

Strategic Framework and Work Plan

for the

International Upper Great Lakes Study (IUGLS)

Report to the International Joint Commission (IJC)

by the

IUGLS Board

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International Upper Great Lakes Study



EXECUTIVE SUMMARY

The genesis of the present International Upper Great Lakes Study (IUGLS), evolved out of the recommendations of the 1993 IJC “**Levels Reference Study - Great Lakes-St. Lawrence Basin**”, which was then influenced by record high lake levels. Both high and low levels were dealt with in the ‘Levels Reference Study’, as well as alternative regulation plans for Lake Superior and potential regulation options of the St. Clair River. The subsequent Plans of Study (2002, 2005) started to see the drought as a growing issue and the latter Plan of Study (2005) also incorporated addressing the St Clair River channel conveyance issue. The current historic record low lake level conditions have further prompted the IJC to request an acceleration of the IUGLS schedule, especially for resolving the issues surrounding the man-made and natural changes to the St. Clair River.

The Study Board has responded to the urgency of the situation, and revised the Plan of Study and the schedule of the St. Clair River Task Team to pursue the identified priority projects that need to be undertaken and completed within the shortened time schedule; reallocated the budget for those projects; and accelerated the series of studies that are essential to resolving the questions raised about the factors affecting purported changes in the conveyance capacity of the St. Clair River. The basic questions that were raised and need to be addressed by a suite of selected interlocking priority technical studies are as follows:

1. The initial work focuses on determining whether the bed in the St. Clair River is eroding or is stable. The cross-sectional surveys, bed material analyses and sediment modelling work are aimed at addressing this particular question.
2. The next question relates to whether the hydraulic regime has been changed, thus altering the channel conveyance or the amount of water that is flowing down the St. Clair River. To determine this will require running hydraulic models and analyzing the stage-discharge relationships.
3. Finally, there is the question as to whether a change in the head relationship between Lake Michigan-Huron and Lake Erie is a result of changes in net basin supply or a change in the St. Clair conveyance. To address this will require applying and interpreting the results from the residual and component methods and employing hydrological and regional climate data and models.

The Study Board has significantly revised the schedule originally developed as part of the Plan of Study (2005), and will reflect the following major changes:

- The Study Board will provide a ***Draft Final Report*** to the Commission (rather than a ‘progress report’), in February 2009, **fully one-year ahead of schedule**, as designated in the POS (April 2010);
- The ***Final Report*** (after technical and independent peer review comments and public comments) will be completed nine months ahead of schedule in June, 2009;
- Interim technical ‘progress reports’ will be delivered in advance of the scheduled IJC semi-annual meetings.

The revised, expedited schedule will place additional burdens on the Study Team (Board, PIAG, TWGs). In particular, the timelines and focus of the public participation campaign, and

associated resources will have to shift markedly towards resolving the St. Clair River issue. Independent Peer Review will become a serious issue, as many of the tasks have been pre-determined by the study team; in order to 'fast-track' the analyses. The IJC will need to accelerate their process for forming the independent panels of experts so that they can stay abreast of fast-breaking developments and provide feed back in a timely manner.

In addition, the focus on expediting the St. Clair River Report will require a substantial shift in human and financial resources allocation, and will significantly affect the schedules for the Lake Superior Task Team. Although a good deal of the preparatory work of that Team and its TWGs will be initiated, the funding will have to be reduced, thereby stretching out the schedules, with the substantive analyses beginning in Year 3 of the Study.

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International Upper Great Lakes Study

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1. Introduction

The International Upper Great Lakes Study Board has relied largely on the Upper Lakes Plan of Study (POS, 2005) as the basis for developing their specific work plans. It was understood that the POS would be modified to reflect changing needs and priorities as the actual work got underway. Several recent important external factors have influenced the Study Board's approach to the revised Strategic Plan. Primarily, the work plans were influenced by the need to address technical issues raised independently by interest groups (e.g., Baird Report) regarding the conveyance capacity of the St. Clair River, and the need to accelerate the investigations related to the St. Clair and Lake Superior regulation plans because of the declining lake level impacts of an ongoing, severe drought over the upper Great Lakes.

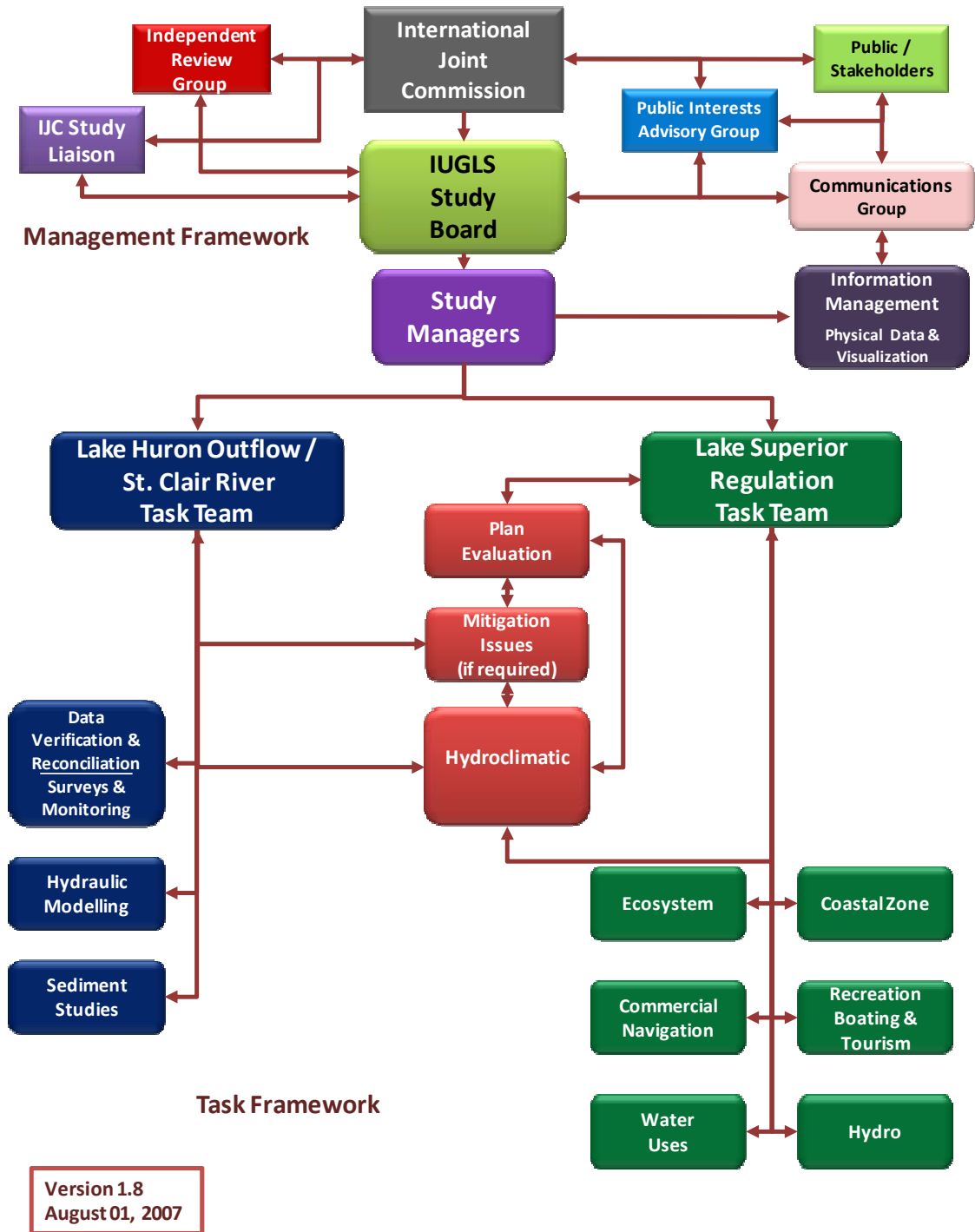
Over the past six months, two workshops were held to solicit project proposals and develop more detailed work plans. A number of scoping papers were also produced that helped to provide more direction on the work that is essential for addressing the study objectives. Finally, in early September, the two Task Teams and associated Technical Work Groups met in Burlington, Canada to help refine or in some cases develop more detailed, costed work plans for each of their areas. Figure 1 shows the study structure and organizational framework that has been established for the Study. This strategic framework report integrates the output from these various sources and provides more information on the management approach and funding required to effectively deliver on all aspects of this study.

Over the summer and fall of 2007 there has been a tremendous amount of press coverage regarding the relationship between purported on-going erosion of the St Clair river bed and the historical low water levels that are being recorded for Lake Superior. This, in turn, has prompted the International Joint Commission to send a letter to the Study Board asking the Board to identify what actions could be taken to help expedite addressing the St Clair issue. This Strategic Plan has taken this into account and thus reflects a compression of the schedule within original Plan of Study, without compromising the substance of the technical studies and scientific credibility.

The compressed schedule will focus on resolving the issues raised with respect to the St. Clair River conveyance capacity, and recognizes the urgency of addressing this issue, given the current record low lake levels and the difficulties that it has imposed on key users of the lakes. The essence of the revised schedule is that a **Draft Final Report** will be completed fully one year ahead of the original schedule, replacing a 'progress report'. The Draft Report will address all the key issues and provides tentative recommendations to the IJC as to subsequent steps and whether undertaking remediation options are warranted.

Figure 1

IUGLS Study Organization



Key Science Questions

The Study Board developed a set of key science questions that need to be addressed, and which will guide the Task Teams and Technical Work Groups. The questions were developed to help the Technical Work Groups focus their activities and are:

1. Has the conveyance of the St. Clair River changed (since the sequence of dredging beginning in the 1920s)?
2. If so, identify and quantify the sources of change:
 - a. Isostatic adjustments,
 - b. Natural erosion and deposition,
 - c. Dredging (deepening & maintenance),
 - d. Localized events (ship & object sinking),
 - e. Hardening of shores, and
 - f. Sediment supply.
3. What impact has this had on relative levels of Lakes Superior, Huron & Erie?
4. Quantify the relative impacts of hydrological components for the recent period (1997-2007) changes in water levels?
 - a. Overlake and basin precipitation,
 - b. Overlake evaporation and evapotranspiration
 - c. Runoff
 - d. Diversions and consumptive uses
 - e. Other components of water budget
5. How has the spatial distribution of hydrological components changed in recent times (1997 to 2007)?
6. How much of these changes can be attributed to natural climate variability/climate change?
7. Given this knowledge, what would be a more robust regulation plan for Lake Superior?
8. What options could be taken to that would help improve the regulation of the Upper Great Lakes?

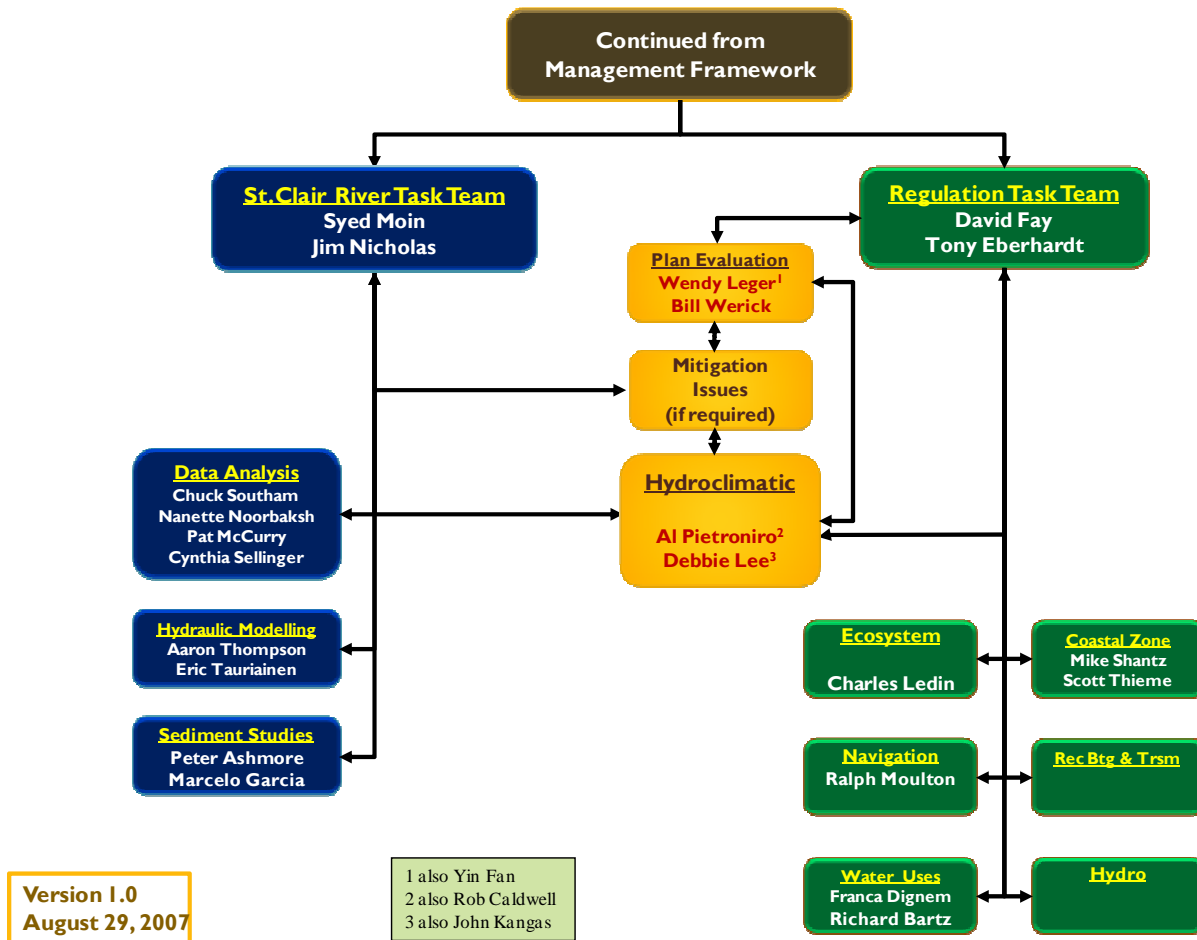
Many of the issues raised in the Plan of Study, and associated science questions, required a higher degree of resolution than the existing data, models and methods are capable of delivering. Since much of the current information, and standard computational methods that have been developed over the decades to provide lake level information and projections by the Lake Superior Control Board are encumbered by various estimation techniques which involve an unacceptable degree of uncertainty. Thus, the Study is taking great care to consolidate the various data bases, adjust them to an updated set of reference benchmarks, and supplement the information wherever necessary, through focused data collection efforts (e.g., acoustic velocity meters ,video monitoring, etc.) in order to reduce the uncertainties in the information base. This is a necessary prerequisite not only for providing a more reliable analytical basis for assessing the relative contributions of various physical changes to lake level fluctuations, but also for any formulation and evaluation of plans that will emerge out of the Study process.

2. Task Teams and Technical Work Groups

The Study will be conducted to address the two tasks identified in the Plan of Study (POS) and as shown in the Organization Chart (Figure 1 previous Section). TWG Co-Leads are shown in Figure 2.

Figure 2

IUGLS Study Organization – TWG Leads



The Lake Huron Outflow/ St. Clair River Task Team will focus on that part of the International Upper Great Lakes Study (IUGLS) which addresses the issues raised in the Plan of Study (POS) related to historic changes in the hydraulic capacity of the St. Clair River due to man-made changes (dredging, gravel mining, ship wrecks, hardening of the shoreline, conveyance constrictions due to bridges and other infrastructure, etc.), natural physical changes associated with glacial isostatic rebound, overall reduction in net basin supplies due to climate change and variability effecting the Lake Huron outflow, or a combination of all the

aforementioned causes. Whatever the causes, the Task Team will also recommend a range of technically feasible corrective remediation/mitigation actions, both structural and non-structural, if they are deemed warranted.

The Task Team will direct the activities of three Technical Work Groups (TWGs) and will work closely with the Hydroclimatic Group.

- Data Verification & Reconciliation/ Surveying & Monitoring - In addition to analyzing existing data, the TWG will gather new data for 2007 and 2008 including bathymetry, water level and flow measurements to determine the present hydraulic regime, and sediment transport and bed material data. This information is essential as input to calibrate and verify a variety of mathematical and simulation models that will be used to study sediment processes (erosion, deposition, transport) as well as hydraulic and hydrologic flow characteristics under different lake level regimes.
- Hydraulic Modelling - The TWG will assure that an accurate and representative modelling system is available and will propose and develop models required to assess the sensitivity of various factors on water level conditions and conveyance capacities. Such models may also be able to describe future channel conditions, based on simulation experiments. The modelling environment will focus on adopting and adapting existing models and obtaining data that are fundamental for representing more accurate physical conditions for model set-up than are currently available.
- Sediment Studies - In order to assess the geomorphologic changes in the St. Clair River's regime, the TWG will conduct in-situ investigations of sediment transport and conditions in the St. Clair River and propose additional investigations, as needed, to determine whether the bed is eroding or stable, and to provide a more accurate basis for selecting the appropriate sediment transport models and subsequent modelling.
- Hydroclimatic – This Group is not organizationally under the Task Team. However, it is closely tied to the work of this Task Team in that it defines the factors studied to determine the degree to which historical changes in St. Clair River conveyance might be due to hydrologic and climatological variability. As the St. Clair River is an immediate priority, this TWG is focusing on this issue as a first order priority.

The Lake Superior Regulation Task Team will be reviewing the current operating rules for regulating Lake Superior (Plan 1977-A) to see if they are adequate and have successfully managed to balance lake levels and equitably provide the benefits to all the water using sectors as envisioned in the Plan. In addition, the Task Team will develop alternative plans and regulations to improve management during extreme periods and possibly increase benefits to the user groups.

The Task Team will address three major items related to the regulation of Lake Superior:

- (i) review of the rules (Orders) controlling the current operation of the structures controlling the outflows from Lake Superior in the light of the impacts of those operations on water levels, flows, and consequently affected interests in the Upper Great Lakes system from Lake Superior downstream through Lake Erie, including the environment, to see if they are functioning as designed over the past 30 years of operation;
- (ii) assessment of whether changes to the Orders or regulation plan are warranted to meet contemporary and emerging needs, interests and preferences for managing the system in

- a sustainable manner, including an assessment of the robustness and resiliency of formulated plans under a wide range of climate change scenarios; and
- (iii) evaluation of any options developed to improve the operating rules and criteria governing Lake Superior outflow regulation, considering their impacts on the principal water-using sectors, stakeholders and interest groups of the Great Lakes.

The Task Team will propose (formulate) alternative regulation plans based on input and suggestions from the Board, PIAG, public inputs, and through the TWGs, whose activities it coordinates. The hydrological inputs required for evaluating those optional plans will be developed by the Hydroclimatic Group (described briefly above) and will include historic, stochastic and climate change parameters as determined by that group. Evaluation of optional plans will be conducted by the Plan Evaluation Group.

The Task Team will direct the activities of six Technical Work Groups (TWGs) that will focus on the benefits and costs and physical impacts of various regulation options on the principal users of the Great Lakes working closely with the Hydroclimatic and Plan Evaluation Groups. In general, each TWG will undertake an assessment of the current conditions and state of their water-dependent sector, providing an appraisal of how the various users have operated since the implementation of Plan 77-A. This will provide one of the evaluation baselines against which future changes in operating regulations would be measured. Part of the assessment would recommend regulation objectives, operating criteria and performance indicators that could be used in evaluating proposed changes to the regulation plan and or new regulation plans.

- Coastal Processes – The TWG is responsible for determining the impact of levels and flows resulting from current and various proposed regulation plan options on the recommended performance indicators related to this sector. Impacts include erosion and flooding along the coast due to high water levels and impacts due to low water levels.
- Recreational Boating and Tourism – The TWG will determine the impact of various regulation plan options on the selected performance indicators related to this sector. The current state of recreational boating and tourism on the upper Great Lakes will be assessed for various hydrologic conditions under Plan 77-A, as well.
- Commercial Navigation – The TWG will determine the impact of the various regulation plan options on that sector’s performance indicators. The focus will be on the water levels and flows of the upper Great Lakes from Lake Superior through Lake Erie. The intra-lake transport of commodities and transits through the entire St. Lawrence Seaway system will also be considered.
- Hydropower – The TWG will determine the impact of the regulation plan options on performance indicators related to this interest. Focus will be on the hydropower facilities in the St. Marys and Niagara Rivers and the Welland Canal.
- Ecosystem – The TWG will determine the impact of the various regulation plan options on selected performance indicators. The ecosystem resource area covers a broad spectrum of valuable individual resources on the upper Great Lakes from Lake Superior through Lake Erie that could potentially be affected by changes in regulation of Lake Superior outflows.
- Municipal, Industrial and Domestic Water Uses – The TWG will determine the impact of the various regulation plan options on this sector’s selected performance indicators, including impacts on water uses, and in terms of the susceptibility of water intakes and

wastewater outfalls to lake level changes. Current and future water demand, consumptive uses and availability (hydrologic supply and diversions) will be assessed.

- Plan Evaluation - The Group will evaluate the plans developed by the Task Team drawing input from the TWGs and from stakeholder groups and PIAG. The group will formulate an evaluation methodology which can assess the performance of plan options in terms of physical, economic, social and environmental performance indicators. A shared vision modelling approach, similar to the one successfully used in the International Lake Ontario-St. Lawrence River Study, will be considered along with other approaches.

Note: In the Sections that follow, tables are provided showing the budget summaries for U.S. and Canadian activities in their respective currencies. Also the years shown relate to respective fiscal years for each country (which are offset by half a year).

2.1 Lake Huron Outflow/St. Clair River Task Team

The Task Team will perform the following functions to manage the activities of the TWGs under its Terms of Reference:

- Develop, implement and oversee the analytical strategy for answering the key questions.
- Coordinate the work and schedules of the Technical Work Groups under the Task Team to ensure the timely completion of tasks on budget.
- Interact with Lake Superior Task Team, and co-direct work of Synthesis Work Groups on Hydroclimatic and Plan Evaluation to ensure that work is relevant to the TT.
- Plan and direct scoping exercises, workshops and symposiums to seek input and provide results on investigations
- Direct and oversee development of work plans, budgets as input to the Study planning process and input to the Study Board
- Participate in the Study Board and PIAG organized forums and public meetings to explain study process, investigations underway, seek input and discuss results.
- Ensure that the work plans from the TWGs are consistent with the Study objectives and recommend approval of the plans and associated budgets to the Board
- Coordinate analytical results and information with the independent review groups; adjusting objectives to reflect feed back or taking corrective action
- Ensure that the project deliverables and timelines are honoured
- Develop rationale and establish the limits and scope of multi-dimensional hydraulic and sediment modelling
- Provide input into the Study Board's planning and budgetary processes.
- Scope and develop remediation and mitigation options for the Study Board's consideration in response to the needs for addressing any erosion related issues should they arise.

The management/administrative budget for U.S. activities for the Lake Huron Outflow/ St. Clair River Task Team is estimated as follows.

	Prior to FY07	FY07 (10/06- 9/07)	FY08 (10/07- 9/08)	FY09 (10/08- 9/09)	FY10 (10/09- 9/10)	FY11 (10/10- 9/11)	Total
Total Cost	0	0	20	20	0	0	40

The management/administrative budget for Canadian activities for the Lake Huron Outflow/ St. Clair River Task Team is estimated as follows.

	Prior to FY07	FY07 (4/07- 3/08)	FY08 (4/08- 3/09)	FY09 (4/09- 3/10)	FY10 (4/10- 3/11)	FY11 (4/11- 9/11)	Total
Total Cost	0	0	15	15	10	0	40

2.1.1 Data Verification & Reconciliation/ Surveying & Monitoring

The TWG has undertaken and will complete a series of studies that are priorities and essential as prerequisites for subsequent modeling:

Priority Projects Underway:

(Note: Many existing data sets, collected by various agencies, are not available within a uniformly adjusted set of reference points. A great deal of effort is needed simply to bring all the existing bathymetry for the St. Clair River system (channel cross-sections) to a common reference point, so that the models all have the same data set.)

1. ***Collection of Bathymetric Data.*** In July, the Detroit District began the collection of bathymetric data collection in the St. Clair River along the same transects as done in previous collection activities in 2000 and 2005. The work is scheduled to be completed and a compilation of data available in October 2007. This work is essential for a more accurate and up-to-date time series of channel configurations that is essential for calibrating the unsteady-state 1-D hydraulic model.
2. ***Geographic Information System (GIS) Analysis.*** In September 2007, the USGS Great Lakes Science Center began compiling data with 130 years of historic St. Clair River data to develop a GIS tool that will be used to visualize the bathymetric changes that have occurred over that period and also provide a means to display the changes to the public and others. The work will be completed no later than July 2008.
3. ***Conversion of 1954 Data.*** In July 2007, the Detroit District began the conversion of this historic data set to be consistent with other more recent collection events (1962, 1973,

2000 and 2005). The 1954 data set is important for calibrating hydraulic models because it is the only independent reference point for St. Clair channel configurations before the last major dredging of 1962. The USGS is responsible for this effort, which should be complete by December 2007.

4. ***Assessing Glacial Isostatic Adjustment (GIA)***. Work has begun to assess the relative role and effects of isostatic adjustment as a factor responsible for Upper Great Lakes water level differences. In some parts of the Lake Superior basin, elevations of the shoreline have risen by as much as 30 cm over the past century, affecting (effectively decreasing) lake level measurements. This assessment will be complete in December 2007.
5. ***Three new hydrometric gauges***. Throughout the summer, discussions have taken place between the EC, USGS, NOAA, the Corps of Engineers, Detroit District and Environment Canada toward the establishment of three international gauges on the St. Marys, St. Clair and Niagara Rivers. A decision will be made in 2007 regarding the exact location of each gauge and which agency will be responsible for purchase, installation and maintenance of each of these Acoustic Doppler Velocity Meters (ADVMS).

Priority Projects Needed to Meet the Revised Study Schedule:

1. ***Evaluate the rating curves used for estimating flows in the St. Clair and Detroit Rivers and flow relationships for computing Lake Erie outflow***. This will establish mass-balance in the system. Efforts will also be placed on determining the errors and uncertainty on a monthly or quarter-monthly. In essence the activity will respond to the travel time, fate analysis of water, etc.
2. ***Verification of the homogeneity of data prior to 1900 and post-1900***. Different lake level measurement methods and instruments were used in different periods of time. These have introduced certain known biases into the historical measurements which need to be reconciled so that a complete and uniform time series of lake level information can be used for subsequent hydrologic analyses. The verification will be performed for two aspects, namely the method of transference to correct for differential crustal movement and the impact of moving from water levels observed three times daily from staff gauges (pre-1900) to continuous recording (post-1900) using stilling wells.
3. ***Datum corrections to water level and bed data***. These corrections are needed to obtain a common reference framework for all subsequent modeling. The establishment and application of appropriate datum is essential in the evaluation of the historic lake-wide average water levels and studying lake-to-lake fall relationships, for representativeness, for inherent bias and possible improvements.
4. ***Chronology of anthropogenic excavations & depositions within St. Clair/Detroit River system.*** Produce a report of the history of dredging, mining, excavations and depositions within the systems, including as much graphical, tabular material as needed to reflect volumes, locations and timing of physical alterations of the St. Clair and Detroit River system (including numerical analyses of historical bathymetric data). Also summarize all the various remediation measures recommended and implemented as a consequence of the work.

5. **The development of cross-sectional profiles for comparative purposes, including an estimate of the measurement error.** This product will be used in visualization of information, to study locations where erosion may be taking place or where deposition is occurring.

The budget for U.S. activities for the Data Verification & Reconciliation/ Surveying & Monitoring TWG is estimated as follows.

	Prior to FY07	FY07 (10/06-9/07)	FY08 (10/07-9/08)	FY09 (10/08-9/09)	FY10 (10/09-9/10)	FY11 (10/10-9/11)	Total
Total Cost	0	450	230	45	0	0	725

The budget for Canadian activities for the Data Verification & Reconciliation/ Surveying & Monitoring TWG is estimated as follows.

	Prior to FY07	FY07 (4/07-3/08)	FY08 (4/08-3/09)	FY09 (4/09-3/10)	FY10 (4/10-3/11)	FY11 (4/11-9/11)	Total
Total Cost	0	135	300	80	0	0	515

2.1.2 Hydraulic Modelling

The TWG has undertaken and will complete the following activities:

Priority Projects Underway:

What is at stake here is the correlation and verification of data developed from ‘rating curves’, which relate river levels (stage) to flows (volumetric discharges), with mathematical models which route flows through a specified channel configuration, based on bathymetric cross-sections. The rating curves are ‘short-cut’ summary outputs that are based on the model runs, and are used for routine correlation of water levels and flows. But they need to be updated periodically, as the channel configuration changes due to erosion, deposition, sand waves and sand bars.

1. **Computing flows and inferring conveyance changes through modelling of the St. Clair and Detroit Rivers.** Calibration of the 1-D unsteady state model was begun at the Hydrologic Engineering Center (HEC) in March 2007. In September 2007, the USGS Water Levels Center began the development of a one-dimensional model of the St. Clair and Detroit Rivers. The model will review the sensitivity of Manning’s “n” roughness coefficient. Based on the results of this modelling, the need for two- and three-dimensional models will be determined in specific reaches of the rivers, though preliminary preparation of the 2-D and 3-D models will be initiated

in parallel with the 1-D model analysis to prepare them for possible use, in view of the time constraints. The work will be completed no later than July 2008. This work is being coordinated with the U.S. Army Corps of Engineer Detroit District and HEC.

2. Apply developed stage-fall relationships. Apply 1-D and 2-D hydrodynamic models to various reaches of St. Clair River to establish discharges from specified stages and to calibrate and verify suitability of rating models over time periods.

Priority Projects Needed to Meet Revised Study Schedule:

Undertake preparation of candidate 2-D hydraulic model for eventual deployment. Develop rationale for multi-dimensional analysis along with the spatial domains where such modelling is required. Determine which available model is best suited for the task, and take actions to prepare for deployment, if needed. Prepare all necessary information that would be needed for calibration and analysis, using available historical continuous bathymetric data. Compute the anticipated changes in water levels and discharges using the 2000 and historic mesh(es) under a variety of hydrological conditions. Calibrate and validate the model application for the complete surveys from Lake Michigan-Huron through Lake Erie. Establish optimal model configuration and boundary conditions for application. Models developed for the St. Marys and Detroit Rivers should be capable of replicating the hydraulic regimes, flow distribution around islands, critical flow zones from navigation, peaking and ponding and other performance perspectives as the Board deems reasonable. Work is to be completed by April 2008, with recommendations for further deployment.

The budget for U.S. activities for the Hydraulic Modelling TWG is estimated as follows.

	Prior to FY07	FY07 (10/06- 9/07)	FY08 (10/07- 9/08)	FY09 (10/08- 9/09)	FY10 (10/09- 9/10)	FY11 (10/10- 9/11)	Total
Total Cost	50	130	190	0	0	0	370

The budget for Canadian activities for the Hydraulic Modelling TWG is estimated as follows.

	Prior to FY07	FY07 (4/07- 3/08)	FY08 (4/08- 3/09)	FY09 (4/09- 3/10)	FY10 (4/10- 3/11)	FY11 (4/11- 9/11)	Total
Total Cost	0	125	280	80	0	0	485

2.1.3 Sediment Studies

The TWG has undertaken and will complete the following activities:

Priority Projects Underway:

In July 2007, a series of studies began to video-graph and collect in-situ data of the channel morphology, sediment loads and bed features of the St. Clair River to determine the links between natural and man-made factors. The investigations continued throughout the summer with a report to be completed by December 2007. Key river cross-sections, especially those in the high velocity reaches of the river, where several deep sections are located, are being investigated.

The data will be used to calibrate and verify a one-dimensional flow and sediment transport model for the river. Subsequently, the need for a fully verified, multi-dimensional sediment transport model will be assessed to help to predict the response of river conveyance to changes in sediment load, maintenance dredging in the lower reaches of the river, potential changes to the river geometry and changes in the roughness characteristics of the river due to vegetation and ice cover.

Priority Projects Planned to Meet Revised Study Schedule and Objectives:

Prepare rationale and identify existing candidate models for multi-dimensional sedimentation analysis along with the spatial domains where such modelling is required. Prepare selected model for eventual deployment, undertaking necessary calibration and verification using a common set of data. Ensure that a verified model can also be used as a “rating curve” for the whole river reach, and it can be incorporated in the overall regulation scheme of the upper Great Lakes water levels. Ensure that the model can help to assess the effectiveness of compensating measures that may be contemplated for the St. Clair River.

The selected model should be able to undertake multi-dimensional numerical modelling of the St. Clair River in order to investigate:

- a. the flow field, bed topography and predicted bed mobility of the upper reach of the river under ‘natural’ conditions;
- b. the potential for erosion due to a disruption of the armor layer (for example, by a shipwreck hitting the bed or local scour around shipwreck);
- c. formation of scour and depositional features associated with natural conditions and with disruption by shipwreck;
- d. the increased shear stress and predicted bed mobility due to ship traffic;
- e. predicted morphological and flow regime adjustments due to dredging operations, as well as future changes in the riverbed or bank, the sediment supply to the river, or the water supply to the basin.

The budget for U.S. activities for the Sediment Studies TWG is estimated as follows.

	Prior to FY07	FY07 (10/06- 9/07)	FY08 (10/07- 9/08)	FY09 (10/08- 9/09)	FY10 (10/09- 9/10)	FY11 (10/10- 9/11)	Total
Total	0	0	115	15	0	0	130

Cost							
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The budget for Canadian activities for the Sediment Studies TWG is estimated as follows.

	Prior to FY07	FY07 (4/07- 3/08)	FY08 (4/08- 3/09)	FY09 (4/09- 3/10)	FY10 (4/10- 3/11)	FY11 (4/11- 9/11)	Total
Total Cost	0	188	215	15	0	0	418

2.1.4 Hydroclimatic Group

The objectives of the Hydroclimatic TWG are focused on addressing the science questions 4 through 6 listed under “Key Science Questions” on page 3. With the development of this document, the TWG is requested to redirect their efforts initially to contribute in fulfilling the objectives of the Lake Huron Outflow / St. Clair River Task Team. Thus, the efforts will be at two levels; initially, the TWG will initiate projects that will allow a better understanding of the factors contributing to the hydrologic cycle. The currently used techniques of computing Net Basin Supply (NBS) and Net Total Supply (NTS) will be compared for anomalies and differences rationalized. This will allow a review of historic NBS and NTS and their component parts for patterns over time. Alternate NBS calculations may be conducted using grid based models for estimating components of water cycle.

Once the objectives of the St. Clair Task Team are fulfilled, the TWG will focus on the needs for improving the regulation plan. The TWG is responsible for generating base case and scenario based series of NBS. These series will include a revisit to the Climate Change and stochastic series efforts under the Lake Ontario St. Lawrence Study. If required, new stochastic series and agreed upon climate scenarios will be developed realizing NBS for formulation and evaluation of the plans for Lake Superior Regulation. The strategy document reflects the changes in Hydroclimatic TWG efforts and resources in meeting the objectives of an accelerated delivery of St. Clair Task Team results.

Priority Projects:

The Group will undertake the following priority activities that are directly related to providing needed inputs to resolving the St. Clair River issues:

1. Comparative Analysis of Net Basin Supplies

- Conduct comparative analysis of residual versus component supplies
- Identify uncertainties and recommendations for operational improvements regarding overlake precipitation, lake evaporation and runoff

The following activities correspond to supporting Lake Superior Task Team objectives and providing inputs into the Shared Vision Modelling.

2. Stochastic Supplies

- Evaluate stochastic supply generation in light of NBS analysis
- Regenerate stochastic supplies with new model if warranted

3. Coordinated Great Lakes Runoff Routing Model (CGLRRM)

- Update the existing CGLRRM code to meet Study needs
- Add functionality for continuous simulation for stochastic series
- Test the robustness under climate change
- Develop variable discharge relationships through time
- Develop user interface
- Revise CGLRRM as needed to meet PEG framework

4. Baseline Plans for Basis of Comparison/ Evaluation

- Develop hydraulic and hydrologic conditions of base plan
- Develop hydraulic and hydrologic conditions of pre-project
- Publish conditions and levels and flows

The budget for U.S. activities for the Hydroclimatic Group is estimated as follows.

	Prior to FY07	FY07 (10/06- 9/07)	FY08 (10/07- 9/08)	FY09 (10/08- 9/09)	FY10 (10/09- 9/10)	FY11 (10/10- 9/11)	Total
Total Cost	0	450	30	25	25	0	530

The budget for Canadian activities for the Hydroclimatic Group is estimated as follows.

	Prior to FY07	FY07 (4/07- 3/08)	FY08 (4/08- 3/09)	FY09 (4/09- 3/10)	FY10 (4/10- 3/11)	FY11 (4/11- 9/11)	Total
Total Cost	0	130	434	190	190	0	944

2.2 Lake Superior Regulation Task Team

The Task Team will perform the following functions to manage the activities of the TWGs under its Terms of Reference:

- Develop, implement and oversee the analytical strategy for answering the key questions.
- Coordinate the work and schedules of the Technical Work Groups under the Task Team to ensure the timely completion of tasks on budget.
- Interact with Lake Huron Outflow/ St. Clair River Task Team, and co-direct work of Synthesis Work Groups on Hydroclimatic and Plan Evaluation to ensure that work is relevant to the TT.
- Plan and direct scoping exercises, workshops and symposiums to seek input and provide results on investigations.

- Direct and oversee development of work plans, budgets as input to the Study planning process and input to the Study Board.
- Participate in the Study Board and PIAG organized forums and public meetings to explain study process, investigations underway, seek input and discuss results.
- Ensure that the work plans from the TWGs are consistent with the Study objectives and recommend approval of the plans and associated budgets to the Board.
- Coordinate analytical results and information with the independent review groups; adjusting objectives to reflect feed back or taking corrective action.
- Ensure that the project deliverables and timelines are honoured.
- Provide input into the Study Board’s planning and budgetary processes.
- Scope and develop remediation and mitigation options for the Study Board’s consideration in response to the needs for addressing any erosion related issues should they arise.

The key aspect of this TT is to generate a range of alternative regulation plans that are intended to improve, if possible, the benefits to lake users over the current Plan 77-A. The TT will address the Directive’s purposes of reviewing the operation rules of the existing structures on the St. Marys River that control the outflows from Lake Superior, and their impacts on the principal user groups of the Great Lakes. Levels and flows will be generated using all alternative regulation plans, as well as with the baseline conditions, climate variability/climate change supply scenarios and various remediation options.

Priority Projects: During the next six months, the Task Team, through its TWGs, will undertake the following priority tasks:

1. ***Develop ‘Fence Post Plans’*** - develop three hypothetical plans, plus a model of Plan 1977-A and a pre-project run tested with 3 sets of water supplies including historic, stochastic (50,000 years) and climate change.
2. ***Develop Template for Future Scenarios*** - for each water user TWG that will be used to highlight the key socioeconomic determinants of future changes in the Great Lakes basin which will affect each sector and its uses of the water resources to the year 2050.
3. ***Develop baseline conditions for evaluation of alternative plans*** - (historic; before and after Plan 77A, etc.) to test the relative performance of Plan 77-A and compare with subsequent alternative plans, for each of the water user sectors.
4. ***Hydrologic Component Sensitivity Analysis*** - tabulate and graph outputs indicating the extent of impact hydrologic components could have on the hydraulic capacity of the river
5. ***Establish pre-project*** - Lake Superior outlet conditions (utilizing the historical supply sequence), and determine resulting water levels and outflows in all lakes and connecting channels, assess water level impacts of existing outflow regulation.

Planned Tasks

1. Impact Evaluation - Prepare Output tables and graphs showing the potential impacts of the fencepost plans on the various interests (coastal, recreational boating, hydropower, commercial navigation, ecosystems and water uses)
2. Climate Change Mode Shifts - Tabulate and graph the ability of fencepost regulation plans to prevent climate change mode shifts

3. Decision Support – coordinate with the Plan Evaluation Group in the development of a Shared Vision Model incorporating hydrology, 5 regulation plans (3 fencepost, Plan 1977A and pre-project) and performance indicators and prepare a set of objectives and guidelines.
4. Assess the impacts on water levels of the St. Marys River due to peaking and ponding operations by hydropower plants at Sault Ste. Marie, develop guidelines governing peaking, taking into consideration the needs and concerns of other resources; work with the Superior Board to coordinate efforts based on what has already been done.
5. Investigate all issues related to improvement opportunities for Orders, criteria, operational rules, guidelines and limitations.
6. Qualitatively assess impacts of future basin water needs and land use changes on water levels and flows.
7. Investigate relationship between groundwater and levels and flows.
8. Incorporate any relevant findings from the St. Clair River investigations.
9. Summarize the impacts of man-made changes in the Niagara River (e.g., installation of hydropower works and fills in the river) on Lake Erie water levels.
10. Investigate and incorporate technical changes to Plan 1977-A, as listed in Section 3.1.2 of the POS.
11. Develop regulation scenarios to address user needs/preferences of water level/flow ranges and frequencies; generate levels and flows for these scenarios.
12. Generate water levels and flows for alternative regulation plan(s) under potential climate change/variability scenarios; recommend regulation plan improvements to enhance their robustness in response to climate variability and their ability to cope under changing climatic conditions.
13. Consider adaptive management procedures including agencies that could participate in monitoring and funding mechanisms.

The budget for U.S. activities for the Lake Superior Regulation Task Team is estimated as follows.

	Prior to FY07	FY07 (10/06- 9/07)	FY08 (10/07- 9/08)	FY09 (10/08- 9/09)	FY10 (10/09- 9/10)	FY11 (10/10- 9/11)	Total
Total Cost	0	0	150	175	175	50	550

The budget for Canadian activities for the Lake Superior Regulation Task Team is estimated as follows.

	Prior to FY07	FY07 (4/07- 3/08)	FY08 (4/08- 3/09)	FY09 (4/09- 3/10)	FY10 (4/10- 3/11)	FY11 (4/11- 9/11)	Total
Total Cost	0	0	80	341	267	190	878

2.2.1 Coastal Processes

Investigations on Lake Michigan shall take advantage of the detailed analyses conducted during the Lake Michigan Potential Damages Study (LMPDS, 2000). The coastal processes model established for five coastal counties on Lake Michigan under the LMPDS could be adapted and expanded for broader applications in this study. The models were developed using detailed bathymetric and topographic data, historical bluff line analysis, and coastal feature collection. The coastal processes model for these five counties could be run with water level scenarios from alternative regulation plans to assess the relative effects of the alternative plans on coastal erosion in these representative regions on Lake Michigan. If there is little relative difference in coastal erosion predicted under various alternative regulation plans for these five counties, or if the predicted differences in erosion rates is within the margin of error of the models, further intensive data collection to support detailed coastal modelling would not be recommended.

Coastal zone analyses must include investigations into the potential impacts of future basin land use changes and the likely effects of new coastal zone management regulations in each of the bordering states and Province of Ontario. Demographic and land use changes and shifts will likely continue to occur in the basin. Demographic changes may result in increased shoreline development that may affect the nearshore environment. When shoreline protection is constructed, natural sediment transport processes are altered, and erosion of barrier beaches and coastal wetlands increases. A review should be made of the existing land use management practices, including zoning, designed to minimize flood and erosion damage. What can not be “managed” through water level regulation, may be able to be mitigated by appropriate land use management practices. An inventory of current practices may help to educate the users of the system as to what can be done to make developments along the coasts more sustainable.

The Coastal Zone TWG will address the issues of climate change/variability and how the coastal zone may need to adapt in the future to respond to more extreme conditions than have been experienced in the past.

Tasks should include the following:

- Conduct a literature review of past flood and erosion concerns, as well as riparian risk land use trends. Review should include the Coastal Scoping Paper by CJS Inc. 2007, work related to the Lower Great Lakes Erosion Study (particularly for Lake Erie) by CJS Inc. 1998, “The Great Lakes Shoreline Type, Erosion and Accretion” work performed by ERDC, CJS Inc., University of Virginia and U.S. Army Corps of Engineers, Detroit District (1999) and the “Report on Prioritization of United States Upper Great Lakes Shoreline Segments for Study by the U.S. Army Corps of Engineers” by Planning & Zoning Center, Inc., Michigan State University (2003).
- Conduct site-specific visits to gather additional information, if needed.
- Gather master plans and zoning ordinances of upper Great Lakes waterfront communities, including existing land use maps, air photos, and other sources of information on land use.
- Consult riparian representatives, experts, and land-use planners on desirable ranges of water levels.

- Assess the impacts on coastal zone of the lower St. Marys River due to flow variations at Sault Ste. Marie; provide input to developing guidelines governing hydropower operations.
- Develop water level – impact relationships or other alternatives such as stage-damage curves, erosion sensitivity versus water level or flooded buildings versus water level curves to compare regulation plans.
- Review and assess effectiveness of existing land use regulations at protecting coastal zone interests from water level related damages, now and into the future.
- Conduct pilot studies for detailed assessment of impacts of water levels using the detailed modelling results developed on Lakes Michigan and Ontario and develop a strategy to apply the results to similar shore environments.
- Develop new stage-damage curves and other evaluation techniques.
- Identify any changes to regulation plans that could minimize coastal resource impacts.

The budget for U.S. activities for the Coastal Processes TWG is estimated as follows.

	Prior to FY07	FY07 (10/06- 9/07)	FY08 (10/07- 9/08)	FY09 (10/08- 9/09)	FY10 (10/09- 9/10)	FY11 (10/10- 9/11)	Total
Total Cost	0	20	150	170	150	10	500

The budget for Canadian activities for the Coastal Processes TWG is estimated as follows.

	Prior to FY07	FY07 (4/07- 3/08)	FY08 (4/08- 3/09)	FY09 (4/09- 3/10)	FY10 (4/10- 3/11)	FY11 (4/11- 9/11)	Total
Total Cost	0	50	100	230	230	50	660

2.2.2 Recreational. Boating and Tourism

In order to assess the effects of alternative regulation plans on recreational boating and tourism in the upper Great Lakes, a detailed description of current recreational boating use and tourism would be developed. A detailed recreational boating study was recently completed for Lake Michigan (PZ&C et. al., 2001). The recreational boating study on Lake Michigan assessed the economic effects of extreme low and high water levels on the recreational boating, sports fishery, marinas, and boat launching facilities.

A similar study could be performed on Lakes Superior, Huron, St. Clair, and Erie, depending on available funding. In addition, the implications of changes to the Lake Superior regulation plan on tourism throughout the upper Great Lakes will be assessed. The study approach should entail the use of site visits, mail and phone surveys, focus groups, interviews, and mapping to collect and analyze data.

The study will assess the current state of recreational boating and tourism on the upper Great Lakes and then project potential impacts due to alternative operating plans and climate conditions. The study will be designed similar to the study recently completed on Lake Michigan so that the Lake Michigan results can be used directly in this study. The low water level period that began in the late 1990s provides a useful basis of comparison when conducting the surveys.

Once an assessment of the recreational boating on the lakes is complete, the results of the survey will be used to develop a relationship between water levels and boater days. The economic information collected through the surveys will also be used to develop an average cost expended per day. Using these relationships, the relative impacts of alternative regulation scenarios on recreational boating can be evaluated. Although this approach does not develop a computerized “model” to predict economic impacts of different water levels, it is appropriate for determining relative impacts between alternative regulation scenarios and has been used successfully for the same purpose on Lake Michigan.

Many areas in the upper Great Lakes are prime fishing locations, both for recreational users and those dependent on fisheries for subsistence, especially Tribal groups. Extreme high and low water levels impact the quality and availability of fishing resources, including such issues as the ability to launch boats as well as to wade in the rivers, lakes and rapids areas. Impacts on tourism will also be addressed in this study. Impacts would be limited to those directly related to fluctuating water levels, such as effects on waterfront commercial districts that are inaccessible during high water levels. Conversely, effects could also include impacts on businesses in small waterfront communities during low water periods that make their marinas inaccessible or reduce the attractiveness of waterfront facilities, such as beaches, for visitors and customers. Impact on sport, subsistence and commercial fishing, which is of particular importance to Native American Tribes and First Nations groups, will also be addressed. This work would have to be conducted in conjunction with the Ecosystem TWG to determine which of the prime recreational and commercial fishes are most affected by lake level changes and/or other factors, such as viruses, invasive species or over-fishing.

The Recreational Boating and Tourism TWG will address the issues of climate change/variability and how these resources may need to adapt in the future to respond to more extreme conditions than have been experienced in the past.

Tasks should include the following:

- Refine study method in consultation with U.S. and Canadian agency representatives, industry organizations, First Nations/Native Americans leaders.
- Analyze tourism, boating, and commercial fishing businesses and the relationship of their infrastructure to water levels on Lakes Superior, Huron, Michigan, St. Clair, and Erie.
- Integrate all data to report on the size and economic importance of coastal tourism, commercial and charter fishing, and recreational boating and the relationship of these resources to water level fluctuations.
- Conduct mail and telephone surveys of marinas, charter boats, boat dealers, boat repair and reconditioning facilities, boaters, and Great Lakes-dependent tourism businesses in Ontario and the states bordering the upper Great Lakes. Representative samples of

registered boat owners would be developed to ensure the survey sample represents all sizes and types of boats and marinas.

- Integrate economic analysis on industries and Great Lakes economy to estimate the economic impacts of fluctuating water levels on recreational boating and tourism industry.
- Assess relative impacts of alternative regulation plans and make recommendations for any improvements to regulation plans specifically for the recreational boating and tourism industry.

The budget for U.S. activities for the Recreational Boating and Tourism TWG is estimated as follows.

	Prior to FY07	FY07 (10/06-9/07)	FY08 (10/07-9/08)	FY09 (10/08-9/09)	FY10 (10/09-9/10)	FY11 (10/10-9/11)	Total
Total Cost	0	20	62.5	62.5	55	25	225

The budget for Canadian activities for the Recreational Boating and Tourism TWG is estimated as follows.

	Prior to FY07	FY07 (4/07-3/08)	FY08 (4/08-3/09)	FY09 (4/09-3/10)	FY10 (4/10-3/11)	FY11 (4/11-9/11)	Total
Total Cost	0	50	90	75	36	25	276

2.2.3 Commercial Navigation

The Commercial Navigation TWG is primarily responsible for determining whether the current regulation plan can be improved to meet its future anticipated needs and what adjustments would need to be made in the operating rules. As a secondary issue, the TWG will conduct any necessary studies to determine the impact associated with hydropower peaking and ponding in the St. Marys River regulation system and participate with the Hydropower, Ecosystems and Lake Superior Regulation Task Team to determine how to evaluate and balance system-wide benefits and detriments.

The TWG can take advantage of the data, forecasts and evaluation methods generated during the International Lake Ontario - St. Lawrence River Study (2005) and also from the recent comprehensive Great Lakes-St. Lawrence Seaway Study (2007) of future navigation needs and options. These studies would be reviewed to determine whether they are applicable to this study. Because of the many inherent economic assumptions made in the forecast and evaluation calculations, particularly regarding monetary values which are subject to change, the evaluation

of impacts of water level fluctuations should not be conducted in terms of purely economic values.

The Commercial Navigation Group will also address the issues of climate change/variability and how commercial navigation may need to adapt in the future to respond to more extreme conditions than have been experienced in the past.

Tasks should include the following:

- Based on existing information and studies, develop forecast scenarios for Great Lakes–St. Lawrence navigation facilities for the study period, including planned dredging projects and capital investments that have a high likelihood of occurring.
- Project cargoes and routes and make an assessment of the relationship between navigation service and other means of transportation (air, rail, pipeline, and truck).
- Determine applicability of existing transportation and evaluation models.
- Formulate assumptions concerning fuel costs and other operating costs.
- Update, and develop as required, the relationships between transportation costs and water levels and flows.
- Investigate, and adapt wherever suitable, other applicable and existing evaluation techniques for use in TWG analysis.
- Identify changes to regulation plans or criteria to improve operations for navigation and navigation interests.
- Identify the impacts on navigation due to level and flow variations in the St. Marys River, identify critical water level locations in the St. Marys River, provide input in developing guidelines governing hydropower operations; identify remedial measures including improvements in communication and scheduling of ship transits.
- Evaluate the effects of alternative regulation and supply scenarios on navigation and navigation interests, including flooding under high level conditions and deterioration of timber crib/pile under low level conditions.

The budget for U.S. activities for the Commercial Navigation TWG is estimated as follows.

	Prior to FY07	FY07 (10/06- 9/07)	FY08 (10/07- 9/08)	FY09 (10/08- 9/09)	FY10 (10/09- 9/10)	FY11 (10/10- 9/11)	Total
Total Cost	0	20	45	45	10	10	130

The budget for Canadian activities for the Commercial Navigation TWG is estimated as follows.

	Prior to FY07	FY07 (4/07- 3/08)	FY08 (4/08- 3/09)	FY09 (4/09- 3/10)	FY10 (4/10- 3/11)	FY11 (4/11- 9/11)	Total
Total Cost	0	0	40	50	50	20	160

2.2.4 Hydropower

The Hydropower TWG will lead the effort to examine how changes in Lake Superior regulation can improve the performance of their sector. In addition, the TWG will examine peaking and ponding impacts of various modes of operation. A small subgroup may be required which would include participation from the Ecosystems and Commercial Navigation TWGs. Recent work performed for the International Lake Superior Board of Control will also be reviewed in this regard.

The Hydropower TWG will address the issues of climate change/variability and how hydropower may need to adapt in the future to respond to more extreme conditions than have been experienced in the past.

Within and beyond the next six-month timeframe, tasks should include the following:

- Evaluate in energy and monetary terms the impacts of peaking and ponding operations; provide inputs in developing guidelines governing peaking and ponding operations.
- Forecast the need for and capacity in the system for additional hydropower facilities for the study period; determine their flow capacities and generating efficiencies.
- Update, and develop as required, evaluation methods that determine the relationships between energy production and flows for the St. Marys and Niagara Rivers and Welland Canal.
- Investigate, and adapt wherever suitable, other evaluation techniques including those used in the International Lake Ontario - St. Lawrence River Study and the Great Lakes-St. Lawrence Seaway Study.
- Assist in identifying changes to regulation plans to improve operation.
- Evaluate the impacts of Lake Superior outflow regulation under a range of alternative regulation and supply scenarios, including those generated by climate variability and change.

Fairly adequate information is available to evaluate the hydropower effects due to alternative regulation plans. Therefore, no extensive data collection effort is anticipated.

The budget for U.S. activities for the Hydropower TWG is estimated as follows.

	Prior to FY07	FY07 (10/06- 9/07)	FY08 (10/07- 9/08)	FY09 (10/08- 9/09)	FY10 (10/09- 9/10)	FY11 (10/10- 9/11)	Total
Total Cost	0	10	50	50	10	10	130

The budget for Canadian activities for the Hydropower TWG is estimated as follows.

	Prior to FY07	FY07 (4/07- 3/08)	FY08 (4/08- 3/09)	FY09 (4/09- 3/10)	FY10 (4/10- 3/11)	FY11 (4/11- 9/11)	Total

Total Cost	0	0	12	60	60	24	156

2.2.5 Ecosystems

Ecosystem analysis for this Study is expected to be complex, since there are still major controversies regarding the value of and need for extreme lake level fluctuations for ecosystem integrity. In order to assess how well the current regulation plan is performing for a host of indicator species (endangered, threatened, commercial, wetlands, etc.), as well as pre-project conditions and alternative plans, substantial thought must be given on how to accomplish the quantification of an impact analysis for such a large area, with limited budget. Substantial literature is available, as well as other agency efforts underway that are relevant to the Study. For example, ongoing studies of the wetlands in Georgian Bay will provide valuable information on the identification and assessment of these wetlands. Specifically, determinations are being made as to which wetlands will be able to migrate towards or away from the shore in response to persistently high or low water levels.

A large scale study was recently completed by The Nature Conservancy and Nature Conservancy of Canada to identify lands and waters critical to the biodiversity in the Great Lakes region. The “Bi-national Conservation Blueprint for the Great Lakes” scientifically and systematically identifies native species, natural communities and ecological system characteristics and determines where they need to be protected to ensure their long-term survival. Studies are being conducted by Michigan State University to identify rare, threatened and endangered species and also key species for the Study. The Corps of Engineers is leading an effort to identify the key ecosystem resources around the Great Lakes that are currently degraded and are prime candidates for restoration.

The Ecosystem TWG will also address the issues of climate change/variability and how the ecosystem may need to adapt in the future to respond to more extreme conditions than have been experienced in the past.

Tasks will include the following:

- Develop a set of indicator species that could be used to evaluate impacts of lake level fluctuations and changes.
- Assess impacts of water level variations, such as from peaking and ponding, on the St. Marys River ecosystem, in particular, habitat for fish species, and provide input on guidelines governing flow variations in the St. Marys River at Sault Ste. Marie
- Acquire and synthesize, for purposes of analysis of lake level scenarios, existing data and expert opinion on the following ecosystem functions of coastal and nearshore habitats: wetlands and other coastal habitats for fish and wildlife, species at risk, fisheries, colonial nesting birds, amphibians and reptiles, submerged aquatic vegetation, exotic/invasive species, wild rice, toxic contaminants, and eutrophying nutrients. The work done by The Nature Conservancy and Michigan State University to identify RTES and key species will serve as an initial step in developing performance indicators that will be assessed as alternative regulation plans are tested.

- Develop decision-support models to link water levels and flows with ecosystem information to have predictive capabilities to assess effects of various alternative regulation plans on ecosystems. Methods for model validation should be included. Incorporate existing bathymetry and topography for coastal ecosystems where data are available, and make decision-support tools available to stakeholders.
- Enhance platforms for status and trend reporting and ways to incorporate status and trend information into decision support tools.
- Evaluate effects of alternative regulation scenarios on the ecosystem.
- Develop a risk assessment framework for use in evaluation of lake level responses by key features of ecosystems, as the scope of effects emerges. While water quantity does have an impact on water quality, it is not within the mandate of this study to investigate water quality in detail. Qualitative discussions will be included where appropriate.

The budget for U.S. activities for the Ecosystem TWG, including salaries and travel, is estimated as follows.

	Prior to FY07	FY07 (10/06- 9/07)	FY08 (10/07- 9/08)	FY09 (10/08- 9/09)	FY10 (10/09- 9/10)	FY11 (10/10- 9/11)	Total
Total Cost	50	45	230	230	165	20	740

The budget for Canadian activities for the Ecosystem TWG, including salaries and travel, is estimated as follows.

	Prior to FY07	FY07 (4/07- 3/08)	FY08 (4/08- 3/09)	FY09 (4/09- 3/10)	FY10 (4/10- 3/11)	FY11 (4/11- 9/11)	Total
Total Cost	0	50	150	500	300	50	1050

2.2.6 Municipal, Industrial and Domestic Water Uses

The TWG will undertake a water demand and availability survey of all major municipal users in the basin and develop a model that will be able to project future impacts of lake level changes and changes in water supply under various climate scenarios. The TWG will make use of the data and evaluation methods used during the International Lake Ontario - St. Lawrence River Study. A fairly comprehensive inventory of the major urban and industrial intakes, especially those relatively more vulnerable to water level fluctuations, will be made. Much of this inventory data is already available from state or provincial agencies. For example, the U.S. Environmental Protection Agency is conducting a source water assessment in all Great Lake states.

All major water intakes have been documented. Invert elevations for many of these intakes are also available through this effort. Any additional information that is needed can be obtained by letter and telephone communications and if needed, followed by visits to the critical sites. During this data collection effort, information on future basin needs for municipal and industrial water supply can also be obtained, if available. This information would be closely related to future land use changes in the basin. As population continues to grow and shift, water demand will also. Analyses should include identification of areas where additional water use may occur in the future as well as relative magnitude of these potential increases.

The Municipal, Industrial and Domestic Water Use TWG will address the issues of climate change/variability and how the water use as a whole may need to adapt in the future to respond to more extreme conditions than have been experienced in the past.

Tasks will include the following:

- Assess future demand scenarios for modelling water balance on the Great Lakes.
- Use existing state and provincial agency inventories to identify major municipal and industrial intakes, including those vulnerable to extreme water level fluctuations.
- Compile current municipal and domestic uses; estimate future expected water demands, in terms of quantity and quality.
- Assess the effects of the current regulation plan on these water uses, assuming present and future use projections.
- If necessary, conduct pilot studies designed to provide more detailed assessment, using selected urban and rural areas. Visit selected sites to collect data, if necessary.
- Assist in identifying any changes to regulation plans to improve operations to benefit municipal, industrial, and domestic water uses.
- Evaluate the effects of alternative regulation and supply scenarios on municipal, industrial, and domestic water interests.

The budget for U.S. activities for the Municipal, Domestic and Industrial Water Uses TWG is estimated as follows.

	Prior to FY07	FY07 (10/06- 9/07)	FY08 (10/07- 9/08)	FY09 (10/08- 9/09)	FY10 (10/09- 9/10)	FY11 (10/10- 9/11)	Total
Total Cost	60	180	20	20	10	0	290

The budget for Canadian activities for the Municipal, Domestic and Industrial Water Uses TWG is estimated as follows.

	Prior to FY07	FY07 (4/07- 3/08)	FY08 (4/08- 3/09)	FY09 (4/09- 3/10)	FY10 (4/10- 3/11)	FY11 (4/11- 9/11)	Total
Total	0	50	40	120	100	20	330

Cost							
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2.2.7 Plan Evaluation

The Plan Evaluation Group will be responsible for helping the TWGs develop a set of evaluation criteria, performance indicators and baseline scenarios against which the various alternative plans will be evaluated. The Group will develop a “Shared Vision Model” or other evaluation framework that will assist the evaluation and comparison of alternative plans in a transparent manner. The evaluation framework will be developed with input from the TTs, TWGs and PIAG through a series of workshops. The PEG will assist TWGs and the two TTs whenever requested to help in setting up workshops and providing necessary inputs, not only for plan evaluation, but formulation as well.

The near-term tasks of the PEG are aligned closely with those of the Lake Superior Regulation Task Team and will provide assistance with:

1. Evaluation of the ‘Fence Post Plans’ developed by the Task Team,
2. Assistance with the develop of baseline conditions for evaluation of alternative plans
3. Hydrologic Component Sensitivity Analysis
4. Development of a Shared Vision Model or other evaluation framework for initial evaluations.

The budget for U.S. activities for the Plan Evaluation Group is estimated as follows.

	Prior to FY07	FY07 (10/06-9/07)	FY08 (10/07-9/08)	FY09 (10/08-9/09)	FY10 (10/09-9/10)	FY11 (10/10-9/11)	FY12 (10/11-3/12)	Total
Total Cost	160	0	100	80	75	40	10	465

The budget for Canadian activities for the Plan Evaluation Group is estimated as follows.

	Prior to FY07	FY07 (4/07-3/08)	FY08 (4/08-3/09)	FY09 (4/09-3/10)	FY10 (4/10-3/11)	FY11 (4/11-3/12)	Total
Total Cost	0	50	110	110	150	60	480

3. Communications

3.1 Overview

The extended drought in the Great Lakes basin has heightened the urgency for the Study to produce ‘results’ more quickly. Although the need for the study was conceived by the IJC as early as 2000, well before the current drought was recognized, it took another five years to

garner public, financial and institutional support for the Study. The record low levels on Lake Superior in 2007 has resulted in extensive news coverage, and attendant political and special interest group pressures to provide quick answers and ‘solutions’ to the plight of navigation interests, recreational boaters and marinas that are stranded, as well as ecologists who lament the shrinkage of marshes and productivity of fish. This has presented a unique challenge for the public participation and communications program because it must directly engage in an unstructured, media-driven public discourse that demands answers and solutions before the Study can generate the body of scientific information that is needed for a credible and scientifically supportable response. As a consequence of sustained media and public pressure (letters from Senators, IJC, GBA, etc.), the Study Board has accelerated its timelines for analyzing the St. Clair River conveyance issue, with a complementary public communications program focusing on that aspect of the Study.

The public participation strategy within the POS, together with the IJC Guidance to the Study Board for communications and public participation, represents a sound operational approach, consisting of two broad interactive components: a parallel *communications strategy*, that is being conducted through the **Study Board**, in conjunction with the **Public Interest Advisory Group**, along with a *public technical engagement strategy* that is referred to as “**Shared Vision Planning**”. Two-way communications between the public and the Study teams are stressed early in Study process – as a combination of both information gathering from the public about their perspectives and needs, as well as conveying information about the study goals and processes to the various interest groups – the active and passive users of the Great Lakes resources. That information, derived from the various activities that are planned as part of the communications strategy (public meetings, newsletter, website, focused interest group workshops and media interaction) will be used as inputs in the more technically-oriented “Shared Vision Planning” (SVP) process conducted in parallel. This process will attempt to engage the public and affected interest groups in formulating plans and solutions; developing evaluation and plan performance criteria, and providing their values and preferences to the PIAG and the Study Board regarding their preferred plans.

3.2 Key Messages

This is a technically complex study, as most natural resource management issues consist of a series of interlocking and highly uncertain physical, ecological and economic relationships, which are difficult to unravel and explain to the public comprised of numerous single issue interest groups. In order to deal with the scientific complexities and public interest groups, the two-tier public participation strategy was organized to deal with two distinct, but interacting issues of devising a new Lake Superior regulation plan and reviewing the need to compensate for the unintended consequences of dredging the St. Clair River.

The communications plan needs to develop a coherent message to the public at large, and for the component interest groups that will be actively engaged in the Study. There are many messages that need to be conveyed, and the challenge will be to simplify a fairly complex set of issues. Among the messages that are important for the Study are the following:

- The IJC and the Study Board is committed to the principle that the public should have a say in decisions that affect it. Therefore, the Commission promotes policies and programs

aimed at enabling all community members to provide advice to the Commission on decisions that may have an impact on them.

- The Study Board will focus resolving the St. Clair River aspect of the study, as quickly as possible, and will have a draft report ready by February 2009.
- The issues to be resolved and questions answered regarding the hypothesis of increased outflow through the St. Clair River due to dredging and subsequent erosion, is tied to a large number of technical assumptions, significant uncertainties in the existing data, and uncertainties in the models and analytical relationships that are used to calculate discharges. Reducing the errors and uncertainties lies at the heart of the analysis needed to resolve both aspects of the problem – St. Clair flows and Lake Superior regulation. The scientific aspects of the study must be peer-reviewed.
- PIAG was created as the ‘funnel’ for public inputs – they represent a wide spectrum of public interests in the management of Great Lakes resources and the services that they provide to the public. PIAG will play a key role in shaping and delivering the messages of the Study.
- The Study is attempting to devise regulation options that will, ‘on average’ improve the current uses and physical conditions of the system, and hopefully reduce (but not eliminate) the adverse consequences of extreme lake levels.
- The IJC, the Study Board and PIAG must balance the geographic and sectoral interests of all the users of the Great Lakes – not just the concerns of a single interest group, while conforming to the existing laws and regulations of various federal, provincial, state and local jurisdictions
- Extreme conditions, such as the periodic, decadal low and high lake level regimes, caused by droughts and excessive rainfall are very difficult to manage – any solution will have both positive and negative downstream consequences, requiring balancing and tradeoffs among the affected interests and geographic regions (upper lakes/lower lakes)

3.3 Public Information Officer(s)

The Study Board, in consultation with PIAG recognized that the Study budget would enable the hiring of two full-time Public Information Officers (PIO); one each for the U.S. and Canadian sides, as originally contemplated in the POS. The Board agreed that rather than hiring two part-time PIOs, it was more effective to hire a single individual who would serve the communication needs of Board and PIAG. There were several early unsuccessful attempts to recruit qualified individuals, and finally, given the circumstances of the need for an accelerated Study schedule, together with a complementary communications strategy, several discrete actions were taken by the Board to meet the challenges of a quicker and more proactive communications strategy. First, in September 2007, the U.S. IJC Secretariat loaned one of their experienced PIOs, Mr. John Nevin, to assist in the development of a Study communications strategy, which is expected to take 3 months, and include the first round of formal public meetings. Second, the Study Board completed interviews with several potential candidates, and offered a full-time position to Mr. Tom Black, and a part-time position to Ms. Suzanne Truskowski-Crawford. It is expected that both Mr. Black and Ms. Truskowski-Crawford can begin working by Oct 15, 2007. All three are located in the Detroit-Windsor area, and will be expected to meet regularly and operate out of the IJC Windsor office. Mr. Nevin will supervise the new employees, initially, and interact as much as possible with the Study management team, the two Task Team co-chairs, and the PIAG co-

chairs. Once the communications strategy is completed and implementation begun, a decision will be made with the IJC, regarding the need for continuing Mr. John Nevin’s services on the Study, depending on his availability.

3.4 Other Staffing Needs, Windsor Office Commitments, etc.

During the course of the Study, there may be a need for part-time student assistance of an administrative and clerical nature (mailings of newsletters; maintenance of mailing lists; help with logistics of public meetings, etc.). The Communications Team (Study co-Chairs, Study Managers, PIAG co-Chairs and PIO) will determine this need, subject to the availability of funding. The IJC has graciously made a room available in the Windsor office as the base of operations for the PIO, along with related administrative support, equipment and logistics.

As mentioned in a subsequent section, the costs of the PIO will be covered by U.S. funding amounting to approximately \$130K. Comparable Canadian funds will be used to cover the Study’s information management needs.

The budget for U.S. activities for the Communications Program, including PIO costs, expenses related to public outreach and travel and expenses for PIAG members is estimated as follows.

	Prior to FY07 ¹	FY07 (10/06-9/07)	FY08 (10/07-9/08)	FY09 (10/08-9/09)	FY10 (10/09-9/10)	FY11 (10/10-9/11)	FY12 (10/11-3/12)	Total
Total Cost	50	196	175	135	135	100	59	850

The budget for Canadian activities for the Communications Program including expenses related to public outreach and travel and expenses for PIAG members is estimated as follows.

	Prior to FY07	FY07 (4/07-3/08)	FY08 (4/08-3/09)	FY09 (4/09-3/10)	FY10 (4/10-3/11)	FY11 (4/11-3/12)	Total
Total Cost	0	50	50	50	50	50	250

4. Information Management

It was agreed upon early in the Study that the Microsoft SharePoint would be used to manage the information, data and the communications for this Study. This system was selected because it was robust, well supported and uses the Microsoft suite of applications, the most commonly used. The server and supporting software licenses were purchased early in the Study (\$47,000 Cdn). There is also a need to purchase SQL Server Software (\$4,000 Cdn) this year to store

SharePoint files in a database. There may be a requirement to purchase a back-up server in Year 3, depending on volume of information. This will cost approximately \$3,000 Cdn.

During the initial year there will be the need for training for the system administrator, Study Team, Study Board, Public Interest Advisory Board and Technical Work Group members. This will be phased in on priority basis. The training will be initially provided through external training centres for the primarily users (i.e. system administrator, Study Mangers) and complemented with internal training sessions for the basic users. There also will be the need to purchase key references and training materials as part of this strategy. It is estimated that this training and training materials will cost about \$10,000 Cdn and all the training will be done in the initial year.

For the purposes of this Study most of this work will be contracted out. A part-time contractor will be employed for managing the server and system for the duration of the Study. This is estimated to cost \$100,000 Cdn. Besides the system administrator it is envisioned that one co-op student will be hired every four months (\$12,000 Cdn) to help develop and populate the system.

The Study Team agreed that Canadian funds will be used for Information Management. To be comparable, U.S. funds will be used to pay the salaries of the public information officers (as mentioned in the previous section). As such, there will be no U.S. funding for this activity. The budget for Canadian activities for the Information Management Program is estimated as follows.

	Prior to FY07	FY07 (4/07- 3/08)	FY08 (4/08- 3/09)	FY09 (4/09- 3/10)	FY10 (4/10- 3/11)	FY11 (4/11- 3/12)	Total
Total Cost	0	60	136	99	99	99	493

5. Study Management

The management framework for the Study is as follows. On the U.S. side there is part-time assistance by a Director and Study Manager for a cost of \$205,000 U.S. per year. Travel is estimated at \$25,000 U.S. per year. On the Canadian side there is a part-time Director, a full time Study Manager and full time assistant for \$225,000 Cdn per year. Travel is estimated at \$25,000 Cdn per year.

The Study Board which comprises the two Directors and eight other members helps in the guidance and management of the Study. It is anticipated that there will be four face-to-face meetings that will cost about \$10,000 each for a total of \$40,000 (\$20,000 U.S. and \$20,000 Cdn), primarily for travel.

The budget for U.S. Study Management activities, including salaries and travel, is estimated as follows:

	Prior to FY07	FY07 (10/06- 9/07)	FY08 (10/07- 9/08)	FY09 (10/08- 9/09)	FY10 (10/09- 9/10)	FY11 (10/10- 9/11)	FY12 (10/11- 3/12)	Total
Total Cost	145	235	250	250	250	250	120	1500

The budget for Canadian Study Management activities, including salaries and travel, is estimated as follows:

	Prior to FY07	FY07 (4/07- 3/08)	FY08 (4/08- 3/09)	FY09 (4/09- 3/10)	FY10 (4/10- 3/11)	FY11 (4/11- 3/12)	Total
Total Cost	0	295	295	295	295	295	1475

6. Independent Peer Review

The IUGLS is a unique study in that it will be undergoing many layers of continuous internal and external (public) scrutiny and is an open, transparent process. The Public Interest Advisory Group (PIAG), with its broad membership of stakeholders, will be involved in many aspects of Study oversight and work, as will the IJC, The Study Board and the numerous Technical Work Groups.

The IJC, however, is interested in another, more targeted and coherent layer of **Independent Peer Review (IPR)** that is outside the Study environs and focusing on key issues identified by the Study Board, which may not be receiving the appropriate technical review that is warranted for the subject matter. In addition, there may be issues that are raised by the PIAG which require a degree of “scientific refereeing”, particularly when there is a substantive scientific debate on unresolved issues, as for example, on the interpretation of climate change scenarios and their application to operational water management. Overall, though, the independent peer review function is structured in such a manner that the IJC itself will manage the IPR process, and the IPR panels will report directly to the IJC.

Traditionally, IPR, as practiced by the US National Research Council (NRC) or the Council of Canadian Academies (CCA) is structured in such a way as to provide an independent, one-time final assessment of a particular project or study, with limited feedback and interaction with study team members. The IUGLS, however, is an ‘operational study’, requiring real-time feedback from experts so that mid-course corrections could be made on a series of highly technical issues and choices. The IUGLS requires both an independent peer review and an advisory function.

As a consequence, the IJC staff, together with the Board reviewed several options and engaged in discussions with the NRC and CCA to see whether they would be able to provide both IPR and periodic advice. The CCA stated that the two functions are in conflict with one another. The

other option discussed and selected was the World Bank model of an “Independent Panel of Experts” (IPOE) that they routinely use to oversee large water planning studies conducted in many developing nations around the world. The IPOE provide both an independent review of an ongoing study to the World Bank managers, as well as providing timely advice on recommendations for needed corrections adjustments and changes in the technical approaches that a study has undertaken.

The Terms of Reference for an IPOE would include the following key principles and directives:

1. The IPOE shall perform an independent review of the designated IUGLS scopes of work, studies and analytical efforts and specified reports by organizing expert panels to focus on, but not limited to the following areas, as identified during the course of the Study by the IUGL Study Board:
 - Hydraulic modeling of the St. Clair River system
 - Net basin supply models
 - Climate change and variability analyses
 - Impact analyses for environmental, hydropower, shore erosion and flooding, recreational boating, and municipal, domestic and industrial water uses.
2. For each of the individual topics, the level of effort, budget and schedules shall reflect the International Joint Commission’s determination of priorities, based on the recommendations of the Study Board in this effort, and will be negotiated with the IPOE
3. The IJC shall select the experts for each of the individual IPOE panels, seeking advice from professional institutions such as the AWRA, ASCE and equivalent Canadian professional societies.
4. The overarching charge shall be to evaluate **the appropriateness and sufficiency** of the studies and models used to inform decisions related to remediation and regulation plan options.
5. The IUGLS program science and technical studies, as represented in the reports and model documentation provided shall be reviewed by the IPOE in terms of the degree to which:
 - the models and reports are **sufficient and appropriate** to evaluate the various regulation plan options (RPOs) and impacts of changes in water levels and flows;
 - the studies reflect **reasonable and acceptable** scientific methods, assumptions and supported findings;
 - the models **sufficiently** and appropriately integrate and display the key information needed for a comprehensive evaluation and understanding of the tradeoffs for selecting among the candidate plans, as well as properly explicating the degrees of uncertainty in the analyses.
6. The review shall be limited to critical evaluation and decision components of the topics listed that relate directly to the Study regulation plan options and remediation options for the St. Clair River. This requirement shall further be interpreted to **restrict the review** to the impact of changing regulation levels and flows, within the limits that these two factors can be managed using the currently existing control structures and the hydrology/hydraulic characteristics of the system. The review shall neither compare regulation plan options nor provide advice on the preference of one regulation plan option over another, as these actions fall directly within the decision-making responsibilities of the Commission.
7. Panels of Experts for each task should be composed of approximately equal numbers of U.S. and Canadian citizens to reflect the bi-national equality of work undertaken by the IJC.

8. The IPOE shall meet at least twice, or as often as is needed to discuss the subject at hand. One meeting shall be at a location in the United States, and one meeting shall be at a location in Canada.
9. When an item has been referred for peer review, a fairly quick turn around time is required. Normally, it is expected that the peer review would be conducted within two to four weeks, depending on the nature and scope of the review requested.

The Study Board has allocated a total of up to \$150,000 U.S. for the IPOE peer review process. This funding would be spent on coordination of input from the peer reviewers and, on an as required basis, for travel expenses for peer reviewers if a meeting is the most efficient way to conduct a review.

The U.S. budget for the Independent Peer Review Program is estimated as follows:

	Prior to FY07	FY07 (10/06-9/07)	FY08 (10/07-9/08)	FY09 (10/08-9/09)	FY10 (10/09-9/10)	FY11 (10/10-9/11)	FY12 (10/11-3/12)	Total
Total Cost	0	0	12.5	50	50	10	2.5	125

The Canadian budget for the Independent Peer Review Program is estimated as follows:

	Prior to FY07	FY07 (4/07-3/08)	FY08 (4/08-3/09)	FY09 (4/09-3/10)	FY10 (4/10-3/11)	FY11 (4/11-3/12)	Total
Total Cost	0	30	30	30	30	30	150

The IJC retains this funding.

7. Revised Funding Profile (Years 1-5)

Tables 1 & 2 show the details of the funding shifts being made by the U.S and Canada in order to expedite addressing the St Clair issue and also to provide funding in those area which were not adequately funded in the Plan of Study; most notably Study Management, Communications, PIAG and Information Management. It should be noted that Lake Superior Regulation has not been reduced by \$1,1M, but by approximately half of that amount. Funding for portions of the hydroclimatic work that was accounted for in the POS under Lake Superior Regulation is now accounted for under the St. Clair River. Actual funding shifts are highlighted in Table 3.

In order to expedite the St. Clair work, funding has been reprogrammed from the Lake Superior Regulation component and some other support areas for this fiscal year. For next year, further additional funds will be needed to complete the St. Clair work that would have gone to various Technical Work Groups to initiate work related to regulation. However, the reprogramming of

funding is not expected to inhibit the execution of activities related to refining Lake Superior regulation.

Table 1 - U.S. Contribution (\$1000) for U.S. Activities

Study Component	Yr 1 POS	FY06 &-07	Yr 2 POS	FY08 Proposed	Yr 3 POS	FY09 Proposed	Yr 4 POS	FY10 Proposed	Yr 5 POS	FY11&12 Proposed	Total POS	Total Proposed
St. Clair River	250	1080	625	585	625	105	250	25	0	0	1750	1795
Lake Superior Regulation	175	0	325	150	325	175	265	175	100	50	1190	550
Ecosystem	100	95	275	230	275	230	175	165	50	20	875	740
Rec. Boating & Tourism	25	20	62.5	62.5	62.5	62.5	50	55	25	25	225	225
Hydropower	10	10	50	50	50	50	10	10	10	10	130	130
Com. Nav.	10	20	50	45	50	45	10	10	10	10	130	130
Water Uses	25	240	75	20	75	20	50	10	25	0	250	290
Coastal	100	20	150	150	150	170	100	150	50	10	550	500
Study Management	220	380	220	250	220	250	220	250	220	370	1100	1500
PIAG & Communication	62.5	246	100	175	87.5	135	100	135	100	159	450	850
Information Technology	25	0	25	0	25	0	25	0	25	0	125	0
Independent Review	0	0	12.5	12.5	50	50	50	50	12.5	12.5	125	125
Plan Evaluation	50	160	100	100	75	80	75	75	100	50	400	465
Grand Total	1052.5	2271	2070	1830	2070	1372.5	1380	1110	727.5	716.5	7300	7300

Note:

1. FY06 & 07 amounts include \$520,000 provided in FY06 to get the Study started and \$1,751,000 in FY07. Although funds have been obligated in FY07, expenditures for Study activities can be made in subsequent FY.
2. For Study Management, Communication & PIAG, IT, ITR and Plan Evaluation, the FY11 & 12 amounts include funds proposed for FY11 and FY12 through March 31, 2012.

Table 2 – Canadian Contribution (\$1000) for Canadian Activities

Study Component	Yr 1 POS	FY07-08 Proposed	Yr 2 POS	FY08-09 Proposed	Yr 3 POS	FY09-10 Proposed	Yr 4 POS	FY10-11 Proposed	Yr 5 POS	FY11-12 Proposed	Total POS	Total Proposed
St. Clair River	300	578	750	1244	750	380	300	200	0	0	2100	2402
Lake Superior Regulation	210	0	390	80	390	341	318	267	120	190	1428	878
Ecosystem	120	50	330	150	330	500	210	300	60	50	1050	1050
Rec. Boating & Tourism	30	50	75	90	75	75	60	36	30	25	270	276
Hydropower	12	0	60	12	60	60	12	60	12	24	156	156
Com. Nav.	12	0	60	40	60	50	12	50	12	20	156	160
Water Uses	30	50	90	40	90	120	60	100	30	20	300	330
Coastal	120	50	180	100	180	230	120	230	60	50	660	660
Study Management	264	295	264	295	264	295	264	295	264	295	1320	1475
PIAG & Communication	75	50	120	50	105	50	120	50	120	50	540	250
Information Technology	30	60	30	136	30	99	30	99	30	99	150	493
Independent Review	0	30	15	30	60	30	60	30	15	30	150	150
Plan Evaluation	60	50	120	110	90	110	90	150	120	60	480	480
Total POS	1263	1263	2484	2377	2484	2340	1656	1867	873	913	8760	8760
Final Government Allocation	1263	1263	2377	2377	2340	2340	1867	1867	913	913	8760	8760

Note:

1. FY06-07 - total of \$200,000 was expended getting the Study started.
2. Final Government Allocation reflects the funding profile that will be received for the Study.

Table 3- Difference between POS and Proposed Contributions for both Canadian and U.S. Activities

Study Component	Canadian Contributions (\$1000) - CDN\$			U.S. Contributions (\$1000) – U.S.\$			U.S. & Canadian Contributions Combined (\$1000) – U.S.\$ <i>CAD\$ have been converted to U.S.\$ at a rate of 1.2</i>		
	Total POS	Total Proposed	Diff.	Total POS	Total Proposed	Diff.	Total POS	Total Proposed	Diff.
St. Clair River	2100	2402	302	1750	1795	45	3500	3797	297
Lake Superior Regulation	1428	878	-550	1190	550	-640	2380	1282	-1098
Ecosystem	1050	1050	0	875	740	-135	1750	1615	-135
Rec. Boating & Tourism	270	276	6	225	225	0	450	455	5
Hydropower	156	156	0	130	130	0	260	260	0
Com. Navigation	156	160	4	130	130	0	260	263	3
Water Uses	300	330	30	250	290	40	500	565	65
Coastal	660	660	0	550	500	-50	1100	1050	-50
Study Management	1320	1475	155	1100	1500	400	2200	2729	529
PIAG & Communication	540	250	-290	450	850	400	900	1058	158
Information Technology	150	493	343	125	0	-125	250	411	161
Independent Review	150	150	0	125	125	0	250	250	0
Plan Evaluation	480	480	0	400	465	65	800	865	65
Grand Total	8760	8760	0	7300	7300	0	14600	14600	0

8. Conclusions and Recommendations

Conclusion: The Study Board has developed a strategic framework and revised work plans to expedite the study of the St Clair and produce the final report by June, 2009, with regular interim reporting of the findings.

Recommendation: *That the International Joint Commission approve the revised work plans and proposed funding shifts.*

Conclusion: There are number of jurisdictional obstacles that may impede the delivery of study results and affect the Study Board meeting the tighter timelines. These may require intervention of the International Joint Commission (e.g., letters of support for obtaining permits required for installing the gauging stations, etc.) to help facilitate a quicker resolution.

Recommendation: *That the International Joint Commission provide assistance, where possible, in order to help expedite the work of the Study.*

Conclusion: There are delays with receiving the funds on the Canadian side that will affect the contracting of work. Currently there is less than 6 months remaining in the Fiscal Year and lead times of a month or more are required for the competitive process.

Recommendation: *The International Joint Commission help with “bridge funding” on the Canadian side until the government allocations are in the financial system.*

Conclusion: The formation of an independent peer review will need to be accelerated to track along with the accelerated study schedule. The IJC needs to move forward with the model that has been suggested by the Study Board.

Recommendation: *The International Joint Commission should establish an Independent Panel of Experts for the St. Clair River study component as quickly as possible to ensure that the Study strategy as presented is reviewed in a timely manner.*