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Contextual Narrative for Recreational Boating and Tourism

[Note: All dollar figures, whether in the U.S. or Canada, are converted to $US]

1. General Socioeconomic Context:

(a) Production value of the interest: As a conservative estimate, recreational boaters in the U.S. and Canada spent $429.7 million on boating-related trips taken to Lake Ontario and the St. Lawrence River in 2002 (Connelly et al. in review, Gardner Pinfold Consulting 2003). These expenditures are exclusive of additional en route expenditures that occurred in areas that do not border the study region. They are also exclusive of other annual, but not trip-related expenditures made in the area ($133 million for Canadian boaters; not measured for US). U.S. and Canadian boaters received a net benefit or consumer surplus of approximately US$278.4 million in 2002.

(b) Numbers of stakeholders: Stakeholders include approximately 310,000 boaters (133,000 US; 177,000 CDN) and approximately 103,000 boat owners (44,000 US; 59,000 CDN) (Connelly et al. in review, Gardner Pinfold Consulting 2003). Boating is very popular along the entire study area. Buffalo is within a few miles of western Lake Ontario and marinas located at the mouth of the Niagara River. Rochester and Toronto have large populations of boaters, some of whom boat locally, but many of whom travel east to more scenic areas along eastern Lake Ontario and the Thousand Islands where they may have summer homes, or where they can enjoy a different type of fishing (bass, muskellunge) from the salmonid fishing offered in Lake Ontario. In the Lower River, a recent survey has also indicated a very large number of boat users all along the river (Duchesne *et al*., 2004). Additional stakeholders just along the US side include the owners of 166 marinas and yacht clubs (Connelly et al. 2002), 226 charter boat operators (Lichtkoppler and Kuehn 2003), and a small number of tourboat operators. Also, the 8 counties that border these waters contain over 4,500 retail businesses (bait and sporting goods stores, gasoline service stations, restaurants and bars, lodging places, and other recreation and entertainment places) where boaters spend money (U.S. Bureau of the Census retail trade and services data). Tourist-related spending by boaters on the U.S. side, after considering indirect effects, resulted in total output of 1,380 full-time equivalent jobs, as derived by IMPLAN analysis (Connelly et al. in review). Although comparable Canadian data are only available at the provincial level (see Goss Gilroy inc. 2003), they are probably also very significant, considering that the riparian cities of Toronto and Montreal are the biggest cities in each province, together totaling more than eight million inhabitants.

(c) Organizational characteristics: Boaters in both the U.S. and Canada tend to be "empty nesters" (68% in US), with a mean age of about 55 and about 20 years of boating experience. They have above average incomes as a group ($65,000 for upstate New York boaters, compared to about $45,000 median household income statewide) (Connelly et al. in review). Average incomes of boaters in Canada are probably slightly lower (Gardner Pinfold Consulting 2003). Although the mean income of boaters is above average, many middle income people participate in boating. Boaters on the Lower St. Lawrence River often take trips of more than 1 day, going from the Lake to the River and vice-versa.

Marinas tend to be small businesses with low profit margins. This is in part because many marinas started as "Mom and Pop" businesses whose owners typically do not have business degrees. Most marinas in the study area are several decades old, and at the time of construction, their owners may not have realized the extent of fluctuations in water levels over a broad time scale. Moreover, marinas can only operate in warm-weather months, and they face numerous risks peculiar to the industry (e.g., weather, quality of fishing from year to year, water levels), as well as economic conditions that affect all businesses (White 1991; Noden and Brown 1975). Profitable marinas tend to be larger, and for the Lower River, the larger marinas are publicly owned and offer different services from the private sector (e.g.,

operations, maintenance) (Zins Beauchesne et Associés 2002). Similar climatic and economic factors affect marinas and yacht clubs on both sides of the border.

Communities along New York waters vary from very rural areas (the case for the vast majority of the shoreline) to small cities (Oswego, Ogdensburg, and Massena), and finally to the metropolitan center of Rochester. The Canadian shoreline of the St. Lawrence includes Montreal, Cornwall, and a number of villages; the Lake Ontario portion is largely rural except for Kingston and the western portion from Toronto to Hamilton. Rural communities along the shoreline are much less diversified economically and tend to have higher unemployment rates (7% to 9% compared to 5% in Rochester based on New York state employment data), and they are much more dependent on tourism than larger urban areas. Rural portions of Lake Ontario, the Thousand Islands area, and the Lake St. Pierre areas are heavily dependent on tourism, with harbors and locks along the River providing additional local attractions (Goss Gilroy Inc., 2003). Tourism is an important part of the economy in Toronto and Montreal as well.

(d) Values and perceptions of the interest. The primary interest and concern is in keeping water levels sufficiently high to allow boating. This is true both for marinas located in embayments along the Lake, and for marinas located on the Upper and Lower River. Extreme high or low water levels impact boating most strongly in July and August because that is when most boating occurs. However, assuming "normal conditions," water levels are usually only a minor problem in a few localities in the summer. Thus, the greatest incremental gains to recreational boating would occur if higher water levels could be achieved during the fall (especially during September and October). This would significantly lengthen the boating season. In Canada, the boating season is generally about a month longer on the Lake than in the Lower River (Zins Beauchesne 2002; McCullough Associates and Diane Mackie and Associates, 2002).

(e) Significant statutory, regulatory, and policy restrictions: There are few places along the shoreline of the Lake and Upper River where additional marinas could be constructed, due to either topography, lack of road access, or sensitive environmental areas (e.g., wetlands). Thus, in large part, any increase in the supply of marina slips has to be accomplished through more efficient use of space at existing marinas. This has been the case for perhaps 20 years; thus, it likely would be very difficult to increase the supply of slips significantly beyond the current number. In the Lower River, substantial marina expansion occurred in the 1990s and again in 2002 with the re-opening of Lachine canal (Parcs Canada 2004). Water quality has improved in the Lower River with the implementation of major sewage treatment plants. If funds were available, it would be possible to enhance the recreational boating network by improving the channel connection from Lake St. Louis to Lake St. Francis. Boaters must use commercial navigation locks, and frequently encounter waits of several hours, as priority is given to commercial shipping. Lock management could be an issue in this regard, however.

(f) History of the interest: Recreational boating has been popular in this area for most of the past century and some older marinas were created in 19th century (e.g. St. Lawrence Yacht Club and *Club nautique de Longueuil*). Early statistics are not available but by 1971, 395,000 boats were registered in New York (Noden and Brown 1975), compared to 504,000 today. Boating in the study area has grown by a similar rate. Marina expansion has been limited, as noted above. However, with the advent of salmon and trout introductions into Lake Ontario in the 1970s, thousands of people from all over the Northeast trailered their boats to the Lake. Several new boat ramps were constructed and the entryway to the Salmon River at Pulaski was improved. In the 1970s and the 80s, major dredging occurred on the Lake and for Upper River marinas. Though this wasn't the case for Lower River marinas, major connections have been reopened, such as Canal Lachine - making links between fluvial section (Varennes-Contrecoeur), Lake St. Pierre and Lake St. Louis. The St. Lawrence River, especially in the Thousand Islands area, contains thousands of second homes and cottages, many of which are undergoing conversion to year-round residences. Boating in conjunction with other summer activities has been a long tradition there. In addition, the Thousand Islands area contains several state parks that provide boating access. Recently in

the Lower River, the Lake St. Pierre area has been recognized as a UNESCO Biosphere Reserve, and the Sorel-Berthier Islands area is one of the oldest rural settlements in Canada (De Koninck 1996). The Thousand Islands area has also recently been granted Biosphere status by UNESCO.

(g) Trade flows and current market conditions: Most of the recreational boating in western and central Lake Ontario is local, although there are significant numbers of boaters from other counties (Connelly et al. 1998). For the eastern Lake Ontario Basin and the St. Lawrence River counties, most boaters are tourists. Most boating tourists come from other regions of New York State, but many salmon anglers, especially in Oswego County, come from other northeastern states (Connelly et al. 1990). Current market conditions are generally steady but probably are not increasing significantly. Except for climate conditions, gas price is probably the main factor that in the short run could change the market conditions for boaters. For Canadian tourism, the dollar exchange rate (CDN-US $) can also have a huge impact. Terrorism and safety measures at borders are an inconvenience for boaters, but have not been a big constraint on tourism. For the larger urban centers, most boaters are local, while for the Thousand Islands area, boating-related tourism is much more important (e.g. more than doubling the number of boaters in summer for the Gananoque area) (Thousand Islands International Tourism Council 2002).

(h) Effect of last high or low water conditions: We have good data from marinas concerning only very recent high and low water periods. During those periods, significant losses occurred to a few marinas, but the impact industry-wide was not large. Over the years most of the marinas on Lake Ontario have installed floating docks, which ease problems in high-water situations. With very few exceptions in the Lower River, floating docks are the norm for all marinas and yacht clubs. According to Canadian Coast Guard data, in low water years such as 1999 for the Lower River, the number of accidents increased, while accidents in other sectors (not having water level problems) were reduced (though water is not the only factor involved) (Garde côtière du Canada, 2001). Low water accidents are usually caused by rocks which in high water are deep enough to pass over safely. Low water often brings new boating hazards, undiscovered by neophytes until contact is made.

2. Performance Indicators:

a1. Key performance indicator: Net economic value lost by recreational boaters and charter boat patrons as water level varies from ideal levels for boating.

a2. Key assumptions: On the U.S. side, we assumed that the population of boaters from which we drew our survey sample (those whose county of principal use as listed on their boating registration bordered the study area) included all boaters who used Lake Ontario and the St. Lawrence River. This was the only population from which a cost efficient sample could be drawn. In 2003, New York Sea Grant funded a statewide survey of boating in New York State which allowed us to estimate the magnitude of this conservative assumption. The results of the Sea Grant study showed that 36% of Lake Ontario or St. Lawrence River boaters listed a county away from the Lake or River as their county of principal use. The Sea Grant study did not ask willingness to pay, but at-site expenditures were similar for boaters whose county of principal use borders the study area versus other boaters. This suggests that willingness to pay for the two groups would be similar. Thus, our U.S. estimates of boating use and net benefits on the Lake and River is likely underestimated by as much as 36% (Connelly et al. 2004). It is also possible that boats registered outside New York State were launched on the Lake or River. We inquired about non-NYS registered boats in our survey of marina operators (the most likely place where out-of-state boats would be berthed) and found them to be a very small percentage [<2%] of all boats.

On the Canadian side, a telephone survey of the general population living near the Lake and River was conducted to estimate the number of boaters. The survey area extended approximately 50 miles north of the Lake and River (Gardner Pinfold Consulting 2003). We believe the number of boaters who come

from outside the area surveyed is very small because the population outside the survey area is small and many other boating sites exist outside the survey area. We were unable to get good depth measurements at boat launch ramps on Lake Ontario or the Upper St. Lawrence River. Therefore, net economic value lost for these boaters are not included in the stage damage curves calculated for those reaches. Thus, the curves presented are conservative estimates.

The other major assumption is that boaters in fact behave consistently with the stage damage curves shown in our results. We do not have independent data from a year of high or low water to test this assumption (although other factors also affect participation). Thus, we have to examine the assumption deductively. Regarding boater behavior during low water levels, we took depth measurements at marinas and boat launch ramps and asked private dock owners for an estimated water depth on a particular day (Labor Day of 2002). These measurements when merged with the depth requirements of boats of various size incorporated no safety margin. Thus, stage damage curves for low water levels may be conservative for two reasons: (1) some boaters will not want to risk damage to their boat or propeller without some safety margin, and (2) many marinas are located on inlets in situations where siltation occurs in the channel leading to the marina slips, and in some cases the depth at the slip is not the most shallow depth the boater faces in getting out to open water. Regarding high water levels, we assumed boater days were lost when fixed docks at marinas were inundated. Although no further measurements were taken, at many marinas boats have to pass under a bridge to get to open waters, and at levels where docks are inundated, larger boats can not get under these bridges. We assumed boaters at launch ramps and private docks could boat at any high water level, a conservative assumption, because of the cost and logistics of obtaining such data.

Related to the above is the assumption that boaters don't move to another area during times of water level problems, and thus once water levels hit certain low or high thresholds, all boating benefits are lost. We believe this is a safe assumption for private dock owners, whose boats are in the water at that site and thus are closely tied to the site. We also believe it is a safe assumption for boaters who use marinas, on a year-to-year basis. We are aware of some cases in which boaters using marinas were forced to find a substitute site only for hauling out their boats (Boudier et Bibeault, 2001). Most marinas and yacht clubs charge an annual slip rental which is paid in advance, and thus it is unlikely that the boater will have his boat hauled out and move to another marina (which may have no slip vacancies) mid-season. Boaters who trailer their boats and use launch ramps have more flexibility, and may be able to move to another facility in low-water situations. However, they may lose the boating day when they assumed they would launch their boat, and water levels may affect nearby ramp facilities similarly.

Total possible days boated used to calculate the performance indicator was the sum of days boated in 2002 plus boaters' estimates of the number of additional days they would have boated by month if water levels had been sufficient. The hypothetical nature of the estimate of additional days raises the possibility that boaters would not have gone boating on all of these days. Since they were being asked after the fact what they would have done, we can be more certain that days were constrained by water level and the estimate of additional days is approximately accurate. The trend in boaters'estimates of additional days follows the typical water level pattern, giving further credence to their estimates, with a few days lost in spring due to high water, no days lost in the summer, and more days lost in the fall due to low water. The estimate of total possible days boated used in calculating the performance indicator therefore is unconstrained by water levels.

Boaters were asked in the late fall of 2002 to recall the number of days they boated Lake Ontario or the St. Lawrence River by month for 2002 to date. Two types of bias could have affected their answers. One was response bias, such that respondents to the survey were more active boaters (boating more days) than nonrespondents. We found this to be the case when we compared respondents and nonrespondents' answers to a screening interview question regarding days boated thus far in 2002. We accounted for this

bias by reducing the estimate of total days boated by 4.7%. A second type of bias is memory recall bias. Respondents could have trouble recalling exactly how many days they boated each month in 2002 by the fall of that year. Past research has shown a general trend toward overestimation of participation (Connelly et al. 2000). Although we tried to minimize this bias by sending out the questionnaires as soon as possible after the end of the boating season, we believe there is likely some overestimation.

We assumed no temporal substitution of boating days, i.e., that boaters facing water level problems would simply boat later in the year after these problems were alleviated. In times of frequent high water levels, this could occur to some extent with resident boaters such as private dock owners. Much of the boating is tourism-related, however, and these boaters are not likely to realize until they reach the destination that there are water level problems. Thus, these trips and boater days are lost. For low water conditions, the problems are exacerbated in late summer and fall, when water levels continue to decline gradually. Boating days lost at a particular time in late summer and fall have little opportunity for substitution later in the year.

There may be some exaggeration of data (e.g., boater days, expenses) for strategic reasons. Boaters were told that the information they provide would help the IJC manage water levels. However, this wording in the cover letter and inside cover of the questionnaire was done with care. Respondents were told the general purpose of the study and they were encouraged to participate, but we avoided language that recreational boating is competing against other interests or that high use and expenditure data would help recreational boating. We believe the effect of this potential bias is minimal.

b. Data limitations; fungibility of the performance indicators: Primary data limitations are covered above. Some assumptions or potential biasing elements likely cause slightly inflated estimates, while other assumptions and limitations, especially related to sampling, understate boating participation and therefore benefits. If anything, we believe that on balance, our estimates are slightly conservative. However, we don't believe the estimates seriously understate lost benefits.

The performance indicator of net benefits lost is based on willingness to pay data asked of boaters. This is the conceptually correct measure to compare net benefits lost from recreational boating with net benefits lost from other sectors. Because of its hypothetical nature, this method is sometimes criticized. However, we used methods generally approved by resource economists and survey researchers to arrive at the most valid estimates possible. First, we defined and eliminated outlier estimates. Second, we asked if boaters provided an inflated estimate of willingness to pay in order to enhance the value (consumer surplus) of recreational boating. Those who responded affirmatively were assigned the mean value provided by other boaters (which was, on average, a reduced value) rather than the value they gave.

Considering various water level plans and possible ranking of those plans, we believe it is unlikely that changes to any of these assumptions would affect plan ranking for recreational boating. Changes in assumptions might affect the proportional loss for recreational boating as compared with other interests.

3. Significant benefit categories not addressed by performance indicators (secondary impacts)

Of the $178 million in total expenditures on the US side, $68 million resulted from tourist-related spending (from boaters residing outside four groupings of counties along the New York border of these waters). This tourist-related spending, after considering indirect effects, resulted in total output of $96 million and 1,380 full-time equivalent jobs (Connelly et al. in review). Based on a Canadian national survey, each dollar spent (direct expenses, net import) added another $1.50 through indirect and induced expenditures. Tourism activity was not measured in Canada, but the Toronto and Montreal areas generate substantial economic activity linked with commercial boating activities (e.g. tour boats). As an example,

for 14 tourboat operators out of 27 contacted, loss of income between 1998 and 2002 related to water levels was estimated at $727,000 (Gardner Pinfold Consulting 2003).

Regional economic impact analysis was performed using IMPLAN to examine economic impacts attributable to boating in subregions of New York that result from new expenditures from boaters who were not residents of each subregion. The four subregions, from west to east, were Niagara County (which is classified as part of the Buffalo Metropolitan Statistical Area [MSA]), Orleans-Monroe-Wayne Counties (much of the Rochester MSA), Cayuga-Oswego Counties (Oswego County is part of the Syracuse MSA), and Jefferson-St. Lawrence Counties, which are not part of an MSA.

The sales or output impacts and the employment impacts resulting from boater spending are shown in Table 1. Over half of all tourist-related spending along the entire study area occurred in the Jefferson-St. Lawrence County region (northeastern Lake Ontario – St. Lawrence River), and about two-thirds of the combination of indirect and induced employment impacts occurred in here. This subregion, within the US, is most dependent on boating-related tourism and would likely be most strongly impacted if a significant number of boater days were lost due to high or low water levels.

The sales impact per boat day was calculated to facilitate construction of an additional water level – impact relationships and regional economic impact performance indicator. Because of (1) how the boater sample was drawn, (2) the various reaches of Lake Ontario and the St. Lawrence River, and (3) the similarity in economic impact data for central and western Lake Ontario, the three western subregions were merged to arrive at these estimates. As with direct expenditures, aggregate sales impacts per boat day are highest (over $119 per day) in the eastern Lake Ontario-St. Lawrence River area.

Some notable points that can be derived from Table 1, with further explanatory notes, are:

1. The majority of the total economic impact (65% of sales and 59% of jobs) created from boater spending occurs in the Eastern Lake Ontario-St. Lawrence River subregion. This region has a wealth of scenic and recreational resources, and tourism has historically been very important in this area (Connelly and Brown 1988).

2. The overall output multipliers (Totals / Direct) are quite consistent across the four subregions and are only moderate in size, ranging from 1.37 for Cayuga-Oswego to 1.49 for Orleans-Monroe-Wayne.

Table 1. Output and employment estimates from spending by recreational boaters on the New York portion of Lake Ontario and the St. Lawrence River in 2002, by coastal region.

	Aggregate Sales Impacts (000s of U.S. dollars)			
Coastal Impact Area	Direct	Indirect	Induced	Totals
Niagara	$ 2,048	$ 438	$ 432	$ 2,919
Orleans-Monroe-Wayne	1,537	347	402	2,286
Cayuga-Oswego	20,496	3,172	4,503	28,171
Jefferson-St. Lawrence	43,464	11,841	7,749	63,055
Totals	67,545	15,798	13,087	96,431
	Sales Impacts per Boat Day			
Regionwide	$51.95	$12.15	$10.06	$74.16
Niagara to Oswego Co.	31.24	5.13	6.92	43.30
Jefferson-St. Lawrence	82.33	22.43	14.68	119.44

Coastal Impact Area	Aggregate Employment Impacts (Full-time equivalent jobs)[1]							
Niagara	35.3		4.1		5.4	48.7		
Orleans-Monroe-Wayne	25.2		2.9		4.2	32.3		
Cayuga-Oswego		392.2		30.5		58.0	480.7	
Jefferson-St. Lawrence	597.1		124.9		97.0	819.0		
Totals	1,049.8		162.4		164.6	1,380.7		

[1] IMPLAN-defined jobs have been converted to full-time equivalents (40 hours per week) using Bureau of Labor Statistics data. These data indicate the typical retail and hospitality job is approximately 30.8 hours per week. Thus IMPLAN data were weighted by a factor of 0.77 to arrive at estimates in FTEs.

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4. Key baseline conditions. Boating is sensitive to economic conditions, but this probably applies more to the purchase of new boats and perhaps the type of boat purchased than to actual boating participation. A prolonged economic downturn or substantially higher fuel prices could dampen the growing demand for larger motorized boats and new boats, but these conditions likely would not have a great impact on boating participation. This is based on prior experience going back to the 1970s; boating demand has not been estimated in the light of recent oil and gas price increases. During the energy crisis of the 1970s, people conserved fuel and took fewer long trips, but continued to boat.

5. Key trends. Because of the price of new boats, boating has short-term fluctuations that mirror the general economy. We are currently seeing this, with sales on the increase since the fall of 2003, after a period of stagnation. Over a broader period, however, boating has increased in numbers, and boats have grown larger. Surveys show a growth of about 10% in the number of boaters between 1994 and 2002, and the U.S. Forest Service, which does long-term forecasting for a number of recreation activities, predicts a 21% increase in boating from 1995 to 2006. In the Quebec region, the number of boats (of all types) increased by 22% from 1995 to 2000, with the highest increase for motor boats of less than 20 feet (26%) and for rowboats (22%) (Ministère des Pêches et des Océans Canada, 2004.) Sailboats of more than 20 feet have also increased by 12%. On the St. Lawrence River (Lower section), between 1995 and 2002, use of power boats and rowboats has increased, but use of sailboats has decreased (Duchesne *et al*., 2004). Although difficult to forecast precisely, it is likely that the number of boats will increase on the St. Lawrence River (Lower River, at least) in the coming years.

The average horsepower of motor boats has increased from 65 hp in 1985 to 86 hp in 2002 in US, and this relationship is probably similar in Canada. Also, the 1990s brought the emergence of "cigarette" boats going at more than 60 mph on the Lower River. We expect continued slow growth in boating, with also a trend toward slightly larger boats where we find higher water levels conditions. These larger boats will have slightly deeper depths, on average, which means low water levels will pose an increasing problem, although at a gradual rate. Jet skis and personal watercraft have appeared within the past 15 years and the number of users has grown substantially. This segment of boating is less affected by water levels, however.

6. Expected consequences of changes: Based on previous experience, boaters are loyal to boating. In times of economic difficulties nationally, or at times of higher fuel prices, they make adjustments within the activity of boating; they do not change from boating to some other outdoor activity. Thus, it is difficult to imagine a scenario in the future where there would be fewer boaters. As a result, water levels

would remain a critical concern to boaters. Adaptation measures could also be adopted (in part) by marina operators, but safety considerations and boater education/training will remain an issue (i.e. to develop better ability to navigate when facing adverse conditions linked with climate and water levels).

7. Adaptive Behaviors: Many marinas have adapted to upward fluctuating water levels through the construction of floating docks. For this reason, high water levels are less of a problem for recreational boating than low water levels. Some smaller marinas still have not gone to the expense of installing floating docks, however. Low water levels are more difficult for marinas to adapt to because for generalized low water, there is no obvious solution, and for specific situations, dredging may be required, which may take a year or two because of both costs and the difficulty of obtaining the necessary permits. Small boat owners who are fishing or waterskiing may be able to adjust over time by going to an inland lake or river. However, many boaters have specific interests in Lake Ontario or the St. Lawrence River because of waterfront properties or other interests.

Over a period of several years, boaters might adapt to low water conditions by buying smaller boats with shallower drafts. In the short term, they would probably simply boat less, going only in late spring and early summer when water levels are highest. Marina owners are less flexible. We believe that in a period of three years with low water levels, perhaps one-quarter to one-third of marinas would go out of business (based on limited in-depth survey information from Boudier et Bibeault, 2001).

8. Risk Assessment/Sensitivity Analysis: (See also adaptive behaviors above.) The primary risk we would identify occurs with water levels that are below the critical levels of the stage damage curves. Low water levels where significant losses of benefits occur affect three boating segments somewhat differently—marina users, launch ramp users, and private dock owners. The larger boats tend to be located at marinas. Low water levels during the boating season may keep boaters from boating. If low water levels are predicted for fall, this may require marinas to haul boats out of the water early, thus shortening the boating season and threatening the economic viability of marinas. Launch ramp users have more flexibility. If low water levels are a very localized problem for a given launch ramp, boaters may be able to shift to another ramp or launch at a marina. For more pervasive low water levels, launch ramp users may shift to other waters (e.g., Lake Champlain, Finger Lakes in New York, regulated St. Francis in Quebec). Private dock users in the short term would probably lose boating benefits, as their boats are associated with primary residences or second home properties, and they have less flexibility to seek alternative places to boat. In times of high or low waters, media reports often overstate the actual situation, or fail to give adequate coverage when water levels return to a generally safe range for boating. This situation keeps many boaters at home and adds to the negative economic impact estimate that would be obtained solely from estimating boater days lost when waters are at unsafe levels.

Most uncertainties in our estimates affect the magnitude of dollar amounts on damage curves, but not the seasonal patterns and general shapes. These issues may affect judgments of disproportionate loss, but are unlikely to affect plan rankings. Thus, any additional sensitivity analyses should focus on factors that change the seasonal pattern of the curves, e.g., the extent to which boaters would take more trips in late summer and fall if water levels were not a problem.

9. Sources.

Boudier, H. et J.F. Bibeault (2001). Enquête exploratoire auprès des opérateurs et gestionnaires de services nautiques pour les secteurs lac Saint-Louis et le tronçon fluvial Montréal-Contrecoeur, Groupe technique sur la plaisance et le tourisme pour la Commission mixte internationale, novembre.

Connelly, N. A., J. Bibeault, J. Brown, and T. L. Brown. Estimating the Economic Impact of Changing Water Levels on Lake Ontario and the St. Lawrence River for Recreational Boaters and Associated Businesses: Final Report of the Recreational Boating and Tourism Technical Work Group. In review.

Connelly, N. A., T. L. Brown, and D. L. Kay. 2004. Recreational boating expenditures in 2003 in New York State and their economic impacts. New York Sea Grant publication NYSGI-S-04-001. Stony Brook, NY.

Connelly, N. A., K. H. Guerro, and T. L. Brown. 2002. New York State inventory of Great Lakes' marinas and yacht clubs—2002. Cornell University, Human Dimensions Research Unit publication 12-4. Ithaca, NY.

Connelly, N. A., T. L. Brown and B. A. Knuth. 1998. New York statewide angler survey 1996, report 4: estimated angler effort and expenditures in New York counties. NYS Dept. of Environ. Conserv., Albany, NY. 62 pp.

Connelly, N. A. and T. L. Brown. 1988. The impact of tourism on employment in New York's coastal areas. Cornell University, Department of Natural Resources. Research and Extension Series No. 32. Ithaca, NY.

Connelly, N. A., T. L. Brown, and C. P. Dawson. 1990. Evaluating the impacts of proposed snagging regulations in the Salmon River. Human Dimensions Research Unit, Cornell Uniersity, Ithaca, NY.

DeKoninck, R. (1996). Les Cent-Îles du lac Saint-Pierre, Retour aux sources et nouveaux enjeux, Les Presses de l'Université Laval, 151 p.

Duchesne et al. (2004). *Suivi des usages et des perceptions du Saint-Laurent par la population riveraine, 2003*, Saint-Laurent Vision 2000, Domaine d'intervention santé humaine. H21-229/2004F.

Garde côtière du Canada (2001). *Statistiques sur les incidents de recherché et sauvetage 1999*, Ministère des Pêches et Océans canada, Région Laurentienne.

Gardner Pinfold Consulting (2003). *Lake Ontario and St. Lawrence River Water Levels Impact Study*, prepared for Recreational boating and Water related Tourism TWG, IJC, November.

Goss Gilroy Inc. (2003). *Economic impact analysis of recreational Boating in Canada: 2001,* Prepared for Discover Boating, August.

Lichtkoppler, F. R. and D. Kuehn. 2003. New York's Great Lakes charter fishing industry in 2002. Sea Grant Great Lakes Network Fact Sheet OHSU-TS-039.

McCullough Associates and Diane Mackie and Associates (2002). *Ontario Marina Impact Study*, research report, prepared for International Joint Commission Lake Ontario-ST. Lawrence River Study, 62 p. and appendix.

Ministère des Pêches et des Océans Canada (2004). *Étude sur la navigation de plaisance au Québec*, présentation, Direction des politiques et de l'économique, Région du Québec.

Noden, D. and T. Brown. 1975. The New York commercial marina and boatyard industry, 1972. New York Sea Grant publication NYSSGP-RS-75-020.

Parcs Canada (2004). *Lieu historique national du Canada du Canal-de-Lachine, Plan directeur*, Direction générale de Parcs Canada, 95p.

Thousand Islands International Tourism Council (2002). 2002 Summer Tourism Season Business Confidence Survey, Executive Report, Alexandria Bay, New York and Landowne, Ontario.

White, D. G. 1991. New York's Great Lakes marinas: a 1990 analysis and profile. New York Sea Grant publication, Oswego, NY.

Zins Beauchesne et Associés, 2002. Enquête auprès des opérateurs de marinas et Yacht Clubs, rapport final, Groupe de travail sur la plaisance et le tourisme de la Commission mixte internationale, pagination multiple et annexes.

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