Review of the Petitcodiac River Causeway And Fish Passage Issues

Prepared For:

Minister of Fisheries and Oceans Canada

Prepared By:

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TABLE OF CONTENTS

List of Major References

Appendices:

A: Terms of Reference
B: List of Stakeholders
C: List of Experts Interviewed
D: G.P.I. Atlantic
E: Potential Candidates for Conflict Resolution/Mediation Process

Attachments:

1. Letter Hon. Kim Jardine, Minister of Environment and Local Government
2. Village of Memramcook: Proposal
3. Lake Petitcodiac Preservation Association
4. Sentinelles Petitcodiac Riverkeeper
5. Conservation Council of New Brunswick
6. Alma Fishermans Association

Executive Summary

The Minister of Fisheries and Oceans Canada appointed me (Eugene Niles) Special Advisor in August 2000. The task was to conduct a review of all the issues and existing information, to consult all stakeholders and seek appropriate expert opinion on a course of action to restore fish passage in relation to the Petitcodiac causeway. This report takes the form of a 2 part document. Part A includes a summary of stakeholder consultations and a synthesis and evaluation of the available information, on issues, perspectives, and areas of consensus and divergence related to the Petitcodiac River Causeway and the Petitcodiac River watershed. Part B includes the identification of a range of options and a recommendation(s) to the Minister, as well as providing advice on the next steps, identification of information gaps, and suggestions on how to address these gaps.

PART A

The Petitcodiac causeway was constructed in 1968 and it became evident within a few months that fish passage was problematic. Although modifications were made to the gates and the fishway, fish passage has remained problematic.

An extensive review of the literature was undertaken some reports were lengthy and detailed while others were more specific and some would probably better be described as memos. At least 50 such reports were done in relation to the trial gate openings of 1998 and 1999. The lack of consensus on many issues shows that some issues are very complex and have never been the subject of thorough and extensive investigation and evaluation.

A great amount of time and effort was taken to identify appropriate and interested stakeholder groups and to consult with them at their convenience. A total of (31) were identified and the vast majority participated, only five did not request a meeting and all of these indicated their interest in reviewing the draft report. A number of interested and concerned individuals responded by phone and dialogue was held. Another (9) meetings were held with interested individuals. A total of (20) experts were identified and consulted. The (26) stakeholders that participated raised many issues and concerns and usually stated their preferences clearly. Fifteen (15) stakeholders support free tidal flow six of these will accept nothing less than full tidal exchange, which can only be accomplished with a partial bridge. Some (5) stakeholders prefer the status quo and (6) took no position preferring to await the results of this report.

As part of the consultation process, a progress report was provided to stakeholders in November and a draft report upon completion of the review. Twelve (12) stakeholders responded with comments and recommended changes. Most of these have been incorporated in the report.

The concerns raised by stakeholders are many and varied. A very concerted attempt was made to enunciate these concerns, which are outlined and identified in 8 pages of the report. The concerns range from a critique of the terms of reference, through problems related to existing infrastructure, erosion, siltation as well as financial, social

environmental and health related risks. All concerns raised by stakeholders are documented, even though not directly relate to fish passage. The concerns are so varied that no attempt will be made to summarize them in an executive summary.

PART B

Eight (8) possible options were identified, however only the following (5) were given serious consideration for the purpose of the report.

1. status quo
2. status quo plus (replacing the fishway)
3. Opening the gates only during peak migration.
4. opening the gates permanently
5. replacing part of the causeway with a bridge

The report discusses each of the options in regard to pros and cons (risks, consequences, and benefits) The options are presented in a step wise fashion. The status quo option was considered initially but for obvious reasons (it doesn't provide adequate fish passage) ruled out. However it remains important in that it must be assessed to establish base line data. Each of the (4) remaining options carries with it its own particular level of benefit for improving fish passage, as well as limitations and associated risks. These are outlined in the report.

The report concludes that, although there are (4) identified options that will provide for fish passage, it is evident that no one option will serve to satisfy all the stakeholders. Many of those who questioned limiting this review specifically to fish passage will be satisfied with nothing less than full tidal exchange that will eventually restore the river, restore fish population, restore the watershed, the tidal bore etc. Others are convinced of the absolute necessity of providing fish passage and although sympathetic to restoring the river they feel it should not be done at any cost. Others will not be satisfied with any option that places at risk the benefits that the status quo now provides. However, my recommendation, in line with the terms of reference, must and will be concerned with fish passage only.

Although some groups are more vocal than others in calling for an environmental assessment, all of the stakeholders consulted support the idea that such an assessment is the next logical step. And the overwhelming consensus is to get on with the process at the earliest possible time.

The EA/ EIA process is briefly addressed in this report and some principles for the type of EA/EIA process that would satisfy the stakeholders are outlined, as well as a brief overview of the guidelines and specific triggers that would require an EA/ EIA. Possible proponents for an EA/EIA are also identified.

My main recommendation centers around the proposal for a full environmental assessment process to be carried out in an expeditious manner on the most aggressive option, the construction of a partial bridge in the Petitcodiac River causeway. Keeping with the concept of proceeding in a step wise process and applying the precautionary

principle there are (4) sub recommendations that follow which if accepted should serve not to delay but allow the process to proceed in a planned orderly fashion to determine which of the 4 options would be most appropriate (considering environmental, social and economic factors) to provide adequate fish passage in relation to the Petitcodiac River Causeway.

After 5 months of intensive consultation, I conclude that there are a number of viable options for improving or restoring fish passage in the Petitcodiac River. While the report documents and considers all issues and concerns presented by stakeholders, my recommendations, to remain consistent with the Terms of Reference, will be limited to the fish passage issue. Of the options reviewed, four are considered viable with varying degrees of potential to improve or restore fish passage. All options have risks associated with them, all have cost implications and all have some benefits. Although the risks and costs of mitigating these risks have all been examined to some extent in the past, in my view these have not been investigated or evaluated sufficiently to determine whether the risks are acceptable or can be mitigated. Some options will, in addition to the costs of mitigating, incur significant construction costs. Although there have been some attempts to quantify the costs versus benefits for various scenarios in past studies, these in my view lack objectivity and are selective in nature. The difficulty appears to be the cost and benefit accounting of intangibles. (See recommendation #2 below)

RECOMMENDATIONS

Consistent with my conclusions that an Environmental Impact Assessment (EA/EIA) is the next logical step in determining the most appropriate option for the restoration of fish passage in the Petitcodiac River, the first requirement is to define a "Project" that will trigger the environmental assessment process. In this instance, the "Project" proposed is Option 5, the one encompassing the issues and concerns related to all the options being evaluated. The alternative of defining four separate projects, each requiring a separate assessment, is considered inappropriate in this instance.

The step-wise implementation approach recommended is also significantly different from the normal EA/EIA process. But this is a unique river with unique challenges calling for equally unique approaches. The process must begin with an assessment of all the options starting with Option 1 (Status Quo) to establish a base line and then moving progressively in a step-wise manner evaluating the other four remaining options.

1. I therefore recommend, that the Province of New Brunswick or the Government of Canada or both governments acting jointly proceed expeditiously with a full environmental assessment based on Option 5, the construction of a partial bridge in the Petitcodiac River Causeway.

2. That consideration be given to a review by GPI Atlantic, or by another similar agency to assist in defining and prioritizing the indicators and intangibles.

3. That provision is made to include stakeholder participation at the very beginning of and throughout the process. It is essential in my view, for stakeholders to be consulted fully in defining the scope of the assessment and the methodology of implementation of the environmental assessment. To ensure participation, funding to cover the cost of travel of stakeholders is considered necessary.

4. That the proponents proceed expeditiously and in a step-wise fashion, with the implementation of the Environmental Assessment process. It is recommended that dedicated resources be allocated to the project to ensure timely implementation. At the risk of offending those responsible for the design of the assessment process, the step-wise implementation process suggested is as follows:

   a) Evaluate and define the risks, cost and benefits of Option 1 to establish a base line.
   b) Evaluate and define the risks, cost and benefits of Option 2 and progressively evaluate other options in the same manner.

   Should the evaluation indicate the need to do experimental openings of the gates to model and verify the impact of tidal flow, these openings should be scheduled at a time most likely to enhance fish passage opportunity.

5. That a mediation or conflict resolution mechanism be in place very early in the process, even before the Terms of Reference are finalized, to assure stakeholders that the process will be fair, objective, open and impartial. To this end, stakeholders have suggested a number of highly qualified individuals for consideration for this task. Names are listed in Appendix F.

I am confident that this process, if it addresses all the issues and concerns identified in this report, will lead decision makers to the most viable option to restore fish passage in the Petitcodiac River.

A REVIEW OF THE PETITCODIAC RIVER CAUSEWAY AND FISH PASSAGE ISSUES

INTRODUCTION

The Minister of Fisheries and Oceans Canada appointed me Special Advisor in August 2000 to review and report on the issue of the Petitcodiac River Causeway and fish passage issues. The Terms of Reference, Appendix A, called for a review and analysis of all existing information on fish passage including environmental, social and economic issues. It further directed the Special Advisor to engage all stakeholders including pertinent municipal and aboriginal governments in a consultative and participative process and specifically to:

- Examine and consolidate, if required, existing fish passage, environmental, social and economic information as it pertains to the causeway and watershed;
- Examine the short and long term viability of all options considered;
- Provide a general range of costs for all options evaluated;
- Present this information to all stakeholders;
- Review with stakeholders the full range of issues, including future causeway options and implementation process options; and
- Report and make recommendations to the Minister of Fisheries and Oceans.

The assistance of Harry Doyle, since the beginning of the project, has been invaluable in keeping the project on schedule and in completing the review of hundreds of reports and studies and in the completion of the many consultation sessions. While I acknowledge his contribution and the generous contribution of all stakeholders and individuals consulted, I accept full responsibility for the content of this report. I have attempted to the best of my abilities to reflect accurately the relevant issues and concerns that have been raised by stakeholders and to formulate recommendations consistent with these.

BACKGROUND

A resolution of the Moncton City Council on 7 January, 1960 called on the Provincial Government to conduct a feasibility study for the construction of a causeway from the City across the Petitcodiac River. This study was conducted by Maritime Marshland Rehabilitation Administration and in its report dated 30 March 1961 considered three

sites, one being the current location of the causeway. Correspondence from the Federal Department of Fisheries dated 3 July 1961 advised of the requirement for a "fishway" in the structure.

At a meeting on 30 July 1963, with representatives from the City of Moncton Town Planning Commission, a representative from the south side of the Petitcodiac River, representatives from the Provincial Department of Health, Department of Public Works, the New Brunswick Water Authority and the Moncton City Engineer, a decision was made to propose a causeway at the western end of the city where the structure now stands.

In November 1963, the Maritime Marshland Rehabilitation Administration was authorized to proceed with the engineering design work. The Provincial Department of Public Works consulted with the Federal Department of Fisheries, Federal Department of Public Works, Federal Department of Transport, Federal Department of National Health and Welfare, the Federal Water Resources Branch, the Provincial Department of Health and the Provincial Department of Lands and Mines. The project was given approval under the Navigable Waters Protection Act on 3 June 1964.

Because of the perceived benefits to agriculture lands, Maritimes Marshland Rehabilitation Administration agreed to cost share construction in the amount of $800,000 out of an estimated total cost of $3,000,000. The Provincial Water Authority in giving their approval believed the resulting freshwater headpond would provide a source of water for industrial use as well as having the potential for recreational purposes.

Construction started on 8 February 1966 and was completed on 10 March 1968. Reports indicate that the gates remained open until 3 May 1968. (Butler, R.L. Memo to RDG, DFO 21 Jan.1969)

From 1969, fish passage through the causeway gates and fishway has been problematic and continues to be problematic to this day in spite of numerous changes in operational procedures and modification to the gates and fishway. A number of studies were carried out starting in 1979 and dozens of reports were written dealing with various aspects of the river and causeway, some starting well before a decision was made to build the causeway.

Reports became more numerous and more focused in the late 1980's after the newly elected provincial government opened the gates in 1988, 1989 and again in 1990. From 1992 to 1995, a number of reports continued to document the difficulty with fish passage and the services of engineering consultants were retained to suggest possible options.

In December 1996, a federal/provincial Memorandum of Understanding (MOU) was signed to proceed with a trial gate opening to collect information required in developing a long-term solution to the fish passage issue. However, for a number of reasons, the physical conditions required to conduct the trial could not be achieved, and after two consecutive attempts the project was terminated on 1 June 1999. A good deal of

information was obtained as a result of these experiments. Although there is currently no specific agreement in place, it should be noted that the Department of Fisheries and Oceans Canada (DFO) and the New Brunswick Department of Transportation (NBDOT) continue to work in cooperation to monitor and adjust the operation of the gates to facilitate fish passage as best they can under the circumstances.

DFO, along with the other signatories to the 1996 MOU, had agreed in principle early in 2000 to a new Public Participation Process (PPP) to help achieve consensus on a preferred option for the management of the Petitcodiac River Causeway. While the concept was agreed to in principle by the signatories, no firm implementation date was ever established

Meanwhile, NBDOT implemented the DFO approved interim adjustments to the usual gate operations (in effect until 1 April, 2001) in an attempt to improve fish passage. DFO is monitoring fish passage during these adjustments.

It should be noted as well that a number of stakeholders have been active since 1969 advocating opening the gates to permit fish passage while others have advocated for the maintenance of the headpond.

In August 2000, the Minister of Fisheries and Oceans Canada, the Hon. Herb Dhaliwal, announced his intention to have a thorough review of all issues and existing information and to consult all stakeholders in an attempt to build consensus within the community on the best course of action. This report documents the results of this review.

PART ONE

FINDINGS FROM STUDIES AND REPORTS (Review of the Literature)

Since the closure of the causeway gates in 1968, the passage of fish through the fishway has been problematic. The fishway, designed for Pacific salmon, has been inefficient at best for salmon and completely unsuitable for other species. Concerns were expressed as early as 1961 about the potential impact of a causeway on fish runs by biologists working on or familiar with the Petitcodiac River. The degree of difficulty however with fish passage only became clear in 1969.

In a report to his Regional Director General (RDG) dated 21 Jan 1969, R.L. Butler, biologist, reports that poor runs of fish into the Petitcodiac and tributaries were noted in 1968 and they were far below the previous year. He states, " There is no doubt that this structure (Causeway) will have a detrimental effect on the fishery of the area, commercial and sport". He also reports that the estuary was rapidly filling in with mud in the vicinity of Moncton and the river channel was getting narrower. He noted that mud flats were developing down to Stoney Creek and as a result had already changed the driftnet fishery.

Other reports in 1969, 1970 and 1971 also detail fish passage problems and some proposals were made to modify gate operations to facilitate fish passage. In these reports, the emphasis is on salmon rather than other indigenous species. A report dated 1975 notes that from mid-September to mid-December 1969 to 1972, a total of 140, 345, 895 and 468 adult salmon were counted through the fishway compared to an estimated run of between 2-3000 prior to1968. The same document reports that the Causeway was considered to have virtually eliminated shad, sea-run brook trout, and striped bass from the system. Only 19 shad were counted at the fishway in 1972.

Similar reports are found dated in 1976 and 1977. During the same period, a number of operational problems were reported with the causeway and gates. These were summarized as follows:

- Erosion along the banks of the reservoir
- Inability to maintain stable reservoir levels during the summer
- Siltation of the reservoir upstream of the causeway as well as downstream of the causeway construction
- Unsatisfactory fishway operation
- Ice jamming at the causeway end of the reservoir
- A number of lesser mechanical problems primarily concerned with gate operation and maintenance.

In 1978, the NBDOT commissioned an engineering and consulting firm, ADI Limited to carry out a study related to the problems identified. Their Report, completed in December 1979, considered three alternative proposals for operation of the causeway:

- Operation as is or "status quo"
- Operation without gates
- Eliminate gate leakage and modify operation.

The first alternative, although low cost, was not considered a practical option by the consultant. It would continue to allow large volumes of silt to enter the reservoir and would not improve the control over the water levels in the reservoir.

The second alternative, removal of the gates, was predicted to cause massive erosion of the river downstream and massive siltation of the headpond. Velocities of flow through the open gates might prove too high for fish passage. Protection of agricultural land upstream of the causeway would be required at an estimated cost of between $650,000 - $950,000.

A third alternative was considered by the Consultant to be a good compromise for all parties. It required modification of the gates to seal against leakage in both directions, some further modification to the fishway to reduce salt water and silt entering into the headpond and modifying the operation of the gates to better attract fish to the fishway. Total cost of this alternative was estimated at $762,500.

DFO and the NB Department of Natural Resources (DNR) favoured the removal of the gates to permit free flow, and even the removal of a portion of the Causeway, if necessary, to return the river to its former tidal flow condition. The NB Government however, decided in the spring of 1980 to proceed with the third alternative as recommended by the Consultant.

These changes did improve fish passage but only marginally except for the year 1983, when an estimated run of 1912 salmon occurred at the causeway. This was attributed to two factors. The stocking of approximately 91,000 hatchery reared fall fingerlings in 1980 and the headpond draw down for construction of a water main across the headpond in 1982 from February to September.

Various reports detail continuing difficulties with fish passage and the continued request by various stakeholders to open the gates to free flow to improve fish passage.

In 1988, a newly elected Provincial government decided to open the gates and allow free tidal flow to help fish migration during the period 15 April to 7 June. Free tidal flow was re-established from 26 September to 31 October. The gates were re-opened in 1989 during the period 3 May to 15 June, and again in 1990 during the period 15 May to 15 June, but only during low tide to prevent the real and perceived siltation of the headpond as was experienced in 1988.

Reports indicate significant improvements in the shad fishery in 1988 but reported landings returned to pre 1988 landings in 1989. Anecdotal evidence indicates a small increase in the sea-run brook trout fishery but there is no evidence that the salmon fishery improved.

In 1991, DFO once again reiterated that in order to maximize anadromous fish production, free flow of the river must be allowed annually during the periods 1 April to 15 December.

In May 1991, a report entitled, " Options for the Future of the Petitcodiac River Dam and Causeway", was prepared by a Provincial Government Inter-Departmental Committee. It defined a series of options for the future of the Petitcodiac River dam and causeway. These options were:

1 Gates operated to maintain headpond and minimize tidal exchange, i.e. "The Status Quo"
2 Operate gates to help fish passage
3 New fishway design
4 Fish trap & transport
5(a) One gate open
5(b) Five Gates Open
6 Replace Causeway with Bridge
7 Separate the River from the headpond

The Provincial Government (NBDOT) commissioned ADI Limited to conduct a study of options and issues identified by the Inter-Departmental Committee. The results of this study were published in a Report dated May 1992. The Consultant concluded that none of the options considered have quantifiable benefits that are greater than the costs associated with the option. The Report states: "Therefore, there is no option than can be recommended on a benefit/cost basis. Only Options # 1 (Status Quo) and 5(b) (Five Gates Open) are found to merit further consideration by Provincial decision-makers. Option #1 will maintain the headpond year-round and protect agricultural land, but will not produce significantly improved fish passage. Option 5(b) will result in significantly improved fish passage and tourism opportunities, but the headpond will be eliminated and agricultural land will be flooded by tidal water".

The Consultant, ADI, further concludes and the report states: " It must be recognized that while the concepts of Options #1 and 5(b) are relatively simple, the impacts of choosing one over the other are extremely complex. The consultants believe that while Benefit/Cost Analysis is a useful technique to aid in decision-making, it is inadequate for choosing between Options #1 and 5b. Many of the impacts of actions taken under these options are difficult to quantify on an economic basis. However, it is recognized that there would be "winners" (those individuals impacted positively) and "losers" (those impacted negatively) under each option. A cursory assessment of the number of people affected by the two options indicates that the number of individuals positively impacted would be far greater under Option 5b (Five Gates Open). The effect of the intangible impacts associated with this decision can be better evaluated through a more appropriate analytical technique, such as Conflict Analysis".

A review of file information and discussions with various government officials reveals a great deal of disagreement with the findings of this report. Some are of the opinion that the assumptions are wrong and the calculations incorrect. These views were not universal which may explain why no action appears to have been taken as a result of this study.

Note: During the course of the current review, it was discovered, at the suggestion of the NB Conservation Council and the Workgroup of the Premier's Round Table, that a more appropriate method of doing cost/benefit analysis of intangibles was now available and currently being used in other jurisdictions. This concept, presented by GPI Atlantic, will be discussed further in the concluding part of this report.

From 1992 until 1995, a number of reports continue to document the difficulty with fish passage and in 1995, DFO again supported the opening of at least one gate from 1 April to 15 December each year to allow free flow which would make some provision for fish passage.

In 1994, Dr. Alyre Chiasson had published a short paper entitled "A Flow Control Model for the Petitcodiac Gates". In effect, this proposal was an alternative to the two options recommended in the 1992 ADI Study. In 1995, the Environment Sciences Research Centre of the Université de Moncton, at the instigation of the Premier's Roundtable on the Environment and the Economy and with funding provided by the Environmental

Trust Fund commissioned ADI Limited to undertake a study of a concept to partially restore the natural ecosystem of the Petitcodiac River. The concept called for:

> "From May to December, open the gates to allow tidal water to flow upstream, past the control structure. However, operate the gates to control or « clip » the tides such that agricultural land located upstream from the causeway is not flooded with tidal water. Also, operate the gates on the falling tide to control the outflow of water through the gates, such that the effects of erosion are reduced. From December to May, leave the gates closed to avoid ice damage, operating them only as necessary for maintenance or water flow considerations".

The Consultant published the findings in a report entitled " Technical Evaluation and Monitoring Program for an Option to Operate the Gates to clip the Tides at the Petitcodiac River Causeway" on 16 February 1996. Three different approaches were evaluated:

- Open one or more gates (partially or fully) and leave them in that position over a tidal cycle, thereby stifling the tide. This approach was determined to be impractical.

- Open one or more gates fully, but close them when a certain water level upstream of the causeway has been reached, thereby clipping the tide. This approach was determined to be technically feasible.

- A combination of the two above approaches, with one or more gates partially or fully open during rising tides to stifle tidal inflow, but increasing the gate opening during falling tides by raising one or more gates. This differs from the previous approach in that the gates would never have to be closed. This approach was also determined to be technically feasible.

In addition, three scenarios were proposed to control the upstream tidal flow:

- Scenario 1, maintaining a maximum water level of 2.5m upstream of the gates resulting in a very small headpond volume with a relatively narrow channel.

- Scenario 2, maintaining a maximum water level of 4.0m upstream of the gates resulting in a medium headpond volume with a medium wide channel.

- Scenario 3, maintaining a maximum water level of 5.5m upstream of the gates, resulting in an initially large headpond volume with a wide channel.

A Memorandum of Understanding (MOU) between the Federal Government and the New Brunswick Government dated 5 December, 1995 provided for an agreement between the federal agencies and provincial agencies on the implementation, monitoring and evaluation of a trial gate opening exercise. The exercise would consist of the second alternative, that is, leaving one or more gates fully open, closing them to clip the tide to

maintain a maximum water level of 2.5 metres upstream of the gates. File information reveals however, concerns and misgivings with the limited conditions imposed.

The trial openings were scheduled for the spring of 1998. In preparation for the exercise, a number of activities were carried out during 1996 and 1997. A number of reviews and studies were done and erosion protection measures were also implemented. Reports indicate that a number of stakeholders were of the opinion that a "Comprehensive Study" as defined in the Canadian Environmental Assessment Act was required before implementing any trial openings. One stakeholder, The Lake Petitcodiac Preservation Association, took Court action to prevent the trials from proceeding without a full Environmental Assessment. The hearing was held in April 1998, and the Judge asked that the intervenors negotiate a solution or compromise.

In a spirit of cooperation during the judges examination, the federal government agencies, DFO and Environment Canada (EC), voluntarily undertook a "Screening Assessment" as defined in the Act. Again this was challenged in the Courts. The ruling of the Courts was: "a stay or injunction pending the hearing of the applicant's application for judicial review". Since no such application was made, the trials got underway but much later than anticipated and well beyond the high discharge time of the river. Reference is also made in reports to a large mud plug above the causeway that was proving difficult to dislodge. Trial conditions were not met and the experiment was ended on 18 June 1998.

The same experiment was initiated again in 1999 with pre-trial flushing starting on 8 April. But once again the trial conditions could not be maintained because of low fresh water discharge and continued difficulty with dislodging a large mud plug above the causeway. As a result, the experiment was concluded on 1 June 1999. It is important to note that the Provincial Minister of the Environment of the day, stated that further experiments would not be carried out without a full Environmental Impact Assessment.

A post trial report entitled "A Review of the 1998 and 1999 Petitcodiac River Causeway Gate Experiments" dated 7 March, 2000 indicates that the assumptions and the parameters imposed for the experiments were incorrect and lacked the necessary flexibility to assure completion of the trials. Specifically, maintaining the headpond water level at a 2.5m elevation could not be achieved. The report further suggests that, increasing the headpond water elevation to 3.5m would have resulted in trial conditions being met in both 1998 and 1999. The Report concluded that maximum headpond elevation should not be the primary constraint defining any future experiments.

It should be noted that more than 50 of the reports reviewed were all prepared in conjunction with the Trial Gate Experiments or post experiments. This provides a wealth of information for any future experiments that may be undertaken. I can also conclude after having reviewed these reports and many more pieces of correspondence related to the trials, that coordination and cooperation between various players and agencies was less than ideal. Lessons learned from the 1998 experiments do not appear to have been applied in 1999. Specifically, there is no information indicating why the maximum water level was not changed or if any attempts were made to deal with the mud plug before the

1999 exercise. More open communication and better sharing of information with all stakeholders and decision-makers might have produced different results. It should be noted however, that at the working level, there is evidently a close working relationship between various agencies in trying to manage gate openings to enhance fish passage opportunities. File reports and other documents reveal this has been an ongoing practice since the construction of the causeway. A commercial eel fisherman interviewed commended those responsible for operation of the gates during the past year and credited this for the success of his fishery.

Other scientific reports reviewed and worthy of highlighting tell us the following:

- In spite of salmon restocking to the tune of 2.7 million fish between 1980 and 1995, the genetically distinct Inner Bay of Fundy salmon has now been completely eliminated in the Petitcodiac River. It is generally believed that, although the causeway was not the determinant factor, it was certainly a contributing factor. It should also be noted that this restocking was just part of a greater restocking effort throughout the Bay of Fundy region.

- Some Scientists and Environmentalists are of the opinion that, opening the gates to free tidal flow or better still opening the causeway to full tidal exchange, would remove much of the accumulated sediment below the causeway with the river returning from 50% to as much as 90% of its former width below the causeway. However, there is no consensus on this point because of the difficulty in modeling this macro-tidal system.

- Others are of the opinion that some modeling is feasible, but it should be done in a step-wise progression and must include some form of physical experiments.

- A number of Scientists are of the opinion that opening the gates to free tidal flow will result in the rapid accumulation of sediment in the headpond and the formation of salt marshes within 2-3 years. There is a great deal of disagreement on this point as well. While some are of the former view, others believe that sediment accumulation would be marginal.

- Some Scientists and Environmentalists believe that siltation of the headpond and the creation of salt marshes and the restoration of the estuary would be a positive thing. They point out that there are only a handful of macro-tidal estuaries in the world and every effort should be made to restore the Petitcodiac Estuary.

- Some Scientists predict that, opening the gates will result in improvements in the runs of non-extirpated anadromous fish species in the river. It is also believed that it may be possible to re-establish extirpated species such as the dwarf wedge mussel, that is now extinct, from other populations.

- A number of Scientists are of the opinion that, maintaining the gates closed will result in the extirpation of other anadromous fish species and over time, the headpond will

fill in and become a fresh water marsh. They also predict that sediment will continue to accumulate below the causeway and well down the River into Shepody Bay and the Bay of Fundy.

- Some scientists however, are of the opinion that some dams/causeways should never be removed, that attempts at removal could cause further damage to an already damaged ecosystem.

- Other Scientists are of the view that, whenever the removal of an obstruction is contemplated, the "Precautionary Principle" must be applied. If there is doubt about the effects of doing something, then you don't do it until the doubt is clarified. (Wells, Peter. presentation at Tidal Barriers in the Inner Bay of Fundy Workshop, pg 34 and Dayborn, Graham. presentation at Tidal Barriers in the Inner Bay of Fundy Workshop, pg 34)

- It must be made clear that this definition of the "Precautionary Principle" differs significantly from the definition adopted at the Rio Declaration on Environment and Development which states: " Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation". In this report, whenever the suggestion is made that the "Precautionary Principle" should apply, the former is intended.

- Others caution that any such attempts must be made cautiously and only after appropriate studies, followed by long term monitoring.

The lack of consensus within the scientific community on many issues clearly shows that some issues are complex and many have never been the subjects of thorough or extensive investigation and evaluation.

The Consultation Process

In early September 2000, a total of 31 letters of invitation to dialogue, along with a copy of the Draft Terms of Reference were sent to identified stakeholders. Included in the list are the two levels of Government, 10 local municipalities, one local service district and one aboriginal government. Invitations were also sent to 17 local groups and associations who had been identified as having an interest in the project. Follow up contact by telephone was made to those who did not respond within the first two weeks.

A total of 26 responded and all were consulted, in some cases on two or more occasions. The remainder did not respond or declined to meet. However during the "draft report" to stakeholders phase they indicated that they wished to be kept informed and wished to review the draft report. A copy of the draft report was provided to each.

A general invitation was also issued through various media that the Special Advisor was prepared to meet with any interested individuals. In all, 9 responded and were subsequently consulted.

More than 20 Scientists, Government officials, Consultants, Experts, and Specialists were consulted on various issues and subjects and in some cases on more than one occasion.

With few exceptions, meetings with stakeholders and individuals were held at a location and a time of their choosing. Meetings were very cordial and information was shared freely. Some stakeholder groups shared their libraries and resources with the Special Advisor and a number submitted written documentation. Some stakeholders have continued to dialogue with the office on a regular basis providing information that they feel is important to the project.

Fifteen (15) of the (26) stakeholders responding, prefer and support the establishment of full tidal exchange or free tidal flow in the river and the estuary. Of these fifteen stakeholders, at least six have expressed the view that only full tidal exchange is acceptable. According to experts, this can only be accomplished by breaching the causeway and providing a partial bridge of sufficient length to permit full tidal flow. The minimum length suggested is not precise but appears to be in the range of 250 to 275 metres. The rest, nine of this group of fifteen stakeholders, are of the view that opening or removing all or some of the gates to create an opening of limited free tidal flow through which fish can pass freely would be an acceptable solution. According to experts consulted, opening the five gates will achieve only between 50 to 60 percent of full tidal exchange. This fact may not be fully understood by stakeholders.

Five (5) of the (26) stakeholders responding, prefer and support maintaining the status quo or at most replacing the current fishway to improve fish passage. Their preference is to maintain the gates closed except to control flooding, maintaining the level of the headpond, ice control and maintenance of the gates.

Six (6) of the (26) stakeholders responding, have taken no position on the issue preferring to wait for the results of this review.

It should be noted that one of the stakeholders who believes that full tidal exchange must be introduced is Chief Knockwood of the Fort Folly Band. He relates vividly and passionately the impact the causeway has had on his people and their traditional way of life. First, they lost the salmon fishery, then the shad and sturgeon and finally they lost the ability to navigate the river because of the heavy silt accumulation. Eventually, the Band decided to relocate to an inland location.

It must be clarified that, some stakeholders represent hundreds of individuals while others may represent less than 10. In this report, no attempt to assign a "weight" to any given stakeholder has been made.

Stakeholders were provided with a progress report about mid way through the review process and a draft report upon completion of the review. Twelve (12) of the stakeholders responded with comments and suggested changes. Most of the recommended changes have been incorporated in the final draft. Additional comments from stakeholders are included as "Attachments" for information purposes.

Issues and Concerns Raised by Stakeholders

It should be noted that some of the issues and concerns raised by the stakeholders, after sufficient investigation and analysis, might prove to be more perceived than real. The author has attempted to capture the concerns conveyed, independently of their merit.

The **issues** raised by stakeholders are numerous. Most can be grouped under one of the following headings: environmental, social, economic or health related.

- Four stakeholders consider the Terms of Reference for this review to be too restrictive or not sufficiently precise. Three have recommended that the terms be expanded to include the river, the estuary, and fish habitat-restoration as well as fish population restoration. The other stakeholder felt that the terms were simply not precise enough.

- A number have expressed the view that there is an urgent need to restore a world unique but badly damaged macro-tidal estuary. They point out that there are only a handful of such estuaries in the world and every effort must be made to take corrective action before the damage becomes irreversible. This view is confirmed by some scientists who are of the opinion that some of the damage is already irreversible.

- The counter argument, presented by other stakeholders, is that a new ecosystem has been established above the causeway with new species of fish and other wildlife such as bald eagles, osprey, and loons. Any effort to restore fish passage by destroying the headpond would endanger at least some of this wildlife.

- A number of stakeholders point to the need to restore on an urgent basis the genetically distinct Inner-Bay of Fundy salmon. They point to the fact there are only a few hundred remaining in captivity as breeding stock. Unless free tidal flow is re-established in the river as a minimum, restocking would be futile, as the experience of the past 20 years has shown. The argument is also made that one should not wait until there is evidence of salmon return before adequately providing for fish passage.

- The counter argument is that the benefit of any effort to restore the Atlantic salmon in the Petitcodiac River at a time when the stock is in continued decline throughout the Atlantic region is questionable. Until there is some evidence that salmon is likely to return, the benefit of maintaining and protecting existing species is far greater. Stakeholders point out that there remains a commercial eel fishery in the headpond that appears to be thriving. The latter was confirmed and two commercial eel

fishermen reported improved catches during the past two years largely attributed to changes in gate operation.

- Some point out that two existing species currently found in the Petitcodiac River system above the causeway, Small Mouth Bass and Pickerel, have been introduced illegally and may over time cause irreparable damage to native species. Some believe they already have. This is a major concern to marine biologists and some stakeholders. They advocate eliminating these as soon as possible.

- Others argue that there is a need to protect and restore other fish species that depend on the Petitcodiac River as a feeding ground and/or for reproduction. Rainbow smelts and Gaspereaux are still seen in the river and headpond but in declining numbers. American shad, Sea-run brook trout and Striped bass are no longer evident in the river and are considered to no longer exist in the present environment. Scientists point out that these fish stocks can be re-introduced from other stocks and with a high probability of success providing the environment is welcoming.

- The counter argument is made that the benefit of maintaining or restoring fish species that have little or no commercial value compared to recently introduced species that are thriving and providing economic spin off from the recreational fishery deserves careful analysis. It is pointed out that there are only a handful of commercial fishers in the Shad fishery and none in the Gaspereaux fishery while there are many hundreds now enjoying Bass tournaments with significant economic spin off.

- Some stakeholders point out that opening or removing the gates will result in the restoration of the Tidal Bore to its former impressive dimension and that would bring in more tourists and economic benefits. Others point out that the Tidal Bore still exists but further down the River. Some are of the opinion that only the introduction of full tidal exchange facilitated by a partial bridge will restore the Tidal Bore.

  Scientists are not certain what effects any of the above will have on the Bore. While they are quite certain that the Causeway caused sediment accumulation and in turn reduced the size of the Bore, they are less certain of the probable impact of reintroducing free tidal flow or full tidal exchange. They point to the fact there are many factors involved that makes prediction difficult. The effects of climate changes which in turn impact the tides and the amount of sediment in the water, the amount of snow and rainfall which in turn impacts the flushing action on accumulated sediment is very difficult to predict. The point is also made that it is not possible to determine what the Tidal Bore would look like today even if the causeway had never been built.

- The counter argument to the Bore issue is that the potential economic benefit of the headpond (lake) is now just starting to be realized and this will far surpass any potential increase generated by a restored Bore. Recreational activities on the lake now include a marina, sea cadet sailing school, recreational sailing, sea plane moorings, fishing tournaments, the possible reintroduction of a tour boat operation and a planned international speed boat regatta. Winter recreational use of the lake is

also on the increase and the lake has become a major thoroughfare for snowmobiles and all terrain vehicles. All would be lost with the opening or removal of the gates.

- Another argument made is that, restoring the river to full tidal exchange will result in the flushing of accumulated sediment in the river and this will permit and encourage recreational sailing, rafting and a tour boat operation down river as well as recreational and commercial fishing downstream from the causeway. Anecdotal evidence indicates increased commercial fishing activities and landings when the gates were open in 1988, 1989, 1998 and 1999. This information could not be confirmed by a review of available records.

- A number of stakeholder groups representing hundreds of property owners point to the dramatic building activities on both sides of the lake which generates a significant economic benefit to all stakeholders and other taxpayers in the province. Building activities create employment and the corresponding property taxes contribute to the well being of all.

- The counter argument made by others is that while the latter may be true, property owners and residents down river in places like Memramcook, from Dover to Beaumont have also seen their property value impacted, but in this case negatively because of the sediment accumulation on their river front. Beaches used to exist with many summer homes being occupied. This has decreased with the disappearance of the beaches and river fronts that could be used for recreational purposes.

- Many stakeholders on both sides of the issue are of the opinion that there has never been a full cost benefit analysis of these many issues. Past studies have indicated the difficulty of doing benefit and cost analysis of many of the factors that are intangible. While this may have been true during the studies of 1979, 1992 and 1996, new analytical techniques have evolved in recent years that might be helpful in this instance. GPI Atlantic for example, a non-profit research institute, has established a method of doing full value accounting of social assets that are generally ignored in conventional economic accounting procedures. This will be further discussed in the concluding part of the report.

The **concerns** raised by stakeholders are also numerous. The following are the most evident:

- Sewage Treatment

  -Sewage treatment for the tri-community of Moncton, Riverview, and Dieppe is accomplished by a relatively new modern, chemically assisted primary treatment facility. Provisions were made in the original design of the Sewage Treatment Plant to incorporate more advanced processes as development of the system continues. On a daily basis, it discharges about 18 million gallons of sewage into the Petitcodiac

River. During heavy rain events, when the capacity of the plant is exceeded, untreated sewage is discharged directly into the river.

The concern of residents is that the opening or removal of the gates will permit this primary treated sewage effluent to be carried by the incoming tides into what is now the headpond and the deposit of unknown material into the riverbed and flats could pose a potential health hazard.

Reports and studies do not indicate any evaluation of this issue in the past except during the Screening Assessment prior to the trial openings of 1998 and 1999. The Screening Assessment Report of May 19, 1998 concluded that fecal coliform material found in the Petitcodiac tidal water does not pose a major threat and there were no anticipated environmental concerns with tidal water moving into the headpond area. Significantly however, the Report goes on to say, " The limited time frame of the experiment does not warrant the expenditure of capital resources toward the installation of disinfection processes at the treatment plant. This would probably be a consideration in a long term river restoration plan".

Stakeholders believe the sewage discharged in the river poses a health risk to both, the residents upstream and downstream of the causeway. The Greater Moncton Sewage Commission (GMSC) advises that their present Certificate of Approval to operate does not contain provisions for disinfection. The Commission is currently investigating operational and process additions to address this matter as part of its long term strategies. In the absence of any scientific evidence to the contrary, one must accept that a risk has been identified and it must be investigated, evaluated, and if necessary, mitigated. This applies to all options including the Status Quo option.

Additional concerns have been expressed that introducing free tidal flow or full tidal exchange could result in damage to the collector sewers with potential public health consequences. Since Scientists cannot predict with any accuracy the potential path of the river should the causeway be opened or altered, stakeholders believe the "Precautionary Principle" should apply.

- Water Supply

-Some stakeholders have raised concerns about the major water supply for the greater Moncton area. Two major supply lines traverse the Petitcodiac River, one under the headpond and the other in the causeway structure. They believe that major modifications to the causeway, such as a partial bridge, will require expensive relocation of this crucial water supply line.

- Infrastructure

-Some stakeholders are also concerned that opening the gates will result in serious erosion that could impact on infrastructure systems particularly water lines and

sewage lines that are buried close to the edge of the river. Some experts consulted do not believe erosion caused by any of the options would impact infrastructure systems.

- Mosquitoes

-Stakeholders residing along the headpond express concern that the introduction of full tidal exchange or free tidal flow will create a salt marsh, ideal for mosquito breeding. The belief is that a fresh water headpond does not present the same health concerns. Some experts consulted are of the opinion that salt marshes are no greater health risk than bodies of fresh water and that although mosquitoes breed in salt water marsh at a different time than in bodies of fresh water, the risk is about the same.

- Abandoned Landfill Sites

-A major concern raised by stakeholders on both sides of the issue relates to the abandoned landfill sites. There are two historical sites, and a much larger more recent landfill that ceased operation in 1992. One of the historical landfills is located in downtown Moncton along Assumption Blvd, on the riverbed and marshland. During recent years, erosion from the changing path of the river has, from time to time, exposed part of this landfill. The second, located east of the Gunningsville Bridge, is located on former farmland. Reports and studies do not provide any evidence that the content of these long abandoned landfill sites is likely to pose a health risk.

The most recent and largest landfill, east of the causeway, however is another matter. A significant portion of the landfill, which closed in 1992, is located on sediment deposited after the opening of the causeway. A number of stakeholders believe that introducing free tidal flow through open causeway gates or full tidal exchange by replacing a portion of the causeway by a partial bridge could result in erosion of some of this accumulated sediment and impact the landfill. Most experts consulted are of the opinion that impact is not likely when gates are open, based on the experience of past gate openings in 1982, 1988, 1989, 1990 and again in 1998 and 1999. They also point out that gates are regularly opened during or after major rain events and opened for long periods during the spring freshets. The same experts are not so certain of the impact should a partial bridge be constructed in closer proximity to the landfill.

Of greater concern is the content of this landfill. Reports indicate the landfill was opened to all and there were no controls to limit what could be disposed of at this site. Anecdotal evidence indicates that an unknown quantity of potentially toxic material was certainly deposited over the 20 years of operation. In 1994, a five-year clean up plan was undertaken as part of the decommissioning process at a cost of about $2.5 million.

In spite of these efforts, tests have revealed traces of PCB and other heavy metals in the leachate. Records show however, that monitoring is done regularly and routinely to characterize this leachate, by the City of Moncton and the Provincial Department of the Environment and Local Government (NBDLG). They advise that leachate

levels are considered to be within acceptable levels. It should be noted however, that recent reports of potentially toxic leachate in the river near the Gunningsville bridge are currently being investigated by Environment Canada.

Some stakeholders are of the view however, that no leachate of toxic material is acceptable and that action must be taken to properly seal the landfill to prevent any leachate transport into the river if full tidal exchange is eventually introduced.

Experts consulted have expressed the view that former landfills pose a greater risk in the longer term of 25 to 50 years. Some toxic material may be buried in closed containers that will not deteriorate for many years. Long term monitoring is therefore essential.

There are two main concerns raised by some stakeholders related to potential leachate from the landfill or possible erosion to the point where material is washed away. First, the concern is that some toxic waste could be carried by the tide into the headpond and be deposited where it may remain for long periods and pose a potential health risk to area citizens.

The second concern is that some toxic leachate could be carried with the outgoing tide to lucrative lobster and scallop fishing grounds in Shepody Bay and the Bay of Fundy. Any toxic material ingested by these species could have disastrous consequences in the marketplace.

A number of stakeholders believe the evidence shows there is some degree of risk involved that has not been fully investigated, evaluated, or mitigated. Again, the "Precautionary Principle" must apply.

- Tidal Sediment

-A number of stakeholders express major concerns that introducing free tidal flow through open causeway gates will flush vast amounts of accumulated sediment down the river into Shepody Bay and the Bay of Fundy. Introducing full tidal exchange by replacing the gates with a partial bridge will flush even more accumulated sediment down stream. The degree of sediment movement and the impact on a sensitive shore bird reserve and habitat like Mary's Point is unknown. Lobster and scallop fishermen in the area also express the view that any massive sediment deposit on sensitive nurturing and feeding grounds could have serious impact on this very important fishery.

Communities supported by the fishing industry are concerned that tourism is also at risk should the fishing industry be impacted. They feel that tourism and the fishery are directly linked. People come to the community to buy lobsters and scallops and stay to watch the boats come and go.

Biologists confirm that lobster landings in Shepody Bay and the Bay of Fundy have increased dramatically in recent years but the reasons for this are not clear. Fishermen confirm that, in recent years, they are fishing in areas near the mouth of the Petitcodiac that were previously not suitable because of the heavy silt. They also relate that this area has now become a nurturing and feeding ground for juvenile lobster. Biologists also relate that small lobsters do not migrate long distances but they cannot predict with any certainty what possible impact increased sediment deposits would have on these juvenile lobsters.

Many fishers believe that sediment deposits in the Petitcodiac has resulted in cleaner fishing bottoms and this is one of the reasons for increased lobster landings. Others attribute the change in the condition of bottoms in fishing areas to the Ground Hog Day storm of 1976.

Some scientists and other stakeholders argue that there is not likely to be any significant negative impact caused by sediment deposit on lobster and scallop fishing grounds. They point out that the causeway gates are opened regularly and for extended periods during spring freshets or major rain events such as the one of September 1999. Any negative impact as a result of rapid or heavy sediment deposits would have been noticed over the years and any impact on landings would have been noticed as well.

Fishermen in the Memramcook area at Pré d`en Haut complain that sediment accumulation in the river down to Beaumont and beyond has impacted their commercial fishery. Shad used to be plentiful but since the construction of the causeway, landings have declined to almost nil and they have to travel much further down river to find sufficient depth of water to lay their nets. They are of the opinion that opening the gates would begin the flushing of accumulated sediment and return their fishing grounds to previous conditions and bring back the Shad. They cite the examples of improvements in the shad fishery during previous gate openings.

Scientists monitoring the sensitive shore bird sanctuaries confirm they have not seen any significant changes of sediment deposits over the years but that some changes do occur and are to be expected as normal occurrences. They do caution however, that any proposed modification to the causeway or to its operation must be carried out carefully and only after appropriate studies are done. They stress the importance of long term monitoring.

During the course of this review, many documents were found dealing with sedimentation in the Petitcodiac but all deal with the immediate area of the causeway, the gates, and the headpond. There has been little effort expended to evaluate the potential sediment behaviour or impact on the fishing grounds down the Petitcodiac River and in Shepody Bay or the Bay of Fundy. This is not surprising given the belief by many scientists that any sediment dislodged or flushed from the Petitcodiac River would quickly be dispersed by the large tides and the large volume of water in the Bays. To a number of stakeholders however, this presents a risk that has not been

sufficiently investigated, evaluated, or mitigated. The "Precautionary Principle" must therefore apply.

- Emergency Water Supply

  -The Fire Chief for the Town of Riverview has raised a concern about the possible loss of a good source of a back up supply of water, should the headpond disappear. During times of drought as has been experienced during recent years, a backup supply of readily available water such as is now provided by the headpond enhances fire-fighting capability for all surrounding communities. The Fire Chief also explains that his Department uses the lake to test fire fighting and rescue apparatus and for training purposes.

  Additionally, this is the only large body of fresh water in the area from which amphibious aircraft can scoop water to water bomb large forest fires.

Consultation with Interested Citizens

A number of interested citizens contacted the office with specific concerns while stakeholder groups referred others. The issues and concerns raised mirror those raised by stakeholder groups. They range from concerns over the state of the river, the diminished tidal bore, the loss of recreational fishery, erosion of a local water front park and pollution. A tour-boat operator expressed his concern and frustration over uncertainty that makes it difficult to plan the future of his business. Two commercial eel fishermen also wanted to enlighten the Special Advisor about the state of the fishery in the headpond. One fisherman gave a good account of the different species he was finding in his traps and commended DFO people and the gate operator for their efforts in gate management during the past year.

Consultation with Scientists, Experts and other Consultants

More than twenty scientists, experts, consultants, and government officials were consulted, some on two or more occasions. The purpose of these consultations was to clarify information contained in their studies or reports or to seek their advice and expertise on specific issues. Some comments previously included in stakeholder consultation can be attributed to information received from experts consulted. Without exception, all were generous of their time and shared openly and freely their expert opinion on many issues. They were extremely patient in their explanation and interpretation of complex issues to make them understandable to lay persons like the Special Advisor and his Assistant.

We were most impressed with the level of interest in this project and the level of experience and knowledge each had about certain aspects of the Petitcodiac River and the causeway. While all were willing to suggest likely outcomes to the various scenarios presented and the likely impact of various options, the consensus was that there remains many unknowns or information gaps about this unique and in many ways, unpredictable

river. This no doubt explains the often-found divergence of views on the same issues and the different interpretation of data from past studies.

While many were willing to hypothesize on various issues raised, almost all pointed out that these can only be used as a starting point and whether concerns are borne out would have to be verified by experiments. Many also agreed and supported the Precautionary Principle, "If there are doubts about the effects of doing something, then you don't do it until you can clarify the doubts or you do it cautiously, with necessary mitigation and control mechanisms". Most therefore, supported the need to do experiments as part of modeling exercises along the lines of the experiments attempted in 1998 and 1999. Most also recommend a step-wise approach. You do something, then monitor and evaluate, correct and mitigate if necessary before moving on to the next step. Many suggest that even with experiments, long term monitoring will be required because some effects or impacts only become evident in the long term.

Other scientific observations or opinions provided are contained throughout the report as well.

PART TWO

Possible Options

It is evident from the literature reviewed and confirmed by those consulted that all possible options to improve fish passage have been considered during the past 30 plus years and no one could propose any additional options. The options are:

1. Status Quo or current operation.
2. Status Quo Plus defined as replacing or installing a new fishway.
3. Opening the gates during peak migration periods in spring and fall.
4. Opening gates permanently except for ice control during winter.
5. Replace the gates with a partial bridge.
6. Removing the causeway in its entirety and replace it with a bridge.
7. Fish trap and transport.
8. Separate the river from the headpond.

Of the eight options, only the first five received serious consideration in past studies or during this review. The following are the reasons for ruling out Options 6, 7, and 8 and no additional information could be found during this review to convince otherwise.

> Option 6 is not considered viable by any stakeholder because of the high cost involved. The almost certainty of this option contributing to a major impact on the landfill will impose enormous costs. Removal of the landfill or protection against erosion when added to the cost of a long bridge is considered by all to be prohibitive.

Option 7 was considered during the 1992 ADI Study and ruled out at that time as impractical. Although this practice is used in other jurisdictions, and could effectively move fish upstream past the gates, the high cost of constructing a fish trap and providing for a transport system plus the high annual operating cost made this option impractical. While this option would enhance upstream fish passage, down stream fish passage would still require the gates open for extended periods. Experts consulted did not consider this option viable for many reasons.

Option 8 was also considered during the ADI Study but did not receive serious consideration because of the ridiculously high cost and the total impracticality with few benefits to be derived. No one suggested pursuing this option further.

Discussion and Analysis

Option 1. Status Quo: (Current Operation)

Most stakeholders consider this option to be unacceptable. They correctly point out, that fish passage has been problematic since the closure of the gates in 1968. A number of stakeholders however, express strong preference for this option because it maintains the headpond at a controlled level almost year round. They point out that the fishway permitted the migration of salmon to their traditional spawning grounds when salmon was abundant. They argue that the decline in salmon stocks throughout the Atlantic region cannot be attributed directly to the causeway.

Most do agree that in spite of major modifications to the fishway and gates and numerous changes to the operation of the gates and fishway, fish passage of all species has really not improved over the years.

A review of reports, studies and discussions with scientists, biologists and other experts confirm that considerable effort has been made over an extended period of years to improve fish passage at the causeway gates. If a solution to the current fish passage problems had been feasible, it is generally agreed that it would have been found and this review would not be required.

It is important to note that along with the perceived benefits, the status quo option is not without risk or consequences. The present practice of operating the gates primarily to maintain the level of the headpond has created operational problems in the past. During drought conditions, priority seems to have been given to maintaining the headpond level at the expense of keeping the gates free of sediment buildup. Great difficulty was experienced during the

1 in 100 year storm of September 1999 when it took many hours to open the gates and for a time flooding was a real possibility.

A risk associated with this option but not mentioned often by stakeholders is that posed by the sewage discharged into the river from the Sewage Treatment Plant and toxic leachate from the landfill. Experts estimate that between 5 and 10 million cubic metres of tidal water pass through the fishway annually. With this option, sewage material and any toxic leachate, that may make its way into the river, could potentially migrate with tidal water through the fishway into the headpond where it may accumulate and/or stagnate. Although water samples are reported to be taken on a regular basis in the headpond, I could not find any documented evidence that this specific risk of contaminated material entering the headpond has been investigated in the past.

Scientists also advise that with this option, continued tidal sediment accumulation can be expected downstream but the extent cannot be predicted. It is not clear whether at present the equilibrium is close or if and when equilibrium will occur. Some scientists have expressed the opinion that equilibrium on an average annual basis has been more or less achieved between the causeway and the Gunningsville bridge but not yet achieved in the section of the estuary below Hillsborough.

A review of studies and reports does not indicate that any serious investigation or evaluation of the risks associated with the Status Quo Option has taken place to date. This in my view needs to be done.

The cost of mitigating the risks posed by the sewage from the treatment plant and the possible intrusion of leachate from the landfill could vary from very little to over $30 million and will not be known until appropriate investigation and evaluation is done.

Option 2. Replacing the Fishway:

This option proposes replacing the current fishway with one that would accommodate all indigenous species on their migration to traditional spawning and feeding grounds and permit the passage of juveniles and adults alike on their return journey to sea. It is believed by a number of stakeholders that this option would improve fish passage without destroying the headpond and its accompanying benefits and is also supported by those preferring Option 1.

A new fishway design was proposed in the 1992 ADI Study. This adjustable model was supposed to accommodate the passage of fish upriver but the study predicted that the gates would need to remain open during extended periods to permit down stream passage. For that reason, it was not considered a viable or cost effective option.

A number of fishway designs were presented by stakeholders during the course of this review. None however, appeared to answer the problem of operating in this silt laden environment as well as satisfying the multi-species requirements of the Petitcodiac River.

Experts consulted agree that designing an adjustable fishway suitable for a variety of species and functional in a silt-laden macro-tidal river is indeed a challenge although not an impossibility. They are less certain however, as to what is required to ensure safe downstream migration of juveniles and adults without opening the gates. They point to the many modifications made to the gates and its operation over many years but cannot ascertain how successful these have been since it is almost impossible to count fish migrating downstream through the causeway.

Many suggest the changes made to the gates, the fishway or to its operation were not very successful based on the small number of fish returning in subsequent years. They point out that the restocking of 2.7 million salmon over many years produced very few returning fish. Some suggest that the majority of juveniles simply got lost in the headpond and became prey or simply perished because of the headpond environment. Others suggest that many did not survive the turbulent passage at the gates and fishway but no evidence could be found to substantiate this view.

A number of scientists however, suggest there are many reasons for the serious decline in the Atlantic salmon stock throughout the region and the Petitcodiac River Causeway is simply just another contributing factor. They point out that during the years when salmon were more abundant, some adult fish did manage to use the fishway as evidenced by the numbers counted and tagged including some returning fish. It is evident from reports that almost all monitoring efforts over the years have been directed at salmon and little information is available regarding other species except to report that some other species have disappeared as well.

There are risks and consequences associated with this option as well. In addition to the risk associated with Option 1, replacing the fishway is a very costly project estimated at between $4 and $6 million and even if an appropriate structure could be found or designed, it could take the better part of two years to construct.

In addition, continued seasonal accumulation of sediment downstream and upstream of the gates is predicted and the requirement to manage the gates to prevent sediment buildup around the structure would at times impact on the level of the headpond.

The cost of mitigating the risks is the same as for Option 1, plus the cost of construction.

Option 3. Gates Open During Peak Migration:

This option proposes that all the gates remain open during peak migration periods in the spring and in the fall. According to biologists, peak migration for most species is during April to mid June and for salmon, during October and November. Attempts of this nature were made in 1988, 1989, and 1990.

Reports indicate that two gates remained open from 15 April to 7 June and one gate remained open during the period 26 September to 31 October in 1988. All the gates were re-opened during the period 3 May to 15 June in 1989 and again in 1990 from 15 May to 15 June, but only during low tide. This was an attempt to help facilitate fish passage downstream. The gates were then closed to incoming tides to prevent siltation of the headpond, something that was experienced in 1988.

Reports are not very clear as to what monitoring was carried out during these openings. Shad fishermen report significant improvements in landings in 1988 but these returned to normal in 1989. There was apparently some improvement in sea-run brook trout catches but no reports of any improvement in the salmon run in spite of continued re-stocking measures.

The argument made by a number of stakeholders is that this option is the minimum that must be done to improve fish passage. It is suggested that opening all five gates will create less water turbulence at the gates than just opening one gate and will also result in the least amount of sediment deposit in the headpond. This in turn will provide reasonable conditions for fish passage upstream and downstream.

Some point out however, that this option will be less efficient for downstream passage since this takes place at a time that is different than peak migration upstream. It may therefore be necessary to experiment with the times and duration of gate openings to arrive at the most effective approach depending on river and weather conditions.

Stakeholders also point out that erosion protection is already in place (completed prior to 98/99 experimental trials) where erosion is likely to occur so the cost of this option will be minimal. Most of the scientists and experts consulted agree that the likely impact on the landfill will not be significant. This option will also maintain most of the economic benefits currently provided by the headpond for about eight months of the year, and the period that is most important for recreational activities.

There is no consensus however that this is the most viable option. Some stakeholders support this option only as a starting point to a long-term strategy of ever increasing tidal flow through the system. This option, in their view, must only be used to temporarily provide some element of fish passage and to model the effects of opening the gates to free tidal flow before moving to the next more aggressive option.

Some scientists and experts suggest that it may take many cycles of tidal exchange to determine whether fish passage is improved while others suggest that there should be some evidence of improvements in fish passage immediately.

The following are the risks associated with this option that have not been fully investigated, evaluated or mitigated:

- Sewage Treatment Plant

  -The most important is related to the sewage treatment plant and the discharge of chemically assisted, primary-treated sewage effluent into the river. There has been little if any investigation on the amount of sewage that is likely to be carried upstream past the causeway when the gates are open to incoming tides and the potential health risk this poses.

  While there are reports on water samples regularly taken in the river and in the headpond by the Environment Departments, there were no reports found to relate these to the potential risk of sewage effluent migrating into the headpond. The Monitoring Plan for the trial gate-opening project of 1998 and 1999 did however call for the monitoring of water quality conditions upstream of the causeway. This was to include a determination of levels of dissolved oxygen, suspended solids loading, nutrients, fecal coliform bacteria, metals and limited toxicity testing.

  A review of the operation of the Greater Moncton Sewage Treatment Plant with the Director of Operations reveals that the plant is presently a chemically assisted primary treatment facility capable of removing 60-70% of the suspended solids and approximately 50% of the Biochemical Oxygen Demand (BOD). The Director also revealed that the plant could withhold discharge during normal flow, for some short duration, during incoming tides and by so doing reduce the amount of sewage effluent in the incoming tide that could potentially pass beyond the causeway gates.

  Mitigating this risk any further would require the construction of a holding tank to take in the sewage overflow during rainstorm events and the construction of secondary treatment facilities before allowing discharge into the river. The cost of such additional facilities is estimated by GMSC to be in the $30 million range.

- Landfill

The second risk is related to the leachate coming from the landfill east of the causeway. Tests recently done by stakeholders and NBDELG confirm that trace amounts of PCBs, heavy metals and other potentially toxic materials are leaching into the river. Although reports indicate that water samples are routinely done in the river and in the headpond, there appears to be little information on the potential risk posed by these toxic materials being deposited in riverbed sediment where they may remain for long periods of time. This applies equally upstream and downstream of the causeway.

The possibility of any potentially toxic leachate migrating downstream to lucrative lobster fishing grounds is also considered a risk by fishermen in Shepody Bay and the Bay of Fundy. Reports and studies reviewed did not provide any information related to this risk. Again, this was to be included in the Environmental Monitoring Plan for the trial opening project in 1998 and 1999.

Reports do indicate however, that at present the level of leachate is well within safe levels and when diluted with the vast amount of water in the river, poses no significant health risks.

- Downstream Habitat

The vast amount of accumulated sediment in the river from the mouth of the river all the way to the causeway is the third potential risk identified by stakeholders. Many believe that opening the gates will dislodge vast amounts of this accumulated sediment, which could migrate down the river and impact sensitive shore bird reserves and the scallop and lobster fishing grounds.

Reports do refer to this potential risk, however, there were no reports indicating any scientific investigations, evaluations or measurements of sediment transport or deposit downstream as a result of past gate openings in 1988, 1989 and 1990. Although some of this monitoring was included in the Environmental Monitoring Plan for the trial opening project, there is no evidence other than anecdotal at this time.

Many scientists and other stakeholders strongly believe the sediment that is surely to be flushed with gate openings will not pose any level of risk. This is based on observations of the results of past gate openings that occurred regularly including the flushing action during spring freshets. They also point to the major storm events that require all the gates being opened for

extended periods however, scientists are also not certain about the rate of erosion of accumulated sediments should the gates be opened to free tidal flow for extended periods.

- Agricultural Lands

  An additional risk is the potential for flooding of agricultural lands upstream of the causeway. An estimated 1000 acres may need protection from flooding by tidal waters during high tides. There is no consensus on this issue. Some experts believe that it is unlikely that tidal waters would ever reach flood level under this option. Others suggest that "clipping" the tide, or closing the gates when water levels reach a certain point may reduce this risk. This in fact was an objective of the 1998 Trial Opening Project. Since the Trials were never completed, this possibility will need to be further explored.

- Headpond

  Another unknown with this option is the degree and rate of sediment deposit that can be expected in the headpond. There is no consensus on this point from scientists and experts in spite of past studies and observations.

Having considered all of the available information associated with this option, it is clear there is a need for further investigation and evaluation of the risks associated with this option followed by long term monitoring.

The cost of mitigating the identified risks posed by the sewage from the treatment plant and the potential leachate from the landfill can vary from very little to about $30 million and will only become known after appropriate investigation and evaluation. The risk posed by the accumulated sediment is more difficult to assess. At the one extreme there may be no cost, or at the other extreme, it may not be possible to mitigate the risk. Only further investigation and evaluation can provide the answer.

Option 4. Gates Open Permanently.

This option proposes that the five gates remain open year round to free tidal flow except for possible ice control during winter. For many stakeholders, this is considered to be the minimum that must be done to address fish passage and partial restoration of the estuary. Most scientists and stakeholders agree that with all five gates open, fish passage upstream and downstream will be much improved over Option 3. Fish migrating upstream or downstream will be able to do so at will instead of waiting for an open gate opportunity. The downside for many stakeholders is that the headpond or lake as it is commonly called will be eliminated along with all the social/economic and new ecological benefits associated with the lake.

All of the risks associated with Option 3 are also applicable to this option but the degree and rate of impact however, may be greater than with Option 3. How much greater cannot be predicted for the reasons given previously. Most scientists and experts agree that the impact of this option on the landfill is likely to be insignificant.

To reiterate, the risk posed by this option from the discharge of the Sewage Treatment Plant, the leachate from the landfill, and possible impact of the accumulated sediment had not been fully investigated and evaluated. Mitigation measures may be necessary and long term monitoring will certainly be required.

The cost of mitigating the risks associated with this option, are the same as for Option 3. There may also be the need for some additional erosion protection estimated by some sources at between $4 and $5 million. This option could therefore have little cost for mitigation measures or could incur cost in the range of $35 million.

Option 5: Replace the Causeway with a Partial Bridge.

This option is considered by many stakeholders to be the optimum option. It is believed that it will ensure better fish passage than all other options being considered. The wide opening which is likely to be about 250 to 275 metres will produce less turbulence than the narrow opening of the gates and will result in almost full natural tidal exchange. The potential for fish passage will be as close to pre-causeway conditions as is possible.

It is believed by a number of stakeholders that this option will also result in much of the accumulated sediment being flushed out and the river being returned to pre-causeway conditions. As a result, they predict that the Tidal Bore will return to pre-causeway size in short order. None of the studies or reports reviewed however, suggest any such prediction nor do the scientists or experts who were consulted. There is general agreement that this option will no doubt result in greater flushing of accumulated sediment downstream but the degree and rate is less certain. Some stakeholders believe that the flushing of accumulated sediment will significantly return river fronts downstream to pre-causeway conditions and with it increased property values and increased tourism.

To a number of stakeholders, an added benefit of this option is the potential for restoration of the estuary and its perceived benefit to the whole Bay of Fundy ecosystem. For them, this is the ultimate goal.

All of the risks associated with Options 3 and 4 are also applicable to this option. More importantly, one additional risk is the possible impact on the Moncton landfill, just east of the causeway, which could require costly mitigation measures. A number of experts consulted are of the opinion the landfill can be secured to minimize the possible impact of both erosion and leachate.

The cost of mitigating the risks associated with this option are significant compared to other options. The risks posed by the effluent from the sewage treatment plant and the potential leachate from the landfill are the same as for the other options. There would also be the cost of protection from erosion at the landfill site, estimated by some to be about $7 million. With this option, the need to provide insurance against erosion is essential given the fact that once the causeway is breached, there is no longer any lead time to mitigate. In addition, there will be the cost of bridge construction estimated at between $12 and $15 million depending on the length. The minimum cost of this option is likely to exceed $20 million and could exceed $50 million depending on the need to mitigate for sewage and leachate. The cost of mitigating for the accumulated sediment is an unknown and could be from zero to being impossible to mitigate.

Conclusions

After having completed an extensive consultation process over the past five months as well as a review of over 300 reports, studies, and other documents, I conclude that there exists a number of viable options for improving or restoring fish passage in the Petitcodiac River.

I conclude also that no one option will satisfy the wishes or strongly held views of all stakeholders. There are some who hold the view that, limiting this review to the issue of fish passage is too narrow and restrictive. They express the view that the only acceptable option is one that will eventually and ultimately restore the river, restore fish population, restore the estuary, restore the watershed, restore the tidal bore, and reclaim wet lands and salt marshes lost when the causeway was constructed.

While many support the notion of restoring the Petitcodiac River and fish passage, they caution that this should not be done at any cost, that limits must be placed on restoration efforts. Some have suggested that available resources could better be spent on protecting sensitive ecosystems from further damage through public education rather than on one big project with questionable results.

Others also caution that there is a limit as to how far back one should attempt to turn the clock in restoration efforts. For example, should we attempt to restore all the former wetlands and salt marshes that have been drained and diked over the past three or four centuries and are now being used as productive farmland? They point out that few would

consider removing all paved roads, parking lots and malls such as Champlain Mall to restore former wetlands or salt marshes on which they are built.

I also conclude that there will be some who will not be satisfied with any option that places at risk, the current benefits of the status quo.

Then there are those who will basically be satisfied with any option that improves or restores fish passage unimpeded upstream to traditional spawning and feeding grounds and their return journey downstream. **This is really the focus of this review.**

While I have documented and considered all issues and concerns presented by stakeholders, my recommendations, to remain consistent with the Terms of Reference, must be limited to the fish passage issue. Of the options reviewed, I conclude that four are considered viable, with varying degrees of potential to improve or restore fish passage.

All options have risks associated with them, all have cost implications and all have some benefits. Although the risks and costs of mitigating these risks have all been examined to some extent in the past, in my view these have not been investigated or evaluated sufficiently to determine whether the risks are acceptable or can be mitigated. Clearly, there are information gaps in this respect that need to be addressed.

Some options will, in addition to the costs of mitigating, incur significant construction costs. Although there have been some attempts to quantify the costs versus benefits for various scenarios in past studies, these in my view lack objectivity and are selective in nature. The difficulty appears to be the cost and benefit accounting of intangibles.

During the consultation process, I had the opportunity to learn of a non-profit agency, GPI Atlantic that is involved in a process known as Full Cost Accounting that may be useful as a part of, or preliminary to an Environmental Assessment (EIA/EA). The unique and important feature of the GPI process is the ability to identify intangibles and to quantitatively evaluate such intangibles. According to GPI, an up-front investment in identifying and prioritizing indicators can be very cost-effective in focusing and framing a possible environmental study, reducing potentially extraneous efforts and unnecessary costs, satisfying stakeholders that the EIA/EA process addresses their concerns, as well as making the entire process very transparent.

Additional information on Full Cost Accounting and GPI Atlantic is contained in Appendix "D".

In view of the foregoing, I conclude that the next step in addressing the gaps in information is an Environmental Assessment (EA/EIA). The Environmental Assessment process should lead to the most appropriate option taking into consideration, identified risks, environmental impact, cost, and benefits. It is my considered opinion that, all viable options would trigger an environmental assessment under both the Provincial and Federal Legislation.

It is interesting to note that, many of the stakeholders have advocated for some time the need for an environmental assessment, and none of the stakeholders consulted have voiced any opposition to the notion that an environmental assessment is the next logical step in this review.

The EA/EIA Process, a Consultants Perspective

The Environmental Impact Assessment (EIA) is the term used in the New Brunswick Clean Water Act Regulation 87-83. The Environmental Assessment (EA) is the term used in the Canadian Environmental Assessment Act (CEAA). In this report, both will be used generically and interchangeably, unless otherwise noted.

An Environmental Assessment is really the process of examining the impact a project, an activity or a program will have on the entire environment it will potentially impact. An EA/EIA should be proactive and anticipatory. It can be a democratic decision-making tool used to determine whether an undertaking has social, economic, and ecological value for the health of the people and the area potentially affected. The EA/EIA can also be a vehicle within which governments and the public can make informed and ecologically acceptable decisions.

An environmental assessment is sometimes seen as an expensive hindrance or an instrument designed to cause unnecessary delay in moving a project forward. A good environmental assessment certainly does take time and it costs money. However, the time and monetary costs are usually substantially less than after the fact alterations or rehabilitation costs. An EA/EIA should address the needs and determine alternatives at a very early stage of a project. Only at this early stage can the best options be selected on environmental, technical, social, and financial grounds.

An EA/EIA must also be open, transparent, accountable, and an independent process. An open process is one, which is easily and fairly accessible to all stakeholders and where they are afforded an opportunity for meaningful involvement. A transparent process allows for the details of decision making, the how and why, to be shared with all stakeholders. An accountable process must have clear lines of decision making and decision-makers must acknowledge responsibility for the decisions they are making.

The provision of a mediation or conflict resolution process early in the assessment will assure stakeholders and the public that the process will be independent of any departmental biases. While some suggest the person appointed must possess scientific credentials, others suggest it might be better to have someone with experience in mediation and knowledgeable of the process and regulatory aspect of environmental assessments. Others still, recommend that this individual or team of individuals must be from outside Canada, because all potential candidates in this country are probably dependent on government contracts and this gives the perception of being biased.

Public or stakeholder participation in an EA/EIA process is essential in order to determine the social impact of a proposed undertaking. To encourage public participation, it is essential for the consultation process to be done at a time and place convenient to the stakeholders. Timely notification of meetings and timely sharing of proposed activities and regular progress reports are key elements in encouraging public support and maintaining public interest.

The following is a brief overview of the Provincial and Federal Legislation and regulations related to environmental assessments.

The New Brunswick Government Regulations, which govern environmental impact assessments, state that individuals, private firms, or government agencies that propose a particular undertaking listed in Schedule A of the Regulation must register the details of the proposal with the Minister of the Environment and Local Government. The requirement for registration includes any plan to modify, rehabilitate, abandon, or demolish an undertaking. Schedule A defines and includes as undertakings:

- all water reservoirs with a storage capacity of more than ten million cubic metres
- all causeways and multiple-span bridges.

The Regulation further states that, after registration, the proposal will be screened to determine whether an Environmental Impact Assessment is warranted. It is my understanding that the current Minister of the Environment and Local Government for the Province of New Brunswick has determined that, any undertaking to modify the current operation of the Petitcodiac River Causeway does warrant an EIA.

The Canadian Environmental Assessment Act (CEAA) states that a federal department requires an environmental assessment of a project if one of the following four (4) triggers apply:

- If a Department is the project proponent and is committed to carrying out the project in whole or in part.
- If a Department provides financial assistance to enable the project to be carried out in whole or in part.
- If a Department, under a provision of the Law List Regulation, is required to issue a permit or license, grant an approval or take any other action enabling the project to be carried out in whole or in part.
- When a Department grants an interest in land to enable the project to be carried out in whole or in part.

The CEAA defines a project as:

- Any proposed construction, operation, modification, decommissioning, abandonment or other undertaking in relation to a physical work, or

- Any proposed physical activity not related to a physical work that is prescribed pursuant to the Inclusion List Regulations prescribed under the Regulations, Section 59(b).

In my view, all proposed viable options satisfy the definition of a project and would trigger the application of the ACT. The CEAA provides four (4) environmental tracks:

- Screening, which consists of a review of existing information pertinent to the project. It systematically documents the environmental effects of a proposed project and determines the need to mitigate the harmful effect.
- Comprehensive Study for large scale and environmentally sensitive projects.
- Mediation, a process in which an impartial mediator is appointed by the Minister of the Environment to help interested parties resolve issues surrounding a project.
- Panel Review, a process where the Minister of the Environment appoints an independent and public panel review of a project following a screening or comprehensive study.

Federal Government officials consulted have suggested that none of the options being considered would require an environmental assessment in the form of a Comprehensive Study. While I do not dispute the fact they may be legally and technically correct, I believe that in this instance, it is necessary to "think outside the box". The environmental process is an enabling tool for decision makers, and should not be used as a tool to limit or manipulate decision making. **No matter what the process is called, the recommendation being made in this report is that the environmental assessment required must meet or exceed those requirements for a comprehensive assessment under the CEAA.**

The Petitcodiac River causeway has been a controversial and divisive issue in the province of New Brunswick for more than 30 years. Stakeholders have been at odds during all these years over the issue of opening the gates permanently or keeping them closed. Two successive Governments of New Brunswick have gone on record as favouring a full environmental assessment to address the many concerns raised by stakeholders.

During this review, the one and only area of strong consensus that was found is the need for such an assessment. Many insist that unless a full independent assessment is done, the result of this review "will again ignite the fires of division in the community" as related by more than one of the stakeholders.

Both the Provincial and Federal Legislation calls for the opportunity for public participation and consultation in the assessment process. The CEAA also makes provisions for a mediation process and a panel review in case of disagreements. These are key issues and of major concern to many stakeholders. The fear of stakeholders is that Governments will limit the scope of an EA/EIA and limit public consultation and participation for financial reasons.

I conclude also that any EA/EIA must include some experimental openings of the gates to model and verify impact of tidal flow, but this requirement and the degree to which it may or may not be applied, will need to be verified during the assessment process. Should these experiments be deemed necessary, and they follow the general approach of the 1998/99 Trials, the lessons learned in 1998/99 must be considered. The experience showed that such experiments must be based on valid assumptions and appropriate constraints, and scientists and experts charged with the conduct of these experiments must be given reasonable latitude and flexibility to ensure objectives can be met.

With regards to experiments, one stakeholder, the Village of Memramcook suggested that similar experiments be carried out first on the Memramcook River, a smaller replica of the Petitcodiac River. Lessons learned could then be applied to the Petitcodiac River. (Attachment)

The decision to be made with regard to environmental assessment is whether to define four separate projects, one for each viable option identified or one project that will address all the issues and concerns raised by stakeholders as well as the identified risks. Four separate projects would require four assessments, one for each project. This approach in my view would be more time consuming, and more costly.

In the final analysis, I am persuaded by the argument that, an environmental assessment based on the most aggressive option, the replacement of the causeway by a partial bridge, is the logical approach to address all the issues and concerns raised by stakeholders and the risks identified with each of the options.

Project Proponents

The Petitcodiac River Causeway is primarily a transportation link between the City of Moncton and the Town of Riverview. Fisheries and Oceans Canada has the legislated authority and responsibility for fish passage and fish habitat. The Province of New Brunswick owns and operates the causeway and gates. The following are therefore possibilities:

- The Province of New Brunswick owns the causeway and operates the gates. The Government of New Brunswick can propose a project and become the Project Proponent.

- The Government of Canada consistent with their legislated authority, can require the Province of New Brunswick (owner of the causeway) to take appropriate measures to assure adequate fish passage. The Province of New Brunswick can then propose the project and become the Project Proponent.

- The Government of Canada can propose a project. Fisheries and Oceans Canada has legislated authority for fish passage and fish habitat. The Government of Canada then becomes the Project Proponent and the Responsible Authority.

- The Government of Canada and the Province of New Brunswick can jointly propose a project and they then jointly become the Project Proponents and the Government of Canada becomes the Responsible Authority.

RECOMMENDATIONS

Consistent with my conclusions that an Environmental Impact Assessment (EA/EIA) is the next logical step in determining the most appropriate option for the restoration of fish passage in the Petitcodiac River, the first requirement is to define a "Project" that will trigger the environmental assessment process. In this instance, the "Project" proposed is Option 5, the one encompassing the issues and concerns related to all the options being evaluated. The alternative of defining four separate projects, each requiring a separate assessment, is considered inappropriate in this instance.

The step-wise implementation approach recommended is also significantly different from the normal EA/EIA process. But this is a unique river with unique challenges calling for equally unique approaches. The process must begin with an assessment of all the options starting with Option 1 (Status Quo) to establish a base line and then moving progressively in a step-wise manner evaluating the other four remaining options.

1. I therefore recommend, that the Province of New Brunswick or the Government of Canada or both governments acting jointly proceed expeditiously with a full environmental assessment based on Option 5, the construction of a partial bridge in the Petitcodiac River Causeway.

2. That consideration be given to a review by GPI Atlantic, or by another similar agency to assist in defining and prioritizing the indicators and intangibles.

3. That provision is made to include stakeholder participation at the very beginning of and throughout the process. It is essential in my view, for stakeholders to be consulted fully in defining the scope of the assessment and the methodology of implementation of the environmental assessment. To ensure participation, funding to cover the cost of travel of stakeholders is considered necessary.

4. That the proponents proceed expeditiously and in a step-wise fashion, with the implementation of the Environmental Assessment process. It is recommended that dedicated resources be allocated to the project to ensure timely implementation. At the risk of offending those responsible for the design of the assessment process, the step-wise implementation process suggested is as follows:

a) Evaluate and define the risks, cost, and benefits of Option 1 to establish a base line.
b) Evaluate and define the risks, cost, and benefits of Option 2 and progressively evaluate other options in the same manner.

Should the evaluation indicate the need to do experimental openings of the gates to model and verify the impact of tidal flow, these openings should be scheduled at a time most likely to enhance fish passage opportunity.

5. That a mediation or conflict resolution mechanism be in place very early in the process, even before the Terms of Reference are finalized, to assure stakeholders that the process will be fair, objective, open and impartial. To this end, stakeholders have suggested a number of highly qualified individuals for consideration for this task. Names are listed in Appendix E.

I am confident that this process, if it addresses all the issues and concerns identified in this report, will lead decision makers to the most viable option to restore fish passage in the Petitcodiac River.

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Appendix A

TERMS OF REFERENCE

Special Advisor to the Minister of Fisheries and Oceans on the issue of the Peticodiac River Causeway and fish passage restoration.

Mandate & Scope

To develop recommendations on a viable long-term strategy for restoring fish passage in the Peticodiac River. In order to do so, the Special Advisor will analyze all existing information on the fish passage issue including environmental, social and economic issues surrounding the causeway.

The Special Advisor will also be required to provide an opinion, from existing information, on the general range of costs associated with the options evaluated. The Special Advisor will consult and share information with stakeholders, including pertinent municipal and aboriginal governments, and will seek their input on the issue. The Special Advisor will seek additional expertise as required, and will conclude his mandate by submitting a recommendation from a range of evaluated options to the Minister of Fisheries and Oceans as soon as is practicable.

Mandate & Tasks

The Special Advisor is to engage all stakeholders in a consultative and participative process. Equitable access to participation in both official languages will be provided. The Advisor will:

- Examine and consolidate, if required, existing fish passage, environmental, social & economic information as it pertains to the causeway and the watershed;
- Examine the short & long term viability of all options considered;
- Provide a general range of costs for all options evaluated;
- Present this information to all stakeholders;
- Review with stakeholders the full range of issues, including future causeway options and implementation process options;
- Report and make recommendations to the Minister of Fisheries and Oceans.

Reporting

The Special Advisor is to report to the Minister as soon as is practicable. Reporting is to take the form of a two part document: the first one will include a summary of stakeholder consultations and a synthesis and evaluation of the available information, on issues, perspectives, and areas of consensus and divergence related to the Peticodiac River Causeway and the Peticodiac River watershed; and, the second part will include the identification of a range of options and a recommendation to the Minister, as well as advice on the next steps, information gaps, and how to address these gaps.

Appendix B

List of Identified Stakeholders (31) with Primary Contact People

Stakeholders	**Primary Contacts**
1. Government of Canada	
A) Dept. of Fisheries & Oceans	Dr. Helene Dupuis
B) Environment Canada	Jean Guy Deveau
2. Province of New Brunswick	
A) Department of Transportation	Lindon Miller
B) Env. & Loc. Government	Diane Kent Gillis
Municipal and Local Government	
1. Alma	Mayor Marion Parsons
2. Riverside	Mayor Harley Tingley
3. Hillsborough	Mayor Eric Steeves
4. Memramcook	Mayor Bernard LeBlanc
5. Dorchester	Mayor Wayne Feindel
6. Salisbuy	Mayor Ruth Jackson
7. Petitcodiac	Mayor Jim Holt
8. Moncton	Mayor Brian Murphy
9. Dieppe	Mayor Yvon LaPierre
10. Riverview	Mayor Bruce Fitch
11. Elgin	Rick Adamczyck
12. Fort Foley First Nation	Chief Joe Knockwood
Associations Service Clubs Groups	
1. LAPPA	Nancy Hoar/Norman Roach
2. Riverkeepers	Daniel LeBlanc
3. Atlantic Salmon Federation	Danny Bird
4. Conservation Council of N.B.	Janice Harvey
5. Alma Fishermen	Martin Collins
6. Tri Community Marina	Dan Cormier
7. Petitcodiac Sportsmans Club	Gerry Gogan
8. Peititcodiac Watershed Monitoring Group	Peter Sawyer
9. Moncton Naturalists Club	Shirley Hunt
10.Greater Moncton Sewage Comm.	Conrad Allain
11. Shepody Fish & Game	Eric Tracy
12. Pre D'en Haut Fishermen	Victor LeBlanc
13. Gr. Moncton Ec. Comm.	Ron Gaudet
14. Premier's Council Environment & Economy(Working Gr.)	Julia Chadwick
15. Shepody Shorebird Refuse	Dr. Mary Majka
16. N.B. Wildlife Federation	Richard Debow
17. Jim Sellers Gr.(Property Owners)	Jim Sellers

Appendix C

Consultation: Scientists, Consultants, Experts
(List of Individuals Interviewed)

John Ritter	-	Bedford Instutute
Hollis Cole	-	ADI Fredericton
Dave Sullivan	-	DOT(Department of Transportation NB)
Lindon Miller	-	DOT
Hélène Dupuis	-	DFO (Fisheries & Oceans Canada)
Jean Guy Deveau	-	Environment Canada
Peter McLaughlin	-	Dept. of Environment, Local Government NB
Diane Kent Gillis	-	Dept. Of Environment, Local Government
George Haines	-	DOT
Al Hanson	-	Environment Canada
Kim Hughes	-	Dept. Of Environment, Local Government
Bill Ritchie	-	DFO
Andrea Locke	-	DFO
Peter Lawton	-	DFO (St. Andrews)
David Robichaud	-	DFO (St. Andrews)
Louis LaPierre	-	U de M Professor (Env. Consultant)
Dale Bray	-	UNB Professor (Consultant)
Brian Burrell	-	Dept. Of Environment, Local Government
Fred Blaney	-	DOT
Conrad Allain	-	Greater Moncton Sewage Commission
Richard Landry	-	City of Moncton (Engineer)
Denis Haché	-	DFO
Don Woods	-	Dept. Of Environment, Local Government
William A. Coulter	-	Regional Director Canadian Environment Assessment Agency

Appendix D **G.P.I Atlantic - a Brief Overview**

The Genuine Progress Index (GPI) "Full Cost Accounting" Approach

GPI Atlantic is a non-profit research institute that is constructing new measures of sustainable development for Canada. GPI Atlantic sits on the sustainable development indicators steering committee of the National Round Table on the Environment and the Economy. The GPI method gives full value to environmental and social assets that are generally ignored in conventional economic accounting procedures. In this way, the Genuine Progress Index can send more accurate signals to policy makers, and provide far more comprehensive measures of progress, well-being and sustainability than current measures based on market statistics alone.

Traditionally it has been common practice to count the value of our forests, soils and ocean resources only when timber, produce, and fish are harvested and sent to market. By that measure, the more fish we sell and the more trees we cut down, and the more quickly we sell and cut these commodities, the faster the GDP will grow. This economic growth is then interpreted as a sign of prosperity and well-being. The depletion of our natural resources is thus mistakenly counted as economic gain, even though our net natural wealth may be seriously diminished, and our economy will eventually suffer, as we experienced in the collapse of the ground-fishery and the dramatic loss of jobs it produced. Traditionally little value has been given to the conservation of our natural resource wealth for the benefit of future generations.

By contrast, the GPI explicitly values the manifold functions of a forest, including protection against soil erosion, watershed protection, climate regulation and carbon sequestration, as well as benefits to recreation and tourism. In agriculture, it considers soil quality and richness, including soil organic matter content, and other ecological and social values, along with the economic viability of farming. For water resources, the GPI values the quality of drinking water, the functions provided by rivers, lakes, wetlands and other marine environments, and it counts environmental degradation as a cost rather than a gain to the economy. Wherever possible, economic and monetary values are associated with the value of these functions to the human economy. GPI thus literally counts the depletion of natural capital wealth (like a decline in fish stocks) as "depreciation" in the same way that manufactured capital is currently assessed, and it counts conservation and restoration efforts as an "investment" in natural capital.

By including these "externalities" and resource values directly in the mainframe economic accounts, the GPI "full cost accounting" methods can give policy makers a far more accurate picture of our long-term economic health and well-being. GPI methods include ecological and social values directly in the economic cost-benefit analyses. This can help ensure the adequate representation of all relevant stakeholder concerns and the identification of long-term outcomes that do not produce hidden future costs.

More detailed information and GPI reports, including the *GPI Water Quality Accounts*, are available from the GPI web site at www.gpiatlantic.org or by contacting Ronald Colman, PhD, Director, GPI Atlantic at 902-823-1944, or by email: gcolman@istar.ca

Appendix E

Names of Potential Candidates Suggested by Stakeholders

For the Conflict Resolution/Mediation Process

Dr. Louis Lapierre	- Université de Moncton
Dr. Dale Bray	- University of New Brunswick
Frank Longstaff	- Lawyer, Lutz Longstaff Hampton
Justice Gerald Laforest	- Supreme Court Justice (retired)
Dr. Niels West	- University of Rhode Island
Dr. David Farmer	- University of Rhode Island

Note: Others of equal stature and with similar credentials would no doubt be acceptable to stakeholders. In the opinion of the author, the mediator must be given some authority to seek additional expert advice on issues where he/she may not be an authority.

Minister
Environment and
Local Government

Ministre
Environnement et
Gouvernements locaux

New
Nouveau Brunswick

January 31, 2001

Mr. Eugene Niles, Special Advisor
Office of the Special Advisor
633 Main St., Suite 650
Moncton, NB
E1E 9X9

RE: Draft Report - A Review of the Petitcodiac River Causeway and Fish Passage Issues

Dear Mr. Niles:

Thank you for the opportunity to review and comment on the above noted report. The Department of the Environment & Local Government (DELG) continues to play a lead role in addressing matters of environmental significance to New Brunswickers and is very interested in the outcomes and recommendations of your review and consultation effort.

The Draft Report provides a comprehensive review of the events and activities that have occurred over time with respect to the Petitcodiac River Causeway. I commend you on this effort. I have taken the opportunity to consult with my staff and colleagues at the Department of Transportation (DOT) in the review of the report. With the intent of providing clarification to the report I am attaching technical and process related comments that have been prepared by staff of DELG and DOT for your consideration.

Upon the release of your final report, I will be presenting the conclusions and recommendations to my Cabinet colleagues for their consideration. Subsequent to this it is my intention to discuss the Petitcodiac River Causeway issue with Ministers Dahliwal and Anderson. The Province of New Brunswick, as well as the Government of Canada, must understand the environmental, social and economic implications associated with any potential outcome.

.../2 (over)

Tel./Téléphone:
(506) 453-2558
Fax/Télécopieur:

P.O. Box 6000
Fredericton
New Brunswick

Case postale 6000
Fredericton
Nouveau-Brunswick

Thank you once again for sharing your work in progress. I look forward to your final report. Should you have questions or comments on the attachment, please contact Kim Hughes at 506-453-4409 or Peter McLaughlin at 506-856-3000.

Sincerely,

Kim Jardine

Kim Jardine
Minister

/rr

Attachment

cc: Hon. Margaret Ann Blaney, Minister of Transportation

VILLAGE DE MEMRAMCOOK

540, rue Centrale Street
Memramcook, NB
E4K 3S6

http://village.memramcook.com

Tél. : (506) 758-4078
Fax : (506) 758-4079

Le 18 janvier 2001

Monsieur Eugène Niles, aviseur spécial
Bureau du Conseiller spécial
633, rue Main, buerau 650
Moncton, NB E1C 9X9

Monsieur Niles,

Le Conseil du Village de Memramcook vous demande de considérer d'insérer dans votre rapport l'offre ou la suggestion d'effectuer une étude de faisabilité sur la restauration de la rivière Memramcook. Étant une plus petite rivière que la Petitcodiac, cette expérimentation serait un atout dans l'évaluation des répercussions d'une telle envergure sur la rivière Petitcodiac.

Le Conseil, monsieur Niles, ne préconise pas être propriétaire, ni responsable de la rivière Memramcook, mais est préoccupé par l'effet négatif que la chaussée a perpétué en amont de la rivière depuis son installation.

Le Conseil se dit disposé à rencontrer les intervenants des divers ministères impliqués dans le dossier pour en discuter davantage . . . ça presse.

Veuillez agréer, Monsieur Niles, l'assurance de nos sentiments les plus distingués.

Bernard R. LeBlanc
Maire

BRL/mb

Translation from the French of a letter on Village of Memramcook letterhead

January 18, 2001

Mr. Eugène Niles, Special Advisor
Office of the Special Advisor
633 Main Street, Suite 650
Moncton, NB E1C 9X9

Dear Mr. Niles:

The Village of Memramcook Council asks you to consider including in your report an offer or suggestion regarding a feasibility study into the restoration of the Memramcook River. As the river is smaller than the Petitcodiac, such a study would be of benefit in evaluating the wide-scale repercussions on the Petitcodiac River.

The Council is not claiming to be the owner or the body responsible for the Memramcook River, but is concerned by the negative effects of the causeway upstream since it was built.

The Council would like to meet with officials from the various departments involved in this matter for further discussion. The matter is urgent.

Yours truly,

Bernard R. Leblanc
Mayor

Norman Roach
88 Summerhill Dr.,
Moncton NB
E1C 9C1
506-384-5036
February 3, 2001

Mr. Eugene Niles
Special Advisor to the Minister of Fisheries and Oceans
633 Main St., Suite 650
Moncton, NB
E1C 9X9

Re: Niles Draft Report of January 22, 2001.

Dear Mr. Niles:

There is no mention of an AVIATION SEA PLANE base or of aircraft landing on the Lake Petitcodiac in your report. This has been discussed in the past by aviation businesses and Pilots.

Every year there are some aircraft that operate off the Petitcodiac lake. These are people who are New Brunswickers and mostly aviators from Ontario and Quebec who come to our area on business or Holidays. This tourist potential has not been tapped as publication of information must be submitted to Transport Canada Months in advance to be included in aviation publications. Because of this fact, over the years there has been no way of knowing if the Petitcodiac lake would be drained, thereby making the publication information inaccurate or false.

There is no other body of fresh water in Eastern New Brunswick large enough where amphibious or sea aircraft can land. Here we have a tourist attraction and mode of transportation, along with many others that can not be developed until the Petitcodiac lake remains, FINALLY. There are thousands of Amphibious or Sea Planes in our country and the United States that could come to our communities and spend their time and money enjoying the Attraction of our Environment surrounding our communities, Restaurants, Motels, Hotels, and Conventions. These tourists, travellers and business people could rent cars to travel one hour and fifteen minutes drive to Prince Edward Island (who do not have a large body of fresh water for Amphibious aircraft) or Nova Scotia. These are just a few of the possibilities of our Petitcodiac lake.

The Petitcodiac lake is a very large body of fresh water that is a source of water to fight any large fires. Amphibious aircraft can scoop water from the lake to water bomb a fire with very fast turn around. That can not be done with salt water or rapidly from an airport..

Our communities are losing tourist DOLLARS. There is more to life than spending Millions of our tax dollars to bring a few more salmon into our lake when there are already many kinds of fish, birds and animals that are doing very well in this fresh water system. I won't expand on these items as there are other stakeholders in LAPPA who are much better informed than I on those

issues and I'm sure they will express their views with more depth than I can.

Our fish numbers have decreased due to pollution such as spraying defoliation (agent orange or 2-4 D) as an example, within about one kilometre of our (Moncton, Riverview and Dieppe) turtle creek fresh water reservoir and this was approved by our government departments. Our water comes from the areas as run off from where sprays have occurred. For years and years the province used sprays for spruce bud worm. That run off goes into our streams, brooks, rivers and wells. These are our main source of fresh water and it also feeds Petitcodiac lake and Petitcodiac river. These sprays are just one of the many reasons of fish decline and they have to be rectified then the salmon and other fish will return. The current fishways work, they don't work as well as they should or could.

Our fresh water system is just as important as our salt water system. We should NOT destroy what we have today in favour of an unknown. **We can not turn back the clock**. It is not fair to our tax payers to buy out the farmers of the Bay of Fundy if the dikes are removed and flood their fields that were created back in the 1700's. Dikes would have to be rebuilt on Petitcodiac Lake if tidal waters were allowed to enter. Do we as tax payers have to buy them out as well? Do we as tax payers have to buy out the fishermen whom all of these people have made their livelihood in their community. The risks to our environment and the livelihood of others are terrible, if the gates are opened. There are an endless number of reasons of pollution including sewage (15 to 20 million gallons a day), the Moncton dumps and silt that comes in with the tides and are stopped at the gates. THANK GOD.

In concluding the only options that I feel are credible and viable are option 1 and option 2.

Your mandate was fish passage, and I feel the only solution is a **proper fish ladder suited to tidal and fresh water**, with **NO tidal water** what so ever allowed in the Petitcodiac lake. It should be a ladder, fishway or passage that **works all year around regardless of time of day, month or season**. There are resources all around the world that have **not** been tapped, as I have found by checking fishways and passages via the internet. There are ways to accomplish this..

There are other things in life that are equally as important such as our fresh water supply, fresh water fish, recreational, scenic, wildlife, and quality of life. Do these important items **not** have a **VALUE** for all of us to enjoy?

I trust you will give my letter due consideration.

Regards,

Norman Roach
President
Lake Petitcodiac Preservation Association

January 31, 2001

Eugene Niles
Special Advisor to the Minister of Fisheries and Oceans
633 Main St., Suite 650
Moncton, NB, E1C 9X9

Dear Mr. Niles,

Responding to the First Draft - Petitcodiac Causeway Review

In keeping with the request of the Special Advisor to the Minister of Fisheries and Oceans to respond to the Draft Report – Petitcodiac Causeway Review (dated January 22, 2001) in a timely manner, please find herewith our comments.

These will be divided into 3 sections: General Comments, Terms of Reference Issues and an Analysis of the Options – Current Terms of Reference.

This response presents numerous comments and suggestions associated with this review (some of which had previously been unpublished), and propose various recommendations with the intention of:

- Recognising the key strengths of the Draft Report
- Recognising some of the limits of the terms of reference and their effect on this review
- Clarifying some of the impacts, risks and benefits associated with the overall restoration project, as they relate specifically to each option
- Clarifying the limit of several options identified as "viable", in order to achieve the overall long-term objective of restoring fish passage in the Petitcodiac River
- Identifying logical and practical reasons why Option 5 (Replace Causeway with Partial Bridge), is the most "viable" and long-term option to restore fish passage
- Identifying logical and practical strategies to manage the project's risks, reduce its overall requirements in terms of time, costs and human resources, all of which have their associated economic and social implications
- Proposing a project direction that will allow most if not all stakeholders to participate in

Thank you for your consideration.

Sincerely,

Daniel LeBlanc
Executive Director
Sentinelles Petitcodiac Riverkeeper

Responding to the First Draft of the Special Advisor to the Minister of Fisheries and Oceans Petitcodiac Causeway Review

January 31, 2001
By the Petitcodiac Riverkeeper

In keeping with the request of the Special Advisor to the Minister of Fisheries and Oceans to respond to the Draft Report – Petitcodiac Causeway Review (dated January 22, 2001) in a timely manner, please find herewith our comments.

These will be divided into 3 sections: General Comments, Terms of Reference Issues and an Analysis of the Options – Current Terms of Reference.

1. General Comments

The report's *Background* and *Findings from Studies and Reports* sections provides a good historical perspective to the issue, and the Special Advisor is to be commended for having taken the time necessary to present these. They, after all, form the basis for the problems that have resulted from the construction of the Petitcodiac River causeway, which began appearing immediately following its completion in 1968. The report also summarises some of the additional problems that have appeared since and continue to plague this issue for over 30 years.

It is also in these sections that the report points out why Status Quo, the current gate management policy, has not and is not an acceptable option to allow fish passage through the causeway structure. And as the Special Advisor suggests further, his review would not have been required had this option been viable.

The report also rightly recommends that the federal and provincial governments proceed with registering an EIA to "Replace the Causeway with a Partial Bridge". This option is described as ideal to achieve full tidal flow, the restoration of fish passage, fish habitat, natural ecosystem functions, and the optimum conditions to restore the river channel and tidal bore. As is pointed out in the report, this option is also favoured by at least 15 of the 31 stakeholders who took part in the review.

The Special Advisor is also to be commended for highlighting the need for the two levels of government to proceed expeditiously with the implementation of this process, and that they allocate the resources necessary for the timely implementation of the project.

The recommendation to define and prioritise the intangibles associated with the project, through the services of a firm such as GPI Atlantic, is also a very positive, practical and cost effective proposal. The new insights that can be gained into the functions and values of ecosystems, for instance, will be very useful to further understand the Petitcodiac and may even have applications elsewhere.

The recommendation to include early stakeholder participation in the process with funding provisions is essential, and will only improve chances of the project being implemented with success. Within our organisation alone for instance, there exists a tremendous wealth of

knowledge and experience on the Petitcodiac River system and the Shepody Bay estuary, on ecosystem functions, estuary functions, marine biology, fish passage, fish habitat, migratory fish movements, lobster and scallop resource management, migratory birds, water pollution issues, river engineering projects, environmental law, aboriginal tradition, historical and natural heritage, tidal bore interpretation, arts and recreation, economic and ecotourism development and project management. The *Petitcodiac Riverkeeper* has also developed an extensive national and international network of advisors on matters of estuary restoration, causeway and dam removal, river management, water pollution, water quality, tidal bore research and sediment movement.

The recommendation to appoint a mediator to facilitate the EIA implementation process is also acceptable to us. We also recognise the advantages of having this mediator position filled early on in the process.

We further agree with the recommendation to include in the overall assessment a more comprehensive evaluation of the risks associated with the Status Quo. This will be an important item in the EIA terms of reference, shedding further light on why Status Quo is an unacceptable option from an environmental, economic and social point of view.

The recommendation that experimental openings be carried out early in the EIA process, to model free tidal flow impacts and to investigate identified risks, is critically important to the success of the EIA process. This will provide the project with the physical and indisputable information required to model the restoration, and to more accurately predict its accompanying benefits and risks.

Finally, the Draft Report also rightly recognises that a number of risks associated with the restoration of the river, raised by some stakeholders over the years, have been found difficult to substantiate. The risks associated with restoring the river, found **not** to have been substantiated by the Special Advisor in his Draft Report, include:

- Impacts on infrastructure systems, particularly water lines and sewage lines that are buried close to the river beds
- Impacts on the two major water supply lines traversing the Petitcodiac River, one under the headpond and the other near the causeway
- The creation of new health risks for residents of the headpond posed by mosquitoes breeding in salt water as opposed to fresh water conditions
- Environmental impacts or threats to waterfowl as a result of tidal water moving into the headpond area

2. Terms of Reference Issues

We note that the current terms of reference for this review are limited to identifying a "viable long-term strategy for restoring **fish passage**", providing amongst other things "a general range of **costs** for all options evaluated", while engaging "**all stakeholders** in a consultative and participative process".

We would like to state for the record once again that the limited scope of these terms of reference impacts the review exercise in a manner as to exclude from the final recommendations several fundamental issues surrounding the Petitcodiac River. Important issues relevant to the Petitcodiac River system and excluded from being considered in the formulation of the report's final recommendations may include:

- **Fish habitat, ecosystem, river channel or tidal bore restoration:** the current "stakeholders" taking part in the review were able to present issues related to fish habitat, ecosystem, river channel and tidal bore restoration, but their implications on the overall project recommendations could not be considered in the final analysis, owing to them not being part of the original terms of reference. We would like to note here that the absence of these enlarged terms of reference adversely affects the advocates of river restoration. We therefore encourage the Special Advisor to make mention of the fact that most if not all of the current "stakeholders", as well as those not consulted in the review, see the river restoration issue as much more larger than "only fish passage".

- **Benefits:** the current terms of reference do not require the Special Advisor to present in his report the benefits or the gains associated with each option. In the Draft Report, only the costs associated with each option were presented (i.e. Option 2 costs between $4 and $6 million, Option 4 costs between $4 to $5 million, etc.). Although the mention of the dollar benefits may not specifically be required to register an EA or EIA project, and as the Special Advisor points out, these will form part of the proposed project (cost benefit analysis), we do note that the absence of this information creates important limitations for this review. As an example, there is no provision in these terms of reference to quantify the approximate benefits associated with restoring the tidal bore under Option 5 (which could exceed $5 million a year, see notes later in this response), nor any of the other benefits associated with each option. To translate this to another context, it is like presenting educational options to a high school student based solely on their costs (i.e. no post-secondary education = $0, university degree = $25,000), while not comparing these with the associated long-term benefits. We would like to note here again that the absence of reference of these benefits adversely affects the advocates of river restoration. We therefore strongly encourage the Special Advisor to make room for presenting "approximate known benefits" in his final report if these are readily available, or else make mention of the fact that these are not included with each option.

- **"Other" Stakeholders:** as mentioned previously, most "stakeholders", as well as those not consulted in this review, see the river restoration issue as much more than "only fish passage". In this respect, we note that several "other" stakeholders which have long had a direct association with the Petitcodiac River, are notably absent from this review. From a business perspective, we note that not one player from the regional tourism industry is represented in this review, some of whom have invested many millions of dollars in their riverfront properties and who look forward to the long term benefits of a restored river and tidal bore. Also absent from the list of stakeholders are the youth environmental associations of this region (university, high schools), some of whom (former Écoversité group, now Vie-Verte/Down-to-Earth) have played a leading role in advocating for the restoration of the Petitcodiac River in the past years. The contribution of the artistic community of this region, which has directed tremendous creative attention to the river restoration issue in the past decades (music recordings and performances, theatre, literature, visual arts, the international 1999 Symposium d'art actuel on the riverfront – 25,000 visitors) also needs to be recognised. We would like to note here that the absence of these other stakeholders in the review process adversely affect the advocates of river restoration.

The Special Advisor is nevertheless to be commended for pointing out in the final paragraph of his Draft Report that "should Governments decide however, to pursue the higher goals of restoring the estuary, restoring the river and the Tidal Bore, or to rehabilitate the system as a whole, then Option 5 (Replace the Causeway with a Bridge Span) becomes the logical option available to achieve this.

The following sections will provide comments on several key aspects of the final four recommendations contained in the Draft Report, with the objective of highlighting several outstanding issues, which in our view, require further clarification.

3. Analysis of the Options – Current Terms of Reference

This section provides comments on issues related to the analysis of the options presented in the Draft Report, under the current terms of reference which are limited to identifying a "viable long-term strategy for restoring **fish passage**" (not including fish habitat, ecosystem, river channel or tidal bore restoration), and to "provide a general range of **costs** for all options evaluated" (and not including benefits).

Notwithstanding these limitations, the analysis provided in the initial Draft Report raises important new issues for us, and which in our view require further clarification. Please find herewith our comments:

Option 1 – Status Quo

As mentioned earlier, the Special Advisor presents clear reasons why Option 1 (Status Quo) does not meet his terms of reference and why it is therefore rejected.

On presenting the costs for this option we would like to make the following suggestions.

Recommendation 1 – Under Option 1 (Status Quo), feature the current costs associated with operating the causeway, plus the known and quantifiable indirect costs

The current costs associated with the operation and maintenance of the causeway are not featured in the Draft Report. Even if Status Quo is **not** considered as a viable option, these should be featured for information and comparison purposes. An approximate cost would suffice. An example of an indirect cost associated with this option is storm sewer maintenance (silt removal).

On the statement "The cost of mitigating the risks posed by the sewage from the treatment plant and the leachate from the landfill can vary from very little to over $30 million and will not be known until appropriate investigation and evaluation is done", we would like to add the following comments.

The Special Advisor correctly recognises the fact that regardless of what happens on the causeway, the two issues of "leachate" and "treatment plant sewage" discharges need to be addressed. In other words, the appropriate investigations and evaluations into these two issues should provide us with further insights on how to address them. We have no objection to this **cost item** being feature in the report, provided that it is equally featured for all of the five options.

Recommendation 2 – Feature the $0 to $30+ million estimated costs with all options

For instance:

- Option 1 – Status Quo $1 - $5? million, Leachate/Sewage Treatment $0 - $30+ million,
- Option 2 – Fishway $4 - $6 million, Leachate/Sewage Treatment $0 - $30+ million,
- Option 5 – Partial Bridge $19 - $22 million, Leachate/Sewage Treatment $0 - $30+ million, etc.

On a related matter, the Draft Report suggests that "Stakeholders believe sewage discharges in the river poses a health risk to both the residents upstream and downstream of the causeway". The issue of "health risk" as opposed to "environmental risk", associated with treated and untreated sewage, upstream and downstream from the causeway, in the main estuary as opposed to the river system's tributaries, needs to be further clarified. Here are our comments:

- Untreated sewage, discharged directly into the river system as a result of heavy rain events (i.e. when the system capacity is exceeded), currently takes place upstream and downstream from the causeway, and in many of the watershed's tributaries. This is an issue recognised by most municipalities and villages in the watershed, and measures are taken in certain locations to address the problems on a priority basis by eliminating these cross-connections (i.e. Jonathon Creek remedial plan by the City of Moncton as one example)
- Rain events upstream and downstream from the causeway, with their creation of **surface water** and **storm sewer** discharges into the river system, create extra water quality conditions
- At least two current conditions upstream from the causeway, the overflow from sewage settling ponds and surface water discharges from agricultural pastures (cattle) may pose similar "health" or "environmental" risks
- More specifically, it is pointed out that high counts of the E-coli bacteria were found in the Petitcodiac headpond in 1997 and 1998, as reported in the Trial Gate Opening Environmental Monitoring Report of 1998. In the report section entitled « Water Quality of the Petitcodiac Headpond, 1997 – 1998; Environmental Quality Branch, New Brunswick Department of the Environment », results of water sampling tests undertaken in the headpond are presented. These results demonstrate that at certain periods during the summer, E-coli bacteria counts in the headpond increased to between 300 and 1,500 parts per 100 ml during those years. The maximum allowed limit for recreational swimming is 200 parts per 100 ml. This type of E-coli bacteria strain is the same one found in the Walkerton drinking water reservoirs, which have been linked to the loss of seven lives last year, countless numbers of illnesses, and is currently the focus of an in-depth inquiry in Ontario
- It is noted that currently no known groups of residents in this region make use of either the headpond nor the downstream river for recreational swimming. It is further noted that the New Brunswick Department of Health currently recognises no designated recreational swimming areas in the headpond (since 1976) nor the downstream river. On this specific issue, it is finally noted that Moncton is situated only several kms away from some of the best beaches in New Brunswick and Canada
- The E-coli bacteria maximum allowed limit for recreational boating, for instance, is 2000 parts per 100 ml. It is noted that certain residents in this region currently use the headpond and some downstream sections of the river for recreational boating or fishing activities
- It is noted further that no "public health" issue has currently been identified nor linked with the fact that in its present form, discharges from the sewage treatment plant currently pose "health risks" to the tens of thousands of residents living downstream from the causeway, the tens of thousands of tourists who stand on the river's edge each summer to watch the tidal bore, or the tens of thousands of local area residents who make use of the riverfront trails each year. Our suggestion would therefore be the following:

Recommendation 3 – That the final report attribute, link or limit the "unknown health risks" posed by sewage discharges to "boating activities" specifically, and that activities related to "swimming" in the Petitcodiac River or headpond be considered as unrelated to the current review exercise

Option 2 – Replacing the Fishway

The Special Advisor describes this option as "replacing the current fishway with one that would accommodate all indigenous species on their migration to traditional spawning and feeding grounds and permit the passage of juveniles and adults alike on their return journey to sea".

As previously explained to the Special Advisor, the *Petitcodiac Riverkeeper* remains of the opinion that it is highly unlikely that this option will allow us to meet the basic physical and biological criteria for restoring "fish passage" in the specific case of the Petitcodiac River for the following reasons:

- No fishway design currently exists to "accommodate all indigenous species on their migration to traditional spawning and feeding grounds and permit the passage of juveniles and adults alike on their return journey to sea"
- Although an "improved" fishway design, if so engineered, **may** "improve" physical fish passage, we believe it can not create the conditions for this physical passage to occur **safely** in the Petitcodiac, if current water environment variations between the headpond and the estuary (temperature, salinity, habitat transition areas, water "odour", etc.) remain unchanged. The unique location of the Petitcodiac River causeway, in relation to this river environment (33 kms of downstream estuary and 21 kms of former upstream estuary), makes it improbable in our view for this sensitive equilibrium function to occur, during warmer temperatures especially, thus achieving **safe** and **unimpeded** fish passage, unless additional free flow measures take place
- It will require many years to design such a fishway
- It will require many more years after its construction to monitor its effects
- Several attempts have been made in the past to improve fish passage in the Petitcodiac River by modifying the original fishway (the last attempt being in 1979) without achieving any durable benefits. It is probably safe to assume that the elimination of at least 6 fish species from the Petitcodiac River system and the extinction of Canada's first mussel species occurred subsequent to these last changes having taken place. The current "severely endangered" status of fish stocks in the Petitcodiac River system merits that we reject options for which the ultimate fish passage outcome is significantly uncertain. For the sake of efficiency, we also feel that spending more time and taxpayers dollars evaluating this option is unnecessary. We would therefore make the following suggestion:

Recommendation 4 – That Option 2 (Replacing the Fishway) not be qualified as a "viable, long-term" option to meet the requirements of fish passage through the Petitcodiac River Causeway

Option 3 – Gates Open During Peak Migration

Option 3 is defined in the Draft Report as "all gates remaining open during peak migration periods in the spring and in the fall". The Draft Report also suggests that "according to biologists, **peak** migration for **most** species is during April to mid June and for salmon, during October and November".

We understand "peak migration" as the term employed to essentially define the peak periods in which upstream migrations for **most** anadramous fish species takes place, in the spring and fall of every year. By definition, this term does not account for migrations outside these peak "spring"

and "fall" periods, nor does it describe other fish passage functions taking place outside these periods (the downstream summer passage of juvenile gaspareau for instance). In our view therefore, this does not meet the basic criteria for "restoring fish passage", nor can it be considered as "viable".

We also note that there is no established consensus in the fish biologist community for delimiting the precise months in which these peak migrations take place, but that at least 20 years ago it was defined by a DFO scientist as follows for the Petitcodiac River:

1979

« Barring complete removal of the causeway gates which is judged to be the best means of assuring fish passage at the causeway, it is recommended that all of the spill gates be left fully open during the period April through mid-June and September through November, i.e., during the critical fish migration periods ».

> April, 1979 – J.R. Semple, Anadromous fish stocks in the Petitcodiac River system and the Moncton causeway: A status report." Unpublished report, Fisheries and Marine Service, Department of Fisheries and Oceans, Halifax, 1979, 29 p.

Should the spring peak migration end in mid June and the fall peak migration begin in September, we are left with only a two and a half month summer period during which time the gates could physically remain closed under Option 3, dramatically changing the conditions in the water environment, directly affecting the viability of fish which were allowed to pass, and physically impeding the passage of fish during this short two and a half month period.

On the issue of the potential erosion risks associated with this option, the Draft Report suggests that "most of the scientists and experts consulted agree that the likely impact on the landfill will not be significant". Under Option 4 (Gates Open Permanently), we also note that the Draft Report suggests that "most of the scientists and experts agree that the impact of this option on the landfill is likely to be insignificant". While the Draft Report suggests that for Option 4, "there may be the need for some erosion protection estimated by some sources at between $4 to $5 million", the same estimated costs are not featured under Option 3. We would therefore suggest the following:

Recommendation 5 – That the costs associated with erosion protection in Option 3 (Gates Open During Peak Migration) and Option 4 (Gates Open Permanently) be given similar weight, and that consideration be given to revise this estimated cost at between $1 to $5 million instead of between $4 to $5 million. In other words also, that the costs associated with Option 1, Option 3 and Option 4 in this document be given similar weight.

On the issue of risks associated with sediment movements and deposits, downstream from the causeway (i.e. as far as Shepody Bay) and upstream in the headpond, we note the following:

- That the risks of sediment deposits downstream (i.e. as far as Shepody Bay) and upstream associated with Option 3 are exactly equal to those associated with Option 4 during the **spring** openings
- That it is foreseeable that the risks of sediment deposits occurring upstream and downstream from the causeway (i.e. as far as Shepody Bay), during the fall openings, **are likely to be greater with Options 3** than with Option 4, in view of the fact that new sediment deposits will be created downstream from the causeway during the summer period

On the specific issue of risk associated with sediment deposits in the headpond and associated with Option 3, we would also like to note that while the Draft Report suggests that there is no consensus on this point, both the province (NBDOT) and the federal (DFO) governments are on record as recognising the fact that there are likely greater risks of depositions occurring in the headpond with a gate management policy such as is described by Option 3 (Gates Open During Peak Migrations) as opposed to Option 4 (Gates Open Permanently):

1989

"(Referring to the 1988 spring and fall experimental opening by NBDOT) It is suspected that in the summer months a considerable quantity of silt deposited downstream of the causeway as is normally observed. When the gate was opened in the fall there was probably a greater supply of silt to move upstream that there was in the spring and, therefore, a significant increase in silt deposits in the fall"

> March 7, 1989 – David Sullivan, P. Eng., New Brunswick Department of Transport Chief Engineer related to the Petitcodiac River Causeway, to Lyle Smith, Assistant Deputy Minister, New Brunswick Department of Transport

In a memo from DFO to NBDOT in December 2000, entitled « Lessons Learned from Previous Gate Manipulations at the Petitcodiac and Memramcook Causeways », DFO writes :

2000

"I partly agree with Dave Sullivan's assessment of the situation (referring to the above 1989 statement). It is obvious that opening the gates in the spring, closing them in the summer and re-opening them in the fall will force tidal water on top of the downstream-accumulated sediment. This would move more mud upstream of the causeway. But this is not the only mechanism involved."

"We have better information on the rapidity and extent of siltation downstream of the causeway during the summer low fresh flow period than Dave had at the time. We can, therefore, better analyse this situation. We know that downstream mud accumulation is up to 3.5 to 4.5 m. by the end of August (note by Petitcodiac Riverkeeper: gate ceiling is at 4.5 m.). This downstream mud accumulation extends over a long distance and is not easy to erode."

(...)

"It is obvious to me and hopefully to others that the bigger the opening through those causeways (referring to the Petitcodiac and Memramcook), the less silt accumulation in the channels. After all, the channels upstream of those causeways were much bigger and deeper before the causeways were built."

> December 12, 2000 – Denis Haché, P. Eng., DFO to Lindon Miller, P. Eng. NBDOT and to Claude Robichaud, P. Eng. NB Department of Agriculture, Fisheries and Aquaculture

With these comments in mind and from our own observations, we would suggest that the following be considered:

Recommendation 6 – That the risks associated with sediment deposition, upstream and downstream from the causeway (i.e. as far as Shepody Bay) under Option 3 (Gates Open During Peak Migration) be identified as being no less, equal or greater than those suggested under Option 4 (Gates Open Permanently)

The Draft Report recommends beginning the EIA process by exploring Option 3 for "two cycles", "monitoring the results", and "considering implementing Option 4 (Gates Open Permanently) only once it is clear that fish passage has not significantly improved with Option 3". We would like to not here that beginning the implementation of the EIA process with Option 3 will lead to uncertainties in some of the following areas:

- Arguing on the actual definition of fish passage (i.e. seasonal upstream migrations vs. other physical and biological fish passage functions)
- The physical impediment of Option 3 achieving fish passage when fish, as well as other organisms and substances in the water column are not allowed to move outside the "spring" and "fall" peak migration periods
- Prioritising fish passage by species according to their peak migration cycles
- Setting the actual "spring" and "fall" dates for peak upstream migrations, according to species
- The biological effect of creating an unnatural water environment variance (temperature, salinity, habitat transit areas, water "odour") by closing the gates during the summer months. and the effects that this has on the overall effort to restore fish passage (and fish stocks)
- The difficulty of quantifying the concept of "only once it is clear that fish passage has not significantly improved, do we move to Option 4", and the difficulty of estimating the time period required to achieve this standard
- The cost implications associated with dedicating at least "two cycles" plus monitoring time to experiment this option
- The human resource implications of having this experimental project proceed during an undetermined period of time
- The economic and social implications of having this experimental project proceed during an undetermined period of time
- The implications of having limiting terms of reference for those responsible for carrying out the project. The 2.5 m tidal water artificial limit set in the 1998 and 1998 Trial Experiences posed great limits on that experiment and caused the actual physical experiences to fail. The results of these limiting terms of reference has had severe implications to this day, and lessons learned from this experience should also tell us to avoid repeating this same fundamental mistake.
- The implications of prolonging the EIA, the restoration project and the complex federal-provincial government decision-making process during an undetermined period of time

Peak migration is different from the term "free flow" also used to describe the unimpeded physical and biological movement of fish in waterways. The Draft Report notes that "attempts of this nature (Option 3) were made in 1988, 1989, and 1990". Since this time, it is noted that the Department of Fisheries and Oceans has gone on record numerous times to advocate the restoration of "free flow" to maximize anadramous fish production in the Petitcodiac River, "from April 1 to December 15". Here are several samples of these statements:

1991

« The preferred fisheries operational strategy is to allow free flow in the river from April 1 to December 15. Free flow through the causeway will maximize anadramous fish production in the Petitcodiac River to the extent of the freshwater habitats potential. Restoration of production to pre-causeway levels may never be possible, but a free-flow system cleary offers the greatest chance of achieving those levels ».

March 15, 1991 – John A. Ritter, Chief, Freshwater and Anadramous Division, Scotia-Fundy Region, DFO to Neil A. Bellfontaine, Regional Director-General, Scotia-Fundy Region, DFO.

1992

« It has always been the contention of DFO that anadramous fish production in the Petitcodiac River is dependent upon efficient fish passage through the Moncton-Riverview causeway, and that the best solution to the apparent problems in fish passage at this site is to return the river to a state of free flow. »

April 7, 1992 – Neil A. Bellfontaine, Regional Director-General, Scotia-Fundy Region, DFO to Gerry Tingley, Petitcodiac Sportsmans Club.

1994

« For these reasons, the Department of Fisheries and Oceans continues to advocate an annual period of free flow (from April 1 to December 15) of the Petitcodiac River as the preferred solution to anadromous fish passage problems at the causeway ».

February 7, 1994 – Neil A. Bellfontaine, Regional Director-General, Scotia-Fundy Region, DFO to Gary Griffin, NB Wildlife Federation.

1995

« DFO advocates free flow through the Petitcodiac causeway gates as the preferred operational strategy for anadromous fish production. »

July 14, 1995 – Neil A. Bellfontaine, Regional Director-General, Scotia-Fundy Region, DFO to P.S. Chamut, Assistant Deputy Minister, Fisheries Management, DFO (Ottawa).

1996

« DFO supports free flow through the Moncton-Riverview causeway annually from April 1 to December 15 as the preferred operational strategy for maximizing anadromous fish production. The opening of at least one of the gates, described as Approach B or C in the recently completed report would provide the desired fish passage. The scenarios with the highest water levels upstream of the gates and the largest gate opening are preferred because they would provide the longest time for fish passage on the flood tide without orifice flow ».

June 29, 1996 – John A. Ritter, Chief, Freshwater and Anadramous Division, Scotia-Fundy Region, DFO, Sirois, G. (DFO, Halifax) and H. Jansen (DFO, Halifax) to Neil A. Bellfontaine, Regional Director-General, Scotia-Fundy Region, DFO.

In summary for Option 3 (Gates Open During Peak Migration), we find that considering:

- That the erosion risks associated with Option 3 and Option 4 are approximately similar
- That the costs of implementing Option 3 or Option 4 are approximately similar
- That the risks of sediment deposits down stream (i.e. as far as Shepody Bay) associated with Option 3 should be no less, equal or greater than those associated with Option 4
- That it is foreseeable that the risks of sediment deposits occurring upstream and downstream, during the fall period, should be greater with Options 3 as compared with Option 4, in view of the fact that new sediment deposits would be created downstream from the causeway during the summer period
- That opening the gates only during peak migrations has physical impacts on fish passage functions outside these peak migration periods
- That closing the gates during the summer period will create adverse biological and environmental conditions for the fish upstream and downstream from the causeway
- That at the most, two and a half months during the summer period is what fundamentally differentiates Option 3 from Option 4
- That the statement in the Draft Report suggesting "monitoring and evaluating Option 3 for at least two full cycles before considering any other more costly Options" leaves many questions unresolved, namely: defining "two full cycles" and "monitoring and evaluating".
- That the statement in the Draft Report suggesting that "Once Option 3 is implemented, if after an appropriate period of monitoring the results, it is clear that fish passage has not significantly improved, consideration must then be given to implementing Option 4, Opening the Gates Permanently as the next logical step" leaves many questions unresolved. These include defining the following concepts: "an appropriate period of monitoring", "when it is clear that fish passage has not significantly improved", "consideration must then be given".
- That there are important human resource, cost, economic and social implications involved with beginning the EIA process with Option 3 as opposed to Option 4
- That lessons learned from previous experiences on the Petitcodiac reveal that "limiting terms of references" during experimental openings generate confusion and can lead to failed experiments. The Draft Report suggests further that "these (future) experiments must be based on valid assumptions and appropriate parameters and scientists and experts charged with the conduct of these experiments must be given reasonable latitude and flexibility to ensure objectives can be met"
- That DFO is on record on numerous occasions in the past decade as advocating "free flow" in the Petitcodiac River from at least "April 1 to December 15" as its minimum preferred strategy, as opposed to "peak migration"
- We also note that similar experimental openings on Option 3 were carried out in 1988, 1989 and 1990, without leading to lasting results. Indeed, the ease of reversibility of this option (closing the gates when opposition makes itself known) makes it unsuitable for the types of results sought by the current review. The argument that not enough monitoring or study was taking place during 1988, 1989 and 1990 to measure the long-term effects of this option on fish passage, in our view, constitutes an insufficient argument calling for more study to be carried out on this perceived disadvantage, most particularly in the case of the Petitcodiac River, referred to commonly as the most studied river in Canada, and as we would add: the most documented case of a dying ecosystem in Canada
- That the current "severely endangered" status of fish stocks in the Petitcodiac River system merits that we reject options for which the ultimate fish passage outcome is significantly uncertain. We would therefore make the following suggestion:

Recommendation 7 – That Option 3 (Open Gates During Peak Migrations) not be singled out, described or presented as having the "least risks and the lowest costs of all other Options", that this option not be retained to begin the EIA process, and in view of its known limitations, its known physical and biological impacts on fish passage and fish populations, its previous unsuccessful attempts in 1988, 1989 and 1990, its supplementary resource and time implications and associated economic and social implications, that it be determined to be "non-viable" as an option to meet the requirements of fish passage in the Petitcodiac River under the current terms of reference

<u>Option 4 – Gates Open Permanently</u>

The Draft Report describes this option has having "five gates open year round to free tidal flow, except for possible ice control during winter". The Draft Report also correctly states:

- That "for many stakeholders, this is considered to be the minimum (or least) that must be done to address fish passage and partial restoration of the estuary"
- That "most scientists and stakeholders agree that with all five gates open, fish passage upstream and downstream will be much improved over Option 3", and
- That "fish migrating upstream or downstream will be able to do so at will instead of waiting for an open gate opportunity"

We also assume that for these same reasons, DFO scientists in the past decade have gone on record as advocating at least "free flow from April 1 to December 15". As suggested previously, we also note the following:

- That the environmental risks (sewage, landfill erosion, sediment movement and deposits upstream and downstream as far as Shepody Bay) associated with this Option are no less, equal or greater than those associated with Option 3
- That the costs associated with this Option are predicted to be no less or no greater than those associated with Option 3
- That the benefits to fish passage and fish populations are without a doubt greater under this Option than those to be found under Option 3, and
- That the conditions found with Option 4 offer more flexibility and latitude during the "experimental opening" (i.e. to determine the feasibility of Option 5) phase of the project, as opposed to those conditions presented in Option 3, and that this fact has important time, human resource and cost benefit implications

Having said this, we however would like to point out some of the limitations of Option 4 (restoring partial free flow) as oppose to Option 5 (restoring 100% tidal flow or free flow), and how these relate to identifying viable and long-term conditions to restore fish passage:

- We note that the tidal flow width created by opening the five gates represents approximately 40 metres, while initial estimates suggest that between 250 and 275 metres would be required to create "full tidal flow" conditions at this junction of the Petitcodiac River
- We also note that this tidal flow difference will create unnatural turbulence conditions immediately upstream and downstream from the causeway gates, and a long term impact on fish passage and fish populations which is undetermined for the time being
- We also note that leaving the five gates open year round to free tidal flow "except for possible ice control during winter" creates a long term impact on fish passage and fish populations which is undetermined for the time being

- More importantly, we note that the maximum gate ceiling is 4.5 metres under "free flow" conditions, while average neap high tides are in the 6.0 metre range, and the spring and fall high tides can reach as much as 7.9 metres. In relation to the physical passage of fish, important consideration must be given to the fact that some fish species (i.e. smelt), travelling during high tide conditions, are not known to have the ability to "dive" under the gate structure to reach the upstream sections during their migration (salmon is one of the few species that may have this reflex). Therefore, we would suggest that the maximum gate ceiling of 4.5 metres under "free flow" conditions also creates a long term impact on fish passage and fish populations which is undetermined for the time being

Other disadvantages of Option 4 not limited to fish passage include the following:

- Long-term viability of the gate structure to operate under year-round conditions
- Long-term deposits of silt immediately upstream from the causeway
- Long-term deposits of silt immediately downstream from the causeway
- Its potentially limiting effect on the restoration of the river estuary and tidal bore
- Its accompanying limited economic benefit associated with a restore tidal bore
- Its potentially limiting physical effect on the costs associated with maintaining the storm sewer lines free from silt deposits
- Its potentially limiting effects on reducing flood risks for this region
- More importantly, the perceived reversibility of this option owing to the fact that the gate structure remains intact
- The socio-economic implications of not proceeding with the ideal option (Replace Causeway with Partial Bridge) to restore the Petitcodiac River, its estuary and tidal bore

For these reasons and those mentioned earlier which directly relate to fish passage, we have strong objections to the statement featured in the Draft Report suggesting that "providing for adequate fish passage should not require resorting to Option 5". Our understanding of the issue leads us rather to conclude that the long-term viability of Option 4 (Gates Open Permanently) to achieve fish passage restoration, creates several impacts on fish passage and fish populations which are undetermined for the time being. With this in mind, and knowing of the potential other limitations of Option 4, we believe it is therefore premature to suggest that Option 5 (Replace Causeway with Partial Bridge) not be required.

This having been said, we do recognise that to achieve the restoration of full tidal flow to the Petitcodiac River (Replace Causeway with Partial Bridge), the restoration project will require to begin with operating conditions such as are found in Option 4 (Gates Open Permanently). As previously written, we also recognise that it is during this initial period of time that the evaluation of environmental risks and benefits, the cost benefit analysis and future plans to prepare Option 5 will be performed. Indeed, we are also of the opinion that a comprehensive cost benefit analysis would only confirm what many suspect, which is that there are very significant environmental, economic and social benefits associated with Option 5 that far outweigh the costs associated with implementing that option. We would therefore suggest the following:

Recommendation 8 – That Option 4 (Gates Open Permanently), or a similar set of unrestricted experimental opening standards be retained to begin the EIA process, with the ultimate aim of measuring the feasibility of Option 5 (Replace Causeway with Partial Bridge), which is the ideal and sought after objective of the project under the current terms of reference

Option 5 – Replace the Causeway with a Partial Bridge

The Draft Report describes this option has having "a wide opening (in the causeway) which is likely to be about 250 to 275 meters", restoring what engineers and hydrologists refer to as "full tidal flow" or "full tidal exchange". The Draft Report also correctly states the following:

- That "it is believed that Option 5 will ensure better fish passage than all other options being considered", that this wide opening "will produce less turbulence than the narrow opening of the gates and will result in almost full natural tidal exchange", and that "the potential for fish passage will be close to pre-causeway conditions as possible"
- That Option 5 "is the logical option available to achieve the higher goals of restoring the estuary, restoring the river and the Tidal bore, or to rehabilitate the system as a whole"
- That Option 5 "is considered by at least 15 out of the 26 stakeholders interviewed to be the ideal option" in the context of this current review

In our view, there is no doubt that Option 5 (Replace Causeway with Partial Bridge) presents the ideal conditions for restoring long-term fish passage alone in the Petitcodiac River for the following additional reasons:

- That as described previously in this response, there are concerns and uncertainties surrounding the feasibility of creating long-term ideal conditions for restoring fish passage under Option 4 (Gates Open Permanently)
- That prior to the construction of this causeway, fish passage was not a problem in the Petitcodiac River, as the natural river conditions created this function
- That it follows that restoring the river to most of its pre-causeway condition, in a phased and responsible approach that deals with its associated impacts, should re-create these ideal long-term conditions to restore fish passage
- That other jurisdictions in the region (and around the world) have been successful in restoring rivers using the scientifically recognised standard of "full tidal flow": at least four rivers in PEI. On the PEI examples alone, we note that according to PEI-DOT officials, "all restoration projects have proved beneficial" and in at least one of these estuaries (West River), the results have produced "significant benefits", referring to fish passage and fish populations. Five years after the West River (PEI) restoration project, "over fifty boats can be seen operating in the shellfish industry" in this location "where only four boats could be found" prior to the restoration project. On issues related to the restoration of estuaries by altering tidal barrier to achieve "full tidal flow", we would like to recognise here that the Department of Transport, PEI is probably the leading transportation department in the Maritime Provinces in matters dealing with tidal barrier restoration projects, having implemented several successful experiences in this area in the past decade. In fact, their cutting-edge approach to dealing with these issues is perhaps unparalleled in Canada.
- That it is a well-established, widely documented and long-known scientific fact that any unnatural obstructions to rivers cause impacts on fish passage and fish populations:

1903

"The conclusion arrived at, after full discussion at the Conference of Dominion Fishery Inspectors, held in Ottawa in April, 1891, (...) that 'wherever a natural pass in a river can be maintained, ... such is to be preferred to any artificial pass'. (...) After an experience more thorough and extensive than it has probably been the privilege of any other living fishery expert

to have, I have come to the conclusion that the decline in the fisheries in inland water is more directly due to obstructions, natural and artificial, than to any other harmful cause. Over-fishing, poaching on the breeding grounds, injurious freshets, and similar natural causes, saw-dust, and other pollutions have all worked injury more or less serious, but none of these compare with the deadly effects of closing the upper waters to the ascent to the schools of spawning fish, and of blocking, by dams, etc., the movements, up and down, of the various migratory species in the young and the adult condition."

Prince, E.E. 1903. "The Fish-way Problem." Department of Marine and Fisheries, 35th annual report, 1902. Sessional Paper No. 22.

The Draft Report also states that "there is general agreement that this option (Option 5) will no doubt result in greater flushing of accumulated sediment downstream but the degree and rate is less certain". While we recognise that in the specific case of the Petitcodiac River, no reports or studies make **definitive predictions** on the likelihood of the "river being returned to pre-causeway conditions", we would like to point out the following:

- That many scientists and experts do believe that these conditions can be restored in the specific case of the Petitcodiac River
- That it is premature for any scientist or expert to rule out the possibility of these conditions being restored in the case of the Petitcodiac River
- That initially creating free flow or similar conditions as described under Option 4 (Gates Open Permanently) will assist the scientists and experts in modelling and predicting the feasibility of restoring the Petitcodiac River to full tidal flow
- That attempting to model these conditions without initially creating free flow or similar conditions as described under Option 4 (Gates Open Permanently) will lead to expensive and time consuming studies for which the ultimate outcome is unpredictable if not irrelevant to the present project

On the added risks associated with Option 5 (Replacing Causeway with Partial Bridge), namely erosion at the landfill site and uncertainty surrounding sediment movements and deposits downstream as far as Shepody Bay (and their potential effects on the lobster and scallop fisheries), we note the following:

- That all stakeholders recognise the need to build protection measures against the landfill site with this option in order to mitigate these risks, that scientists and experts agree that such protection measures are available, that experts recognised that directing the breach in the causeway away from the landfill will minimise these risks (i.e. as suggested by the 1967 aerial photo modelling), and that most stakeholders agree that the costs associated with these protection measures should be included in the restoration project

- That all stakeholders recognise the uncertainty of being able to predict with complete accuracy the effects of sediment movements and deposits downstream under this option, especially in Shepody Bay, that most experts and scientists believe that the probable impacts of this risk will be minimal if not non-existent, and that more information on these specific impacts will be available once the implementation of Option 4 (Gates Open Permanently) takes place. Most stakeholders also agree that costs dealing with the potential mitigation measures associated with this risk should be included in the restoration project

On the issue of restoring channel conditions that would produce an improved tidal bore in the Petitcodiac River, the Draft Report suggests that it is difficult to predict what it would look like today (without the causeway having been built) and what it could be like in the future, with conditions such as are found under Option 5 (Replace Causeway with Partial Bridge). While we recognise that the overall implications of restoring the tidal bore, regretfully, fall outside the mandate of the current review, we would like to point out the following:

- That previous to the causeway, the Petitcodiac River Tidal Bore occurred under natural conditions (i.e. a river channel clear of heavy sediment build-ups, a river presenting a natural upwards slope and a natural downstream flow, influenced by tidal amplitudes, winds, the moon, the sun and seasonal variations)
- That some sediment deposits occurred in the river channel during dry conditions, and that these would return into suspension during a regular rain event or a heavy rain event occurrence (i.e. once every 2 to 3 years), as is the case for most river channels in the world
- That the Petitcodiac River Tidal Bore was recognised internationally, and as early as 1910 featured on the front page of the *London Illustrated News*, alongside the Qiantang River Bore in China, and described as one the "Natural Wonders of the World" (this 1910 picture of the Petitcodiac Bore is featured at www.petitcodiac.org)
- That the Petitcodiac River Tidal Bore, seen from the Moncton Bore Park located on the riverfront, developed as one of the earliest tourist attractions in New Brunswick and Atlantic Canada (Bore Park itself constructed in 1907)
- That prior to the construction of the causeway, the Petitcodiac River Tidal Bore was considered to be one of New Brunswick's and Moncton's best known tourist attractions
- That since the 1960's, world tidal amplitudes, as well as tidal amplitudes found in the Bay of Fundy, have not reduced but in fact have increased. There are also well established scientific foundations for believing that these will continue to rise in the next century
- That stronger tidal amplitudes create stronger conditions for a tidal bore
- That other tidal bore producing estuaries in the world, unaffected by human interference, continue to produce equal or larger bores than was the case in the 1960's
- That the Qiantang River Bore in China today, described by experts as the world's most impressive (2 m+), attracts yearly over 250,000 visitors and local area residents to a three-day festival in late-summer, early-fall, and that this phenomenon is the key anchor attraction in that region's tourism destination strategy
- That apart from the Inner Bay of Fundy (Nova Scotia and New Brunswick), only one other estuary in North America is known to produce tidal bores: the Cook Inlet in Alaska
- That a relatively unknown tidal bore in the 1960's, notably on the Schubenacadie River in Nova Scotia, is now the focus of a multi-million dollar industry (river zodiac adventures) and considered the key anchor attraction in that region's tourism destination strategy

On this subject again, apart from the fact that the Petitcodiac River Tidal Bore may today be one of New Brunswick's most neglected but most promising "Natural Wonder of the World", we would like to suggest that **should the causeway not have been built**, or **should the river channel be restored in the future**, that any of the following scenarios would likely be true:

- That the tidal bore attraction would be a major if not the major anchor attraction of this region's tourism destination strategy
- That it would be featured predominantly in New Brunswick's Bay of Fundy – Marine Wonder of the World campaign

- That based on visitation numbers registered in other regional attractions (i.e. Hopewell Rocks – approximately 200,000 visitors, Bouctouche Dune – 250,000 visitors), and the fact that under current conditions, the Petitcodiac River Tidal Bore still attracts between 40,000 to 50,000 visitors a year, that it is conceivable that a restored tidal bore attraction, adequately promoted and managed, could also generate 200,000+ visitors and be considered as one of New Brunswick's top tourist attractions
- That the peak viewing times for the tidal bore occurs during the tourism shoulder season (i.e. late March to mid-June, and September to November)
- That with all of these conditions combined, we would suggest that private and government investments into this activity would be commensurate to the remarkable potentials associated with its benefits (estimated by some industry experts to exceed $5 million a year)

Considering the previously detailed benefits and probable impacts of Option 5 (Replace Causeway with Bridge Span) as they directly relate to the **ideal** long-term viability of restoring fish passage and fish populations, to the **indisputable benefits** and the **precedents** associated with restoring "full tidal flow" conditions to disturbed estuaries, to the known additional benefits associated with restoring the river ecosystem, estuary, channel and tidal bore, we would therefore make the following suggestions:

Recommendation 9 – That it is premature to reject Option 5 (Replace Causeway with Partial Bridge) as an unnecessary long-term option to restore fish passage in the Petitcodiac River, and that the Special Advisor consider amending or retracting from the final report the following sentence: "providing for adequate fish passage, in my view, should not require resorting to Option 5", and

Recommendation 10 – That in light:

- **Of the limitations and the uncertainties associated with restoring long-term fish passage in Option 2 (Fishway), Option 3 (Gates Open During Peak Migration) and Option 4 (Gates Open Permanently)**
- **Of the recognised higher benefits associated with restoring long-term fish passage with Option 5 (Replace Causeway with Partial Bridge), as well as the associated benefits of a restored tidal bore for instance**
- **Of the fact that the unavailability of reliable dollar figures describing the benefits associated with Option 5 place it at a disadvantage when comparing this option with others on an "only cost basis"**
- **Of the fact that most experts, scientists and stakeholders recognise that the major risks associated with Option 5 and their mitigation measures are well documented, and that it is premature at this stage to suggest that these risks are unacceptable**
- **Of the fact that the great majority of stakeholders, scientists and experts believe that Option 5 will deliver the ideal conditions for restoring long-term fish passage conditions in the Petitcodiac River:**

That the Special Advisor consider recognising Option 5 (Replace Causeway with Partial Bridge) as the most logical and viable long-term option to restore fish passage in the Petitcodiac River

Conclusion

This document presented numerous comments and suggestions associated with the review on the Petitcodiac River causeway conducted by the Special Advisor to the Minister of Fisheries and Oceans, initially recognising some of the prominent key strengths of the Draft Report. It also recognised some of the unfortunate limits of the terms of reference of this review, and described their potential impact on this exercise and the ultimate future of the Petitcodiac River.

The document then proceeded to clarify some of the impacts, risks and benefits associated with the overall restoration project, as they related specifically to each option, demonstrating the unquestionable unsuitability of at least two options identified as "viable" to achieve the long-term objective of restoring fish passage in the Petitcodiac River (Options 2 and 3). More specifically, this response paper rejected the proposal presented in the Draft Report to begin the EIA project under conditions specified in Option 3 (Peak Migrations).

This document then proceeded to identify a number of serious limitations associated with Option 4 (Gates Open Permanently), within the framework of selecting the ideal long-term option to restore fish passage in the Petitcodiac River.

This having been said, the response recognises that beginning an EIA project with such conditions as are provided under Option 4 (Gates Open Permanently), in order to better prepare for the implementation of Option 5 (Replace Causeway with Partial Bridge) will allow the project to better manage its associated risks and impacts, reduce its overall time, costs and human resource requirements, all of which have important economic and social implications.

Many well documented reasons are provided in this document to suggest why Option 5 (Replace Causeway with Partial Bridge), is the most viable long-term option to restore fish passage in the Petitcodiac River, presenting in addition ideal conditions and numerous benefits associated with the "higher goal" of restoring the river, its ecosystem, estuary functions and tidal bore.

Now, on with the task of building this project, so that we can all partake in the benefits of:

- Undertaking New Brunswick and Canada's most long-awaited fish passage and fish habitat restoration project, its most important river restoration project
- Restoring pride in a unique New Brunswick and Canadian River and Natural Wonder
- Reversing one of New Brunswick's worst environmental mistakes of the 20th century, and putting an end to one Canada's longest environmental battles

Thank you for your consideration.

Annexe

Our Vision

Safe, healthy, productive waters and aquatic ecosystems, for the benefit of present and future generations, by maintaining the highest possible standards of service to Canadians.

Fisheries and Oceans Canada, 1999

Our Mission

To restore, preserve and protect the water quality, the ecological integrity and the heritage value of the Petitcodiac River system and the Shepody Bay estuary for the sake of our natural environment, and for the benefit and enjoyment of present and future generations in our communities. The Petitcodiac Riverkeeper will fulfil this mission by educating the public about the Petitcodiac River system and the Shepody Bay estuary, serve as an advocate and act as a watchdog for the watershed, with the goals of restoring and enhancing the river as a natural environment with great aesthetic, social, recreational, spiritual and socio-economic values.

Sentinelles Petitcodiac Riverkeeper, 1999

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February 5, 2001

Eugene Niles
Office of the Special Advisor
633 Main St., Suite 650
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Dear Mr. Niles:

This letter is in response to the first draft (January 22, 2001) of your "Review of the Petitcodiac River Causeway and Fish Passage Issues." I apologize for missing your January 31 deadline for comments. I trust this contribution is not too late to be taken into account.

I wish to commend you for the comprehensiveness and clarity of your synthesis of the history of the causeway and its effects, and of the issues with respect to it. I am concerned, however, that there is much less clarity with respect to the articulation of options and recommendations. I will deal with each of these separately.

1. Options

I wish to reiterate my concern with the narrowness of your mandate, that is to consider fish passage, as opposed to river or habitat restoration. As I had predicted, this constraint has influenced your analysis and presentation of the options. Even with this constraint, with respect to fish passage, I believe you have not fully considered the "long term viability" of the various options you present. Out of five possible options (dismissing the more elaborate ones), you have only ruled out the status quo (Option 1). This is despite strong evidence that at least two others (Options 2 and 3) have little chance of meeting the long term viability criteria.

Option 2: Replacing the fishway. Experience and the best judgement of a number of scientists and consultants cited in your report suggest that an improved fishway (Option 2) would be technically speculative, with no basis for judging its long term (say, 50 years) viability for the array of species in the river. Further, sedimentation would continue to be a problem, requiring every increasing management intervention. The Conservation Council therefore contends that this option should be ruled out as a long term option.

Option 3: Gates open during peak migration. This strategy will unnecessarily limit the ability of all species to optimize their use of the river. As you acknowledge, downstream passage is not accommodated by this strategy, nor is the passage of fish unlucky enough to attempt to navigate the river outside peak times. Such a strategy is not viable over the long term since it requires a high degree of ongoing management, oversight, and monitoring.

It requires a much greater degree of knowledge of fish and their utilization of the river and estuary than we now possess. It also sets the stage for rather spectacular failure down the road, from which fish populations may not recover. Further, valuable time and money will have been lost to yet another speculative experiment that is unnecessarily constrained by the externally imposed goal of trying to maintain some semblance of a head pond. This is exactly the trap that the 1998 and 1999 trial gate openings fell victim to. The mistake should not be repeated. As you point out, the lessons learned from those gate openings, as

well as the openings in 1988, 1989, and 1990, must be built upon, not ignored. Thus, this option should be ruled out as being viable over the long term.

Option 4: Gates open permanently. This option provides a much more realistic opportunity for viable fish passage. However, the long term viability of the river, and therefore the future of the species that inhabit it, remains in question. The effect of channelling the river flow through a 40 metre span will still create the sub-optimum conditions of any tidal barrier. Scour pools and erosion will still occur, sediment may continue to accumulate, and the velocity and amplitude of water flow through the barrier may well mitigate against certain species being able to use it effectively. Consequently, it remains to be proven whether it could be called a long-term, viable option.

Option 5: Replace the causeway with a partial bridge. Scientists will acknowledge that this option has the best chance of providing a long term, viable option for fish passage. It virtually eliminates the constraints to effective use of the river by all fish species. Clearly, this is the most fail-safe option for fish passage, and subsequent reproduction and re-establishment of populations.

The Petitcodiac River has suffered through three decades of tinkering with this or that to improve the conditions for fish, all to no avail. It's time now to get beyond this and adopt a strategy which has a high possibility of success. We urge you to acknowledge, based on your own inquiry, that Options 2 and 3 have a low probability of long term effectiveness. This would very quickly focus scarce time and resources on the two options which have the most likelihood of meeting DFO's goal.

2. Recommendations

With respect to your recommendations, I appreciate your first recommendation which is to propose that Option 5 be the "project" submitted for review under an environmental impact assessment. The recommendation becomes redundant, however, with your surprising concluding statement, "Providing for adequate fish passage, in my view, should not require resorting to Option 5." With respect, these two statements are contradictory and do not advance a logical, coherent solution to the Petitcodiac process. Instead, what is proposed is a confusing morass of projects to be undertaken which have nothing to do with the 'option 5' project or an EIA.

After carefully considering the full suite of recommendations, it is clear that you outline two distinct and mutually exclusive directions. The first direction is a set of recommendations dealing with an EIA (1, 2, 3, 4, 5, 7). The second direction (recommendations 8, 9, and 10) takes the approach of actual project implementation to determine outcomes. (Recommendation 6 doesn't seem to fit well in either camp.) The Conservation Council strongly favours the set of recommendations directed towards an Environmental Impact Assessment. Conversely, we strongly oppose those recommendations that deal with actual implementation of options on a trial and error basis (8, 9, 10).

It appears there is some confusion as to the purpose and conduct of an EIA. What you have proposed in Recommendations 8, 9, and 10 is the actual implementation of at least one, and up to four projects, each of which would have to run their full course, including monitoring, before any judgements could be made of their risks or suitability. This is not an EIA; it is trial and error project implementation. To run the gamut of options could take as

long as ten years, full implementation costs would be incurred, and environmental impacts would be inflicted. This is simply an untenable approach. An analogy would be to build the Confederation Bridge in order to find out what its impacts will be. If those impacts are unacceptable then it is torn down and something else is tried. Clearly this is not a desirable approach, and so an EIA is done prior to the project being undertaken.

The purpose of any EIA is to avoid this trial and error approach to project implementation. An EIA assesses the impacts of a clearly defined project prior to its implementation. This is done by bringing existing information and best judgements by informed people and agencies to a forum where it can be carefully scrutinized and analyzed, Where information is missing, new research can be commissioned under the auspices of the EIA. On the basis of existing and new information, recommendations for project implementation are made, based on the goals the project are expected to meet. In short, an EIA is a planning exercise which is meant to avoid costly mistakes and make the end project much better and the outcomes relatively predictable.

In the case of the Petitcodiac, you don't have to implement each of these options to figure out how effective they will be. An EIA, which includes the computer modelling exercise and a thorough examination of existing information under the direction of a qualified EIA panel, will provide the basis of knowledge on which to make a final project decision.

Let me address each recommendation in turn.

Recommendation 1: "that [governments] propose as the "Project" the construction of a partial bridge in the Petitcodiac causeway." This implies that an impact assessment study would be conducted on this project, and that this study would then be subject to a thorough public review under the auspices of an appointed EIA panel. Recommendations 8-10 contradict this and therefore should be dropped.

Recommendation 2: "that the proponents proceed expeditiously and in a step-wise fashion with the implementation of an EIA process...". I agree that the EIA process should be implemented expeditiously. Once engaged, it should also be carried out expeditiously. Again, recommendations 8-10 contradict this.

Recommendation 3. "That consideration be given to a review by GPI Atlantic or other similar agency to assist in defining and prioritizing the indicators and intangibles." We commend the inclusion of the reference to 'full-cost accounting'. However, this recommendation is insufficient as it stands. I believe the recommendation should explicitly state that the true costs and benefits of whatever option is chosen will be much better appreciated through the application of a full-cost accounting analysis. This methodology is being pioneered by GPI (Genuine Progress Index) Atlantic. In this regard, there is no other agency with this internal capacity. Further, the contribution of the GPI methodology should go beyond just 'defining and prioritizing the indicators and intangibles', to actually conducting a full cost accounting analysis based on those indicators. This is the second phase of the work proposed by GPI, where your recommendation only captures the first phase.

Recommendation 4. "That provision be made to include stakeholder participation....". We agree with this recommendation. Your reference to funding, however, is limited. Intervener or participant funding is to cover participation costs beyond just travel. CEAA now has

participant funding guidelines. It would be sufficient in your recommendation simply to reference these guidelines.

Recommendation 5. "That a mediator...be appointed early in the process...". We agree with this, but would urge that an expert in EIA and mediation processes (not necessarily environmental law) would be more useful than someone with scientific credentials. Also, I would counsel against naming potential candidates in the final report. I did not seek the permission of those I suggested before I passed their names on, and so I would prefer that they not show up in print. I assumed these would be submitted in private to the Minister.

Recommendation 6. "That the first five options be assessed to ensure that the risks associated with the status quo option are evaluated as well." The reference to 'the first five options' is confusing, as is the word "assessed." If your intent is to suggest that the risks associated with the status quo option be assessed in the context of an EIA, then that should be the recommendation.

Recommendation 7. "That experimental gate openings be carried out early in the EIA process to model free tidal flow impacts and to identify risks..." We support this recommendation in the context of collecting data to calibrate a model which would simulate the response of the river system to the "project" which would be the subject of the EIA – that is, to the construction of a partial bridge span in the causeway. This is in contrast to Recommendation 8.

Recommendation 8. "...it is recommended that DFO proceed with the proposal as defined in Option 3....This option should be monitored and evaluated for at least two full cycles before considering any other more costly options."
Recommendation 9: "Should the risks associated with Option 3 prove to be unacceptable or the cost to mitigate unreasonable, it is also likely that Options 4 and 5 will also be unacceptable for the same reasons. Should this be the case, then Option 2, replacing the fishway, will need to be considered."
Recommendation 10: "Once Option 3 is implemented, if after an appropriate period of monitoring the results, it is clear that fish passage has not significantly improved, consideration must then be given to implementing Option 4 as the next logical step...."

These three recommendations contradict all previous recommendations and have nothing to do with an EIA. Instead, you give direction to actually implement options and study them once they are in place. This approach is expensive, time consuming and unnecessary.

To summarize, the Conservation Council proposes the following approach:

1. Limiting the options. Existing information, experience and best judgements should have dispensed with Options 2 and 3 as not being viable, long term options for fish passage. There is little evidence that any new experimentation with these options would result in anything useful. Surely we can take some advantage of the years of studies, reports, technical adjustments and various gate openings to move on from here.

2. Following the EIA course set out in Recommendations 1, 2, 3, 4, 5, 7. Given that the majority of people agree Option 5 would provide optimum conditions for long term, viable fish passage, the 'project' to be assessed by an EIA should be the partial bridge span. The

EIA would compile all available information, gather evidence from expert witnesses, and generate new information by running computer models calibrated to actual gate openings which should help in the prediction of impacts of the partial bridge. This information would be used to identify and mitigate potential impacts. The computer modelling would very easily be able to also predict the impacts and effectiveness of other options against which to compare the risks and benefits.

The full-cost accounting analysis should be undertaken to provide a comprehensive understanding of the costs and benefits associated with the project, and the alternative, option 4. It goes without saying that the status quo would also be analyzed since this would be the baseline situation against which any changes would be measured. Only such an analysis will provide an reliable basis on which to make final decisions on the 'value' of the project.

Finally, we also wish to acknowledge the substantial brief prepared by the Petitcodiac Riverkeepers in response to your draft report. Nothing in this letter is contradictory to that analysis, and CCNB concurs with their analysis of the document.

I strongly urge you to reconsider your recommendations in light of these comments. Once again, I appreciate the ample opportunity the Conservation Council has had to contribute to your review.

Sincerely,

Janice Harvey
Marine Conservation Director
Conservation Council of New Brunswick

Jim Wood for ALMA FISHERMAN'S ASSOC.

FEB 1 2001

Mr Eugene Niles
Special Advisor to the Minister of Fisheries & Oceans
633 MAIN St. Suite 650
Moncton NB

Re Niles Report

The ALMA Fishermen's Association has appreciated the opportunity to meet with you, in conjunction with LPPA, and seperately on several occasions.

Please accept the following in addition to the verbal feedback concerning report on Dec 28^{00} & Jan 29^{01}.

The Association remain convinced that the construction of the causeway has had a positive effect on the marine ecology of the lower estuary, Shepody & Chignecto Bays. These areas of ocean while geographically small have become extremely productive for lobster & scallop in the past 15 years. We suspect this is true for other species as well. However we do not fish other species & unfortunately there has been no such monitoring by DFO or other agency.

We maintain that an Environmental Assessment is necessary to provide accurate essential baseline data concerning the

Upper Bay Area. Surely much of the confusion by scientists, as evidenced in the Report, must be attributed to their virtual complete lack of knowledge about this area & what's going on in it. It is inconceivable that responsible agencies, both gov't & NGO's, would push major changes to the Petitcodiac/Shepody system without first assessing the system as a whole. The insistence by many scientists that "opening the gates" would have no effect on the lower estuary is completely irresponsible.

DFO has stated their intention to open the gates since at least 1980. This must make it very difficult of any DFO staffer or scientist to support any other option or position as well many of these folks don't believe that any effect will be felt downstream & thus no resources, time or interest have been allowed to develop. This is not right nor in the overall interest of the ecological future of this area.

Specifically to the recommendations:
Recommendation 1. This is the worst case scenario and not acceptable.
2. Essential that any EIA be completely developed with input from all, & accepted before any further activity goes ahead.
3. Again it is crucial that whatever party carries out an EIA their terms of

referred be acceptable & supported by all
#4 —
#5. Since this is not an all inclusive list why not dispense with it.
#6. Essential that each option be evaluated thoroughly with a fair assessment.
#7. We do not support opening the gates. Leachate and sewage issues must be examined. Dilution is not the solution - contamination from the dump has potentially catastrophic results for the fishery. ie the tainted mussel problem in PEI & lately the PEI potato issue. Real or feigned the damage to the fishery will be unacceptable.
#8. - #10.
"higher goals of restoring the estuary, restoring the river & the Tidal Bore, or to rehabilitate the system as a whole" We are not sure what these terms actually mean - but read them in the newspaper, as catch-alls for blindly supporting a particular point of view. We are not sure why they are in your report.

Yours sincerely.

James J Wood
for the Alma Fishermens Association