



SENTINELLES  
**PETITCODIAC**  
RIVERKEEPER®

## **10 Worst Pollution Sources of the Petitcodiac River System in 2012**

9<sup>th</sup> Edition  
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# Table of Contents

<b>Executive Summary</b> .....	<b>1</b>
<b>Introduction</b> .....	<b>2</b>
<b>Methodology</b> .....	<b>2</b>
<b>10 Worst Pollution Sources in 2012</b> .....	<b>3</b>
1. Petitcodiac Causeway .....	3
2. Greater Moncton Sewerage Treatment Facility .....	4
3. Memramcook Causeway.....	6
4. Shepody Causeway .....	6
5. Urban Development – Watercourse and Habitat Destruction.....	7
6. Abandoned Mill Creek Navy Dam .....	8
7. Abandoned Humphreys Brook Dam.....	8
8. Various Other Dams and Barriers.....	8
9. Stormwater Runoff.....	9
10. Shale Gas and Uranium Exploration and Mining .....	9
<b>Conclusion</b> .....	<b>12</b>
<b>References</b> .....	<b>13</b>

# Executive Summary

Since 2002, Petitcodiac Riverkeeper has released annual reports detailing the 10 Worst Pollution Sources of the Petitcodiac River system, an area which includes the Petitcodiac and Memramcook Rivers, Shepody Bay, and all their tributaries. The purposes of the reports are to:

- Document the ten most immediate threats to the health of the river ecosystem and quality of life in the region;
- Recommend effective solutions to these problems; and
- Increase public awareness of these environmental issues in our watershed.

For the first time since the report was published in 2002, one of the top-three pollution sources in the watershed, namely the former Moncton landfill, was removed from the worst polluters list. The Jonathan Creek diversion project, associated with the court order to cease all discharges of leachate into this watercourse, was completed by the City of Moncton in March 2010 at a cost of \$3 million. It followed an investigation into the matter initiated by Petitcodiac Riverkeeper in 2000 and a landmark court decision and clean up order issued in 2003. Monitoring at the site will continue for decades but for now Riverkeeper is satisfied that the former Moncton landfill no longer poses a significant risk to aquatic life in the river. The former landfill was featured during an eight year period as the watershed's third most important pollution source.

On another positive note, Stage 2 of the long awaited Petitcodiac River Restoration Project began in April 2010 with the opening of the gates of the Petitcodiac causeway. Results from the first two years of these interim gate opening measures show remarkable fish passage improvements, a reduction in the flooding risks in the region and the slow and steady rebirth of the tidal bore.

The Province has however yet to announce its intentions to complete Stage 3 of the project. This stage requires the construction of a permanent partial bridge on the causeway to comply with the *Fisheries Act* and was scheduled to begin in 2012 or 2013. For this reason, the Petitcodiac causeway remains the number one threat to the health of the river ecosystem and to the quality of life in our watershed.

In summary, the 2012 rankings for pollution sources in the Petitcodiac River System remain largely unchanged compared to previous years, with the exception of the former Moncton Landfill threat being removed from the 3<sup>rd</sup> spot and large scale shale gas development being added on the 10<sup>th</sup> rank of this list.

## Introduction

Petitcodiac Riverkeeper's mission is to lead in the restoration, protection and promotion of the ecological integrity of the Petitcodiac and Memramcook watersheds and the Shepody Bay estuary, an area of approximately 3,000 km<sup>2</sup> situated in southeastern New Brunswick and the Bay of Fundy. Our mission is accomplished by engaging in public education, promoting the rivers' cultural heritage, social and economic values, monitoring the watershed, addressing pollution sources, and initiating watercourse rehabilitation projects.

Since 2002, Petitcodiac Riverkeeper has released annual reports detailing the 10 worst pollution sources of the Petitcodiac River system. The purposes of the reports are to:

- Document the ten most immediate threats to the health of the river ecosystem and quality of life in the region;
- Recommend effective solutions to these problems; and
- Increase public awareness of these environmental issues in our watershed.

The 2012 version of the report represents our 9<sup>th</sup> edition of the list into these environmental problems, which continue to cause the greatest negative impacts on the health of our watershed.

## Methodology

The term “pollution source” in this document refers to an activity by individuals, corporations or government agencies that has caused and continues to cause a single or multiple negative impact on water quality, species habitat and the ecological integrity of the Petitcodiac River system. In selecting the “10 Worst Pollution Sources” of the Petitcodiac River System in 2012, the following criteria were applied:

1. Activities that have **multiple negative impacts** on water quality, species habitat, biodiversity and the ecological integrity of the watershed;
2. Activities that **continue to create negative impacts** on the watershed; and
3. Activities that have both **short and long-term negative impacts** on the watershed.

# 10 Worst Pollution Sources in 2012

## 1. Petitcodiac Causeway

**Owner:** Province of New Brunswick

Built in 1968 and owned and operated by the Province of New Brunswick, the Petitcodiac causeway has dramatically and extensively altered the natural functions of the entire 3,000 km<sup>2</sup> Petitcodiac River and Shepody Bay ecosystem. The causeway is an obstruction to natural fish passage to nearly half (1,340 km<sup>2</sup>) of the river system and is responsible for the elimination of at least two aquatic species from the river system, namely:

- The Dwarf wedgemussel (the first case of a mussel being declared extirpated from Canada – the Petitcodiac River was its only known Canadian location);
- The Inner Bay of Fundy Atlantic salmon (declared eliminated from the Petitcodiac in the mid-1990s and since declared endangered in Canada).

The Petitcodiac causeway is also responsible for the buildup of massive silt deposits downstream from the structure, reducing the width of the Petitcodiac River from an average of one kilometre in 1968 to approximately 150 metres currently in Moncton. The Petitcodiac causeway continues to be responsible for ongoing massive deposits of silt reaching as far as 35 kilometres downstream to Shepody Bay and 21 kilometres upstream to Salisbury. Indeed, the Petitcodiac has acquired the unfortunate distinction of being one of the few rivers in North America where you can see man's destructive influence from space.

The Petitcodiac causeway continues to significantly impact the once world-renowned Petitcodiac River tidal bore, formerly Canada's most spectacular tidal bore and one of Atlantic Canada's top tourist attractions. Also, natural navigational conditions continue to be greatly impacted on the Petitcodiac River as a result of extreme sediment deposits. Once a proud shipbuilding center, the Greater Moncton community continues to remain one of the few in North America to be unable to exercise its full and inherent right to a navigable waterway because of the causeway.

The battle to restore free flow to the Petitcodiac River now spans five decades, making this the longest standing environmental battle in Canada. Between 1961 and 2001, over 132 studies were conducted on the Petitcodiac River and its causeway. This body of research on the Petitcodiac River constitutes one of the most documented cases of a dying ecosystem in Canada (AMEC Earth & Environmental 2005; Locke and Bernier 2000). In 2003, as a result of the extensive ecological damage brought about by the Petitcodiac causeway, the environmental organization Wildcanada.net designated the Petitcodiac Canada's Most Endangered River.

In 2010, however, a historic milestone was reached in the battle to save this cherished watercourse. The Province of New Brunswick began Stage 2 of the \$80 million Petitcodiac River Restoration Project by opening the gates of the Petitcodiac causeway.

Results from the first two years of these interim gate opening measures show remarkable fish passage improvements, a reduction in the flooding risks in the region and the slow and steady rebirth of the tidal bore.

The Province has however yet to announce its intentions to complete Stage 3 of the project. This stage requires the construction of a permanent partial bridge on the causeway to comply with the *Fisheries Act* and was scheduled to begin in 2012 or 2013. For this reason, the Petitcodiac causeway remains the number one threat to the health of the river ecosystem and to the quality of life in the region.

Federal funding for the estimated \$40 million Phase 3 of the project has yet to be secured. While acting as co-financer and partner on the file with the Province for decades, the federal government today continues to stall the project by stating publicly that they are not interested in providing their share of the funding.

### **Solutions to correct the problem:**

- The Province must ensure that the full restoration project is implemented by aggressively pursuing the federal government for a project funding agreement and ensuring that project work is completed as quickly as possible.
- Alternatively, the Province must finance the final phase of the Petitcodiac River Restoration Project on its own.

## **2. Greater Moncton Sewerage Treatment Facility**

**Owner:** Greater Moncton Sewerage Commission (and indirectly the municipalities of Riverview, Moncton and Dieppe)

Municipal wastewater is the largest single source of effluent discharge by volume in Canada. Scientific research has identified several environmental and health impacts resulting from insufficient wastewater treatment such as negative impacts on fish and wildlife populations, depletion of dissolved oxygen, restrictions on recreational water use and fishing, and restrictions on drinking water consumption. Pollutants in wastewater which can impact ecosystems and human health include:

- Decaying organic matter and debris;
- Nutrients such as nitrogen (including ammonia) and phosphorus;
- Chlorine compounds and inorganic chloramines;
- Bacteria, viruses, and other disease-causing agents;
- Metals such as mercury, lead, cadmium, chromium and arsenic; and

- Other substances such as pharmaceutical and personal care products (Environment Canada 2001 and 2007).

In Canada, sewage treatment involves all three levels of government. Federal and provincial governments are responsible for creating and enforcing rules to prevent sewage pollution through laws such as the federal *Fisheries Act* and the provincial *Clean Water Act*. In addition, municipal governments and sewage commissions are responsible for treating our region's wastewater effluent, complying with the law, and taking a lead role in upgrading facilities to achieve the highest quality of sewage treatment available.

In Moncton, Riverview and Dieppe, sewage is treated by the Greater Moncton Sewage Treatment Facility located in Riverview. The facility is operated by the Greater Moncton Sewerage Commission (GMSC), an organization established by the Province in 1983. Before the GMSC was created, our sewage was dumped directly into the Petitcodiac River without any treatment. Therefore, a facility was built in 1994 and promoted in the early 1990s as a state-of-the-art plant that would eventually offer full wastewater treatment. This achievement has long since been out-of-date and wastewater effluent continues to receive advanced primary treatment only before being released directly into the Petitcodiac River at Outhouse Point.

Nearly thirty years after the project was first initiated and eighteen years after the plant was commissioned (1994), the GMSC has still not publicly released its timeline and its plans to upgrade the facility to secondary or tertiary treatment.

On average, the plant directly discharges 70 to 100 million litres of primary treated effluent every day into the Petitcodiac River. Not only are there suspected toxic substances and hormone-related chemicals entering the river at the outfall, but the extreme richness of the wastewater effluent likely causes river water to be overloaded with nutrients. Nutrient overload can cause excessive microbial activity and deoxygenation. Trying to navigate a stretch of river lacking in oxygen is a big hazard to any fish that might be swimming upstream or downstream. In addition, coliform bacteria counts at the outfall are also known to routinely exceed the Canadian Water Quality Guidelines set for recreational use.

While some cities in Canada still discharge raw sewage directly into oceans and waterways, information from Environment Canada points out that about 78% of Canadians on sewer systems are serviced by secondary treatment or better. Only about 19% are serviced by primary treatment, similar to the Greater Moncton facility (Sierra Legal Defence Fund 2004).

Primary wastewater treatment will however not be acceptable in Canada for much longer. Following a five year review process, new regulations under the *Fisheries Act* were introduced by the federal government in 2009, requiring secondary wastewater treatment for all municipal systems in Canada by 2020. While the GMSC could in theory complete these upgrades by 2015, it remains unclear as to whether it will carry out these works before the year 2020 deadline.

### **Solutions to correct the problem:**

- The GMSC must publicly release detailed plans to upgrade treatment to an advanced secondary or tertiary system and present financial scenarios (federal/provincial/municipal partnerships, long-term borrowing arrangements, etc.) to achieve this objective;
- The municipalities of Riverview, Moncton and Dieppe must ensure that the GMSC facilities are upgraded to secondary or tertiary levels as quickly as possible.

### **3. Memramcook Causeway; 4. Shepody Causeway**

**Owner:** Province of New Brunswick

The Memramcook and Shepody River causeways, built in 1973 and 1958 respectively, are owned and operated by the Province of New Brunswick. The causeways have completely altered natural ecosystem functions in the 400 km<sup>2</sup> Memramcook River system and the 550 km<sup>2</sup> Shepody River system. The two causeways, designed with no fish ladders, continue to create an obstruction to natural fish passage conditions to over 85 percent (approximately 350 km<sup>2</sup>) of the Memramcook River system and to over 90 percent (500 km<sup>2</sup>) of the Shepody River system. Both causeways have also caused the elimination of several kilometres of upstream estuary, affecting the historical tidal range and salt-fresh water exchange in the system.

Both the Memramcook and the Shepody causeways are responsible for the elimination of nearly every historical fish species in the river systems, including the distinct Inner Bay of Fundy Atlantic salmon (formerly a run believed to have exceeded 1,000 in each river), American shad, Striped bass, Atlantic tomcod, Sea run brook trout and others. The Memramcook and Shepody causeways also continue to be responsible for the buildup of massive sediment deposits downstream from these structures, reducing the width of the Memramcook and Shepody Rivers and affecting Shepody Bay's mudflats, a critical habitat for migrating shore birds.

In the fall of 1999, the Province of New Brunswick initiated the process of restoring free flow to the Memramcook River at the request of the community. Twelve years after this public commitment was made, the plan to restore the Memramcook River has yet to be implemented. However, removal of the Memramcook causeway remains a top priority for the community. Village Council passed the community's first Green Plan in 2008. One of the top priorities outlined in the Plan is to address river restoration and potential removal of the causeway.

### **Solution to correct the problem:**

- The Province of New Brunswick must return the Memramcook and Shepody Rivers to free flow conditions in the interim; and
- The Province of New Brunswick must undertake a detailed assessment to return the rivers to full tidal flow by replacing these causeways with partial bridges.

## 5. Urban Development – Watercourse and Habitat Destruction

**Responsible Authority:** Federal, provincial and municipal governments, private developers

Urban sprawl and land development carried out by residential, commercial and industrial developers with the endorsement of the watershed's Planning Commissions can have multiple, severe and irreversible impacts on the ecological components of river systems. Urban development creates negative impacts in the watershed by:

- Decreasing the amount of wetlands and forested areas available for aquatic and terrestrial habitat;
- Increasing the amount of impermeable surfaces (eg. concrete and asphalt) which in turn increases stormwater runoff into watercourses and erosion in riparian areas;
- Increasing the amount sediment discharged into watercourses as a result of soil disturbance activities which affects water quality and the health of fish populations; and
- Increasing the quantity of water needed to support new commercial, residential, or industrial activities.

Watersheds must have healthy wetlands, riparian zones, and forested areas to support aquatic and terrestrial life. In addition, these areas have an important role in maintaining and improving water quality. Upland and riparian areas work together to support ecosystem structure and function. Physical characteristics of wetlands and watercourses determine the types of plant and animal life which can be supported. Fish need certain types of substrate to lay eggs during the spawning season and for adequate shelter and food. Vegetation along streams and riverbanks (i.e. the riparian zone) also has an important role to play in the river system. Vegetation filters water trickling down along the edge of a watercourse, reduces erosion and provides shade, thereby keeping water temperatures cool in the summer time and promoting high levels of dissolved oxygen which are critical to fish survival.

Habitat destruction and declining water quality continue at an accelerated rate in the Petitcodiac River system as a result of urban sprawl and land development, causing both ecological and socioeconomic consequences. For example, increases in stormwater runoff and watercourse sedimentation not only can affect water quality (i.e. ecological impact), but may also lead to a decline in commercial and sport fish populations (i.e. socioeconomic impact). As a result, fishermen may suffer reduced catches, fewer economic opportunities and potential loss of their livelihood in areas well beyond watershed boundaries.

### **Solution to correct the problem:**

- Federal, provincial and municipal governments must implement stronger regulations and policies to protect sensitive areas, fish habitat, wetlands, watercourses and riparian zones, in addition to increasing enforcement capabilities.

## **6. Abandoned Mill Creek Navy Dam; 7. Abandoned Humphreys Brook Dam; 8. Various Other Dams and Barriers**

**Owners:** Town of Riverview, City of Moncton and Province of New Brunswick

Abandoned dams and barriers located on tributaries of the Petitcodiac River continue to create obstacles to fish passage and to affect the ecological integrity of the watershed. Abandoned dams and barriers in this category include:

- Abandoned Mill Creek/Navy Dam (affecting 50 km<sup>2</sup>, Town of Riverview);
- Abandoned Humphreys Brook Dam (affecting 37 km<sup>2</sup>, City of Moncton);
- Fox Creek Aboiteau (affecting 34 km<sup>2</sup>, Province of New Brunswick); and
- Jones Lake Dam (affecting 48 km<sup>2</sup>, City of Moncton).

Dams and barriers listed above are believed to be responsible for the elimination of historical fish species in these tributaries, including the distinct Inner Bay of Fundy Atlantic salmon, Sea run brook trout and others. All of these barriers and abandoned dams continue to be responsible for the buildup of sediment deposits upstream from the structures, for increasing water temperatures and for decreasing water quality. Built for a variety of uses (eg. aesthetic, energy, flood control, water supplies) as far back as the 1800's and as late as the 1950's, some of these barriers have since been abandoned and no longer serve their intended purpose.

Decommissioning plans have been prepared for the abandoned Navy Dam on Mill Creek (Riverview) and the abandoned dam on Humphreys Brook (Moncton) since 2003. While the City of Moncton is preparing to remove the abandoned Humphreys Brook dam in 2013, no such plans have been announced by the Town of Riverview. One of the gates of the Fox Creek Aboiteau could also be opened to free flow conditions, but this option needs further study. Measures are also available to improve fish passage at the Jones Lake/Jonathan Creek system.

### **Solutions to correct the problems:**

- Town of Riverview must remove or create a fishway for the abandoned Navy Dam;
- City of Moncton must remove the abandoned Humphreys Brook dam;
- Province must conduct assessments on restoring partial free flow to Fox Creek; and
- City of Moncton can undertake a feasibility study on restoring fish passage and/or tidal flow in the Jones Lake/Jonathan Creek system.

## 9. Stormwater Runoff

**Responsible Authority:** Federal, provincial and municipal governments

Stormwater is a term used to describe water that originates during precipitation events. Stormwater that does not soak into the ground becomes surface runoff and either flows directly into watercourses or is channeled to storm sewers, settling ponds, and/or treatment facilities. Due to the widespread presence of hard surfaces such as roads, buildings, and parking lots, urban areas contribute a considerable amount of stormwater runoff into our local waterways. Impermeable surfaces also reduce groundwater infiltration, which in turn causes flooding in low-lying areas.

While new residential, commercial, and industrial land uses are required to include adequate stormwater management systems, existing urban areas continue to discharge stormwater directly into watercourses. In addition, municipalities are increasingly burdened with aging and leaking sewer infrastructure. As a result, toxic chemicals and other pollutants in stormwater are affecting water quality.

Stormwater runoff can reach high velocities during heavy rainfall events, causing erosion of adjacent watercourse banks. Stormwater runoff can also elevate stream water temperatures during summer months and such drastic temperature changes can be lethal to a variety of aquatic organisms. Pollutants, such as sediments, petroleum, metals, pesticides, bacteria and nutrients, accumulate on impermeable surfaces and, in some cases, are discharged directly into watercourses.

**Solution to correct the problem:** Federal, provincial and municipal governments must:

- Develop and adopt more stringent standards for stormwater management, similar to other jurisdictions in North America.
- Commit significant financial resources to upgrade and maintain existing sewer infrastructure in urban areas.

## 10. Shale Gas and Uranium Exploration and Mining

**Responsible Authority:** Province of New Brunswick

Uranium is the heaviest naturally occurring mineral and is typically found in hard rock and sandstone. The substance is primarily used as a fuel source for nuclear reactors, in the manufacturing of weapons, and in production of radioisotopes for medical and scientific purposes. Uranium has been mined across Canada, including in the Northwest Territories, Saskatchewan and Ontario. Significant deposits of uranium have been discovered in Nova Scotia and British Columbia, but due to public opposition and research on the dangers associated with the substance, uranium mining has been banned in these provinces. (Conservation Council of New Brunswick 2008a).

In recent years, uranium exploration and mining companies have staked many acres of land in New Brunswick, including in the Turtle Creek watershed area which supplies Greater Moncton with drinking water. Scientific evidence has confirmed that uranium mining and exploration cause irreversible effects to the health of ecosystems, watersheds, wildlife, agriculture, recreation, and public health. Exposure to radioactive elements has been linked to serious health conditions such as lung and other cancers and reproductive system deficiencies.

Three main environmental risks are associated with uranium as follows:

- Release and deposition of radon gas during mining activities;
- Spread of radioactive dust particles in water and vegetation which bioaccumulate up the food chain and eventually are ingested by fish, animals, and people; and
- Surface and groundwater pollution by chemicals and radioactive by-products of mining activities. (BC Medical Association 1980; Conservation Council of New Brunswick 2008a; Edwards 1992, Winfield et al. 2006).

In 2008, Petitcodiac Riverkeeper and 30 other environmental groups teamed up to call for a permanent ban on uranium exploration and mining in New Brunswick. In response to widespread public opposition to uranium exploration, the provincial government implemented new rules that would prohibit uranium exploration in protected drinking water areas, within municipalities, and within 300 metres of any residence. While the new rules are a step in the right direction, a permanent and complete ban is the only way to ensure that citizens and the environment are protected against the dangers of uranium development.

Large scale shale gas developments are also being proposed in vast areas of New Brunswick including the Petitcodiac River watershed, with active explorations underway in Albert County, the headwaters of the Petitcodiac River system and the Memramcook River Valley.

Since several years, drilling and “fracking” for shale gas has become a hot topic with the discovery of potentially lucrative shale deposits in southeastern New Brunswick. Residents in communities such as Elgin, Hillsborough and Turtle Creek, where drilling is already taking place, are concerned about the impacts of shale gas development on their groundwater, the aquatic ecosystems, air quality, health and the future of their communities. Municipal authorities have similarly expressed concerns regarding the proposed large scale extraction of ground water or drinking water, and the disposal of toxic wastewaters involved in the extraction processes.

There are reports of water contamination in the United States, including Pennsylvania where large scale shale gas developments are underway. Moratoriums on drilling and fracking have, in the meantime, been adopted in New York State, Quebec and France. Many counties, municipalities and communities all over the world are calling for moratoriums or outright bans.

Petitcodiac Riverkeeper is therefore of the opinion that current regulations and the minimal experience of New Brunswick associated with large scale shale gas development cannot control all of the inherent risks potentially affecting our watercourses, drinking water supply, air quality and human health.

**Solution to correct the problem:**

- The Province of New Brunswick must enact a permanent ban on uranium exploration and mining province-wide.
- The Province of New Brunswick must enact a moratorium on the further development of shale gas in New Brunswick.

## Conclusion

In 2012 and in the eleven years since the first edition of this list was published in January 2002, a series of historic pollution sources in the Petitcodiac River system continued to threaten our ecosystem and public health. Causeways, sewage discharges, abandoned dams and stormwater runoff continued their toll on our local environment.

While some progress was made on certain issues, notably with the completion of the Jonathan Creek Diversion Project and proceeding with Stage 2 of the Petitcodiac River Restoration Project (opening of the causeway gates) in 2010, new and potential threats have appeared with the proposed large scale development of shale gas in our river system. It is also important to note that progress achieved towards eliminating many of the historic pollution sources featured on this list has either been slow or non-existent; responsible parties continuing to take little to no actions to permanently correct the damages being caused to our river system.

In conclusion, the 2012 rankings for pollution sources in the Petitcodiac River System therefore remain largely unchanged compared to previous years, with the exception of the former Moncton Landfill threat being removed from the 3<sup>rd</sup> spot and large scale shale gas development being added on the 10<sup>th</sup> rank of this list.

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