiered framework to help guide future committee activities. As noted earlier, the tiered framework has been incorporated into a draft strategy document and also includes the committees focus related to operating standards such as quality control, project tracking and funding mechanisms as well as the important requirement for effective information management. The mid-term strategy is currently being reviewed and will be presented to the Boards of Control in the fall of 2016 to solicit their feedback and guidance.

Progress was also made on a number of other management and administration activities, including the development of an initial triennial report outline which was discussed by the committee at their March 2016 meeting in Detroit. This initial draft will be revised by the committee in the fall of 2016 and a priority task will be to develop the committee's triennial report by the end of January 2017. Many of the other management and administrative tasks are considered ongoing activities that will carry over into the 2017 work plan.

2.6 Communication, outreach and engagement

The committee's communication, outreach, and engagement strategy was approved by the IJC at the October 2015 semi-annual appearances. Four key principles of the strategy include:

1. The GLAM Committee's external communications will be effectively coordinated with the Lake Superior, Niagara and St. Lawrence Boards of Control and IJC Communications. GLAM Committee public announcements and interactions will typically be made through the Boards or IJC and/or with full endorsement by the Boards and IJC.
2. The GLAM Committee may engage in external communication directly with specific audiences to facilitate research, seek stakeholder input, provide information regarding general adaptive management principles, and identify funding opportunities.
3. The GLAM Committee's internal communications will adhere to the IJC communication principles.

4. While the focus of GLAM Committee communications will be to maintain the on-going evaluation and assessment of lake level regulation plans, communications activities will also support the principle of adaptive management. These activities will inform those who are more interested in adaptive management than lake regulation.

Committee members took advantage of a number of conferences and proceedings to promote the activities of the committee with technical experts in the fields of adaptation planning, water level impact analysis, and coastal management. GLAM committee members made presentations in April at the Adaptation 2016 conference in Ottawa, Ontario and the Initiatives pour l’Avenir des Grands Fleuves workshop in Montreal, Quebec. Committee members were also invited to give a presentation on Lake Superior regulation and GLAM at a meeting of the Lake Superior Partnership Work Group. In May 2016, the Canadian co-chair presented at a University of Michigan workshop and live-streamed event regarding water level integrated assessment. Finally, in June 2016, presentations were made at the International Association of Great Lakes Researchers as well as the Coastal Zone Canada conference.

The GLAM Committee continued efforts to engage targeted stakeholder groups as outlined in the 2016 work plan (e.g. agency senior management, circles of influence, research networks, and Great Lakes Water Quality Agreement). Some progress has been made in this area, including an initial strategy to engage with Great Lakes Water Quality Agreement activities beyond just the IJC’s Science Advisory Board and Water Quality Board. However, further effort is required to support ongoing engagement activities and the committee will be looking to work with the various Boards to undertake targeted progress in this area as part of the 2017 work plan.

3.0 Future Work

The GLAM Committee has initiated development of its 2017 work plan, which will cover the period from October 1, 2016 to September 30, 2017 and will align with the US fiscal year. The objective will be to seek board endorsement following the September 2016 meetings and present to the IJC at the October semi-annual appearances. As described in Section 2.0, the committee has made significant progress on a number of tasks identified in the 2016 work plan and is pleased with progress made, especially given challenges within the first year in terms of funding mechanisms and in developing strategic frameworks. Given these challenges, some tasks could not be completed and must be carried over into the 2017 work plan.

Priorities for the next reporting period will include working with the Boards to finalize the mid-term strategy document, completing the FEPS and Lake Ontario wetland indicator reviews as identified in *Section 2.1*, and working closely with IJC staff to prepare the committee’s first triennial assessment report. The committee also expects to invest considerable effort and time in applying the proposed tiered framework being developed within the mid-term strategy to help frame ongoing and future activities. Attention will also be paid to implementing the Communication, Outreach, and Engagement strategy, in coordination with Great Lakes water quality activities. The committee will continue to provide oversight to a number of projects funded through the IWI as outlined in *Section 3.1* below. It is important to note that the US and Canadian federal governments are still deliberating Plan 2014 and that an announcement is

possible in the coming months. Depending on the outcomes of those deliberations, resources may need to be re-allocated from activities currently identified in the GLAM work plan to other priorities which would impact potential progress.

3.1 Upcoming International Watersheds Initiative projects

The GLAM Committee’s 2016 work plan represented tasks that the committee believed could be accomplished within the year given the available agency in-kind staff contributions at the time the work plan was developed. A number of additional tasks were identified in the 2016 work plan as ones that would be considered should alternative funding sources become available. The committee submitted proposals for a number of these projects as part of the IWI in both December 2015 and May 2016, resulting in conditional approval. The individual projects are provided in *Table 1*, along with their current status. Funding arrangements have been a challenge for a number of the approved projects. The committee continues to work with our IJC liaisons and the IWI coordinators to ensure all necessary conditions are met and that appropriate funding and contracting mechanisms are in place for individual projects. These IWI projects will be included as part of the 2017 work plan.

Table 1: Current GLAM Committee IWI projects

IWI Project Code	Source	Project Title	Project Status
AM-04-2015	US	Closing the water balance of the Great Lakes: developing a new historical record of reconciling bias and uncertainty	Conditions approved. Hope to include in IJC’s FY17 budget.
AM-05-2015	US	Programming support for update of Coordinated Great Lakes Regulation and Routing Model	Conditions approved. Hope to include in IJC’s FY17 budget.
AM-06-2015	US	Monitoring of Lake Ontario - St. Lawrence River coastal wetland habitat in support of adaptive management (US shoreline)	Conditions approved. IJC finalizing contract.
AM-07-2015	US	Monitoring the extent of wetland types in the Lake Ontario - St. Lawrence River coastal system in support of adaptive management (US shoreline)	Conditions approved. IJC finalizing contract.
AM-08-2015	CAN	Update the computing code of the Lower St. Lawrence Environmental Performance Indicators (IERM2D)	Conditions approved. IJC has arranged funding transfer to ECCC.
AM-01-2016	CAN	Extended hindcast of Water Supply Components over Canada/U.S. Transboundary Watersheds	Conditions approved. IJC finalizing funding transfer to ECCC.
AM-02-2016	CAN	Baseline Common Reed extent in selected Lake Ontario coastal wetlands	Conditions approved. IJC has arranged funding transfer to ECCC.

AM-03-2016	CAN	Detailed scoping of requirements for developing an ecohydraulic model of the St. Marys River	Conditions approved. IJC finalizing funding transfer to ECCC.
------------	-----	--	---

4.0 Funding and Resourcing

The GLAM Committee would like to thank the IJC for contributing funds to support specific GLAM activities over the reporting period, particularly through the IWI. Two IWI-supported projects were completed in the reporting period and a third one will be finalized in the coming months. In addition, a number of new IWI projects have been conditionally approved as outlined in *Section 3.1*. The committee looks forward to pursuing these new projects as part of the 2017 work plan. Funding provided by the Canadian Section of the IJC to support the operations of the committee and the surveillance contracts is also appreciated.

All other committee activities within the reporting period relied on in-kind contributions from supporting agencies, including those represented through members of the GLAM Committee as identified on page 3 of this report. These contributions have been critical to the ability of the committee to move activities forward during the reporting period.

The GLAM Committee will continue to rely heavily on in-kind support from contributing agencies as well as resource contributions from the IJC to successfully implement adaptive management approaches in the ongoing review of existing water level regulation plans through the Great Lakes Boards of Control.

Respectfully Submitted,



Mr. Kyle McCune
GLAM Committee US co-chair

Ms. Wendy Leger
GLAM Committee Canadian co-chair

Appendix A: Summary of Work Plan Progress

<i>Task</i>	<i>Task Name</i>	<i>Status</i>
Model verification on water levels and flows		
1.1	Monitoring of Lake Ontario coastal wetland habitat (IWI)	IWI scope was approved by the IJC in 2015 and funding was allocated. CWS staff completed wetland surveys in fall 2015 and have provided final results and summary document in March 2016. Data is being used for GLAM Task 1.2.
1.2	Evaluate meadow marsh algorithm (IWI)	Excel versions of the wetlands algorithm within the IERM have been developed. The work identified a few items that need clarification between the documentation and model code and that work was pursued following a meeting held in Burlington on March 1 and 2, 2016. A draft summary of the model testing is being developed. Preliminary processing (statistical analysis) was undertaken for existing wetland monitoring data, including from Task 1.1. Efforts are now underway to take the summary of the monitoring results and compare to model output. This work will extend into GLAM's 2017 work plan.
1.3	FEPS models - update based on Shore Protection Information (PI verification)	The newest field data was organized in the FEPS database by USACE (Buffalo) and an updated database provided to the committee. While some USACE staff is becoming familiar with the FEPS model, further education and practice is still required. ECCC staff has initiated a comparison of model results between new and previous databases. This work will extend into GLAM's 2017 work plan.
Water supply tracking		
2.1	Track advancement towards improving quality of NBS information	The Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data is advancing this task. The GLAM Committee has a number of members cross-appointed to the Coordinating Committee and GLAM is pursuing options to leverage expertise of the Coordinating Committee in tracking key advancements.
2.2	Extended CaPA and GEM hindcasts of water supply components in the Great Lakes basin (IWI)	The final project report and executive summary was provided in May 2016. The web interface component of the original project proposal was delayed as a suitable student could not be hired to perform that aspect of the project. Funding from the IJC was adjusted accordingly and that work will be completed in the near future.
2.3	Inventory of available NBS components for the Great Lakes	Work is ongoing in association with the Hydrology sub-committee of the Coordinating Committee. A project summary is expected in the fall of 2016.
2.4	Review and update of historical hydrologic and hydraulic datasets for the Lake Ontario - St. Lawrence River system through Montreal	Progress continues on this project through ECCC. Much of the work has focused on Lake St. Louis outflows and progress has been made in that area with input from partners at Seaway and Parks Canada. The work will help extend previous datasets used to simulate lower St. Lawrence River water levels under different outflow management scenarios.

Physical, environmental and socio-economic system changes and impacts		
3.1	Design a surveillance plan	The intent was to pursue this in the recent reporting period but work was deferred so that more focus could be put on the strategic plan framework.
3.2	Initial surveillance to determine what has changed and whether there are new data and models available to support AM effort. Includes subtasks: 3.2.1: Ecosystem surveillance 3.2.2: Socio-economic surveillance 3.2.3: Surveillance of physical changes and modeling tools	Three individual contracts to cover the ecosystem surveillance, the socio-economic surveillance, and the physical changes surveillance continued to be pursued during the reporting period. All contracts were funded by the Canadian Section of the IJC. Final products have been received for the ecosystem and physical changes items. Interim products are available for the socio-economic and committee members are working with the contractor to revise and finalize.
Regulation plan improvements		
4.1.1	Review the benefits and impacts of reductions in maximum side-channel capacity due to hydropower outages and other limitations and develop optimal operational guidelines for addressing them	The re-coding of the Coordinated Great Lakes Regulation and Routing Model to allow for further testing of St. Marys River outflow strategies has been completed and testing is ongoing. Further work on Performance Indicators is required and this project will benefit from the development of an ecohydraulic model in the St. Marys Rapids which will be pursued as part of a new project funded through the IWI that will be initiated in the next few months. As a result, this work will continue within the 2017 work plan.
4.1.2	Review the use of multiple partially-open gate settings at the Compensating Works and the benefits and impacts on St. Marys River stakeholders	The USACE continues to refine their 2D model of the St. Marys River which has been calibrated and is now able to simulate hydraulic effects of various water level and flow scenarios, including multiple partial-gate settings. The model will also be the basis for development of the ecohydraulic model of the St. Marys River to support this project. Work under Task 4.1.2 will continue within the 2017 work plan.
4.2	Develop a shared vision planning/modeling process for the on-going evaluation of regulation plans	Considerable effort has gone into developing a tiered framework to structure the work of the GLAM Committee with regards to ongoing regulation plan review and evaluation. The framework is being integrated into GLAM's strategic plan.
4.3	Learning phase and test run of evaluation process using any updated information/tools of various scenarios	Some FEPS model learning was initiated as well as some of the International Upper Great Lakes Study models. Further work is required in this area and this is expected to be an ongoing activity to ensure agency capacity exists to operate the models.
Management and administration		
5.1	GLAM Committee coordination, management and reporting Includes: 5.1.1: Prepare and submit annual work plan 5.1.2: Establish working groups 5.1.3: Develop semi-annual reports	Work was initiated on the 2017 work plan which will be presented to the Boards at the September meetings. The spring 2016 semi-annual report was finalized and presented to the Boards and IJC in March and April 2016, respectively. GLAM is in the process of establishing working groups in the context of the new proposed tiered framework for plan review and evaluation.

5.2	Develop triennial report outline	A draft outline was discussed by the committee at the March meeting in Detroit. Moving from the outline to a draft report will be a priority task for the first part of the 2017 work plan with the target of a product by the end of January 2017.
5.3	Prepare mid-term strategic plan	This has been a priority activity during the reporting period. A draft strategic plan has been developed using the proposed tiered plan review and evaluation framework and will be shared with the Boards at the September meetings for initial discussion.
5.4	Establish annual priority-setting procedures	Preliminary guidelines outlined during the previous reporting period are being integrated into the strategic plan document
5.5	Monitoring of the work plan delivery	The spring semi-annual update was prepared for the IJC along with the draft fall update which tracks progress on work plan delivery. Detailed scopes were used as reference for progress, although timelines for many projects had to be adjusted based on actual implementation time and available resources.
5.6	Establish internal info-management system	The committee is making use of SharePoint and FTP sites managed by the IJC, as well as within-agency information management tools to maintain current operations. A more detailed review of GLAM information management/information technology requirements is expected as part of the 2017 work plan.
Communication, outreach and engagement		
6.1	Develop story line of the evolution of the GLAM	Previously completed as reported in the spring 2016 semi-annual update.
6.2	Develop stakeholder networks (includes 6.1.1 through 6.1.4)	<p>The committee remains interested in developing key stakeholder and advisory networks and felt this work would best be pursued after further refinement of the tiered plan review and evaluation framework was completed along with the mid-term strategic plan. This will be carried over into the 2017 work plan.</p> <p>The GLAM Co-chairs continue to participate in meetings with the co-chairs of the IJC's advisory Boards including the Great Lakes Water Quality Board, the Great Lakes Science Advisory Board, including the Research Coordination Committee and Science Priority Committee as well as the Health Professionals Advisory Board.</p> <p>A number of presentations were made on behalf of GLAM providing a general overview of committee activities to targeted audiences including:</p> <ul style="list-style-type: none"> - Initiatives pour l'Avenir des Grands Fleuves, April 2016, Montreal, Quebec. - Adaptation Canada 2016, April 2016, Ottawa, Ontario. - Lake Superior Partnership Work Group, April 2016, webinar/teleconference. - Water Levels Integrated Assessment, May 2016, Ann Arbor, Michigan. - International Association of Great Lakes Researchers Conference, June 2016, Guelph, Ontario - Coastal Zone Canada, June 2016, Toronto, Ontario
6.3	Develop an engagement plan for advisory networks	The bulk of this activity will need to be carried over into the 2017 work plan.