International Watersheds Initiative: St.Croix River Watershed Board

"The Boundary Waters Treaty remains vibrant as it enters its second century. Recent International Joint Commission initiatives such as International Watershed Boards provide opportunities for local stakeholders to build networks that can prevent or resolve problems at the community level. The Treaty continues to be a model for managing shared resources and a tribute to the enduring friendship between the United States and Canada."[1]

Committee Overview

The International Joint Commission (IJC) established its International Watersheds Initiative (IWI) to promote an integrated, ecosystem approach to transboundary and boundary water management. The IWI has been designed to engage local communities and people in solving local transboundary issues and conflicts. The St. Croix waterway along the border between Maine, United States and New Brunswick, Canada was one of the regions selected by the IJC to pilot the watershed management concept.

The International St. Croix River Watershed Board was created to assist the IJC in preventing and resolving transboundary disputes specific to the St. Croix River system using an ecosystem approach. The Board monitors ecological health and ensures compliance of projects and structures in the area. It also works to engage and support local stakeholders in discussing and managing a host of local issues such as hydroelectric power generation, fish migration, wastewater and stormwater discharges, in-stream environmental flow needs, and habitat restoration, among others.

The goal of this committee is to model the IJC's International Watersheds Initiative's St. Croix River Watershed Board in its ability to support local participation, build local capacity, and develop local solutions within the watershed. During the conference, members of the committee will be confronted with a series of watershed concerns and "crises" requiring them to consult on and respond to old and emerging challenges as they unfold during the sessions.

KEY TERMS

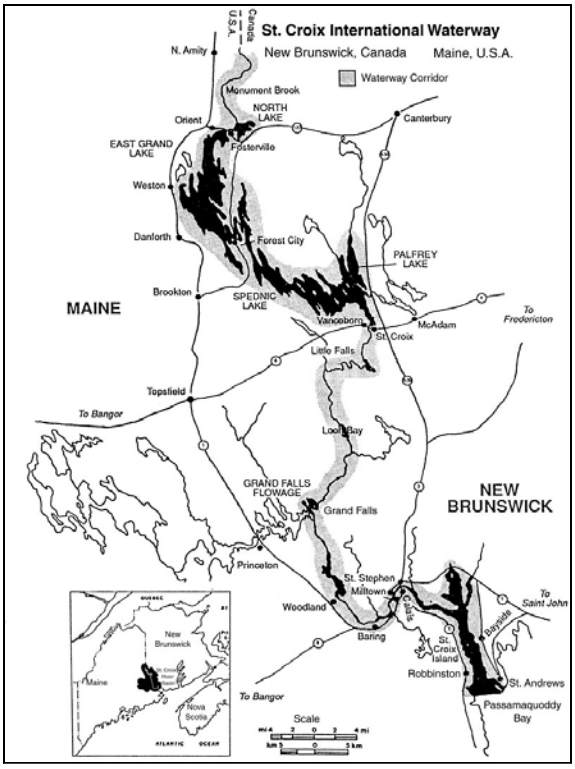
Combined sewer overflows (CSOs): refers to a system designed to transport both sanitary sewage and stormwater in one single (combined) pipe that transports it to a treatment facility. The capacity of these systems and facilities may be exceeded in periods of heavy rainfall or snowmelt, resulting in a decision to directly discharge untreated wastewater (sewage), combined with stormwater, into nearby waterbodies.[2]

Ecosystem approach: refers to a management strategy or framework that evaluates how human activities affect the function and productivity of an ecosystem, and takes a holistic, long-term view by integrating the management of land, water and living species to protect water quality and quantity. The approach acknowledges that ecosystems function as whole entities and should be managed as such, beyond political boundaries. Also referred to as *ecosystem-based management* or *integrated watershed management*.[3]

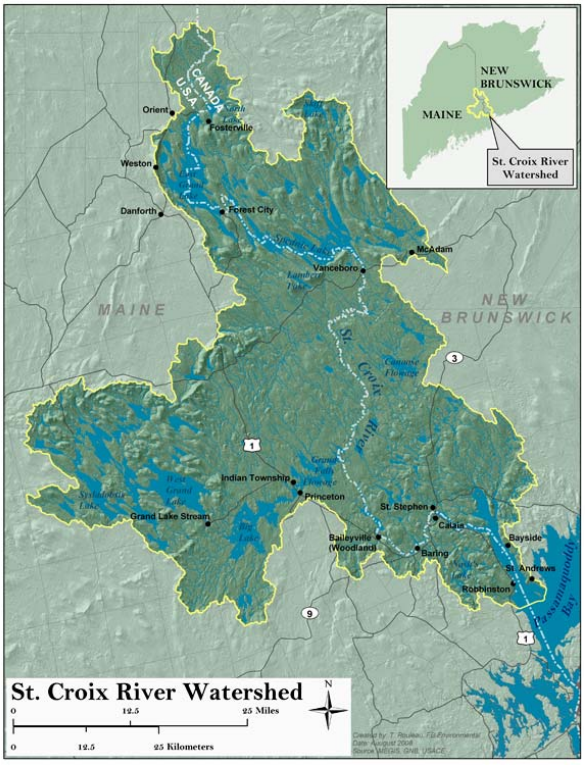
Eutrophication: is a process resulting from large amounts of nutrients being released into a nutrient deficient water body which leads to excessive amounts of aquatic plant growth. Also referred to as *nutrient enrichment*.[4]

Introduction

The St. Croix (pronounced "Croy") waterway contains three main regions straddling the border between Maine and New Brunswick.[5] First, the river rises in the Chiputneticook Lakes (North, East Grand, Mud, Spednic and Palfrey Lakes) which provide great sport fishing and recreational opportunities. Second, the water flows south and southeast, via the communities of Calais and St. Stephen, through an estuary. Finally, water discharges into Passamaquoddy Bay in the Bay of Fundy, where 25 feet (7.5 metre) high tides rise and fall twice a day. See Map 1 and 2 illustrating the same basin. [When researching this region, take care to note that the St. Croix River in Maine/New Brunswick (and associated organizations) should not be confused with others across North America with the same/similar name].



Map 1: St. Croix International Waterway
Source: www.stcroix.org/waterwaymap.html



Map 2: St. Croix River Watershed
Source: www.ijc.org/rel/boards/saint/watershed_report_e.htm

With trees covering 70-80% of the region, the economy of the St. Croix watershed is fueled primarily by the pulp and paper industry. It also relies on tourism and recreational activities for local development. Some of the key issues in the St. Croix region involve protecting the watershed from municipal wastewater and stormwater discharges, industrial pollutants, and agricultural runoff, as well as maintaining water quantity for in-stream environmental flows threatened by dams that artificially regulate water levels and flows. Conflicts continue to surface as various water users (hydroelectric power companies, urban communities, forestry and other industrial businesses, agricultural farmers, recreational users, fisheries agencies, and the environment itself) compete for water and the benefits it provides. Species and habitat protection and restoration have become increasingly critical to ensure the sustainability of fish, wildlife and plants. The most significant disputes in the watershed have resulted from the competing interests of smallmouth bass fishing and the restoration of a native fish species,[6] as well as municipal and industrial wastewater discharges.

Background

International Joint Commission

The IJC was established by the Boundary Waters Treaty of 1909 to help the United States and Canadian governments prevent and resolve disputes over the use of shared waters. The specific work of the IJC involves apportioning (distributing) water, approving and regulating proposals for dams and diversion structures in transboundary waters, and offering investigative studies, advice, and recommendations on transboundary issues referred by governments.

In the past, transboundary water issues were seen as localized problems specific to a particular dam or structure or specific to certain pollution sources in isolation from other factors.[7] The IJC recently acknowledged the best way to manage transboundary water is through an integrated watershed or ecosystem-based approach that manages using ecological boundaries rather than political borders.

International Watersheds Initiative

The IJC International Watersheds Initiative (IWI) was created to promote an integrated, ecosystem approach to issues arising in transboundary and boundary waters, encouraging and supporting local participation and strengthening local capacity. The underlying premise is that local people, given appropriate assistance and support, are best positioned to resolve many transboundary problems.[8] The concept and approach have been incubating within the IJC for the last ten years.

1997-1998: The IJC released a pivotal report in 1997 entitled *The IJC and the 21st Century*, which further acknowledged the IJC's role in not only preventing disputes but helping governments address problems being raised by various stakeholders. The report advised the United States and Canada about the intention of establishing permanent IJC international watershed boards in major transboundary watersheds along the border. These boards would provide a better mechanism for avoiding and resolving disputes. They would also facilitate integrative watershed-specific responses to emerging challenges such as urbanization, population growth, climate change, increasing demand for/changes in water use, pollution sources, and aquatic invasive species, among others. In addition, the proposed development of IWI watershed boards would help the IJC strengthen its own capacity, through supporting local involvement and gathering local advice, as well as provide funding for various local activities such as research, mapping, and public outreach.

In 1998, the IJC received a formal request (via a "reference") from Canada and the United States to investigate the possibility of developing local watershed initiatives. It consulted with federal, state and provincial governments, tribes and First Nations, and communities, among others, to develop a series of reports and consultation papers on the subject in 2000 and 2005. In 2005, the IJC identified several pilot areas to test out the initiative across Canada - United States border, with the intent of expanding the watershed approach along the entire length of the border in time. One particular area identified as a pilot was the St. Croix River watershed in New Brunswick and Maine.

St. Croix River Watershed Board

For many years, the IJC had two boards in the St. Croix River watershed. The first, called the International St. Croix River Board, was established in 1915 and dealt with the construction of dams and regulation of water levels and flows in the area. The other, called the International Advisory Board on Pollution Control – St. Croix River, was formed in 1962 to report on municipal and industrial pollution and water quality objectives. Due to the close cooperation between these two boards, they were formally

combined in 2000 to create the International St. Croix River Board.[9] After an IWI pilot phase, this IJC body was designated the first formal IJC international watershed board in April of 2007, having made the greatest progress to date within the IWI. Since that time, it has been known as the International St. Croix River Watershed Board. Its role is to balance the concerns brought forward by various stakeholders in such a way as to maximize benefits and minimize harm, while at the same time think of the long-term interests of all parties.

Status

The St. Croix has been a relative success story. It has been involved in reversing legislation with respect to fish migration and organized government meetings to exchange information on wastewater and stormwater management. As a result of its efforts, it is often used as an example to guide collaborative water management in other regions along the border.

Two IWI workshops held in 2008 allowed the IJC to develop and propose new ways to enhance and expand the IWI and its watershed approach along the entire length of the border. In its latest report, *International Watersheds Initiatives: Implementing a New Paradigm for Transboundary Basins*, the IJC indicates more work needs to be done to strengthen local participation, share best practices, and speed up and improve implementation. The St. Croix Board is no exception. It is viewed a region leading the way, as it continues to work with communities to solve old and emerging water-related challenges.

Unfortunately, despite notable success, problems still persist, particularly with respect to managing fisheries and controlling pollution in the region. Communities in the St. Croix watershed have a number of stakeholders with the potential to become very disgruntled about the state of the waterway, especially if pollution prevention and other controls are too strict (prevent economic activity) or not strict enough (harm the environment, pose health risks, reduce recreational opportunities). IJC Board members should be prepared to respond to intense criticism voiced by various stakeholders, through protests or other strategies, and consider ways to balance interests that are equally important yet in direct competition.

Roles

The International St. Croix River Watershed Board consists of a United States Section and a Canadian Section, with equal members from both countries. Board representatives include members from various government departments/agencies such as: Environment Canada, United States Environmental Protection Agency, United States Geological Survey, United States Army Corps of Engineers, New Brunswick Department of the Environment, and Maine Department of Environmental Protection. Members act in their personal and professional capacity, not as representatives of their countries, agencies, or institutions. Representatives from private and community organizations may also be invited.

All Board members should be familiar with the mandate and intent of the IWI as well as the spectrum of concerns within the specific watershed of the St. Croix River. Members should also be ready to comment on and share advice with respect to possible solutions. Faced with a series of St. Croix watershed "crises", members will have to work quickly to respond. They may choose to draft outlines of response plans, issue a press release, write a letter asking for a new IJC reference, review other jurisdictional responses to similar concerns, or draft recommendations tailored to the issue.

Issues

Hydroelectric power generation has been an important factor in the region's development. Six dams in the region (Milltown is operated by New Brunswick Power; with Forest City, Vanceboro, West Grand, Grand Falls, and Woodland owned by Domtar Inc, a pulp and paper company) generate power, store water for future use, and provide scenery for properties along banks of the water.[10] They also help control water level highs (flood conditions) and lows (dry conditions) resulting from natural and seasonal variations, climate change, and changing water needs. Unfortunately man-made diversions and reservoirs also come with some significant environment impacts. These include irreparable damage to the landscape and habitats, disruptions to in-stream environmental flows supporting various species, and imbalances in the region's nutrient and biodiversity levels.

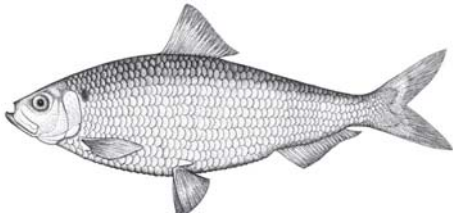
Since the IJC is involved in approving diversion structures and monitoring and studying and regulating water levels and flows, it is responsible for balancing various uses and needs for the waterway, which can conflict with one another. Members of the St. Croix Watershed Board should be prepared to deal with conflicts and crises situations related to fish migration, pollution and other community concerns.

Issue A: Fish Migration- Alewives

One of the tasks of the St. Croix Board involves providing watershed stakeholders and fisheries managers with unbiased, scientific information and advice concerning a long-standing dispute around alewife migration and access. One of the crises scenarios board members may encounter will focus on the conflict between recreational fisher people searching for their next big catch versus scientists seeking to restore the natural ecology of the area.

The St. Croix River has 44 fish species, including both native (lake trout, landlocked salmon, brook trout, alewife) and non-native species (smallmouth bass, white perch).[11] Some of these species are migrating or anadromous in that they live in the ocean but breed in freshwater, and therefore need to move freely up the river. Over the years, the construction of dams in the United States along the St. Croix waterway has blocked certain fish from swimming upstream, including a species called the *alewife* (similar in appearance to herring).

Alewives release nutrients into freshwater ecosystems in the form of eggs, excreted materials and decaying bodies. Females can produce 60,000 to 467,000 eggs in a year, collectively releasing trillions each spring, resulting in significant amounts of protein of great benefit to aquatic fish and bird species.[12] In addition, the alewives provide a protective cover for migrating salmon and also host mussels that help naturally filter water. They are important to the ecology of the area, and scientists are keen to protect the benefits of this native species. While not a prized sport fish, they are also used as lobster bait, and therefore integral to that industry.



Alewife
Source:www.gulfofmaine.org/council/publications/alewifesciinsights.pdf

The dams interfered with the natural migration cycle, causing a decline in anadromous alewives that in turn changed predator dynamics, protective covering of other migrating fish, nutrient levels, and mussel populations. To fix the access issue, efforts were made in the 1970s and 1980s to restore the alewife using "fishways" that allowed for the passage of species.

However, despite the ecological benefits of the alewives, restoring the alewife in the 1980s was believed

to be threatening the population of smallmouth bass stocks upriver. The bass, an introduced species brought into the lakes in the 19th century, continue to be a prized sportfishing species. Therefore bass fishermen were quick to blame the alewives for bass reductions and became strong advocates for removing the fishways to again reduce alewife populations. Salmon and mussel fisheries agencies supported the return of alewives, as those species rely on alewives. The divide between users intensified.

In 1995 the Maine State Legislature decided to pass a bill to close the Woodland and Grand Falls fishways that allowed alewives to swim upstream.[13] This was mainly to protect the bass as an important economic activity in the region with respect to angling, guiding and other spinoff activities. Restricting access to alewife spawning grounds was said to be the main cause of a significant decline of alewives in the St. Croix waterway, from hundreds of thousands of alewives in the mid-1990s, to just 900 in 2002.

To counteract and rectify the problem, Fisheries and Oceans Canada began capturing, trucking and releasing alewives upstream where they are released to spawn. Unfortunately this approach had mixed results, and the alewife population continued to decline.

This kind of conflict and ever-changing management approach to the alewife migration issue has gone on for decades. Since deciding to protect bass through the elimination of alewives, studies have shown that there may be less of direct correlation between anadromous alewife species than previously thought.[14] According to a study by an organization called *Maine Rivers*, anadromous alewives have caused no harm to the smallmouth bass, but rather provided some benefit, as bass feed off alewives in the river. The case is different for landlocked alewives in lakes, which are shown to threaten fisheries.[15] However, the population of bass is said to be affected by a number of environmental factors, including water temperature, water levels, as well as food availability and predators.[16]

Based on this new information, a plan was recently developed to once again reestablish the alewife.[17] Restoration involves reinstalling fishways that allow, rather than block, both upstream and downstream passage, and can also involve dismantling dams entirely. Pollution prevention controls and minimum water flows are also useful in this restoration effort.[18]

It remains to be seen how this new management strategy will impact the ecology of the St. Croix waterway and its fish and wildlife species. This ongoing dispute is an example of how social (recreational), economic and environmental needs conflict with one another and must be carefully researched, monitored and analyzed. While some would suggest there are many reasons for fish populations to rise and fall, efforts to restore one species, or change a particular habitat, can seriously impact the health of other interconnected species, and cause frustration and even heated conflict between two users of the waterway. In this case, those connected to recreational fisheries and sportfishing are opposed to alewives, whereas scientists are extremely protective. As the economy declines and research sheds more light on the matter, priorities may shift again, leading to greater frustration and conflict on both sides.

Issue B: Municipal & Industrial Pollution

IJC St. Croix board members also keep a close eye on municipal and industrial operations, gathering research data and conducting annual site visits. The operation of municipal wastewater and stormwater discharge facilities, as well as key industrial businesses with toxic effluent such as pulp and paper plants, can put the quality of water along the St. Croix waterway in jeopardy, causing considerable frustration, worry and discontent among community members and other water users.

Municipal Wastewater

Municipal governments are responsible for managing urban stormwater and wastewater. Some older municipalities have "combined sewers" which, after a heavy rainfall, may discharge a mix of stormwater and sewage (residential, industrial, commercial, institutional) into the St. Croix River.[19] Combined sewers are an old urban design with underground systems transporting both sanitary sewage and stormwater in a one pipe to a treatment facility. During intense wet weather, these systems may not be able to handle the volume of water all at once. The precipitation therefore mixes with sewage, causing a combined sewer overflow (CSO).

During wet weather, sewage treatment plants can also have bypasses or spills. Sewage bypasses occur when a wastewater treatment facility is overloaded, and some of the sewage is deliberately redirected into local water bodies with little or no treatment. Bypasses also occur during routine maintenance and power failures when a sewage treatment plant is not operating.

Municipalities must make a decision to bypass in order to avoid extensive infrastructure damage, flooded basements, and public health complaints. However, the toxic mixture released into water bodies can seriously impact fish stock and habitat, ruin recreational facilities and natural areas like beaches and wetlands, and cause nuisance and toxic algal to grow as they feed off the excessive nutrients, cut off oxygen to fish, and cause eutrophication. It can also result in high levels of E. coli which can seriously affect human health.[20] The main pollutants found in sewage contributing to these effects include pathogenic bacteria and viruses, oxygen-depleting substances, suspended solids, and excessive nutrients like phosphates.[21]

The City of Calais and the Town of St. Stephen are two examples of municipal wastewater facilities in the region with combined sewer and bypass issues in the past. In 2008, Calais, located in the lower part of the St. Croix waterway, had five CSOs including one incident at the sewage treatment plant. However, this community is nearing the end of a multi-year plan to eliminate its CSOs, and has already achieved a significant reduction of CSO events from pumping stations. A neighboring community called St. Stephen recently reported having 28 CSOs in its sewer system with 11 located along the river. St. Stephen is working on a two phase sewage system upgrade project involving: the construction of a new sewage treatment plant (completed), and elimination of CSOs one by one, at an estimated cost of $7.5 million.[22] Until the project is complete, the community will undoubtedly continue to have wastewater and stormwater overflows, and the question remains on what to do about this in the interim.

Eliminating CSOs can be a very expensive and disruptive for communities, often involving a long-term process to upgrade and replace underground infrastructure like tanks, pipes and tunnels. Green infrastructure options – including green roofs, stormwater ponds and constructed wetlands, downspout disconnections, pervious pavement and other streetscape improvements, among others – mimic natural processes and consequently help reduce the burden of stormwater. They can also postpone the need for infrastructure expansion.

Industrial Effluents

During the 1960s, pulp and paper effluent was discharged directly into the St. Croix, causing fisheries in the lower part of the waterway to almost disappear. Improvements have been made since, but the area still has instances of industrial pollution contributing to high levels of bacteria, nutrients, and toxic pollutants.

"Dioxins" are highly toxic and persistent chemicals produced by industrial processes that use or burn products containing chlorine, particularly in pulp and paper mills. Dioxins are released into the

atmosphere through the incineration of plastics and wood, as well as the release of waterwater effluent into rivers. Evidence suggests dioxin contamination has a strong correlation with cancer and has been shown to disrupt hormonal, reproductive and immune systems in humans, fish and wildlife.[23] The issue is complicated by the fact that fish metabolize dioxins very slowly, which means they bio-accumulate up the food chain. In Maine, dioxin legislation was put in place in 1997, requiring that, by 2003, fish downstream would have no more dioxin that fish upstream of mills. Companies agreed to work toward eliminating dioxin discharges.

On July 1, 2004, a North American industrial pulp and paper company called Domtar spilled 3.5 million gallons (13.25 million litres) of untreated wastewater from its mill located in Maine into the St. Croix River.[24] Although Domtar recently announced it was shutting down its Woodland plant indefinitely due to the slowdown of the global economy, once up and running again, it could be guilty of a similar discharge. In addition, other industrial operations could be equally to blame. St. Croix Watershed Board would be expected to listen to stakeholders and respond accordingly.

Other Important Considerations

Aboriginal Peoples and Tribes

The St. Croix River watershed has been inhabited by the Passamaquoddy Tribe for more than 600 generations (equivalent of 12,000 plus years). The river cuts through the middle of Passamaquoddy homeland and was historically used by many native peoples as a travel route to two other regional rivers systems, the Penobscot and the Saint John. The St. Croix River used to be called the Passamaquoddy River after the tribe in Maine and western New Brunswick.

Recreational Needs

The St. Croix waterway provides a number of recreational activities for locals and tourists alike, including: sport fishing (smallmouth bass, salmon, lake and brook trout, white perch, shellfish) already discussed, as well as hunting (moose, deer, bear, waterfowl), camping, boating and canoeing, and hiking. Recreation is second only to forestry as the waterway's most important industry.[25] Recreational interests have a strong voice, particularly when the sustainability of their environment is threatened.

Source: http://www.stcroix.org/

A management plan for the St. Croix waterway co-developed by Maine and New Brunswick includes several policies to protect recreational water use in the watershed. Specific actions focus on identifying user conflicts and pollution sources, ensuring adequate public access and facilities, managing fisheries, and encouraging low-impact water recreation.[26]

There are numerous organizations in the St. Croix River watershed with a wide range of intersecting and sometimes competing water needs. Water users may not be aware of how their interests relate to and/or impact other needs, including those of the environment. With the growth of the region's recreational sector, debates and complaints from competing users are likely to continue and become increasingly heated in communities along the St. Croix waterway.[27]

Proposed Liquefied Natural Gas Facilities

New Brunswick and Maine are emerging as part of an 'Atlantica' International Northeast Economic Region to develop a wider range of opportunities beyond forestry and recreation.[28] For example, there proposals were recently put on the table to build liquefied natural gas (LNG) terminals and storage facilities along the St. Croix waterway, near the mouth of the river on the US side of the border, that would link up to a system of natural gas pipelines. While offering jobs and development spinoffs, officials from Canada and the New Brunswick have voiced environmental and navigational safety concern.[29] Discussions remain underway for one particular proposal for the City of Calais.[30]

Coordination of Government Jurisdictions

Since the St. Croix River represents the international boundary between Canada and the United States, the juggling act between the above users and interests is further complicated by the need for various jurisdictions to work together to monitor the health of the watershed and to plan, develop and implement strategies in a truly collaborative manner. For example, over time, Canada and the United States have developed separate geographic information system (GIS) systems to monitor and record important environmental indicators and data. Structuring GIS maps and other management tools based on political boundaries has hindered attempts to adequately understand and manage the entire river basin. The IJC is working with others to harmonize these maps in order to facilitate an integrated watershed management approach based on ecosystem boundaries.

Encompassing public, private and non-governmental sectors, IJC boards complement and contribute to state, provincial and localized initiatives by coordinating efforts between jurisdictions and raising awareness of various perspectives and local expertise. Boards like the St. Croix have the potential to be more flexible in their approach and mandate than government agencies alone, able to tailor measures and make adjustments over time.

Questions to Consider

1. What challenges do St. Croix Board members face in having to act in their personal and professional capacity, and not as representatives of their countries, agencies, or institutions?
2. Are stakeholder consultations valuable methods of public engagement or token exercises? How might involving communities and stakeholders in the planning, development and implementation of watershed management plans help resolve disputes and enable progress? How can it prevent or otherwise interfere with progress?
3. Since the IJC is not in a position to fund the implementation of all of their recommendations, nor truly enforce their advice in the same way governments can, what happens when two jurisdictions disagree or refuse to comply with what the IJC recommends based on stakeholder input?
4. As a Board member, what would you do to respond to a heated community protest along the St. Croix River?
5. During a period of economic decline, what circumstances would threaten/benefit environmental and recreational water needs?
6. Should interests impacted by point source pollution receive compensation? Who should pay for the costs of clean-up and compensation? Who currently pays?
7. How do economic assessments and scientific analyses outline different priorities placed on native and non-native fish and wildlife species?

8. Are current controls and penalties in Maine and New Brunswick enough to prevent major sources of water pollution? Should the IJC recommend adopting stricter pollution prevention strategies and policies? What are the economic, social and environmental impacts of additional controls?

* Please make a note of other questions that could be shared for consideration and debate.

Position Paper

Once positions and roles are assigned and confirmed, participants will be asked to prepare a short position paper on the issues and their perspective.

Resources

International Watersheds Initiative (IWI)

- IJC IWI: www.ijc.org/conseil_board/watershed/en/watershed_home_accueil.htm
- Government of Canada (1998). *Letter of Reference*. www.ijc.org/php/publications/pdf/ID1611.pdf
- IJC Report (2000). First Report. *Transboundary Watersheds*. www.ijc.org/php/publications/pdf/ID1563.pdf
- IJC (2005). Second Report. *A Discussion Paper on the International Watersheds Initiative.* www.ijc.org/php/publications/pdf/ID1582.pdf
- IWI Workshop (Mar 2008). www.ijc.org/rel/boards/watershed/IWI_Workshop_Report_&_Annexes_Final.pdf
- * IJC (Jan 2009). Third Report. *International Watersheds Initiatives: Implementing a New Paradigm for Transboundary Basins*. www.ijc.org/php/publications/pdf/ID1627.pdf

St. Croix River

- * IJC (2008). *St. Croix River: State of the Watershed Report*. www.ijc.org/rel/boards/saint/watershed_report_e.htm
- IJC St. Croix River Watershed Board: www.ijc.org/conseil_board/st_croix_river/en/stcroix_home_accueil.htm
- International St. Croix River Board. *2007 Annual Report*. www.ijc.org/rel/boards/saint/saint2007ar.pdf,
  2006 Annual Report. www.ijc.org/rel/boards/saint/saint2006ar.pdf
  2005 Annual Report. www.ijc.org/rel/boards/saint/discussionpaper_alewife_oct2005.pdf
- St. Croix International Waterway Commission (Maine/New Brunswick): www.stcroix.org/
- Maine Rivers: www.mainerivers.org/st_croix.html

Issues

- Nedeau, E. (2003). Gulf of Maine Council on the marine Environment. *The Amazing Alewife.* www.gulfofmaine.org/council/publications/alewifesciinsights.pdf
- Alewife article in Kennebec Journal: http://kennebecjournal.mainetoday.com/view/columns/4829126.html
- * IJC publications on alewife – includes *Two Reports on Alewives in St. Croix River* by Maine Rivers (Nov 2006): www.ijc.org/conseil_board/st_croix_river/stcroix_pub.php?language=english
  See same link for meetings on CSO issue.
- Timeline of alewife management decisions: www.ijc.org/rel/boards/saint/MaineRiversStCroixReportFinal.pdf
- Watts, D. H. (2008). http://friendsofsebago.org/saintcroix.pdf
- *Alewife Info Sheet* (2000): www.chiplakenews.org/info1021.htm
- Natural Resources Council of Maine. *Dioxin Problem: Paper Mill Connection* www.nrcm.org/dioxin_facts.asp
- Calais LNG: www.calaislng.com/Public_Site/about_calais.aspx
- Atlantica: www.shiftportal.com/bangor-saintjohn/home/index.cfm#

General Links

- *International Joint Commission:* http://www.ijc.org/
- *Boundary Waters Treaty:* http://bwt.ijc.org/

Endnotes

[1] Former Secretary of State Condoleezza Rice quoted in IJC (2009), *International Watersheds Initiative: Implementing a New Paradigm for Transboundary Basins.* Retrieved from: www.ijc.org/php/publications/pdf/ID1627.pdf
[2] IJC (2008) www.ijc.org/rel/boards/saint/watershed_report_e.htm#river
[3] IJC (2009) www.ijc.org/php/publications/pdf/ID1627.pdf
[4] Env Canada (2006) www.ec.gc.ca/cleanair-airpur/Eutrophication-WS64CD2186-1_En.htm
[5] St. Croix International Waterway Commission www.stcroix.org/
[6] IJC (2005) www.ijc.org/php/publications/pdf/ID1582.pdf
[7] IJC www.ijc.org/php/publications/html/21ste.htm#Sec3P1
[8] IJC IWI www.ijc.org/conseil_board/watershed/en/watershed_home_accueil.htm
[9] IJC Board www.ijc.org/conseil_board/st_croix_river/en/stcroix_mandate_mandat.htm
[10] www.ijc.org/rel/boards/saint/watershed_report.pdf
[11] IJC (2008) www.ijc.org/rel/boards/saint/watershed_report_e.htm#alewives
[12] Nedeau (2003) www.gulfofmaine.org/council/publications/alewifesciinsights.pdf and IJC (2008) www.ijc.org/rel/boards/saint/watershed_report_e.htm#alewives
[13] Maine Legislature http://www.mainelegislature.org/legis/statutes/12/title12sec6134.html
[14] Maine Rivers (2006). Two Reports on the Alewives in the St. Croix River. www.fws.gov/northeast/gulfofmaine/downloads/fact_sheets/MaineRiversStCroixReportFinal.pdf; IJC St. Croix Board 2006 Annual Report. http://www.ijc.org/rel/boards/saint/saint2006ar.pdf; Kennebec Journal http://kennebecjournal.mainetoday.com/view/columns/4829126.html
[15] IJC (2006). www.ijc.org/rel/boards/saint/saint2006ar.pdf
[16] Chip Lake News Info Sheet based on St. Croix International Waterway Commission report (April 2000). www.chiplakenews.org/info1021.htm
[17] Sochasky, L. *St. Croix Watershed.* www.mainerivers.org/st_croix.html
[18] Nedeau (2003) www.gulfofmaine.org/council/publications/alewifesciinsights.pdf
[19] IJC St. Croix Board (2008) www.ijc.org/rel/boards/saint/stcroixmtg080520_e.html
[20] *Bangor Daily News* (March 27, 2008) www.mwwca.org/st-croix-river.pdf
[21] Ecojustice (2008) www.ecojustice.ca/publications/reports/the-green-infrastructure-report/attachment
[22] IJC Meeting Summary on CSOs (May 2008) www.ijc.org/rel/boards/saint/stcroixmtg080520_summary_e.pdf
[23] Natural Resources Council of Maine www.nrcm.org/dioxin_facts.asp
[24] CBC News New Brunswick (July 2, 2004) www.nben.ca/environews/media/mediaarchives/04/july/domtar.htm
[25] St. Croix International Waterway Commission www.stcroix.org/
[26] www.ijc.org/rel/boards/saint/watershed_report_e.htm#rec
[27] www.ijc.org/php/publications/pdf/ID1582.pdf
[28] www.shiftportal.com/bangor-saintjohn/home/index.cfm#
[29] IJC www.ijc.org/rel/boards/saint/saint2006ar.pdf
[30] www.savepassamaquoddybay.org/news_archives/2008/st_croix_courier/nov/2008nov25_clng.html and www.istockanalyst.com/article/viewiStockNews/articleid/3155428