

**KELLIGREWS ECOLOGICAL
ENHANCEMENT PROJECT
WATERSHED MANAGEMENT
STUDY**

Conception Bay South, Newfoundland & Labrador

Supported by

The EcoAction Program, Environment Canada

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EXECUTIVE SUMMARY

This report is presented by consultants ECDC (Extension Community Development Co-operative) under contract to KEEP (Kelligrews Ecological Enhancement Program). The study was funded by Environment Canada under their EcoAction Program.

KEEP is a volunteer, non-profit registered charity founded in 1999 to preserve, protect and enhance the natural environment for the benefit of present and future generations. As well as planning for recreational development of the area, KEEP conducts educational and research activities and oversees the condition of the waterways.

The purpose of the study was to begin a process that would end with a watershed management plan for the Kelligrews and Lower Gully Rivers at Kelligrews in the town of Conception Bay South (CBS), near St. John's, Newfoundland. It is not a technical document but rather an exploration of the issues faced by KEEP in protecting these watersheds and of how these issues should best be addressed.

One part of the study is a mapping project which will develop a database that will permit the mapping, monitoring, modeling and impact analysis of land-use changes within the watershed area. The mapping project uses historical land-use data, digital elevation models and soil and forestry data as well as aerial photographs. A virtual model of the Kelligrews River watershed is also being constructed. Delays in obtaining some of this information mean that the mapping project is not yet complete.

There are competing uses of the watershed area, some of them long established, which include industry, quarrying and agriculture as well as residential, recreational and sporting uses. Several busy highways cross the watershed area; there is also a sewage waste treatment plant and a decommissioned dump and incinerator site on or near the Kelligrews River. All these uses must be reconciled in a watershed management plan.

The watershed area is governed by two sets of municipal regulations, those of CBS and St. John's. A variety of federal and provincial government departments also have responsibility for various aspects of the watershed area. A summary of the major legislation, regulations and guidelines is given in an appendix.

ECDC carried out the study through key informant interviews, stakeholder consultations and public participation and by reviewing regulations. The aim was to gather information from the public while encouraging public participation, so as to engender public trust in the process and acceptance of the ensuing report.

Issues identified:

Issue no. 1: Recreational uses of the rivers. There was general agreement that recreational uses will be the future purpose of the watershed area, including walking trails and educational activities.

Issue no.2: Reconciling conflicting uses. Though some would allow little other than recreational uses of the watershed area, most felt that other uses will persist and must be reconciled, especially housing, industry and quarrying.

Issue no. 3: Regulations to protect the watershed area. Many respondents complained that there were few regulations to protect the area and that there was little enforcement of what regulations do exist.

Issue no. 4: How to manage the watershed area. Three views of how this should be done were (1) to work through municipal regulations; (2) to set up a separate management authority and (3) to work through municipal regulations and set up an advisory committee to oversee their application..

Issue no. 5: KEEP's role in management. Regardless of which management option (under issue no. 4) was adopted, KEEP's role would not be managerial. Rather, under any option KEEP would play advisory, custodial and educational roles as well as conducting research.

Issue no. 6: Present health of the river systems. Respondents differed on whether they considered the rivers' present health to be good or bad, while still others deferred judgment until more research could be conducted.

Recommendations:

- 1) Map land ownership in the watershed area.
- 2) Develop a watershed management plan for the area through consultation with the public, municipalities and government agencies. Adopt the plan, including provisions for monitoring and evaluating the implementation of the plan.
- 3) Designate proposed uses of the watershed area by zone including proposed recreational features and uses. The zoning plan should take into account hydrology, land use and pollutant and risk inventory. Zoning should be done in consultation with the municipalities so that the uses can be reflected in their municipal plans, as well as in consultation with users and stakeholders.
- 4) Decide what regulations are needed to reach goals in terms of recreational uses and water-quality and have them incorporated into the CBS (and perhaps St. John's) municipal regulations, as in 2) and 3) above.
- 5) Adopt a custodial rather than directly managerial role in administering the watershed management plan. KEEP would be watchdog, monitor, educator and researcher.
- 6) Determine the present state of health of the river systems, identify threats to their health, set goals for what the state of the river systems should be, identify deficiencies and means of remedying them and devise a plan for reaching the desired state of affairs.

7) Set up at least one water-quality testing station on each of the Kelligrews and Lower Gully rivers.

8) KEEP's board of directors and technical team should participate in a strategic planning process to decide what steps should be taken in the short, medium and long terms in the light of this report.

INTRODUCTION

This report was prepared by consultants Extension Community Development Co-operative (ECDC) in fulfilment of their contract to develop a watershed management plan for certain waterways in the Town of Conception Bay South (CBS), namely the Kelligrews River and Pond and the Lower Gully River and Pond and their tributaries. This work was conducted on behalf of the Kelligrews Ecological Enhancement Program (KEEP). A brief profile of KEEP is given below, along with an account of how the work was conducted. We should explain that in this study the term watershed means the drainage basin of a river or rivers – not, as in the City of St. John’s municipal plan, the area around a drinking-water reservoir. A computer-mapping project, which was part of this study, is described below.

This study explores the issues facing KEEP in addressing the management of the watershed area, how these issues should best be treated in a watershed management regime (and by whom) and what KEEP’s role in the management of the resource should be. This exploration was carried out through consultation with affected interests and knowledgeable persons and agencies through a participatory process, as is detailed below.

KEEP Mapping Project

The aim of the KEEP mapping project is to develop a reliable and standard geo-spatial database that will permit the mapping, monitoring, modeling and impact analysis of land-use changes within the watershed area. To that end historical land-use data from the 1986 Canada Land Use Monitoring Program (CLUMP), digital elevation models (DEM), soil and forestry data from the provincial government and recent digital aerial photographs from both the Town of CBS and the City of St. John’s are being integrated in a geo-spatial database. Land activity information is presently being digitized from the aerial photography and will not be completed until late spring. The reason for the delay is that access to the St. John’s digital aerial photography was not approved until February of this year. Information digitized from the digital aerial photography will also be stored in standard ArcMap geodatabase format and can be used for a myriad of applications such as land-use change analysis and watershed hydrological modeling. In addition, a virtual model of the Kelligrews watershed is being constructed and will be available in mid April of this year. In the short term the final database will be housed in Memorial University’s Department of Geography’s GIScience Research Laboratory. After the database is completed a spatial temporal land use change analysis will be completed and the data will be made available to researchers and students who are interested in studying the physical environment of the Kelligrews and Lower Gully Rivers’ watershed. The final completion date for the geo-spatial database is late spring, 2007.

ABOUT KEEP

KEEP is a volunteer, non-profit, registered charity established in 1999 to promote sound environmental stewardship through long-term planning and community participation. KEEP is a committed supporter of sustainable development. The mission of the organization is to conserve, preserve, reclaim and enhance surrounding waters, environment, flora and fauna of Farrell's Grove, the Kelligrews River and Pond and the Lower Gully River and Pond as well as wetlands, forests and beaches. To this end, KEEP has developed a conceptual plan for these areas designed to enhance recreational and educational opportunities through interpretation and the development of trails that encourages citizens' participation and promotes the importance of a safe, healthy and sustainable environment. All ecologically sensitive areas are being identified, monitored, analysed and evaluated to determine the action required to protect, preserve and remediate where necessary. The area served by KEEP is also instrumental to promoting tourism in the Town of CBS. Nevertheless, threats to the health of the river systems occur through quarrying, businesses in adjoining areas, residential development, road-building and pollution, hence the identified need for a watershed management plan.

KEEP has fulfilled several roles in relation to the rivers. One is educational: presentations have been made to schools, materials developed for the use of students and talks given to community groups to raise public awareness of the importance of the waterways and of environmental considerations in general. Another is oversight – KEEP members have monitored the condition of the waterways and brought any unsatisfactory conditions to the notice of the public and of the authorities, which has sometimes resulted in remedial action. KEEP also carries out promotional and fundraising activities (including the annual Railway Festival), conducts clean-ups and has commissioned research into the quality of the rivers' waters. KEEP's ultimate purpose is to conserve the waterways for recreational use, including walking trails (connecting with existing and planned trails) and outdoor educational structures.

CONTEXT OF THE STUDY

Kelligrews is now part of the Town of CBS, incorporated in 1973, which was formed of nine communities along the southern shoreline of Conception Bay about 20 kilometres from St. John's. CBS is now Newfoundland's largest and fastest-growing town with a population of 21,000 and more than 200 new houses built annually in recent years.¹ There is a sizeable local business community (and more in adjoining areas of St. John's), though most residents work in St. John's. Despite urbanization, agriculture remains an important industry in areas of CBS, particularly in Kelligrews.

Being formed of nine coastal communities, CBS is a long town – some 26m – but it is a narrow one and does not stretch far inland. Expansion of the town is blocked by the waters of Conception Bay on one side and by the City of St. John's on the other. Growth in population, therefore, has been accommodated by infilling and in recent decades housing has spread far inland from the earlier areas along the coastal road. This has put pressure on natural resources, as housing developments have led woodlands to be cleared and former agricultural land to be converted to residential uses. It is this pressure upon

¹ Source: Town of Conception Bay South Community Profile, 2005.

resources by development that has led organizations such as KEEP to want to preserve natural resources for the benefit of residents of the town.

Complicating their efforts to do so is the situation of CBS, alluded to above, in close proximity to St. John's, with which it shares a land boundary. Some CBS residents consider the present position of the boundary to be anomalous. For instance, the headwaters of the Kelligrews and Lower Gully Rivers both lie within St. John's, though they flow for most of their length through CBS. Similarly a body of water known as Black Mountain Pond – long considered a possible future reservoir for CBS and historically considered part of Kelligrews – also lies within St. John's. Conservation of the rivers, therefore, is complicated by the need for co-operation between two municipal bodies.

ACTIVITIES IN THE WATERSHED AREA

Complications arise, as noted above, from the jurisdictional overlap affecting the watershed area. In addition, the area of the headwaters of the rivers lying within St. John's is one of heavy (and possibly polluting) industrial sites, especially along Incinerator Road. These sites include that of the former CBS incinerator and dump-site, which give the road its name, along with industries concerned with concrete-making, meat-rendering, sewage waste disposal, asphalt making and toxic waste disposal, as well as a storage site belonging to the Department of Highways.

Along the course of the rivers within CBS there are long-established industrial uses, in particular quarrying pits (some very close to the waterways) and, to a lesser extent, agricultural uses. Housing development has in some cases also come close to the waterways and they have also been affected by the building of the Route 2 road from St. John's to Legion Road in Kelligrews. There has been, moreover, a continuing problem of raw sewage leaking from the Cronin's Head plant (at the mouth of the Kelligrews River) whenever computers malfunction or the power is lost at the plant. There are thus many competing uses of the waterways and their hinterlands, all of which must be managed and reconciled to some extent in devising a watershed management plan.

REGULATORY REGIME

The overlapping jurisdictions of two municipal bodies have been mentioned, but a variety of governmental agencies administer legislation that bears in some way upon the waterways. The Environmental Protection Act and Water Resources Act apply in general to the waterways for obvious reasons, but there are other pieces of legislation that govern them in more limited contexts. As the rivers contain fish, there is the Fisheries Act; as they are bordered by woodlands there is the Forestry Act; as they are affected by extractive industries there are the Minerals Act, Mining Act and Quarry Materials Act to mention but a few. In general these regulations require potentially harmful interventions to be approved and require some buffer zones to be observed around waterways, usually in accordance with municipal regulations to the same effect; there are also provisions for remediation after industrial activities. A review and brief synopsis of the major pieces of legislation that apply to the waterways in question is given in appendix A.

The two municipal jurisdictions that govern the watershed area are CBS and St. John's; their relevant regulations are also summarized in appendix A. St. John's (under whose regulations this would not count as a watershed area) requires a 15-metre buffer

zone to be preserved along waterways, the distance being measured from the 100-year high-water mark. Little but recreational use of the buffer zone is allowed. In CBS most waterways have open-space designation around them. Buffer zones around waterways are required but their width varies and the 100-year mark is not used in CBS.

This is, in short, a difficult area for which to devise a watershed management regime. One respondent, in fact, suggested during the study that this watershed area management plan be recommended to the Minister of Environment as a model for sustainable development just because it is so difficult and complicated an area in which to work.

DESIGN OF THE STUDY

The study was conducted using a variety of methods: review of regulations, key informant interviews, stakeholder consultations and public participation, as are described below. All questionnaires, agendas and other data-gathering instruments are given in appendix B.

Throughout the study our aim was both to gather information from the community and to engender public participation in the construction of a watershed management plan, so as to encourage public trust in the process and to develop a plan that enjoyed widespread acceptance in the community. Key informants were therefore chosen and the consultations designed using the notion of three clusters, which represented the interests affected by the plan. These three clusters were:

- (1) Regulatory agencies that have responsibility for some aspect of the watershed area;
- (2) Businesses that might affect the watershed area or be affected by the watershed management plan;
- (3) Community interests and agencies, including farmers, residents of the watershed area and the general public.

Key informant interviews: Twelve key informants were interviewed, who were chosen in consultation with KEEP to represent the three clusters - regulatory agencies, businesses and the public. These interviews were conducted by telephone or in person using a questionnaire designed by the consultants

Cluster meetings: Separate meetings with representatives of each of the three clusters – regulators, businesses and the public - were held in Kelligrews on the dates given below:

- 1st cluster meeting, with regulators, 28th June 2006
- 2nd cluster meeting, with businesses, 19th October 2006
- 3rd cluster meeting, with the community, 18th January 2007

Attendance at the first two was by invitation, but the third cluster meeting was open to the public. The first and third meetings were well attended, but attendance at the second (with businesses) was disappointing. However, some business people were interviewed as key informants and KEEP sent out a follow-up questionnaire to businesses that were not represented at the cluster meeting, so input from the business community was obtained.

Further public input into plan: Once data from the above sources were analysed a draft report was prepared and presented to a public meeting in Kelligrews on 22nd February, 2007. Public comment on the draft report was used to revise the draft into the final watershed management study report.

Regulatory review: The consultants reviewed the major federal, provincial and municipal regulations that govern the watershed area together with the regulations of two watershed management authorities elsewhere in the province. A summary of the provisions of these regulations that are likeliest to affect the Kelligrews and Lower Gully River watershed area is given in appendix A.

ISSUES ARISING DURING THE CONSULTATIONS

Much information was gathered during key-informant interviews and other consultations about issues that need to be addressed in a watershed management plan. Six issues were identified that arose persistently during the consultations and appeared to be the most important to the endeavour, which are:

Issue no. 1: Recreational uses will in future be the most important use of the watershed area.

Issue no. 2: Reconciliation of conflicting uses of the watershed area.

Issue no. 3: Protective regulation of the watershed area will be needed. At present there is not enough regulation, there is little monitoring and the few regulations that do exist are not strictly enforced.

Issue no. 4: Two views of how to protect the watershed area were voiced – one is to write regulations into the CBS municipal plan; the other is to set up a watershed management authority.

Issue no. 5: KEEP's role in the management of the watershed area should be custodial – monitoring, advising and researching - and educational, but not managerial. KEEP's role in the community was also discussed.

Issue no. 6: The present health of the rivers produced opinions that may be divided into those of optimists, pessimists and sceptics. Pessimists think that the area is already badly damaged; optimists think that it isn't, but that the situation might get worse; and sceptics call for scientific research to determine the present health of the rivers and the direction of threats to its health. Each of these issues is examined in greater detail below.

Issue no. 1 - Recreational uses of the rivers: "There's a lot of life in that river."

There was general agreement that recreational uses will be the future role of the watershed area, perhaps enhanced by suitable grading and planting and the construction of an outdoor classroom. Walking trails were the most frequently mentioned recreational use along with fishing, sports, bird watching, horse-riding, educational tours and swimming. Recreational development of this nature would contribute to public health, enhance the natural beauty of the area, improve the quality of life, increase the value of housing and other property and create a useable resource for the next hundred years.

Recreational development would also contribute to the local tourist industry (as is said to have happened with the Manuels River) and provide economic benefits to local

businesses, especially if the trails can be linked to other trail systems in CBS and it is hoped that it would also improve wildlife habitat. It is also said that trail construction in other areas has raised public awareness of environmental protection, which has helped to improve the health of streams where trails have been constructed.

Mention was also made of possible damaging effects of recreational development, which would need to be addressed by design, monitoring and regulation. It was observed that in other jurisdictions trail construction has led to an increase in vandalism, nuisance and theft, especially when trails pass close to houses and give easy access to them. Noise, dust and the dumping of garbage were mentioned as other possible consequences of trail development. Businessmen and residents at the cluster meetings raised some concerns that this might happen in the watershed area. These harmful consequences, it was felt, should be addressed by leaving buffer zones around trails that would protect nearby residents.

Issue no. 2 -Reconciling conflicting uses: “Development is good but it shouldn’t be ugly.”

Some respondents would allow little other than recreational uses of the watershed area, as is the practice of the St. John’s City Council in buffer zones along waterways. Most, however, acknowledge that existing non-recreational use of the area will persist and would allow most development in the watershed area provided that was not detrimental to the integrity of the watershed area, though with no new non-recreational development allowed within the buffer zones along the rivers.

It is recognized that reconciling conflicting uses of the watershed area will not be easy. The task is, moreover, complicated by the watershed area falling under two municipal jurisdictions, CBS and St. John’s. Existing businesses within the watershed area constitute one barrier to development of a watershed management plan. It was suggested by one municipal official that land ownership may be another barrier and that it may be difficult to identify land ownership along the rivers.

Most respondents who discussed threats to the future health of the rivers concentrated upon the possible harm caused by industry. One respondent, however, discussed the harmful effects of housing development (particularly regarding silting of the rivers). This respondent called for stricter regulations to apply to housing development in the watershed area and not just to business development – in fact, for a designing rather than engineering approach to housing development that would incorporate the expertise of landscapers and ecologists into the design. More vegetation would be retained on housing sites and walking trails incorporated into housing development and building would be kept farther than at present from the waterways so as to reduce silting of the rivers. Altogether, a planned management approach to all forms of development in the watershed area is the key to protection of the waterways and reconciliation of conflicting uses of the watershed area.

Issue no. 3 - Regulations to protect the watershed area: “Government departments don’t even talk to each other, let alone monitor.”

Residents of the area who were interviewed commonly complained that there were few regulations to protect the watershed area. In one way this is inaccurate, as CBS and St. John’s both have development regulations that cover the watershed area. In

appendix A are summarized nine pieces of legislation or guidelines that apply to some aspect of the watershed area – many of which require control measures to be incorporated in projects at the approval stage. Moreover, Newfoundland is said to be a leader in watershed management in terms of legislation. Respondents, however, said that there is little monitoring and that the few regulations that exist are not strictly enforced – for instance, the Town of CBS has one municipal enforcement officer. The requirements for buffer zones along streams were often mentioned as an example of non-enforcement, as were regulations requiring remediation after industrial uses. In general it seems to be felt that authorities proceed by public complaint rather than by routine monitoring. No one authority is responsible for monitoring or enforcing regulations and some suggested that if one authority were responsible for monitoring and enforcement the watershed area would be better protected.

Issue no. 4 – How to manage the watershed area: “At present [the watershed area] is managed on the basis of out of sight, out of mind.”

Respondents expressed three views of how the watershed should be protected and by whom, though all were agreed that, however it was done, regulations would be required along with the will to enforce them. The differing views were:

a) *Work through municipal plan:* Watershed management regulations should be incorporated into CBS’s (and perhaps St. John’s’) municipal plan. This could be done once a watershed management plan has been devised. One suggestion is that a steering committee could then be established to monitor implementation and review development applications affecting the watershed area. There is, however, the complication that St. John’s also has jurisdiction over part of the watershed area. The CBS council has already suggested to St. John’s that they jointly manage the Kelligrews River.

b) *Set up a separate authority:* A watershed management authority should be established that represents all the interests that govern the watershed area to administer the watershed management plan. Some respondents, however, were wary of setting up a separate authority because of the confusion of jurisdictions involved and the uncertainty of how such a body would relate to existing authorities. Some also wondered if enough resources of time, money and personnel would be allocated to a management authority to enable it to work effectively.

c) *An advisory committee:* In this view, espoused by some key informants, protection would first be written into the CBS municipal plan and an advisory committee to oversee application would be set up later. The advisory committee would have representatives from city, town, government and business and would regulate development in the watershed area. A stormwater-management plan might also be managed by this committee. The same reservations regarding resources were expressed about this option as were expressed about option b) above. It was also noted that St. John’s and CBS already consult informally about applications near their boundaries.

Issue no. 5 – KEEP’s role in management and the community: “KEEP mustn’t be seen by the community as extremists.”

Some respondents discussed KEEP’s role in the community. In general KEEP’s role was acknowledged and affirmed during the consultations, but some respondents cautioned against KEEP being perceived as anti-business or anti-development. KEEP therefore needs to consider this view (whether justified or not). It should develop broad-based community support by representing the interests of all parties including the general community. Any approach that is seen as being adversarial may create resistance to the fulfilment of plans for the watershed.

Regarding KEEP’s role in the management of the watershed area, we have identified several elements, which are:

- a) Managerial:* Regardless of which watershed management model (under Issue 4) was adopted, KEEP’s role would not be managerial, though it is expected that KEEP would play at least an advisory role in any option that was adopted. Some respondents also suggested that CBS council should have a representative on the KEEP board.
- b) Custodial:* The lack of monitoring was mentioned and it is this custodial role that most respondents thought the most important task of KEEP – as custodian, monitor and watchdog in protecting the health of the watershed area.
- c) Educational:* KEEP already has programmes aimed at schools, which construction of the proposed outdoor classroom would no doubt enhance. There is also a public education role for KEEP in regard to protection of the environment – some respondents referred to the remnants of a frontier mentality among some residents and the need for KEEP to build an ethic of conservation and stewardship in the community.
- d) Research*

Issue no. 6 - The health of the river systems: “Identify the problems and see if they really are problems.”

It was noted earlier that respondents differed on whether they thought the present condition of the rivers good or bad, while others deferred judgement until more scientific research has been conducted². Water-quality monitoring has been suggested as one activity for KEEP. It is believed that if KEEP could raise the money for the necessary equipment, the Water Resources Management Division of the Department of Environment and Conservation would install, operate and service it. An estimate of the capital cost of establishing a water-quality testing station is given in appendix D; this would be a hydrometric station also capable of real-time water-quality monitoring. It is understood that there would be an annual operation and maintenance cost of \$12-16,000 as well as a cost of \$5-10,000 for building a shelter and deploying the instruments in addition to the capital cost.

² Northeast Avalon Atlantic Coastal Action Plan (NAACAP) has tested water-quality and issued a report on Nut Brook at the headwaters of the Kelligrews River (for which see www.naacap.ca).

CONCLUSIONS AND RECOMMENDATIONS

This report is the first step in a process towards a watershed management plan for the Kelligrews and Lower Gully rivers. The boundary between CBS and St. John's might one day become an issue and this and many other factors could affect the development and implementation of a watershed management plan.

Accordingly, this section is restricted to recommendations that arose in the course of the study's consultation process. In general it may be said that respondents affirmed the importance of KEEP's activities and approved of its role in protecting the watershed area. KEEP may well wish to build upon this reservoir of good will by involving all stakeholders in the planning process and in particular ensuring close co-operation between CBS and St. John's in respect of planning for the future of the watershed area. It was recommended during the consultative process that KEEP take the following actions:

- 1) Map land ownership in the watershed area, in which the Lands Branch of the Department of Environment and Conservation may be of assistance.
- 2) Develop a watershed management plan for the area through consultation with the public, municipalities and government agencies. Adopt the plan, including provisions for monitoring and evaluating the implementation of the plan.
- 3) Designate proposed uses of the watershed area by zone including proposed recreational features and uses. The zoning plan should take into account hydrology, land use and pollutant and risk inventory. Zoning should be done in consultation with the municipalities so that the uses can be reflected in their municipal plans, as well as in consultation with users and stakeholders.
- 4) Decide what regulations are needed to reach goals in terms of recreational uses and water-quality and have them incorporated into the CBS (and perhaps St. John's) municipal regulations.

This recommendation means that option a) in issue no. 4 is preferred – that is, that KEEP work through municipal regulations rather than setting up a separate management authority, of which we doubt the practicality in view of the jurisdictional overlap. We leave open whether a standing advisory committee would be preferable to ad-hoc consultations.

- 5) It follows from the previous recommendation that KEEP's role in administering the watershed management plan would be custodial rather than directly managerial – in other words, KEEP would remain an environmental lobby group. KEEP's role would be that of watchdog, monitor, educator and researcher and this relationship might be formalized through memoranda of understanding with the CBS and St. John's councils.
- 6) Determine the present state of health of the river systems, identify threats to their health, set goals for what the state of the river systems should be, identify deficiencies and means of remedying them and devise a plan for reaching the desired state of affairs. It has been suggested that the Department of Environment and Conservation may be able to assist in this task.

7) Set up at least one water-quality testing station on each of the Kelligrews and Lower Gully rivers. A cost estimate is given for one such station in appendix D.

8) KEEP's board of directors and technical team should participate in a strategic planning process to decide what steps should be taken in the short, medium and long terms in the light of this report.

Appendix A

Regulatory Review Summary

REGULATORY REVIEW SUMMARY

The following is a brief review and summary of the principal federal, provincial and municipal regulations and guidelines that apply to the watershed area. Most sets of regulations are available on departmental web pages; the CBS and St. John's municipal regulations were given to us by their respective planners. Reference to two other watershed management areas in the province, the Gander River and Steady Brook, are included for information, though not strictly relevant to the KEEP case.

Agricultural practice guidelines

The Agrifoods web site gives environmental guides for poultry, livestock and horticultural producers. Together they run to hundreds of pages and are only marginally relevant to KEEP's concerns, so we have not reproduced them here. They do cover some matters that might be of interest to KEEP including separation distances for manure storage from watercourses and wells, manure application, prevention of pollution, storage of petroleum products and the storage, use and disposal of pesticides. They are, however, only guidelines and are not legally required to be followed. The section from the horticultural guidelines on preventing pollution, which seem to have the most relevance to KEEP, is reproduced.

CBS municipal plan and development regulations

In a nutshell, most waterways have open space designation around them. Buffer zones are required, though they vary in width and CBS doesn't use the 100-year high-water marks as St. John's does. Relevant sections of the Development Regulations are part 2, items 19 (dedication of land for public use) and 20 (reinstatement of land); part 3, items 25 (alterations to the natural environment - note that alterations harming watercourses aren't allowed), 28 (buffer strips), 44 (mineral exploration) and 70 (watercourse protection - requires 15 metre minimum buffer zone). Other relevant provisions are in schedule C, Use Zone Tables, which set out requirements for development in each use zone - see provisions for open space conservation (p.23, what uses are permitted in open space zones) and mineral working (pp.24-27, requirements for carrying out quarrying etc), especially items 3 (water pollution) and 9 (rehabilitation).

City of St. John's Development Regulations

Voluminous, but the relevant portion is in a few pages - section 8 of the Municipal Plan Resource and Environmental Areas. These are divided into watersheds (which in the municipal plan means the areas around reservoirs) and environmentally valuable areas, which is what the watershed area would be if it was in St. John's. Any development in environmentally valuable areas is subject to a land use assessment report and a conservation plan. A 15-metre buffer zone is reserved from the 100-year high-water marks of bodies of water and some other buffers are required to preserve open space and near highways. Passive recreational uses are allowed in environmentally valuable areas but not much else and the only buildings allowed are for these uses or for flood control etc. There are also agricultural and forestry districts and restricted development districts around environmental hazards

Environmental Protection Act

This covers the release of harmful substances into the environment, waste disposal and management, use of pesticides etc. Basically it says that you can't release harmful substances into the environment unless the minister approves it (or it's exempted) and are supposed to report it and make remediation if you find that you've done so.

Perhaps most relevant to KEEP are the rules (p.26ff) concerning environmental assessments, previews and impact statements. Any undertaking that might harm the environment is to be notified to the minister. He may forbid or approve it or may call for an environmental preview report or an environmental impact statement, to be prepared under guidelines that the minister decides. If the latter, then the proponent writes it but is supposed to consult all interested members of the public, who can submit comments to the minister (the impact statement itself will also be released to interested persons). If the minister decides that it would be in the public interest, he may order public hearings.

In a nutshell, environmental assessment procedures are very much at the discretion of the minister, though if the procedure goes far enough it is supposed to include public input - that is, if the minister doesn't use his powers (see p.35) to exempt a proposed undertaking from the environmental assessment procedure altogether.

Fisheries Act

The crucial section appears to be that headed Fish Habitat Protection and Pollution Prevention (sections 34-42, especially 34 & 35). These forbid any harmful alteration to fish habitat except by permission of the minister. The mnemonic HADD (harmful alteration, disruption or destruction) of fish habitat is used.

Some other sections of the act could apply to the watershed area in some circumstances, for instance sections 20-22 (also 66 & 67) govern fishways and could apply here if the rivers were dammed. Note also sections 30 & 69 regarding guarding water intakes.

Some other items on the same web site under related regulations may be of some interest - the Meat & Poultry Products Plant Liquid Effluent Regulations might be relevant to the meat-rendering plant on Incinerator Road.

Forestry Act

This concerns the management of forests on crown and public lands but, as far as can be found, makes not a single reference to water. The minister may require protection of the environment as a condition of the issuance of a cutting permit and cutting is banned within 100 metres of a highway, but there is no mention of a buffer zone around streams.

The department does, however, have environmental protection guidelines, a copy of which is attached. Most of them appear to apply to large-scale commercial cutting. Of most relevance to KEEP is section 1.2, which requires a buffer zone of at least 20 metres to be kept around (even small) bodies of water and forbids the use of petroleum products within that distance. Greater distances are required around protected water supply areas.

Note the last article of the guidelines (p.19), which states that forestry within a planning area must meet the regulations of the planning authority, usually municipal but also the Development Control Unit of the Department of Municipal and Provincial Affairs.

Gander River Management Association

A copy of their management plan from three years ago is reproduced - it's still relevant, as their plans haven't changed. The relevance of the GRMA to KEEP is debatable, as their main aim is conservation of salmon stocks, though they do try to balance the interests of all users of the river and have done so successfully despite conflicts. The GRMA is governed by a volunteer board of directors, each of whom represents an interest, though they have no powers except consultation. Government departments do, however, take their concerns seriously and provide most of their funding.

Lands Act

For KEEP's purposes, the meat is in section 7 (pp.6-7, Reservation of Shoreline), which deals with buffer zones around waters. Generally, 15 metres is reserved, though it may be less adjoining residential land and grants to the waterline can be made for aquaculture, road construction and some other purposes, though the public must still have access. Section 16 (p.9), however, appears to say that this act doesn't apply to lands granted before the act came into force. Note also section 15 (p.9), which says that a land grant doesn't convey rights to the minerals under that land.

Minerals Act

This governs acquisition of rights to minerals - leasing, staking, exploration etc. - rather than their extraction, but it's included because of its relevance to the local quarrying industry.

Also included are environmental guidelines for construction and mineral exploration companies. They are guidelines not regulations, so are not binding, but there is much in them of relevance to the watershed area. They cover such matters as respecting buffer zones around water, leaving tree screens, mitigation in clearing near streams or after quarrying and mineral exploration - drilling, blasting, trenching and restoration afterwards. Note that there are legal requirements about quarrying near water, covered under "Planning" section on page 3 of the guidelines. The guidelines also cover restoration after quarrying, etc., though it's unclear if these are required or merely advisory (see "Restoration" etc on p.4ff).

In the guidelines is a long list of regulations etc. that might be required for mineral exploration, organized by government department. This list might have many uses as a digest of requirements for many activities relating to the watershed area.

On the same web site (Mines & Energy) there are also the minerals regulations under the Minerals Act. None of these seems particularly relevant to the present task, but the regulations are easily found if needed.

Mining Act

This applies also to quarries: an operator requires a lease, a development plan and a rehabilitation and closure plan. Also required are operations plans stating the proposed work for the coming year and an annual report at year's end. Operators are to carry out progressive rehabilitation, not just when the project finishes and financial assurance is required to ensure that it's carried out. If it isn't the minister can order the operator to carry out rehabilitation or have it done and charge the operator. See also the Quarry Materials Act, which is less specific about rehabilitation.

Quarry Materials Act, 1998

This governs the permits (short term) or leases (long term) required to remove quarry materials; note that short-term permits can be issued for removal from beaches, Of interest to KEEP is section 25, which allows the minister to make regulations for rehabilitation but doesn't actually require it - perhaps this is superseded by the Mining Act, the guidelines for which do require rehabilitation plans in operational plans, reports etc (see Mines & Energy web-site).

Note that under the Quarry Materials Regulations the minister can ban quarrying to protect environmentally sensitive areas or to prevent conflicts in land use.

Steady Brook Watershed Management Plan

This governs the drinking water supply of the town of Steady Brook. It may not, therefore, be highly relevant to KEEP's concerns, especially as there seem to be no industrial activities and little human use of the watershed area. It is intended to develop from the watershed management plan a template that other municipalities might use to develop their own management plans (this was in process in Summer, 2006). Some extracts from the Steady Brook Watershed Management Plan are reproduced.

Water Resources Act

This governs rights to and protection of bodies of water in the province, including ground water and forbids causing adverse effects to water. The minister may allow diversion of water for various purposes - a list of purposes in order of priority is given on p.12 - but occupants of property adjoining water are allowed to use it for domestic purposes that don't alter its quantity or quality.

Regarding protection, the minister may control uses of wetlands that might affect their hydrology (p.18), must approve flood-control schemes, sewage works and water works and may designate public water supply areas (p.22). There are also regulations regarding well drilling (pp.27-30).

On the same web site (Department of Environment and Conservation) are various sets of regulations under the act and policy directives relating to water-control matters, of which the most important from KEEP's viewpoint appear to be:

Environmental Control Water and Sewage Regulations 2003 under Water Resources Act (it regulates what you can put in sewers).

Policy Directive for Infilling Bodies of Water (basically, they're unlikely to allow it within a buffer zone around water).

Policy Directive for Development in Wetlands (basically, they won't allow it if it would cause flooding or pollution).

Works, Services and Transportation

The department's web-site shows no legislation for which the department is responsible that might affect KEEP. The most obvious effects on the watershed would come from the department's depot and the new highway, but presumably these are covered under legislation for which other departments are responsible.

Appendix B

Research Instruments

KEEP WATERSHED MANAGEMENT PLAN

Key Informants' questionnaire

NAME:

ROLE:

Note to respondents: We are consultants retained to develop a watershed management plan for the watershed area of the Kelligrews and Gully Rivers and their tributaries. We are using the same questionnaire for all key informants, even though all questions will not apply to all respondents. Please answer only those questions that you feel to fall within your area of experience or expertise.

A watershed is a land area that captures precipitation, filters and stores water and regulates its release at a common outlet. Each watershed can act as an effective natural management unit. A watershed management plan represents a framework around which a range of approaches have been adopted or identified that are meant to preserve, protect or restore water resources.

KEEP is attempting to define, using a consultative non-adversarial process, a best practises approach that will enable the full use of resources in the watershed area, while protecting the natural workings of the watershed area.

The confidentiality of your replies to this questionnaire is assured and nobody but the interviewers will ever be aware of them. With your permission we will tape-record the interview to ensure accuracy in making notes, after which the tape will be erased.

1. What is your stake in the watershed area? What values does it hold for you?
2. What benefits (for example recreational, economic, educational, tourism, environmental) could the watershed area bring to the municipality?
3. What regulations, guidelines, policies or directives affect stakeholders' use of the watershed area?
4. What actions should be taken for the watershed area to bring most benefit to the municipality? Are there any barriers that would have to be surmounted?
5. What suggestions do you have for developing, protecting, conserving and rehabilitating the watershed area?
6. How can the watershed area best be managed? What role should you and other stakeholders plan in managing it?
7. What are the main issues to be considered in developing a watershed management plan? How do you see your role in developing such a plan and what concerns do you have about the process?

8. What activities should take place within the watershed area?
9. What are the key impacts on the watershed area at present?
10. Do you have any concerns about the health of the watershed area?
11. What do you see as the future of the watershed area?
12. Do you have any other comments that you wish to make?

Appendix D

Cost Estimate, Water-Quality Monitoring Station

Equipment List and Approximate Prices for Hydrometric and Water Quality Monitoring

Equipment	Cost
Hydrometric (Water Quantity)	
Vedas 2 Data Logger Complete with High Data Rate (HDR) GOES Transmitter c/w cables	\$6,850
GOES Antenna c/w cables	\$800
Hydrologic LPN 8/3 Pressure Transducer (stainless steel fittings)	\$5,200
Solar Panel 30W c/w Mounting Hardware	\$370
Regular for Solar Panel	\$ 55
12V Battery suitable for Charging with Solar Panel (70-100 watt hrs)	\$300
Misc. Hardware Including Cabling and Orifice Line	\$800
Total Hydrometric	\$14,375
Water Quality	
Hydrolab Series 5X Datasonde Multiprobe	\$5,730
Hydrolab Option DS/MS4A/5 Specific Conductance	\$480
Hydrolab Option DS/MS 5 Luminescent Dissolved Oxygen	\$1,760
Hydrolab Option DS/MS4A/5 PH/Standard Reference	\$640
Hydrolab Option DS4A/5 Self-Cleaning Turbidity	\$1,960
Hydrolab Option DS4A/5 Ammonium	\$1,020
Hydrolab Option DS4A/5 Nitrate	\$1,020
Hydrolab Option DS/MS4A/5 Memory (120k reading) and Internal Battery Pack (8 pk) (inc DS4A Bail Kit or MS4A Mooring Sleeve)	\$810
Hydrolab Cable DS/MS4/4A 100m Underwater	\$1,520
Hydrolab Accessory DS/MS4A SDI-12 Interface	\$160
Hydrolab Cable MS/DS5/5X Calibration	\$370
Hydrolab Cable MS/DS5/5X Power Adapter	\$140
Hydrolab MS/DS5/5X 110 volt Power Supply/Charger	\$170
Total Water Quality	\$15,780
Total Equipment Cost	\$30,155

* Please note prices are subject to change*

Source: R. Picco, Dept. of Environment and Conservation

Notes:

- 1) There is an additional cost associated with building the shelter and deploying the instruments of \$5,000-10,000
- 2) There would also be annual operation and maintenance costs of \$12,000-16,000