Lake Ontario-St. Lawrence River Study Board

Work Plans

Summary Report

January 22-24, 2001 – Montreal Workshop

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Background

A workshop was organized in Montreal, Canada on January 22-24, 2001 to bring together experts and public interest advisors from the interest groups that will be the focus of Study Teams under the Plan of Study for Criteria Review for regulation of Lake Ontario-St. Lawrence River levels and flows. Eight workgroups discussed the following topics:

1. environment/wetlands interests
2. coastal zone interests—riparian/shore property
3. recreational boating interests
4. municipal, domestic and industrial water interests
5. commercial navigation interests
6. hydroelectric power interests
7. hydrologic and hydraulic evaluation models for use by all Study Teams
8. common data needs for all Study Teams

Introductory Remarks

Lynn Cleary, a member of the Study Board, opened the workshop by stating that the final goal of the Plan of Study (PoS) was to review the criteria for regulation of Lake Ontario-St. Lawrence River levels and flows. She acknowledged that there are conflicts among interest groups and noted that the PoS will not resolve those conflicts but will provide information for discussion.

Eugene Stakhiv, United States Co-Director of the Study Board, explained that this meeting was intended to provide input into budgetary and other planning that the Board would be submitting to the International Joint Commission (IJC) in early February.

He described the goal of the criteria review as managing resources more effectively for recreation, habitat maintenance and other uses and needs. The difference in this PoS is the degree of public consultation and involvement, and the involvement of interest groups not associated with government or other institutions.

He said that this workshop needed to help determine the first-year priorities and products that would support and justify funding for the remaining four years of the study.

He ended by emphasizing that the overall task requires good science to determine alternatives to the operational criteria currently in place—scientific, economic, ecological, and social dimensions need to be analyzed with equal care. It is a multi-dimensional and multi-objective undertaking in the context of sustainable development. Public involvement helps formulate objectives and options so as to use science to produce better planning for all users.

Participant Expectations

Participants were asked to state their expectations for the workshop. The following main goals emerged:

1. Gain a better understanding of how the system works on a physical, organizational and environmental basis
2. Learn about the Plan of Study process: try to ensure we have some balance and do not cram everything into one year—good science and impact assessment take time and cannot be completed in one year
3. Develop sufficient information from each area of expertise so that we see the interdependency of interests and integrate them for a better regulatory approach
4. Walk away from this meeting with each group having an action plan and a mutual understanding of each other's interests in terms of how they want to see water levels regulated

Presentation on Current Regulatory Plan

Tony Eberhardt, US Co-Manager of the Study Board, briefed participants on the current plan. He explained that Lake Ontario regulation is bound by the 1909 Treaty establishing the IJC. He said agreement to build the St. Lawrence Seaway in the 1950s was based chiefly on its value to navigation but the US was willing to become involved only if there was a hydropower component; Lake Ontario flood control became an objective as well.

He indicated that this Study has the mission of developing, considering, evaluating and recommending possible changes to the IJC Criteria of 1956 which currently regulate water levels in order to more appropriately address and reflect current and future expected conditions on Lake Ontario and the St. Lawrence River. He noted that there have been more extreme supplies since the inception of the plan, which have required frequent deviations although the amount of deviation is often rather small. Deviation from the plan prevented both very low levels that would have occurred in the 60s and very high levels in the 70s and 90s.

Workgroup Presentations

Following the opening plenary, participants broke into their respective workgroups. They were asked to review the main tasks proposed in the Plan of Study for each Study Team and to develop the following:

- objectives for each task
- sub-tasks to be accomplished under each objective
- priorities and deliverables for Year 1 of the PoS
- estimated budgets for the deliverables

Participants met again in plenary to present the results of their work, get input from other participants and respond to questions and suggestions. Highlights of their presentations follow.

Environment/Wetlands Workgroup

The Environment/Wetlands workgroup identified three main tasks to address the study objective. The sub-tasks for each of the main tasks are outlined in the tables below, together with deadlines and estimated costs for each of the geographical areas.

Task 1
Wetland vegetation studies and mapping
Objective
Provide recommendations on the regulation scenarios to maintain dynamic cycles and processes

Sub-tasks	**Deadline**	**Cost US**	**Cost CAN**	**Cost L. St. L.**
Lake Ontario and Upper St. Lawrence				
1. Interpret historical aerial photos to see where wetlands no longer exist but might under a new regulatory regime	1. Mar 02 2. Mar 02	1. 30K 2. 75K	1. 30K 2. 35K	
2. Get new air photos for selected study sites, covering both protected and exposed environments, and map vegetation types. Sites should avoid areas that are highly disturbed	3. Rec. Mar 02			
3. Topography and bathymetry from the other groups, fill in if needed for specific study sites	4. Protocol for field studies Mar 02	4. 70K	4. 0K	
4. Survey the elevation of the hydrologic connection to the lake to assess the frequency of contacts with the lake				
5. Field sampling along selected contours				
6. Evaluate long-term lake level changes to determine periodicity, amplitude, cycles (cores)				
7. Develop 3D models for both protected and exposed environments to predict vegetation response; couple these models with the faunal model				
8. Models need abiotic information from modeling group–critical information				
9. Recommend scenarios				
SL River (Cornwall to Trois-Rivières–Lake St. Francis used as a reference area without water level variations)				Same as PoS
1. Historical sequence of aerial photographs are currently being analyzed to document changes to wetland surface and distribution	1. Mar 02			
2. A complete set of recent aerial photos were taken in 2000 summer for whole shore	2. Mar 02			

3. Ground truthing will be completed in summer 2001 4. Study sites are monitored each year, for past few years –looking at year-to-year variability 5. Physical-chemical-geomorphological-meteorological (Water clarity, turbidity, substrate, temp—air and water, wave exposure, residence time, etc) are gathered internally but also rely on the output from the modelling group (hydrodynamic model). 6. Layers of physical information will feed into models of emerged and submergent vegetation—species composition and biomass. 7. Vegetation and physical habitat model will be coupled with faunal model- the complete exposure gradient is used instead of 2 separate classes as in GL model. Defining habitat preferences of the different species of fauna are key. 8. Examine the impacts of different water level scenarios on habitat surface area, distribution and productivity and assess/recommend scenarios	3. On-going field studies Mar 02			

Vegetation types and bathymetry data to model lake level regulation impacts; vegetation succession. Identify the succession for plants over time (GL is 10–100 years temporal scale, SL is 1–10 years) to model changes. The different time scales of change may result from the fact that St. Lawrence habitats are more strongly influenced by physical forces than the GL.

Task 2

Faunal studies (native species)

Objective

- Ensure that faunal species that need to have access to the tributaries and floodplain for spawning have that access at the required times of year.
- More general version for species that do not use the floodplain—ensure that faunal species have access to all the types of habitats they require to complete their life cycle

Sub-Tasks	**Deadline**	**Cost US**	**Cost L.Ont.**	**Cost L. St. L.**
1. Identify indicator or affected native species 2. Identify habitat requirements of these species and stressors of regulation to the degree possible 3. Identify gaps to be filled (based on existing literature and data) and prioritize data needs 4. Map the habitat potential using the preferences 5. Validate potential habitat with observed data 6. Fill the information gaps with prioritized field studies as needed 7. Survey the elevation of the hydrologic connection to	1.Mar 02 2.Mar 02 3. Mar 02 4. Start before March 02	1. 35K 2. 35K 3. 0K	1. 30K 2. 30K 4. 30K	Same as PoS

the lake to assess the frequency of contacts with the lake 8. Identify the temporal constraints on critical habitat for each of the life stages 9. Identify specific changes in regulation to overcome problems • bathymetric mapping • habitat mapping—characterize 10. Propose mitigation measures to reduce the negative effects that can't be avoided through changes in regulation. (using existing examples e.g., managed marshes) 11. Translate impacts into positive economic or social values such as number of hunters, fishers, activity levels and types (boating, swimming, fishing, nature observation etc.) rather than through specific dollar values (it is difficult to quantify $$ losses to marinas, tourism, commercial fishing, etc.) 12. Evaluate impacts of proposed scenarios—modeling				

This concept relates to all species including exotics; in the latter case, however, instead of looking for species having problems you are looking for species that are creating a problem as a result of regulation—the objective and some of the steps need to be adapted but the general procedure (middle steps) remains the same.

The specified deliverables are the minimum ones for projects that are to be initiated this year. However, some projects currently under way in the St. Lawrence River portion may provide Year 1 deliverables for sub-tasks 6 to 8, depending on the species/faunal group of interest. This has to be adjusted on species site-specific bases.

Some links need to be made with commercial navigation with respect to importation of exotic species through ballast waters—the question of whether the introduced species were stocked, introduced accidentally (escapees from fish farms) or from other sources (gardeners, ballast waters, fishers, etc.) was raised but not resolved.

How do you integrate all of them—see next table.

Task 3
GIS, modeling and integration of data
Objective
Determine the outcome of water level scenarios on habitat and fauna

Sub-Tasks	**Deadline**	**Cost US**	**Cost L. Ont**	**Cost L. St.L.**

GIS
1. Establish base mapping
• Topographic/Bathymetric model for selected study sites
  • St. L. R: Topographic elevation data is essential for the river studies (bathymetry available)
  • Lake Ontario: Bathymetric data is harder to get, other methods may be available
2. Integrate with other data layers
• Wetland and habitat inventories
• Vegetation mapping at site studies
• Physical and chemical water characteristics
• Faunal information/impacts
 	
Time series
1 Historical water levels
2 Meteorological data
3 Historic aerial photos
4 Climate change scenarios—yearly cycle of supplies
5 Regulation hydrologic models—links
	Started Mar 02
	
	Rec. standards Mar 02
	
	Building GIS and Data acquisi-tion–On-going Mar 01
		1. 45K	1. 40K	Same as PoS

Estimated Total Cost—Year 1

Task	**Cost for US**	**Cost L. Ontario**	**Cost for L. St. Lawrence**	**Total US $**
1. Wetlands	175K	65K	300K	
2. Fauna	70K	90K	150K	
3. GIS	45K	40K	60K	
Total	**US $290K**	**CDN $195K**	**CDN $510K**	**US $765K**

Coastal Zone Workgroup

Study Objectives

1. Improve understanding of the natural, modified, and future physical system for lake, river (upper and lower), and bay shorelines
2. Prediction of flooding and erosion through development and application of state-of-the-art data acquisition, management, and modeling
3. Coordinate and promote wide dissemination of information with other groups/public (cross-pollination)
4. Apply #1-3 to evaluate potential water level and flow scenarios

Major Tasks for 5-Year Study Period

1. Determine and prioritize data needs and decide temporal and spatial coverage
2. Develop modeling strategy
3. Develop coastal zone GIS layers
4. Determine critical damage locations and select representative (size and type) sites
5. Conduct detailed analysis of study sites
6. Evaluate pre- and post-regulation system conditions and determine critical processes
7. Apply system-wide and to study water level scenarios to assess damages
8. Report

Tasks 1-4 were identified as priorities for Year 1.

Task 1

Determine and prioritize data needs, and decide temporal and spatial coverage

- ID existing data and studies for each region.
- ID other relevant studies and study partners
- Determine data needs
- Determine base conditions, temporal and spatial coverage.
- Determine resolution for basin and site studies

Year 1 Deliverables

Status report on Lake Ontario
Status report on Upper St. Lawrence
Status report on Lower St. Lawrence

Estimated Cost

US $50K
CAN $75K

Task 2

Develop modeling strategy

- Review available models and determine appropriateness
  - "FEPS" for application to handling Lake Ontario erosion and flooding, prediction of future shorelines
  - existing suite of Canadian models for handling river flooding, waves, erosion, currents, sediment transport
  - USACE models to supplement?
  - what models work best for each area?

- Look at synergy and opportunity for integration of models
- ID mechanisms or process elements not covered adequately by existing numerical models, handle via:
  - concepts, assumptions, statistics, consensus of experts

Year 1 Deliverables
Model workshop—decision document
Estimated Cost
US $200K
CAN $200K

Task 3
Develop coastal zone GIS layers

- Acquire unified imagery (defer costing to CDG, need in Year 1)
- Acquire High-resolution topo and bathy data to generate DEM (defer costing to CDG, need in Year 1)
- Re-evaluate and/or determine valid recession rates throughout system. (US $100K, CAN $150K)
- Develop input data sets for sediment budgets. (US $150K, CAN $200K)
- Complete shore, nearshore, and current level of protection characterization/classification. (US $50K, CAN$150K)
- Define land use, zoning, resources, facilities, etc. (US $80K, CAN $75K)
- Import numerical model and prototype data sets (ice cover, waves, currents) Year 2

Year 1 Deliverables
Uniform, geospatial data set, commonly accessible to support all other study elements
Estimated Cost
US $ 380K
CAN $575K

Task 4
Determine critical damage locations and select representative sites

- ID historical flooding and erosion damage areas
- ID potential flooding and erosion damage areas considering climate change scenarios, habitats, and development trends
- Select representative sites (coordinate with other study teams)

Year 1 Deliverables
List of study sites
Estimated Cost
US $50K
CAN $70K

Estimated Total Cost—Year 1	
US	**$680K**
CAN	**$920K**

Recreational Boating Workgroup

Study Objective
To develop new criteria for recreational boating through assessment of the relationship of water levels and impacts to recreational boating and related tourism, and local and regional economy

Task 1
Consult/involve members of the boating community (initial consultation)
Objective
Solicit concerns and get buy-in to study
Sub-tasks
- Define "boating community" stakeholders in concert with PIAG
- Define workshops specific purposes
  - disseminate information on project plan and Plan of Study
  - feedback from stakeholders
- Invite stakeholders and hold workshops (animation process)
- Develop list of concerns for report with analysis, follow-up and proposals

Year 1 Deliverables
Summary and analysis of concerns collected from boating community regarding the proposed study approach on a regional basis

Task 2
Develop levels/impacts model
Objective
Define how the model will accomplish water impact relationship
Sub-tasks
- Literature review
- Develop schematic with relationship of physical characteristics of boats, docks, channels and slips as they relate to water levels
- a) Develop usage pattern impact over season—socio-economic variables (linked with surveys to come)
  b) Define specified physical data needs (depths at slips, etc.)
- Define reaches (hydraulic) in coordination with modeling group—stage-frequency (duration) by reach

Year 1 Deliverables
Interim report describing the overall study approach (impact model)

Task 3
Collect/update physical data and in-depth marina surveys
Sub-tasks
- a) Define terms of reference
  b) Review previous/existing studies and databases (e.g., Coast Guard)
- a) Select sites (marinas, ramps, public docks, etc.) —public access
  b) Characterization of sites

- Define places of measurement—both mobile and fixed infrastructures with channel access—and frequency of measurements
  - make measurements of water depths (with geographical units) and link with database GIS
  - index point of references (IGLD)
  - translate/transfer data on GIS

Year 1 Deliverables
Progress report/inventory

Task 4
Boater surveys (develop, administer, data entry)
a) permanent base boater survey
b) trailer-drawn boater survey

Objective
Identify user patterns and values

Sub-tasks
- Design three different surveys for (i) boaters, (ii) marinas, yacht clubs, (iii) municipalities
- Pre-test surveys
- Review surveys

Year 1 Deliverables
Draft surveys, pre-testing and finalizing surveys.

Estimated Total Cost—Year 1 ($K)		
Task	**PoS Budget**	**Workgroup Estimated Budget**
1	0 US 0 CAN	20 US 20 CAN
2	80 US 80 CAN	60 US 60 CAN
3	60 US 100 CAN	60 US 100 CAN
4	0 US 0 CAN	10 US 10 CAN
Coordination	20 US 20 CAN	20 US? 20 CAN?
Total	**160 US** **200 CAN**	**170 US** **210 CAN**

Municipal, Domestic and Industrial Water Workgroup

Study Objective
Identify and characterize potential problems with water intakes (quality and physical levels) related to water level fluctuations, by taking into account:

- Variations in hydrodynamics in regard to biological processes (e.g., algae blooms)
- Microbiology—pathogens effects in low levels compared to normal levels

The workgroup proposed the following four tasks for municipal water uses, assigning them a HIGH priority.

Task 1
Assemble an inventory of existing municipal intakes
Objective
A database containing the above information by basin (ON, QC, NY)
Sub-tasks

- Assemble municipal sites information

Year 1 Deliverable
A database containing an inventory of existing municipal intakes within the Lake Ontario-St. Lawrence Basin (ON, QC, NY)

Task 2
Identify problems with specific municipal intake (quality and physical) due to water fluctuations
Objective
List of municipal intakes (representative) with above problems to further characterize
Sub-tasks

- Identify problems with municipal intakes (quality and physical) due to water level management

Year 1 Deliverable
A list of representative municipal intakes in which potential problems have been identified due to water level fluctuations

Task 3
Characterize selected sites
Objective
A list of sites with characterizations
Sub-tasks

- Characterization of specific municipal intake sites
  - establishment of agreed upon standards (common methodology)

Year 1 Deliverable

- A set of agreeable standards and methodologies that will be used to evaluate which "problem sites" are due to water fluctuation and need further study
- Interim year-end status report on municipal intake studies

Task 4
Recommend action for sites
Objective
Recommendation report

Tasks 1 to 4 would be repeated for industrial water uses, but the priority would be LOW. For domestic uses, the workgroup proposed the following two tasks, assigning a MEDIUM priority.

Task 5
Conduct survey of domestic users to obtain information on problem versus levels
Objective
Survey result and analysis
Sub-tasks
- design survey
- develop distribution list
- distribute and collect information
- analyze information
- report

Year 1 Deliverables
Interim report with survey and distribution

Task 6
Analyze and recommend
Objective
Recommendation report
Year 1 Deliverable
Final report on domestic intakes

Estimated Total Cost—Year 1 ($K)		
Task	**CAN**	**US**
1	80	54
2	25	17
3	100	67
4	50	33
5 and 6	8	5
Total	**263**	**176**

Commercial Navigation Workgroup

Study Objective
Assess effects of levels and flows on commercial navigation from Lake Ontario (Port Weller) to Bécancour (just downstream of Trois-Rivières).

Eight tasks and objectives were identified and, for each task, a tentative list of sub-tasks, deliverables and estimated costs was established for the first year (see Table below).

Task 1
Document the physical (static/dynamic) characteristics of the existing system for four geographical areas—Port Weller to Kingston, Kingston to Cornwall, Cornwall to Montréal, Montréal to Bécancour (Montréal-Sorel and Sorel-Bécancour)
Objective
Develop/establish common understanding of facts and issues through the system

Task 2
Develop economic model/tools
Objective
Evaluate the economic impact of fluctuating water levels and flows

Task 3
Develop a hydrodynamic model of whole system
Objectives
- Evaluate impact of flow changes on levels and velocities
- Maximize vessel loading on an operational basis

Task 4
Develop a dynamic model that provides safe loading conditions for a range of water levels for each sub areas
Objective
Determine underkeel clearance required for safe navigation in confined areas

Task 5
Determine impacts of fluctuating flows/levels on stability of ice covers
Objective
Maintain channel discharge capacity and prevent ice jams

Task 6
Establish criteria for minimum operating levels in the Port of Montreal
Objective
Obtain parity with upstream equivalent existing “H”, “I” and “J” criteria

Task 7
Determine optimal operating conditions for the whole navigation system (four sub-areas)
Objective

- Optimize loading capacity of vessels (tons carried per trip)
- Optimize economic viability of marine transportation system
- Provide a method to rank/evaluate various regulation scenarios

Task 8
Document environmental/social effects from shipping
Objective
Measure the increase/decrease of environmental effects from shipping due to changes in water levels (i.e., impacts of modal shifts on fuel consumption and resulting greenhouse gas emissions)

Task	**Deliverables–31 March 2002**	**Funds** US ($K)	**Priority**
1	Mapping of system–transportable numerical format of physical characteristics of navigation system (channel profile, structures) unique vertical datum (IGLD 85) on a GIS (NAD 83)	75	1
2	Leading toward the economic impact model (establish the consultation database, the data set requirements and the scope, scope–definition needs, public approval of the concept), define resources required for subsequent steps	30	3
3	Carry out consultation and close coordination with involved agencies and the modeling group with respect to data needs and modeling needs	15	2
4a	Review existing data and squat studies in order to scope the further studies and requirements on safe navigation in extreme hydrodynamic conditions	15	8
b	Coordinate with modeling group on data gathering needs for wake modeling requirements	15	7
5	Add—to the existing operational guidelines on ice management for the Lake Ontario-Montréal section—new guidelines that would govern the Montréal-Bécancour section. Coordination between OAG and CCG and report	10	9
6	Document the Port of Montréal optimal operating conditions and windows of opportunity (timing and water level ranges)	10	6
7	Identify optimal operating conditions and windows of opportunity for the 4 geographical areas (timing and water level ranges)	10	4
8	Document environmental (air and water) /social effects from shipping and consequences of modal shifts. Literature review, define the scope and feasibility of the study and plan for the subsequent years	50	5
	Estimated Total Cost—Year 1	**230**	

Hydroelectric Power Workgroup

Study Objective

- Review the proposed change in the regulation plan on hydroelectric operation
- Participate in the information exchange among the involved groups

Year 1 Deliverables

1. Status report
   - Hydroelectric operation
   - Facility limitation
2. Information resources
   - Report—overview, recorded data
3. Summary of electricity industry impacts
   - Hydroelectric production along St. Lawrence
   - De-regulation
4. White paper that can be used as public presentation
5. Information and assistance to public outreach activities

Estimated Total Cost—Year 1
$50K

Hydrologic and Hydraulic Evaluation Models

Study Objective
Provide hydrological and hydraulic modeling (and regulation plan) to allow evaluation by various interests

Task	Year 1 Deliverables	Estimated Cost $K
1	Routing and Regulation Model • Complete Lake Ontario to Trois-Rivières (weekly means)	40
2	Hydrodynamic Modeling on St. Lawrence River • Define user needs a) Demonstration and data collection (upstream $40K, down $40K) b) 1-D model error analysis ($10K)	90
3	Ottawa River and Tributary Modeling • Ottawa: update existing routing model report ($80K) • Tributaries: define modeling needs and report ($15K)	95
4	Stochastic Hydrology • Assess and report on statistical properties of G.-L. supply series • Agree upon the statistical properties to be explicitly preserved	100
5	Climate Change Supplies • Extension of HADCMZ and CGCM1 1°X1° interpolated datasets (already available for Great Lakes) to Ottawa River and downstream to Trois-Rivières ($5K) • Evaluation/analysis of GCM models (i.e. HADCM2 and CGCM1), new emission scenarios (i.e. SRES98 compared to IS92) and techniques (i.e. RCM, downscaling methods) that can be used in climate change scenario development ($10K)	15
6	Review Existing Regulation Plan • Deviations, lessons—ice, maximum flow, shortcomings ($10K) • Base case model ($10K)	20
7	Investigate/Adapt New Techniques • Literature review of regulation techniques and report	30
8	Hydrological Forecast Model • Workshop on forecasting techniques—H and H modes—used by different agencies ($30K) • Evaluation of these techniques—reports Great Lakes-St. Lawrence River ($20K)	50
9	Develop Pre-Project Conditions • Sensitivity analysis—report ice crystal movement	20
10	Modify and Evaluate Regulation Plans with Criteria • No Year 1 deliverable	0
	Total	**460**

Common Data Needs Workgroup

Needs

- Bathymetric and topographic mapping of the shoreline
  - Light Detection And Ranging (LIDAR) airborne laser technology
- Digital Elevation Model (DEM)
  - Shoreline topographic data in a Geographic Information System (GIS)

  Objective: To acquire detailed bathymetric and topographic data of the nearshore zone to develop a detailed DEM of the shoreline to support the modeling of impacts of water levels fluctuations on various interests groups
- Common GIS
  - Establish standards for developing and working with spatial data (e.g. platform, projections, file formats, data exchange, metadata, etc.)

Groups Needing Data

- Environment
- Coastal
- Recreational Boating
- Domestic, Industrial and Municipal Water Uses
- Hydrologic Modeling

Priorities

- Bathymetric mapping of Lake Ontario and upper St. Lawrence River
  - no existing data
  - critical to modeling exercises
  - provides some topographic data
- Topographic mapping of lower St. Lawrence River
  - turbidity too great for SHOALS mapping
  - low water levels allow excellent opportunity to gather a good amount of data

Options

1. Seek partners and complete all bathymetric and topographic mapping
2. Complete bathymetric mapping for Lake Ontario and upper St. Lawrence and topographic mapping of lower St. Lawrence (fewer partners)
3. Select priority zones based on site studies (limits lakewide/riverwide extrapolation)

Issues

- Timing of the flights (spring or fall best for topographic, summer best for Shoals)
- Bathymetric mapping downstream of Cornwall is not covered in the proposal (Shoals not appropriate due to turbidity)
- Site studies are not yet chosen
- Timelines are tight

Short-term Action Plan

1. Prepare letter from Study Board seeking partners (W. Leger—Feb/01)
2. Prioritize zones of the lake and river for mapping (Work Groups—Feb/01)
3. Any items in work group budgets that can be contributed? (Work Group—Feb/01)
4. Go back to contractors for new estimates (Feb-Mar/01)
5. Develop detailed operations and contingency plan (Data Work Group—April-June/01)

Deliverables—Year 1

1. Topographic mapping completed for lower St. Lawrence River
   - all, or priority areas (depending on funding)—spring or fall 2001
2. Bathymetric mapping completed for Lake Ontario and upper St. Lawrence River
   - all, or priority areas (depending on funding)—June or July 2001
3. Topographic mapping for specific sites on Lake Ontario/upper St. Lawrence River—spring 2002

Estimated Total Cost—Year 1

Task	US ($US)	CAN ($US)	TOTAL ($US)
Phase 1–Project Design	40,000	68,000	108,000
Phase 1–Geodetic Design	71,000	90,000	161,000
Phase 2–Topo LIDAR	968,350	1,260,000	2,228,350
Phase 2–SHOALS	520,000	860,000	1,380,000
Phase 3–GIS layers and data	194,000	242,300	436,300
TOTAL	**1,828,350**	**2,573,400**	**4,401750**

Source: USACE, MacDonald Dettweiler, LaserMap and Atlantic Technologies

Board Revised Budget for Plan of Study

Following the workshop, the Study Board met to review the recommendations presented by the workgroups in the context of the budget available for Year 1—US $3.6 million. Their decisions are shown in the table below. Explanatory notes follow.

Lake Ontario-St. Lawrence River Plan of Study for Criteria Review

Year 1 Budget

(US $K unless otherwise indicated)

Study Team or Activity	Plan of Study Proposed Budget			Workgroup Proposed Budget	Board Budget Decision*
	US	CAN	TOTAL		
Common Data Needs	500	700	975	1400	1000
Environment	640	865	1220	765	685
Coastal	770	770	1270	1296	600
PIAG	270	340	498	490	285
Recreational Boating	160	200	300	310	280
Mun./Indus. Water	79	116	160	350	260
H &H Modeling	160	235	320	460	225
Commercial Navigation	49	197	185	230	105
GIS	-	-	-	100	100
Plan Form./ Evaluation	-	-	-	250	40
Hydro	0	0	0	50	20
TOTAL				**5701**	**3600**

* Includes travel budgets

For all groups that identified data needs and proposed budgets to meet them, the purpose of any GIS activity in Year 1 should be to prepare to feed into the overall GIS work. Bathymetric requirements will be covered by the Common Data Needs Study Team.

Environment

- Wetlands—US $420K
- Fauna—US $240K
- GIS—US $25K (for Year 1 use budget to assess and put data into the right format; if required, additional funds could be available in Years 2 and 3)

Coastal Zones

- Task 1—US $100K (maximize use of in-kind service)
- Task 2—US $100K (utilize on-going studies from Lake Michigan)
- Task 3—US $400K (focus only on recession rates, sediment budget data and shoreline characteristics—bullets 3-5, defer zoning, land use, etc.)
- Task 4—0 (covered elsewhere)

Recreational Boating

- Task 1 is a PIAG responsibility and should be removed from workplan, which will be further defined when more stakeholders can be involved

Municipal, Domestic and Industrial Water

- Task 1—US $80K
- Task 2—US $20K
- Task 3—US $100
- Task 4—US $50K
- Task 5—US $10K

Hydrologic and Hydraulic Modeling

- Task 1—US $40K
- Task 2—US $50K (to review 2-D hydrodynamic models, review cost/feasibility of linking them, and determine what questions they will answer for purposes of the PoS)
- Task 3—US $75
- Task 4—US $25K (to start; total should be rounded to $70K)
- Task 5—US $15K
- Task 6—US $5K (review existing reports)
- Task 7—US $5K (straightforward literature review)
- Task 8—deferred for consideration in Year 2
- Task 9—US $10K

Commercial Navigation

- Task 1—use existing info
- Task 2—US $30K
- Task 3—US $15K (inventory of requirements of existing commercial navigation community)
- Task 4a— include pilots in the process
- Ensure all tasks are covered in a single report

GIS

- The architecture of the GIS system will be designed by a consultant in conjunction with the Common Data Needs Study Team so all other groups will coordinate and specify requirements so data collection can proceed.

Hydroelectric

- Allocate US $20K to send a consultant to hydro companies and synthesize their data into a report
- It will be essential to select a good Study Team