

THE HIDDEN DIMENSION: WATER AND THE OIL SANDS

**Liberal Report
from the Study of the
Standing Committee on Environment
and Sustainable Development on the
Impact of Oil Sands Development on Canada's Freshwater**



Residual Bitumen. Aerial photo of oil sands tailings pond by Louis Helbig.

“It [the destruction of streams and peatlands by oil sands mining] probably wouldn’t be a big concern if it were a small area, but of course, it’s no longer a small area, and I predict it will disrupt the whole hydrology of that lower Athabasca system.”

– Dr. David Schindler
World-renowned water scientist¹

“...there should be more orderly development of the Alberta oil sands...they should do one project at a time and finish the one project with an upgrader before starting a second project...it would give time for technology, from an environmental point of view, to catch up.”

– Peter Lougheed
Former premier of Alberta²

“The Government of Canada should live up to its legislative responsibility and substantially increase its role in protecting human health and the environment through oversight and regulation of the oil sands industry’s impact on freshwater resources and aquatic ecosystems.”

–From *Watered Down*, a report on the oil sands and water from seven Canadian environmental organizations³

Preface

Canada has the world’s second-largest proven concentration of oil after Saudi Arabia. Canada’s ranking is the result of its vast oil sands reserves. When in 2003 the Alberta oil sands were for the first time included in the calculation of Canada’s proven oil reserves, these jumped from 5 billion to 180 billion barrels. Canada’s oil sands wealth, however, is likely much greater: “Oil sands estimates, conservatively based on recoverable reserves using current technology, represent only 11 percent of the estimated 1.6 trillion barrels of tar sand oil in Alberta...As improved technology allows for increased recovery rates, it is only a matter of time before Canadian reserves become the largest in the world.”⁴

¹ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. David Schindler*. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services, Canada, 2009.

² Peter Lougheed. (2009, June 8). (A Radwanski, Interviewer) Globe and Mail.

³ Danielle Droitsch. *Watered Down: Overcoming Federal Inaction on the Impact of Oil Sands Development to Water Resources*. Calgary: Water Matters Society of Alberta, October 2009. 24.

⁴ Kasoff, Mark J. “East Meets West in Canadian Oil Sands.” *American Review of Canadian Studies* (2007): 177-183. (p. 178).

Alberta's oil sands are found in three regions of the province—the Athabasca-Fort McMurray area; the Cold Lake area; and the Peace River area.⁵ In total, they cover approximately 140,000 km².⁶ According to the Alberta Department of Energy, “Oil sands production from all three deposits is expected to triple from the 2005 level of one million barrels per year to three million by 2020, and possibly to five million by 2030.”⁷

If, as expected, development of Canada's vast oil sands reserves expands to meet the galloping world demand for fossil fuels, mitigating the harm to the environment from oil-sands-driven economic growth will be a daunting challenge for both the industry and its regulators—namely, the federal and Alberta governments.

Talk of Alberta's oil sands has typically revolved around their contribution to Canada's greenhouse-gas emissions (GHG) and global climate change.^{8,9} But the oil sands industry also affects Canada's freshwater supplies, not only in Alberta but potentially also in Saskatchewan and the Northwest Territories.

The question of the industry's freshwater impacts has attracted less notice, among the media and the public, than the more heated and rancorous debate about the oil sands, GHG emissions, and climate change. This lack of attention to the effects of oil sands development on such a vital—for human health, the environment, and the economy—resource is what motivated the Liberal members of the House of Commons environment committee to propose that the committee conduct an in-depth study of the water-oil sands nexus. It was also behind our persistent efforts to see the study through to its

⁵ Alberta Department of Energy. Alberta's Oil Sands 2008. Edmonton: Government of Alberta, 2008. Web. 2 July 2010 <http://www.energy.alberta.ca/OilSands/pdfs/AB_OS2008.pdf>.

⁶ The Expert Panel on Groundwater. The Sustainable Management of Groundwater in Canada. Ottawa: Council of Canadian Academies, 2009. p. 143.

⁷ The Expert Panel on Groundwater. The Sustainable Management of Groundwater in Canada. Ottawa: Council of Canadian Academies, 2009. p. 143.

⁸ According to the Government of Alberta, GHG emissions from Alberta's oil sands development, including emissions from co-generation facilities, totalled 38.4 megatonnes (Mt) in 2007; about 5 percent of Canada's overall GHG emissions. Canada's total emissions grew by 129 Mt between 1990 and 2006, with oil-sands-related emissions responsible for approximately 12 per cent of the total increase. (Government of Alberta. FACTS ABOUT Alberta's oil sands: Greenhouse gas emissions and the oil sands. December 2009. 29 June 2010 <www.oilsands.alberta.ca>.)

⁹ According to the Pembina Institute, “Because of the extra energy needed to melt the bitumen and separate it from the sands—obtained by burning natural gas—and because of emissions from the upgrading process, production of a barrel of synthetic crude oil from oil sands generates, on average, more than three times more GHG emissions than production of a barrel of conventional light or medium crude oil.” (Bramley, Matthew, Derek Neabel and Dan Woynillowicz. The Climate Implications of Canada's Oil Sands Development. Backgrounder. Drayton Valley, AB: Pembina Institute, 2005. pp. 2-3.). However, other estimates are that, on a life-cycle basis (including taking into account the energy required to mine and upgrade bitumen), producing oil from the oil sands results in 5 to 15 percent more GHGs than for conventional oil. (“Stelmach's timely reminder of American self-interest.” Globe and Mail. 2 July 2010, Metro ed.: Editorial, A14.)

conclusion, in the face of interruptions brought on by the 2008 general election and 2010 prorogation of Parliament.¹⁰

Although the industry's impact on freshwater has not generated the same degree of controversy as its consequences for global warming, one cannot dismiss or minimize growing concerns around the issue of water and the oil sands. In particular, one must note the concerns of First Nations in Fort Chipewyan, downstream from Fort McMurray. They are rightly worried about the industry's potentially-noxious effects on their environment, health, and treaty rights.¹¹ Nor should one underestimate the intensity of the reaction that any suggestion the industry is contaminating water in the region can provoke among oil sands promoters and defenders—even those in the normally staid realm of the public service. For example, Preston McEachern, head of science, research and innovation with Alberta Environment, was recently forced to issue a retraction and apology to two respected scientists, Kevin Timoney and Peter Lee, for alleging they “lied in their research about the oil sands industry”¹² in relation to its impact on Alberta's water resources.

The same defensiveness was observed when federal environment minister Jim Prentice, answering a question from Liberal M.P. Francis Scarpaleggia in the House of Commons about research by world-renowned water scientist Dr. David Schindler that proved the industry is contributing to contamination of the Athabasca River, described Dr.

¹⁰ The committee first agreed to a motion to conduct a study of oil sands and water on January 30, 2008. (Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Minutes of Proceedings*. (Meeting No. 10, January 30, 2008) 39th Parliament, 2nd Session, 2008. (Online). Available: <http://www2.parl.gc.ca/HousePublications/Publication.aspx?DocId=3237757&Language=E&Mode=1&Parl=39&Ses=2> . [July 6, 2010]). On February 10, 2009, following the 2008 election and post-election prorogation, the committee agreed to re-launch the study that “began shortly before the last federal election.” (Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Minutes of Proceedings*. (Meeting No. 3, February 10, 2009) 40th Parliament, 2nd Session, 2009. (Online). Available: <http://www2.parl.gc.ca/HousePublications/Publication.aspx?DocId=3667359&Language=E&Mode=1&Parl=40&Ses=2> . [June 29, 2010]). Finally, on March 16, 2010, following the early late 2009-early 2010 prorogation, the committee agreed to resume the study once again. Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Minutes of Proceedings*. (Meeting No. 2, March 16, 2010) 40th Parliament, 3rd Session. (Online). Available: <http://www2.parl.gc.ca/HousePublications/Publication.aspx?DocId=4354279&Language=E&Mode=1&Parl=40&Ses=3> . [June 29, 2010]).

¹¹ Among the infringements on First Nations' treaty rights, “[oil sands] leases are being made in areas where Treaty 8 assures native people that their rights to hunt, trap and subsist will not be impaired.” [David W. Schindler (O.C., A.O.E., D.Phil., F.R.S.C., F.R.S.). *Brief* to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. 40th Parliament, 2nd Session. Ottawa, Ont. 13 March 2009.]

¹² Alexandra Zabjek. “Gov't scientist apologizes for saying researchers ‘lied,’” *Edmonton Journal*. 22 June 2010, Final ed.: News, A1.

Schindler's findings as mere "allegations."¹³ As for the Alberta government, it likewise rushed to negate Dr. Schindler's findings. Preston McEachern reiterated the province's long-held position that "contamination in area soils and rivers is natural and poses no serious health risk"¹⁴ while Alberta's environment minister said "It appears that the kinds of contaminants that we're seeing today are not substantially or not measurably different from what was there prior to the development of [the] industry. Remember that the rivers in that area flow through land that is rich in bitumen."¹⁵

For its part, the committee approached its study with an inquisitive and open mind and without foregone conclusions about where its investigations might lead.

For example, Liberal members of the committee—and no doubt members of other parties—were looking forward to hearing testimony from the Alberta government, especially on our tour of Alberta. This expectation that we would be able to hear from representatives of the Alberta government was born of statements by Alberta environment minister Rob Renner following initial news stories of the committee's decision to launch the study: "It [the study] seems like it's a pretty honest attempt to get the facts...[and] we believe we have a strong story to tell."¹⁶

In the final analysis, the story of the oil sands' relationship to water is very much a tale of denial by interested parties—private-sector and governmental—of the potential negative consequences the industry might be having on a vital Canadian resource, of parsimony and foot-dragging in funding research into the oil sands industry's possible watershed impacts, and of long-standing abdication of federal leadership in an area—the protection of fish-bearing waters—that is rightfully Ottawa's under the Constitution's division of powers.

Finally, we would be unforgivably remiss not to acknowledge the excellent support of committee staff throughout this long endeavour. Analysts Tim Williams and Penny Becklumb were outstanding in their research acumen and professionalism. Norm Radford, now retired, was invaluable in organizing committee hearings in Ottawa as well as our tour through Alberta that included meetings in Calgary and Edmonton, a remarkable tour by air of the oil sands, and a crucial trip to Fort Chipewyan to hear First Nation concerns about the downstream impacts of oil sands development. Guyanne Desforges, who took over the clerkship of the committee in the fall of 2010 and who

¹³ Canada. Parliament. House of Commons. Debates, 40th Parliament, 3rd Session, 2010, vol. 145, No. 22, April 1, 2010. Ottawa: Canadian Government Publishing, 2010.

¹⁴ Bob Weber. "Oilsands-Contamination." Canadian Press, 8 December 2009.

¹⁵ "Minister says toxic watershed result of bitumen-rich land," Edmonton Journal. 9 December 2009, Final ed.: News, A11.

¹⁶ "Fed environment committee to study oilsands impact on Alberta's water systems," Canadian Press, 2 March 2009.

therefore organized our last set of hearings, ensured an efficient and seamless conclusion to the study hearings.

Introduction

There are a variety of ways the oil sands industry may be affecting the Athabasca River and its basin. Toxic seepage from tailings ponds¹⁷ may be migrating from dykes or through groundwater into the river. Or surface-water runoff from mined areas where soil cover has been disturbed during the process of bitumen extraction may also be making its way into the river. Finally, the airborne transportation of pollutants released during surface mining or through emissions from oil sands upgraders has now been shown to be infecting the Athabasca.

Because the industry withdraws vast amounts of water from the Athabasca in order to separate sand from bitumen in surface mining and to generate steam to pump bitumen from the ground in *in situ* operations, the oil sands industry can also harm fish, fish habitat, and the wider environment by lowering water levels in the river.

The federal government's involvement in the oil sands—a provincial natural resource—flows from its constitutional right and responsibility to protect fish, fish habitat,¹⁸ and the natural environment in general from harm caused by pollution and other human activities. More specifically, federal oversight in the oil sands is enabled by the following statutes: the *Fisheries Act*,¹⁹ the *Canadian Environment Protection Act*; the *Canada*

¹⁷ Alberta's oil sands operations produce "enough sludge every day (400 million gallons) to fill 720 Olympic pools." This toxic waste produced by separating bitumen from sand is stored in dyked ponds. These ponds "now cover twenty-three square miles of forest and muskeg. That's equivalent to nearly 120 Moraine Lakes, the pretty body of water that appeared on Canada's old twenty-dollar bill, or more than 75 Lake Louises without the Rocky Mountain scenery. Within a decade, the ponds will cover an area of eighty-five square miles." Moreover, "if Alberta drained its tar sands waste into Lake Erie, it would fill the basin to a depth of eight inches today. By 2030, this toxic soup would be nearly seven feet deep." [Andrew Nikiforuk, *Tar Sands: Dirty Oil and the Future of a Continent*. (Vancouver: Greystone Books, 2008) 78-80.]

¹⁸ While protection of fish and fish habitat is a key stand-alone environmental objective, their health is also an effective proxy for overall water quality in a given ecosystem.

¹⁹ Both sections 35 and 36 of the *Fisheries Act* aim to protect fish and their habitat. Section 35 "prohibits any work or undertaking that results in the harmful alteration or destruction of fish habitat, unless authorized" and is administered by DFO [Department of Fisheries and Oceans]. Compliance with this section of the act is monitored by Fishery Officers. Section 36 "prohibits the deposit of a deleterious substance in any type of water frequented by fish, unless authorized. Environment Canada administers and enforces section 36 and related regulations, including the *Pulp and Paper Effluent Regulations* and the *Metal Mining Effluent Regulations* [and will administer new wastewater regulations as well]." Environment Canada has responsibility for the "various components of the administration and enforcement of the pollution prevention provisions of the *Fisheries Act*..." In the interests of administrative efficiency, "Environment Canada has concluded bilateral agreements with some provinces to provide for the cooperative administration of the *Fisheries Act* as well as under relevant provincial statutes that deal with pollution prevention." [Penny Becklumb (Analyst, Resources and Environment

Water Act; the Canadian Environmental Assessment Act; the Species at Risk Act; the Migratory Birds Act; and the National Parks Act.

Ottawa's fiduciary responsibility for First Nations, i.e. for ensuring the treaty rights of Aboriginal Canadians are respected, further justifies the federal role in oil sands development.

Finally, the Constitution gives the federal government jurisdiction over "activities" that cross provincial boundaries. The growing possibility that the industry may not only be impacting Alberta's freshwater supplies but also watersheds in neighbouring Saskatchewan²⁰ and Northwest Territories could inevitably draw Ottawa into playing a more active role in preventing and mediating future disputes caused by the extra-territorial impacts of oil sands development on water. For the time being, however, "there is no comprehensive, widely trusted and arms-length set of monitoring data from which to evaluate environmental effects"²¹ created by one jurisdiction on a neighbouring one.

First Nations Cancer Concerns

The First Nations communities (Mikisew Cree and Athabasca Chipewyan) living in Fort Chipewyan have repeatedly insisted, based on both anecdotal evidence (i.e. Aboriginal Traditional Knowledge) and on concerns raised publicly by their physician, Dr. John O'Connor, that their environment (i.e. water and country foods) and human health are being threatened by upstream oil sands activity. These First Nations have pointed to cases of deformed fish, as well as "filmy" water with a different taste than the past, as evidence their watershed is changing for worse.

In 2006, Dr. O'Connor drew media attention "after discovering a rare form of cancer" in the small northern Alberta community of 1,200 people.²² Of note is the fact that "O'Connor and the other health professionals weren't the first to sound the alarm about apparent health problems in this community. Dr. Michel Sauvé, an internist and

Section, Parliamentary Information and Research Services, Library of Parliament). "Notes on the Prosecution of Offences Under the *Fisheries Act* and its Regulations." Briefing note prepared for Francis Scarpaleggia, Ottawa, Ont. 5 March 2010.]

²⁰ "Saskatchewan isn't the only one of Alberta's neighbours to express environmental concerns about the oil sands. Last May, all 33 communities in the Northwest territories—most of which are downstream of the oil sands—approved a motion asking the Alberta government to shut down further activity in the region until the province worked out an environmental deal with the territory." ([Alberta oil sands lead to acid rain in Saskatchewan, data suggests](#). 13 August 2009. 11 April 2010

<<http://www.tarsandswatch.org/alberta-oil-sands-lead-acid-rain-saskatchewan-data-suggests>>.)

²¹ FLOW (Forum for Leadership on Water). "Oil Sands Environmental Monitoring Project (OSEMP) Proposal." Memo from Jim Bruce to Francis Scarpaleggia. 31 March 2010. Email.

²² De Souza, Mike. "Doctgor alleges oilsands coverup." [Calgary Herald](#) 12 November 2007: News.

president of the Fort McMurray Medical Association, had raised similar concerns three years earlier during government licensing hearings for two oil sands operations: Shell Oil and Canadian Natural Resources Ltd.”²³

While leaky tailings ponds have received the greatest attention as a suspected source of upstream industry pollution of the Athabasca River, other potential sources of contamination exist as well. In addition to pulp and paper mills located on the river,^{24,25} there are abandoned uranium mines on the east end of Lake Athabasca.

After Dr. O’Connor drew public attention to higher-than-normal cancer rates in Fort Chipewyan, Alberta Health and Wellness (AHW) pledged to study the situation. Then on July 14, 2006, AHW “suddenly released a health analysis of Fort Chipewyan residents at a licensing hearing for...Suncor.”²⁶ AHW’s analysis, based on a search of a provincial billing database and a cancer registry database, claimed that “overall cancer rates in Fort Chipewyan were no higher than the rest of the province. It also did not find three to five cases in 100,000 of cholangiocarcinoma, a rare bile-duct cancer previously reported by O’Connor, which normally strikes one to two people.”²⁷

The AHW study, however, was quickly criticized by Dr. O’Connor who “called the study rushed and incomplete...failing to include data more recent than the 1995-2005 statistics it was based on.”²⁸ In fact, the study’s lead investigator “did admit to using incomplete data even for the years included in the analysis because of the limitations in the cancer database. She also said a review of medical charts from Fort Chipewyan’s

²³ In Depth: Fort Chipewyan. 2010. CBC. 22 June 2010 <www.cbc.ca/edmonton/features/fort-chipewyan/in-depth.html>.

²⁴ Andrew Nikiforuk, Tar Sands: Dirty Oil and the Future of a Continent. (Vancouver: Greystone Books, 2008) 89.

²⁵ “There are actually several pulp and paper mills upstream on the Athabasca, but over the past 20 years they have really cleaned up their act. The one at Hinton, for example, spewed huge amounts of dioxins and furans into the river in the early years of its operation. I think the watershed was when the Alberta-Pacific mill, which is near Athabasca, several hundred kilometres above the area we’re talking about, in a dispute in the early nineties that I was a part of, produced a process that eliminated dioxin from effluents. Since that time, dioxins are no longer a part of the effluents from pulp mills. There are still some organic compounds and so forth. One source of worry, actually the source of worry that drove the northern river basins study of the 1990s, has been eliminated.” [Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. David W. Schindler*. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services, Canada, 2009.]

²⁶ In Depth: Fort Chipewyan. 2010. CBC. 22 June 2010 <www.cbc.ca/edmonton/features/fort-chipewyan/in-depth.html>.

²⁷ In Depth: Fort Chipewyan. 2010. CBC. 22 June 2010 <www.cbc.ca/edmonton/features/fort-chipewyan/in-depth.html>.

²⁸ In Depth: Fort Chipewyan. 2010. CBC. 22 June 2010 <www.cbc.ca/edmonton/features/fort-chipewyan/in-depth.html>.

nursing station wasn't completed for the analysis—something that had been promised to the community.”²⁹

In an effort to further clarify the matter, in 2008 the Alberta Cancer Board (ACB) committed to conducting a comprehensive study of the health of Fort Chipewyan residents. The Board found a 30 percent higher-than-normal cancer rate in Fort Chipewyan but because of the small sample size suggested further investigation “by tracking a cohort of residents who have lived in the area within the past 20 to 30 years”³⁰ was needed. The Board also recommended further monitoring of cancer rates over the next five to 10 years.³¹

Much of the discussion of elevated cancer rates in Fort Chipewyan has focused on the incidence of rare cancers, like bile duct and colon cancers. The ACB study showed the incidence of rare cancers to be higher than average in Fort Chipewyan. Health Canada officials, appearing before the House of Commons environment committee, explained the community's higher rare-cancer rates as follows: “First Nations cancer rates are usually below the provincial average for cancers across Alberta, except cholangiocarcinoma [bile duct cancer]. Cholangiocarcinoma is known to be higher in native Americans and indigenous people around the world, and in Alberta the rate of cholangiocarcinoma is two to three times higher than for the rest of Albertans. So it is definitely the case that it is within the expected range. The fact that two cases happened one after the other in the next year is probably, likely, due to random variation and chance because of the small size of the population. As for the colon cancer, the physician [Dr. O'Connor] submitted 12 cases of colon cancer that he said he's seen. From the 12 he submitted, only three were confirmed to be colon cancers. Because of the rigorous work of the Alberta Cancer Board, they found another three that he had not submitted.”³²

²⁹ In Depth: Fort Chipewyan. 2010. CBC. 22 June 2010 <www.cbc.ca/edmonton/features/fort-chipewyan/in-depth.html>.

³⁰ Yiqun Chen. “Cancer Incidence in Fort Chipewyan, Alberta 1995-2006.” Division of Population Health and Information Surveillance. Alberta Cancer Board, February 2009. 10.

³¹ “One of the approaches used to rule out random aggregation of cases is to establish close monitoring to see whether new cases of the same type of cancer continue to occur in the area. The detection of an increased occurrence of cholangiocarcinoma or leukemia, for example, in Fort Chipewyan in the next 5-10 years would substantiate the suggestion that there are elevated cancer rates in the area and would justify more extensive investigations into possible causes. Conversely, the absence of an increase of cholangiocarcinoma or leukemia in the next five to 10 years would suggest that the increase in the number of observed cases in the community was likely due to random aggregation of cancer rates or increased detection.” (Yiqun Chen. “Cancer Incidence in Fort Chipewyan, Alberta 1995-2006.” Division of Population Health and Information Surveillance. Alberta Cancer Board, February 2009. 33.)

³² Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. Wadieh Yacoub (Health Canada)*. (Meeting No. 10, March 12, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services, 2009.

As for the higher overall rate of cancer in Fort Chipewyan: “There definitely are small increases in the rates of the other cancers that the board reviewed—blood cancers, lymphatic cancers, soft tissue carcinomas. However, even for those cancers, these are the number of cancers, not the number of people. Some people have actually more than one cancer.”³³ As for the possibility that observed cancer rates in Fort Chipewyan are the result of environmental risks: “Going back to the notion of environmental exposure, one of the things the Alberta Cancer Board points to is the absence of any childhood cancers in the community. Childhood cancers would be one of the strong signals of environmental exposure. The second factor the report mentions is that communities that are closer to the oil sands have not seen any elevation in their rates of cancer. We need to look into that.”³⁴

In 2007, four complaints were lodged against Dr. O’Connor before the College of Physicians and Surgeons of Alberta (CPSA) by three Health Canada physicians. Two years later, the CPSA concluded that three of these complaints were valid. Namely, that Dr. O’Connor: “failed to inform public health officials and the Alberta Cancer Board of the identities of and clinical circumstances of patients whom he’d diagnosed with various types of cancer in a timely manner; did not respond to multiple requests for information after he made public his concerns about the incidence of cancer in the community of Fort Chipewyan; made a number of inaccurate or untruthful claims with respect to the number of patients with confirmed cancers and the ages of patients dying from cancer.” The CPSA, however, did not rule on the complaint that Dr. O’Connor’s “statements resulted in harm to Fort Chipewyan residents and caused them to lose faith in public health officials...”

Water Quality

The federal government does not fully exercise its responsibility to monitor water quality in the oil sands (and downstream) or enforce the relevant provisions of the *Fisheries Act* with respect to industry impacts on fish-bearing waters. Ottawa appears to have *de facto* devolved and diluted this constitutional responsibility.

First, the federal government appears so far to have been conveniently hiding behind its administrative arrangement with the Alberta government for enforcement of federal anti-pollution laws (namely, section 36 of the *Fisheries Act*). The agreement provides cover to Ottawa by allowing it to transfer, in the spirit of bureaucratic efficiency and

³³ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. Wadieh Yacoub (Health Canada)*. (Meeting No. 10, March 12, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services, 2009.

³⁴ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. Wadieh Yacoub (Health Canada)*. (Meeting No. 10, March 12, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services, 2009.

cooperative federalism, day-to-day responsibility for the monitoring and inspection of the oil sands industry's freshwater impacts to the province.^{35,36,37,38}

The *Canada-Alberta Administrative Agreement for the Control of Deposits of Deleterious Substances under the Fisheries Act* was signed in 1994.³⁹ As stated by the federal environment commissioner, the purpose of the agreement was to “establish terms and conditions for the cooperative administration of the pollution prevention provisions of the *Fisheries Act* and relevant provincial legislation...[and] Environment Canada relies on the Agreement and the arrangements with Alberta to meet its *Fisheries Act* responsibilities.”⁴⁰ In essence, Ottawa has used the agreement to create the illusion

³⁵ “The monitoring of the river was actually started in very good fashion by the federal government, but over the years they’ve gradually turned the monitoring over to the province of Alberta, which in turn has turned a lot of it over to industry itself. As a result, we have a database that’s not available to independent scientists to see. We have no public transparency in the database...I find it rather scandalous that those people [Department of Environment and Department of Fisheries and Oceans] are not involved in this area. The reason they’re not involved is that they have insufficient budget to allow them to operate.” Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. David W. Schindler*. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services, Canada, 2009.

³⁶ “Environment Canada...does not have its own independent monitoring program because Alberta prohibits the release of tailings ponds contents to surface water and monitors for leaching into local rivers and lakes. [Leaching does occur into the groundwater below the ponds but to degrees believed safe.] Alberta has a process in place to report spills to Environment Canada, including incidents that potentially fall under the *Fisheries Act*.” [Canada. Office of the Auditor General. “*Chapter 1: Protecting Fish Habitat.*” *Report of the Commissioner for Environment and Sustainable Development*, Ottawa: Public Works and Government Services Canada, Spring 2009. (Cat. No. FA1-2/2009-1E). (Commissioner: Scott Vaughan). p. 39.]

³⁷ “In June 2008, Environment Canada reported that ‘there is no national network of water quality monitoring sites designed specifically for the purpose of reporting the state of Canada’s water quality in a fully representative way at different geographic scales across Canada.’ [Canada. Office of the Auditor General. “*Chapter 1: Protecting Fish Habitat.*” *Report of the Commissioner for Environment and Sustainable Development*, Ottawa: Public Works and Government Services Canada, Spring 2009. (Cat. No. FA1-2/2009-1E). (Commissioner: Scott Vaughan). p. 37.]

³⁸ “We focussed on Environment Canada’s approach to cooperation with other jurisdictions, most notably provinces. Environment Canada relies on water legislation and enforcement in other jurisdictions to protect water from the effects of pollution and complement *Fisheries Act* responsibilities. We expected that Environment Canada had determined the extent that it could rely on water legislation and enforcement by other jurisdictions to meet its mandate for the *Fisheries Act*’s prohibition requirement. We found that Environment Canada has not done this.” [Canada. Office of the Auditor General. “*Chapter 1: Protecting Fish Habitat.*” *Report of the Commissioner for Environment and Sustainable Development*, Ottawa: Public Works and Government Services Canada, Spring 2009. (Cat. No. FA1-2/2009-1E). (Commissioner: Scott Vaughan). pp. 37-38.]

³⁹ As the agreement remains in force until one party terminates it, renegotiation might first require notice that the federal government is preparing to “review” the agreement with a view to ending and renegotiating it.

⁴⁰ Canada. Office of the Auditor General. “*Chapter 1: Protecting Fish Habitat.*” *Report of the Commissioner for Environment and Sustainable Development*, Ottawa: Public Works and Government Services Canada, Spring 2009. (Cat. No. FA1-2/2009-1E). (Commissioner: Scott Vaughan). p. 39.

that the federal government is overseeing the environmental impacts—in this case, freshwater impacts—of oil sands activity.

But in some respects the agreement has not been fully implemented. As the environment commissioner stated in his spring 2009 report entitled *Protecting Fish Habitat*, the “Agreement’s Management Committee has not provided its oversight role in over two years and Environment Canada has not formally assessed the extent that the arrangements with Alberta fulfill the Department’s *Fisheries Act* responsibilities.”^{41,42} Moreover, as environment committee researchers Tim Williams and Penny Becklumb have pointed out, while under clause 5.2 of the Agreement both parties “envisioned establishing an arrangement relating to ‘complementary and cooperative monitoring programs with provisions for information sharing’... it appears no such arrangement was ever concluded.”⁴³

Second, the federal government has been satisfied with subordinating its *Fisheries Act* powers to multi-stakeholder initiatives like the Regional Aquatic Monitoring Program (RAMP) and the Cumulative Environmental Management Association (CEMA), both of whose purported aims are to monitor and manage the environmental consequences of oil sands development.⁴⁴

⁴¹ Canada. Office of the Auditor General. “Chapter 1: Protecting Fish Habitat.” *Report of the Commissioner for Environment and Sustainable Development*, Ottawa: Public Works and Government Services Canada, Spring 2009. (Cat. No. FA1-2/2009-1E). (Commissioner: Scott Vaughan). p. 39.

⁴² “The Management Committee, as defined in the Agreement, has not met since 2003. The Agreement specifies positions of Management Committee representatives within Department of Fisheries and Oceans, Department of Environment and Alberta Environment that no longer exist. However, *ad hoc* meetings according to the different annexes of the Agreement are being held. For example a formal meeting with regard to the inspection, investigation and enforcement occurred in May 2009 and the next meeting is planned for May 2010.” [Email communication from Environment Canada, 6 May 2010, in Penny Becklumb and Tim Williams (Analysts, Resources and Environment Section, Parliamentary Information and Research Service, Library of Parliament). “Federal Agreements with Alberta, Saskatchewan or the Northwest Territories Regarding Water Monitoring and Enforcement of Regulations.” Briefing note prepared for the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. May 3, 2010.]

⁴³ Penny Becklumb and Tim Williams (Analysts, Resources and Environment Section, Parliamentary Information and Research Service, Library of Parliament). “Federal Agreements with Alberta, Saskatchewan or the Northwest Territories Regarding Water Monitoring and Enforcement of Regulations.” Briefing note prepared for the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. May 3, 2010.

⁴⁴ CEMA is “a multi-stakeholder group created to manage the impacts of oil sands development.” It has, for example, “been tasked with developing a framework for protecting environmental flows (or instream flow needs) in the Lower Athabasca River” with a view to creating a framework to guide industry water withdrawals from the river under river-flow conditions that often fluctuate depending on season or climate factors. [Maas, Tony. “Protecting Nature’s Water Needs in the Athabasca River.” *FLOW Monitor – Canadian Water Policy Watch* 2. Winter (2010): 9-10.]

Funded by the oil sands industry, RAMP is the main multi-stakeholder process— involving the federal government, the Government of Alberta, oil sands producers, and First Nations groups—for monitoring the state of aquatic ecosystems in the oil sands. But despite its laudable goal of ensuring responsible management of oil-sands activity, RAMP has been the target of sharp criticism. According to Dr. David Schindler, Canada’s pre-eminent water scientist: “RAMP is supposed to be looking after this [the impact of the oil sands on water quality], but the most recent review of RAMP is scathing. The data are not shared with and seldom reviewed by outside experts, and little is published. Some key contaminants are not scrutinized in detail.”^{45,46}

The lack of credible independent research by RAMP, the Alberta government, or the federal government on water quality in the oil sands and downstream led Dr. Schindler to conduct his own investigation to test the “it’s all from natural sources” hypothesis. This view invokes the fact some bitumen oozes naturally from the banks of the Athabasca into the river to categorically negate the contribution the oil sands industry might be making to watershed contamination. In Dr. Schindler’s words, “...it seems that a detailed, well-designed, rigorously implemented, and publicly available examination of the toxic chemicals related to oil sands mining should have been done, but this has not happened. This lack of thorough investigation and transparency led me and several colleagues to undertake a study to investigate the relative roles of natural [sources] versus mining and oil sands processing in the pollution of the Athabasca River

⁴⁵ David W. Schindler (O.C., A.O.E., D.Phil., F.R.S.C., F.R.S.). *Brief* to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. 40th Parliament, 2nd Session. Ottawa, Ont. 13 March 2009.

⁴⁶ “In recent years, I have become concerned about the quality of monitoring done on the Athabasca River and its tributaries under the Regional Aquatic Monitoring Program (RAMP). In 2004, I played a minor role in a review of the RAMP project that was largely done by three prominent scientists with Environment Canada and the Canadian Department of Fisheries and Oceans. The review (Ayles et al. 2004) contained many scathing criticisms of the RAMP program. They found that the number of monitoring sites was inadequate, the sampling practices had produced data that could not measure, let alone detect impacts, and the water quality program design would not allow for cumulative impacts. To quote the review: ‘the reviewers...felt there was a serious problem related to scientific leadership, that individual components of the plan seemed to be designed, operated and analyzed independent of other components, that there was no overall regional plan, that clear questions were not being addressed in the monitoring and that there were significant shortfalls with respect to statistical design of the individual components.’ Elsewhere ‘The problems with the report are found in lack of details of methods, failures to describe rationales for program changes, examples of inappropriate statistical analysis, and unsupported conclusions.’ The review was never made public. There has not been a subsequent external review of RAMP. Recently, Alberta Environment...has published an analysis of trends in the Athabasca River. Some of the trends refute RAMP’s contention that there are no temporal trends in the flows and chemistry of the Athabasca River...RAMP’s data are considered proprietary, so that they are not available to the scientific community at large for further analysis and critical review.” [David W. Schindler (O.C., A.O.E., D.Phil., F.R.S.C., F.R.S.). *Brief* to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009.]

system.”^{47,48} Dr. Schindler’s research also aims to support and build on the earlier conclusions of a study by Kevin Timoney and Peter Lee that showed increased levels of contaminants over time in sediments and fish downstream of oil sands operations.⁴⁹ The Timoney and Lee study was criticized because its data was taken at a limited number of monitoring stations in the river.⁵⁰ However, as already mentioned, at least one strong critic of the Timoney and Lee study, the Alberta government, has had to retract earlier statements denigrating the researchers’ work.

It is worth noting that Dr. Schindler obtained funding for his research into industry pollution of the Athabasca River from the Natural Sciences and Engineering Research Council and from foundations such as Ducks Unlimited and the Walter and Duncan Gordon Foundation. He would gladly have accepted support from Environment Canada, but says funding for research projects in the oil sands is difficult to obtain from the department owing to the need for researchers to obtain letters of endorsement for their work from “clients”; in other words, from oil sands operators themselves.⁵¹ It would presumably be difficult to obtain such letters given that, from the industry’s point of view, the nature of Dr. Schindler’s investigations tend to dispel the myth hitherto propagated of a non-polluting and water-tight industry.

Dr. Schindlers’ preliminary “snapshot” of the Athabasca River and its tributaries to discover if “oil sands mining is adding to the burden of organic toxins [namely, polycyclic aromatic hydrocarbons, or PAH]⁵² in the river supplied from natural sources”⁵³ was

⁴⁷ David W. Schindler (O.C., A.O.E., D.Phil., F.R.S.C., F.R.S.). *Brief to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development.* (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009.

⁴⁸ According to Dr. Schindler, “there has been no airborne monitoring of the Athabasca area since 1981, at least that’s been reported.” [Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. David Schindler.* (Meeting No. 6, March 30, 2010) 40th Parliament, 3rd Session, 2010. Ottawa: Public Works and Government Services, 2010.]

⁴⁹ Kevin P. Timoney and Peter Lee. “Does the Alberta Tar Sands Industry Pollute? The Scientific Evidence.” 3.78 (2009): 65-81. (p. 78).

⁵⁰ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. David Schindler.* (Meeting No. 6, March 30, 2010) 40th Parliament, 3rd Session, 2010. Ottawa: Public Works and Government Services, 2010.

⁵¹ “...there are also some aspects of federal funding that I don’t like. For example, for anything bigger than an ordinary discovery grant they want letters of endorsement from clients such as oil sands companies to say how great your research is. Well, if four or five times you’ve found out bad things about the industry, it’s hard to get those letters.” [Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. David Schindler.* (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services, 2009.]

⁵² “We chose to study this group of compounds because it contained several known carcinogens which we know are high in bitumen.” [Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. David Schindler.* (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services, 2009.]

released in spring 2009 before the House of Commons environment committee at its hearings in Edmonton. Dr. Schindler looked at potential river contamination by PAH and a suite of toxic trace metals, including arsenic and mercury, lead, cadmium, and uranium.⁵⁴ In terms of PAH, he found they are “present in the Athabasca River just below Fort McMurray, confirming that there are natural sources to the river. However, there are large increases in the region of oil sands mining. Also, dissolved PAH in some of the impacted tributaries showed strongly increasing concentrations downstream of mining activity.”⁵⁵ As for trace metals, there were slight observed “increases in arsenic, lead and a two to threefold increase in summer [when the river is ice-free and open to both runoff and airborne sources of contaminants] concentrations of mercury in the river as it passed through the mined areas.”

While in his presentation to the committee in May 2009, Dr. Schindler referred to pollution from “mining” activity, in his subsequent appearance, in March 2010, to discuss his final results he made a more specific link to airborne emissions from upgraders.^{56,57} Dr. Schindler also noted that his “data agreed with Environment Canada’s National Pollutant Reporting Inventory: “...All of these contaminants are being spewed to the atmosphere, which the companies are reporting to Environment Canada...”⁵⁸

Dr. Schindler’s research has not only showed “high contamination of polycyclic aromatics including several known carcinogens” in snow samples from the Athabasca River “near the centre of [oil sands] activity and also at the bottom of the impacted

⁵³ David W. Schindler (O.C., A.O.E., D.Phil., F.R.S.C., F.R.S.). *Brief to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development.* (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009.

⁵⁴ David W. Schindler (O.C., A.O.E., D.Phil., F.R.S.C., F.R.S.). *Brief to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development.* (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009.

⁵⁵ David W. Schindler (O.C., A.O.E., D.Phil., F.R.S.C., F.R.S.). *Brief to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development.* (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009.

⁵⁶ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. David Schindler.* (Meeting No. 6, March 30, 2010) 40th Parliament, 3rd Session, 2010. Ottawa: Public Works and Government Services, 2010.

⁵⁷ “All thirteen elements on the U.S. EPA Priority Pollutant list were higher within a 50 kilometre radius of the upgraders on the river and Environment Canada’s NPRI [National Pollutant Release Inventory] emissions data indicate that these same elements are being spewed into the air in increasing amounts.” [Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. David Schindler.* (Meeting No. 6, March 30, 2010) 40th Parliament, 3rd Session, 2010. Ottawa: Public Works and Government Services, 2010.]

⁵⁸ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. David Schindler.* (Meeting No. 6, March 30, 2010) 40th Parliament, 3rd Session, 2010. Ottawa: Public Works and Government Services, 2010.

[Athabasca River] tributaries,”⁵⁹ it also “found high concentrations of several contaminants under the ice that are known to be high in tailings ponds at sites that are just downstream of tailings ponds indicating that there is some effect of tailing pond leakage under winter’s low flow conditions.”⁶⁰ Although leakage from toxic tailings ponds into groundwater is expected—environmental assessment reports have explicitly predicted this outcome—it has not been considered a problem.^{61,62,63} Dr. Schindler’s findings, however, suggest leakage may be more prevalent and far-reaching than previously thought.⁶⁴

⁵⁹ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. David Schindler*. (Meeting No. 6, March 30, 2010) 40th Parliament, 3rd Session, 2010. Ottawa: Public Works and Government Services, 2010.

⁶⁰ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. David Schindler*. (Meeting No. 6, March 30, 2010) 40th Parliament, 3rd Session, 2010. Ottawa: Public Works and Government Services, 2010.

⁶¹ “Shell indicated that over time the proportion of tailings seepage would increase until groundwater chemistry in the affected areas approached the same composition as undiluted tailings seepage. It also indicated that changes in groundwater quality would be long term and irreversible, but it did not expect to see significant effects on the PCA [Pleistocene Channel Aquifer] due to tailings area seepage. Shell stated that the tailings sand seepage water composition would be within the natural variation of groundwater quality in the PCA and maintained that the water would still be classified as usable...AEVN [Alberta Environment...] stated that it considered seepage from the external tailings disposal area into the PCA to be an impairment to the aquifer. AEVN believed that the water within the PCA would be considered a usable groundwater resource even after seepage effects modified its composition.” [Alberta Energy Utilities Board (EUB) and The Government of Canada. *EUB/CEAA Joint Review Panel Report (EUB Decision 2004-009) of Shell Canada Limited: Application for an Oil Sands Mine, Bitumen Extraction Plant, Cogeneration Plant, and Water Pipeline in the Fort McMurray Area*,”. Edmonton: EUB, 2004. pp.44, 46.]

⁶² “I would say that, at *current rates* of river flow and *current rates* of seepage [our emphasis] it’s [tailings pond seepage into groundwater] probably a very small part of the overall picture compared to the airborne and surface run-off problems that we’ve documented.” [Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. David Schindler*. (Meeting No. 6, March 30, 2010) 40th Parliament, 3rd Session, 2010. Ottawa: Public Works and Government Services, 2010.]

⁶³ “In 2003, the Northern Rivers Ecosystem Initiative [a joint effort of the Governments of Canada, Alberta, and Northwest territories] concluded that natural erosion of oil sands caused slight to moderate impacts to the Athabasca River, but found ‘no evidence that industrial oil sands operations were having an impact.’ Tailings pond leak pollutants into soil, groundwater and surface water, but industry and the government suggest that quantities are insignificant, despite recent reports that leakage rates are 11 million L/day...The 2008 RAMP community update, based on 2006 RAMP data, stated that ‘there were no detectable regional changes in aquatic resources related to oil sands development...only localized, site specific exceptions.’ [Erin N. Kelly, et al. “Oil sands development contributes polycyclic aromatic compounds to the Athabasca River and its tributaries.” Proceedings of the National Academy of Sciences of the United States of America (2009): 6.]

⁶⁴ Dr. David Schindler rejects the conclusion of the 2003 Northern Rivers Ecosystem Initiative (NREI), partly as a result on his most recent research data that shows the oil sands industry’s impact on contaminant levels in the Athabasca River. This rejection, however, is also influenced by internal discrepancies in the 2003 Northern Rivers Ecosystem Initiative report: “...Joanne Parrot and her colleagues at EC [Environment Canada] have discovered that contact with the river sediments in the oil sands area is toxic to fish eggs and embryos, causing high mortalities and rates of deformities. This was published in the Northern Rivers Ecosystem Initiative’s 2003 report, although it is not mentioned in the executive summary.” David

Environmental groups have consistently targeted tailings pond seepage. They have first sought to prove the phenomenon indeed exists—against industry claims to the contrary—and, second, attempted to show the seepage is *not* negligible.

For example, in its submission to the committee, Ecojustice produced deductive evidence that Syncrude's Mildred lake tailings pond is leaking. The evidence is implied by the company's own reporting of its decision to stop putting process water into the tailings pond: "...the flux of water moving *beyond* [our emphasis] the perimeter ditch is expected to decrease, and invariably the potential for influence on this surrounding environment...[and] seepage water reaching the ditch, moving past the ditch and entering Beaver Creek [a tributary of the Athabasca] is expected to decline."⁶⁵

As Dr. Mary Griffiths has further pointed out, referring to a report by NGO Environmental Defence, "Intercepting wells can capture the shallow leakage, but not the leakage to deep aquifers. As no measurements of actual leakage were publicly available, the report used estimates from environmental impact assessments, to calculate the potential leakage. It was estimated that four billion litres (i.e. four million cubic metres) may have been lost to the environment in 2007."⁶⁶

While Dr. Griffiths admits "The concentration of contaminants [e.g. naphthenic acids and polycyclic aromatic hydrocarbons] leaking from one tailings pond appear to attenuate relatively close to the source...ongoing study of tailings ponds is required. As groundwater moves slowly a problem may not become evident for a long time."⁶⁷

In a presentation to an IPEC (Integrated Petroleum Environmental Consortium)⁶⁸ conference in 2007, Jim Barker, Dave Rudolph, and Trevor Tompkins of the University of Waterloo (and other co-presenters) acknowledged the existence of seepage of tailings water from Suncor's Tar Island Dyke to the Athabasca, but stated it is "more likely from

Schindler (O.C., A.O.E., D. Phil., F.R.S.C., F.R.S.). "Re: Water Monitoring." Email to Francis Scarpaleggia. 12 April 2010.

⁶⁵ Karin E. Buss. "Oil Sands Development and Impacts on Water." *Brief* to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. 40th Parliament, 2nd Session. Ottawa, Ont. Ottawa: Ecojustice, 7 May 2010. 35. (p. 32).

⁶⁶ Dr. Mary Griffiths. *Brief* to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009. p. 8, footnote 30.

⁶⁷ Dr. Mary Griffiths. *Brief* to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009. p. 8-9.

⁶⁸ The Integrated Petroleum Environmental Consortium (IPEC) is a consortium of four universities in Oklahoma and Arkansas that studies the development of environmental technologies for the petroleum sector. [United States Environmental Protection Agency. National Center for Environmental Research. 13 July 2010. 13 July 2010

<http://cfpub.epa.gov/ncer_abstracts/INDEX.cfm/fuseaction/outlinks.centers/center/96>.]

sand dyke construction than ponds” (seepage of dyke construction water, 65 litres per second; pond seepage through foundation, 2 litres per second).⁶⁹ While these scientists claimed “no impacts to the aquatic ecosystem have been found,” they did nonetheless warn that “on the other hand, new mines are encountering more shallow sand and so potential impacts remain.”⁷⁰

For their part, Timoney and Lee, in their paper *Does the Alberta Tar Sands Industry Pollute? The Scientific Evidence*, use excerpts of correspondence from the Government of Alberta to oil sands companies to mount implied evidence that tailings ponds are leaking into, and contaminating, their surrounding aquatic environments. Their paper mentions, for example, that “Alberta government technical staff acknowledged escape of tailings from the Aurora North tailings pond when it advised Syncrude that it hoped construction of a soil-bentonite wall would *reduce* [our emphasis] or eliminate further seepage of process water. The seepage occurs adjacent to Stanley Creek, a tributary of the Muskeg River. On the Suncor lease, the pond known as ‘Natural Wetland’ contains elevated levels of hydrocarbons, naphthenic acids, and salinity due to seepage of tailings water through the adjacent containment dyke.”⁷¹ Furthermore, “Seepage from the Syncrude Mildred Lake site is implied in the high concentration of naphthenic acids found in Beaver Creek and in high and increasing levels of naphthenic acids downstream of the ‘lower seepage dam.’ Government correspondence with Syncrude shows that the government suspects seepage off the Syncrude site. Excerpts:..This is all indicative of an advancing plume...Wells with elevated chloride...indicate increasing chloride concentrations...[please] Explain the increasing naphthenic acid concentration in monitoring well OW98-09...”⁷²

Naphthenic acids are found in tailings ponds. But they are also found naturally in unprocessed bitumen that seeps into the Athabasca River. The concentrations of naphthenic acids in tailings ponds, however, reach levels one hundred times higher than those found in the Athabasca River.⁷³ They are in fact the “primary source of toxicity in

⁶⁹ “Roughly two tonnes of oil sands are excavated to produce one barrel of oil, and the sand and associated process water is discharged to large tailings ponds. The tailings-ponds dams may be constructed out of some of this processed sand. There is a concern that this has resulted in more-permeable zones in the dams that may leak and act as migration pathways for the contaminants in the tailings water. Of particular concern is the proximity of the tailings ponds to the Athabasca River, with a potential to detrimentally affect both human and aquatic ecosystem health downstream.” [The Expert Panel on Groundwater. *The Sustainable Management of Groundwater in Canada*. Ottawa: Council of Canadian Academies, 2009. p. 146.]

⁷⁰ Jim Barker, et al. “Attenuation of Contaminants in Groundwater Impacted by Surface Mining of Oil Sands, Alberta, Canada.” International Petroleum Environmental Conference (IPEC), Houston, TX: 6-9 November 2007. *Microsoft PowerPoint* file.

⁷¹ Kevin P. Timoney and Peter Lee. “Does the Alberta Tar Sands Industry Pollute? The Scientific Evidence.” 3.78 (2009): 65-81. (p. 72).

⁷² Kevin P. Timoney and Peter Lee. “Does the Alberta Tar Sands Industry Pollute? The Scientific Evidence.” 3.78 (2009): 65-81. (p. 72).

⁷³ Woynillowicz, Dan. *Tar Sands Fever*. 13 August 2007. 12 July 2010 <www.worldwatch.org/node/5287>.

oil sands tailings.”⁷⁴ While companies in the U.S. are “required by the U.S. *Comprehensive Environment Response, Compensation, and Liability Act* to report releases of naphthenic acids of more than 100 lbs., in Canada the NPRI (National Pollutant Release Inventory) doesn’t list naphthenic acid as a substance requiring reporting.”⁷⁵ Furthermore, although the Conservative government’s new process for reviewing harmful substances, the *Chemical Management Plan*, includes a “petroleum stream (the only industry that got its own stream)...naphthenic acid does not make the list of substances being reviewed there...”⁷⁶ Both these omissions give rise to suspicion the Harper government is surreptitiously protecting the oil sands industry against federal regulation of one of its most harmful pollutants.⁷⁷

The question of tailings ponds seepage is far from settled despite industry assurances the ponds are well contained and thus do not contaminate the Athabasca watershed. At the very least, in Dr. Schindler’s words, “the impacts on the Athabasca ecosystem of mining wastewater, snowmelt, or contaminated groundwater remain enigmatic due to high seasonal variability of flow and dilution capacity.”⁷⁸

Seepage of highly-toxic process-affected water is not the only way tailings ponds can endanger the aquatic environment. Another is the possibility of a future breach in a tailings-pond dam which would spell environmental disaster for the Athabasca River all the way into the Northwest Territories. As Dr. Schindler reminded members of the committee: “There was one spill in 1982...I believe it was [only] 50 million litres that were released into the river, and because it was impossible to clean up under ice...that spill made it all the way to Lake Athabasca. If something the size of the tailings pond at the Syncrude Mildred Lake facility were to breach “under winter conditions, I’m sure we’d see the effects of that spill all the way to Great Slave Lake and the Mackenzie.”⁷⁹

⁷⁴ Matthew Price (Policy Director, Environmental Defence). Letter to Leona Aglukkaq (Federal Minister of Health) and Jim Prentice (Federal Minister of the Environment). 6 July 2010.

⁷⁵ Matthew Price (Policy Director, Environmental Defence). “Naphthenic Acid.” Email to Francis Scarpaleggia. 20 April 2010.

⁷⁶ Matthew Price (Policy Director, Environmental Defence). “Naphthenic Acid.” Email to Francis Scarpaleggia. 20 April 2010.

⁷⁷ “Naphthenic acids are one of the main pollutants responsible for the toxicity of tar sands tailings to aquatic organisms, and have shown to harm liver, heart and brain function in mammals. Naphthenic acids are also very long-lived, taking decades to break down.” Matthew Price (Policy Director, Environmental Defence). Letter to Leona Aglukkaq (Federal Minister of Health) and Jim Prentice (Federal Minister of the Environment). 6 July 2010.

⁷⁸ Kelly, Erin N., et al. “Oil sands development contributes polycyclic aromatic compounds to the Athabasca River and its tributaries.” Proceedings of the National Academy of Sciences of the United States of America (2009): 6.

⁷⁹ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. David W. Schindler*. (Meeting No. 6, March 30, 2010) 40th Parliament, 3rd Session, 2010. Ottawa: Public Works and Government Services Canada, 2010.

And finally, the federal government's own report, *From Impacts to Adaptation: Canada in a Changing Climate 2007* (Chapter 7, co-authored by Dave Sauchyn and Suren Kulshreshtha), states that "Large-scale tailings ponds are also typical of open pit mines. Extreme precipitation events could cause overflows and spillage of contaminated or fresh water in storage."⁸⁰

In addition to airborne contamination of the Athabasca—from upgrader emissions and ambient dust from mining activities—and water-borne contamination from leaky tailings ponds, Dr. Schindler has identified a third pathway for industry pollution to enter the Athabasca River and its tributaries: namely, surface-water runoff from land disturbed during strip-mining operations. "If I look at all our evidence," Dr. Schindler said before the committee in March 2010, "it looks like the worst contamination occurs during the first few years after a watershed is exposed, and that's very common in watershed disturbance. Any chemical that's in the geological substrate increases dramatically once the surface biological layer is removed and then the amount of contamination tails away with time."⁸¹

Notwithstanding his own rigorous research, Dr. Schindler feels a "more comprehensive, expertly-designed and executed, year-round and multi-year study is needed to fully assess the full extent to which mining activity has harmed the river system and its inhabitants, and the potential for increasing harm if mining activities expand."⁸² He adds that "Current monitoring does not seem to have an appropriate design to assess trends over time in contamination."⁸³

Dr. Schindler believes that longitudinal monitoring should not be left to the oil sands industry or the Alberta government. Rather, this work should be undertaken by Environment Canada. Dr. Schindler contends that Environment Canada "has all the necessary analytical equipment, worth millions" and "very skilled organic chemists." Moreover, Environment Canada has a "long-term reputation for being an excellent laboratory with very rigorous quality control procedures and inter-lab intercalibrations. The group is headed by Derek Muir...a scientist of very high integrity, one of the world's

⁸⁰ David Sauchyn and Suren Kulshreshtha. "Chapter 7: The Prairies." *Impacts to Adaptation: Canada in a Changing Climate*. Ed. D.S. Lemmen, F.J. Warren, J., Lacroix and E. Bush. Ottawa, Ont: Government of Canada, 2007. p. 313.

⁸¹ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. David W. Schindler*. (Meeting No. 6, March 30, 2010) 40th Parliament, 3rd Session, 2010. Ottawa: Public Works and Government Services Canada, 2010.

⁸² David W. Schindler (O.C., A.O.E., D.Phil., F.R.S.C., F.R.S.). *Brief* to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009.

⁸³ David W. Schindler (O.C., A.O.E., D.Phil., F.R.S.C., F.R.S.). *Brief* to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009.

top environmental chemists.”⁸⁴ He adds that Environment Canada “has excellent capability to directly test the toxicity of the contaminant mixtures that are being added to the [Athabasca] river, while neither AE [Alberta Environment] nor industry does. There are some complicated questions that make the usual one pollutant at a time toxicity testing inadequate: arsenic is known to enhance the toxicity of PAHs, as is UV light supplied by sunlight exposure. The metal additions include almost every known highly toxic metal, mercury, arsenic, lead, cadmium, zinc, thalium, to name a few. The potential for synergistic effects of these is very high.”⁸⁵

Alberta environment minister Rob Renner, seeking to reassure Albertans that recent cuts to the province’s water monitoring programs will not impact “our capacity to conduct compliance, enforcement, and regulatory work” has pointed out that “in the oil sands region, Alberta Environment conducts continuous monitoring of the Athabasca River and its tributaries at 11 sites, audits the monitoring data that operators are legally required to provide, and participates in the Regional Aquatics Monitoring Program [RAMP], which has more than 100 water quality stations in the region.”⁸⁶

While Renner’s statement—as well as similar assertions by Environment Canada⁸⁷—suggest all is under control in the oil sands in respect to monitoring of the aquatic environment, Dr. Schindler has reinforced criticism of RAMP as a deeply deficient process: “The program was highly criticized by a peer review of the program’s five year report (1997-2001), which described the number of monitoring sites as inadequate, identified sampling practices that could ultimately neither measure nor detect impacts and stated that the program design could not assess cumulative impacts on water quality. The reviewers also ‘felt there was a serious problem related to scientific leadership, that individual components of the plan seemed to be designed, operated and analyzed independently of other components, that there was no overall regional plan, that clear questions were not addressed in the monitoring and that there were significant shortfalls with respect to statistical design of the individual components.”⁸⁸

As for RAMP’s vaunted “100” water-quality stations, Dr. Schindler says “they have for the most part not been monitored frequently enough and for a long enough period to

⁸⁴ David Schindler (O.C., A.O.E., D. Phil., F.R.S.C., F.R.S.). “RE: Water Monitoring.” Email to Francis Scarpaleggia. 12 April 2010.

⁸⁵ David Schindler (O.C., A.O.E., D. Phil., F.R.S.C., F.R.S.). “RE: Water Monitoring.” Email to Francis Scarpaleggia. 12 April 2010.

⁸⁶ Renner, Rob. “Efficiency the goal of water monitoring approach.” Lethbridge Herald 21 March 2010: Letters Confirmed, A6.

⁸⁷ De Souza, Mike. “River toxins near oilsands targeted.” Calgary Herald 21 June 2010, Final ed.: News, A1.

⁸⁸ Kelly, Erin N., et al. “Oil sands development contributes polycyclic aromatic compounds to the Athabasca River and its tributaries.” Proceedings of the National Academy of Sciences of the United States of America (2009): 6. (p. 1).

detect trends.”⁸⁹ Further, the stations “are not strategically placed to test the ‘it’s all from natural sources’ hypothesis” and “they do not sample airborne deposition of contaminants at all...”⁹⁰ In contrast to Environment Canada, which boasts excellent laboratories and first-rate experienced chemists, “Alberta has no laboratories, and must farm out all of its analyses to consultants. Some of the labs have not stacked up well with Environment Canada’s analyses in the past, having poorer detection limits and being able to measure fewer congeners of the organic chemicals.”

Dr. Schindler has also lamented RAMP’s lack of transparency: “The [peer] review was never made public, and RAMP raw data are considered to be proprietary and are not readily available for further analysis and critical review.”⁹¹

Dr. Schindler believes that ensuring the scientific integrity of any future Environment Canada monitoring program requires strict oversight by a committee of independent scientists as well as frequent expert reviews and public updates.^{92,93}

Although the Conservative government has not to date shown any sign of wanting to create a long-term, independently-audited water-monitoring program in the oil sands, Dr. Schindler’s findings and the House of Commons committee’s attention to the issue has forced the environment minister to take matters more seriously. For the first time, the government has had to admit to the possibility that not all bitumen in the Athabasca River comes from natural sources. Specifically, Environment Canada recently announced plans to deploy a \$1-million machine “to settle a scientific debate about toxins in the Athabasca River near the Alberta oil sands...The new equipment, an

⁸⁹ David Schindler (O.C., A.O.E., D. Phil., F.R.S.C., F.R.S.). “RE: Water Monitoring.” Email to Francis Scarpaleggia. 12 April 2010.

⁹⁰ David Schindler (O.C., A.O.E., D. Phil., F.R.S.C., F.R.S.). “RE: Water Monitoring.” Email to Francis Scarpaleggia. 12 April 2010.

⁹¹ Kelly, Erin N., et al. “Oil sands development contributes polycyclic aromatic compounds to the Athabasca River and its tributaries.” Proceedings of the National Academy of Sciences of the United States of America (2009): 6. (p. 1).

⁹² David W. Schindler (O.C., A.O.E., D.Phil., F.R.S.C., F.R.S.). *Brief* to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. 12 May 2009.

⁹³ FLOW (the Forum for Leadership on Water) has suggested that any independent program to monitor water quality and quantity in the oil sands region and downstream should be “sustained over 10 years minimum” and that annual reports “should contain basic data and analyses.” The group has also suggested that “the program be managed by an independent body such as the Alberta Water Research Institute, Pembina Institute or Alberta Research Council under the direction of a Board with representatives from federal and provincial governments, University of Alberta, Alberta Research Council, an environmental NGO and a representative of industry.” Moreover, “since such monitoring and assessment may be more important to decision, and public perceptions, about the oil sands than carbon capture and storage (CCS), it is suggested that a modest proportion (say 20%) of the CCS funding level should be devoted to this project.” [FLOW (Forum for Leadership on Water). “Oil Sands Environmental Monitoring Project (OSEMP) Proposal.” Memo from Jim Bruce to Francis Scarpaleggia. 31 March 2010. Email.]

orbitrap, could *theoretically* [our emphasis] answer questions about whether some contaminants in the river match the fingerprint of natural oil sands deposits or whether they are identical to samples from industrial tailings ponds.”⁹⁴ Indications are, however, that testing of the instrument is very much at the preliminary stages—no timelines for completing the work have been given—and any plans to use it to analyse water samples may be far off in the future. Moreover, there has been no sign to date of allowing independent third-party oversight of the project design. In other words, the government’s announcement may be simply an attempt to neutralize the issue of industry water contamination and insulate itself from criticism of its long-standing abdication of leadership in this area.

A sticky problem remains for the Harper government however. The *Fisheries Act* categorically prohibits the deposit of deleterious substances into Canada’s fish-bearing waters. While some have questioned the relevance of this *Fisheries Act* prohibition by arguing that toxic leakage from tailings ponds is minimal and thus not in fact harming fish, as a recent submission by a coalition of environmental groups to NAFTA’s Commission for Environmental Cooperation has pointed out, “[In order for a violation of the *Fisheries Act* to occur] Canadian case law has clarified that it is not necessary that the receiving water be rendered deleterious to fish—it is the substance itself being deposited that is deleterious or not...” Moreover, “What is being defined is the substance that is added to the water, rather than the water after the addition of the substance.”⁹⁵

Similarly, in a 1980s case against Suncor wherein the company was charged with two counts under section 33(2) of the *Fisheries Act* of depositing oil and grease into the Athabasca River, the Alberta court quoted a 1906 judicial decision: “In my [judge’s] opinion, the time at which the deleterious character of the matter is to be ascertained is the moment it enters the river. The effect of the action upon it of the water of the river, which necessarily must be after it has entered it, is in my view absolutely immaterial.”⁹⁶ On the defence that the deposited deleterious substance would be rendered harmless through dilution in a “mixing zone,” the judge was of the “view that a consideration of a deleterious substance must primarily be made at the end of the pipe where the effluent enters the river, and that any consideration of a ‘mixing zone’ or area of allowable pollution around the end of a pipe would be totally without merit unless it was specifically allowed by the Act or regulation.”⁹⁷ A fact worth noting is that “The Governor in Council *has not* [our emphasis] made any regulations pertaining to oil sands mining, oil sands tailings ponds or any effluent types released by those operations.

⁹⁴ De Souza, Mike. “River toxins near oilsands targeted.” *Calgary Herald* 21 June 2010, Final ed.: News, A1.

⁹⁵ Environmental Defence Canada, et al. Submission to the Commission for Environmental Cooperation Pursuant to Article 14, North American Agreement on Environmental Cooperation, Montreal, Qc. 14 April, 2010.

⁹⁶ R. v. Suncor Inc. No. 4 F.P.R. Edmonton. 25 May 1985.

⁹⁷ R. v. Suncor Inc. No. 4 F.P.R. Edmonton. 25 May 1985.

Therefore, there are no regulatory exemptions from the requirements of subsection 36(3) of the *Fisheries Act* that are relevant to oil sands mining or tailings ponds resulting from oil sands mining.”⁹⁸

Whether from airborne sources^{99,100} or leaky tailings ponds, Dr. Schindler and others have shown that contaminants are indeed reaching the Athabasca River in clear violation of the *Fisheries Act*. Thus exists a contradiction that cannot be denied, one that leaves both the industry and the Conservative government in an untenable legal limbo that sooner or later must be addressed.

Water Quantity

While the quality of water in the Athabasca River has changed over time, so has the *quantity* of water in the river. Specifically, “the net amount of water flowing from the land to the Athabasca River has declined by approximately 50 per cent for the 94 per cent of the basin that is downstream from Hinton [near Jasper, upstream from Fort McMurray].”¹⁰¹ While quite variable, “The total amount of water that flows past Fort McMurray in the Athabasca River between May and August...has declined by an average of 29% between 1971 and 2005.”¹⁰² Diminished flow of the Athabasca coincides with “increased temperatures and declines in precipitation and snow accumulation.”¹⁰³

⁹⁸ Submission to the Commission for Environmental Cooperation Pursuant to Article 14, North American Agreement on Environmental Cooperation. Environmental Defence Canada et al. April 14, 2010.

⁹⁹ “In addition to prohibiting the direct deposit of deleterious substances into water frequented by fish, the second half of subsection 36(3) clearly prohibits the *indirect* deposition of deleterious substances and has a preventative element of prohibiting deposition ‘in any place under any conditions where the deleterious substance *may* enter into such waters.” [Environmental Defence Canada, et al. Submission to the Commission for Environmental Cooperation Pursuant to Article 14, North American Agreement on Environmental Cooperation, Montreal, Qc. 14 April, 2010.]

¹⁰⁰ In his response to a question in the House of Commons on April 1, 2010 from Lac-Saint-Louis M.P. Francis Scarpaleggia about Dr. David Schindler’s evidence of airborne contamination of the Athabasca River by the oil sands industry, the fact that airborne pollution of a waterway is prohibited under the *Fisheries Act* appeared to be lost on environment minister Jim Prentice: “I did not take Mr. Schindler’s *allegations* [our emphasis] to relate to emissions but rather to airborne emissions as opposed to *Fisheries Act* issues.” [Canada. Parliament. House of Commons. Debates, 40th Parliament, 3rd Session, 2010, vol. 145, No. 22, April 1, 2010. Ottawa: Canadian Government Publishing, 2010.]

¹⁰¹ Dr. William F. Donahue. “*Changing Water Supply in the Athabasca River, and Implications for Water-Intensive Development in Northeastern Alberta.*” Brief to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009. p. 1.

¹⁰² Dr. William F. Donahue. “*Changing Water Supply in the Athabasca River, and Implications for Water-Intensive Development in Northeastern Alberta.*” Brief to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009. p. 6.

¹⁰³ Dr. William F. Donahue. “*Changing Water Supply in the Athabasca River, and Implications for Water-Intensive Development in Northeastern Alberta.*” Brief to the Parliament of Canada, House of Commons,

Moreover, “Warmer temperatures will likely result in less available water, due to continued decrease in spring snowmelt, increases in evapotranspiration, and coincident declining glacial runoff.”¹⁰⁴

In view of continuing high demand for water to process bitumen, there has indeed been recognition that industry withdrawals from the Athabasca River must be better managed. Thus, in March 2007 the first of a two-phase science-based water-management framework for the Athabasca was released by Alberta Environment and the federal Department of Fisheries and Oceans. The release came after the Cumulative Environmental Management Association (CEMA), the multi-stakeholder group tasked with developing a system to determine allowable rates of industry water withdrawals as a function of river-flow at a given moment, failed to reach consensus by its 2005 deadline.

Phase 1 of the *Lower Athabasca River Water Management Framework* works like a traffic-light system. It prescribes three different withdrawal regimes depending on river flow. When the river is in a “green” state, companies can cumulatively extract up to 15 per cent of river flow. A “yellow” state means companies can cumulatively extract up to 10 per cent of river flow with a maximum extraction rate in winter of 15 m³/s. A “red” state limits cumulative extractions to 5.2 per cent of river flow with mandatory storage of water and a maximum extraction rate of 15 m³/s in winter.¹⁰⁵

Phase 1, however, is flawed on four counts.

First, Phase 1’s rules are voluntary, hence unenforceable.¹⁰⁶ This flaw was highlighted when Suncor Energy and Syncrude Canada, Alberta’s oldest and biggest oil sands miners, stated they “will slow but won’t stop taking water from the Lower Athabasca

Standing Committee on Environment and Sustainable Development. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009. p. 1.

¹⁰⁴ Dr. William F. Donahue. “*Changing Water Supply in the Athabasca River, and Implications for Water-Intensive Development in Northeastern Alberta.*” Brief to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009. p. 1.

¹⁰⁵ Dr. William F. Donahue. “*Changing Water Supply in the Athabasca River, and Implications for Water-Intensive Development in Northeastern Alberta.*” Brief to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009. p. 16.

¹⁰⁶ While the framework “suggests the presence of legal restrictions [on water withdrawals by the oil sands industry], there remains no evidence to suggest this framework is based in law or regulation. On January 27, 2009, several environmental organizations issued a press release indicating their primary concern that Alberta Environment lacked the regulatory ability to monitor and enforce water withdrawal restrictions during low flow conditions and ensure that oil sands operators are adhering to the intent of a weekly maximum cumulative withdrawal rate.” [Water Matters. Oil sands diversions and the lower Athabasca River. 4 February 2009. 17 May 2009 <www.water-matters.org/node/266>.]

River in the event of 100-year low-flow levels...”¹⁰⁷ The companies have said “they wouldn’t comply with a push by environmental and aboriginal members of the committee [of CEMA] to voluntarily agree to zero withdrawals, even though other two current miners, Shell Canada’s Albian Muskeg River and Canadian Natural Resources Ltd.’s Horizon, agreed to slow their take to just enough to prevent their system’s from freezing.”¹⁰⁸

Second, Phase 1 takes a static historical perspective on river flows.¹⁰⁹ In other words, it ignores *trends* in river flow, especially in regard to the impacts of climate change on the Athabasca River.

Third, while the framework’s goal is to manage industry impacts on the Athabasca’s natural flows to prevent harm to fish and fish habitat, its designers lacked access to the baseline data needed to predict how different river-flow scenarios could affect fish and fish habitat. According to Dr. Donahue: “Data on fish habitat use and other biota are very limited for the lower Athabasca River and its tributaries. Consequently, many of the conclusions in current estimates of IFN [instream flow needs] for the region are based on large assumptions and applications developed for southern rivers.”¹¹⁰ In the final analysis, “The lack of fisheries habitat or population information, especially in lower reaches of the Athabasca, means the methods used to create the management plan are woefully inappropriate for supporting recommendations for water extraction limits.”¹¹¹

This lack of data on fish habitat, in the oil sands region and elsewhere, was highlighted by the Commissioner of Environment and Sustainable Development in his spring 2009

¹⁰⁷ Healing, Dan. “Oilsands reject halt to river water use.” *Calgary Herald* 4 February 2010.

¹⁰⁸ Healing, Dan. “Oilsands reject halt to river water use.” *Calgary Herald* 4 February 2010.

¹⁰⁹ “The overarching presumption inherent to the Water Management Framework for the Lower Athabasca is that conditions in the river or its catchment that affect streamflow and fish habitat will remain unchanged in future. The most important shortcoming of current IFN models and the decision-making frameworks is that they do not consider past trends in streamflow (or fish habitat), or any relationships that may exist between climate and surface water supplies. Without considering and incorporating these factors into risk assessments of streamflow and fish habitat, decisions made in attempting to manage oilsands development and a sustainable Athabasca River quickly moves from science-based to conjecture.” [Dr. William F. Donahue. “*Changing Water Supply in the Athabasca River, and Implications for Water-Intensive Development in Northeastern Alberta.*” *Brief to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development.* (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009. p. 14.]

¹¹⁰ Dr. William F. Donahue. “*Changing Water Supply in the Athabasca River, and Implications for Water-Intensive Development in Northeastern Alberta.*” *Brief to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development.* (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009. p. 14.

¹¹¹ Dr. William F. Donahue. “*Changing Water Supply in the Athabasca River, and Implications for Water-Intensive Development in Northeastern Alberta.*” *Brief to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development.* (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009. p. 1.

report: “Fisheries and Oceans Canada and Environment Canada cannot demonstrate that fish habitat is being adequately protected as the *Fisheries Act* requires. In 23 years since the *Habitat Policy* was adopted, many parts of the Policy have been implemented only partially by Fisheries and Oceans Canada or not at all. The Department does not measure habitat gain or loss. It has limited information on the state of fish habitat across Canada—that is, on fish stocks, the amount and quality of fish habitat, contaminants in fish, and overall water quality.”¹¹² Because of “The absence of detailed hydrographic and ecological monitoring, especially in the lower reaches of the river, makes it difficult to estimate future impacts [of industry water withdrawals]” Dr. Donahue recommends that “Detailed monitoring programs should be started immediately, and sustained during all seasons if science-based management and protection of this river [the Athabasca] is desired.”¹¹³

Finally, Phase 1’s fourth flaw is that it fails to incorporate an ecosystem base flow (EBF).¹¹⁴ An EBF establishes a science-based threshold of river flow below which *all* [our emphasis] water withdrawals would cease.¹¹⁵

Phase 1’s lack of effectiveness in protecting fish habitat from industry water withdrawals may be partly due to the constraints inherent in CEMA’s decision-making model. CEMA is a consensus-based body^{116,117} that subsumes the dictates of science to

¹¹² Canada. Office of the Auditor General. *Report of the Commissioner for Environment and Sustainable Development, Chapter 1: Protecting Fish Habitat*. Ottawa: Public Works and Government Services Canada, Spring 2009. (Cat. No. FA1-2/2009-1E). (Commissioner: Scott Vaughan). p. 12.

¹¹³ Dr. William F. Donahue. “*Changing Water Supply in the Athabasca River, and Implications for Water-Intensive Development in Northeastern Alberta.*” Brief to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009. p. 1.

¹¹⁴ While the Phase 1 Water Management Framework did not specify an EBF, the framework did recognize that some level of low flow (EBF) could occur in the Athabasca River such that water withdrawals for industry should effectively stop, and that research would be directed towards the definition of an EBF in a Phase 2 or final Water Management Framework for the Lower Athabasca river. [Alberta Environment, Fisheries and Oceans Canada. Water Management Framework: Instream flow needs and water management system for the Lower Athabasca River. Edmonton, AB: Government of Alberta, 2007. p. 13]

¹¹⁵ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence*. (Meeting No. 21, May 13 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

¹¹⁶ “Deviation from the principle of requiring consensus on product decisions should only occur on an exception basis...It is the management committee’s responsibility to make a recommendation to the general membership as to whether a non consensus decision should be put forward to regulators and under what terms.” There are 8 criteria CEMA’s management committee must consider before making a “recommendation to the general membership as to whether a non consensus decision should be put forward to regulators and under what terms.” Cumulative Environmental Management Association. Decision Making Policy and Guidelines. Wood Buffalo Region. Fort McMurray, AB: CEMA, 2008.

¹¹⁷ CEMA’s rules of decision-making do permit “non consensus” decisions and recommendations. The first such decision was to issue a recommendation by CEMA’s Sustainable Ecosystems Working Group to the

the political compromises needed to sustain and protect a powerful industry that is an engine of economic prosperity.¹¹⁸ CEMA's decision-making rules give the industry an effective veto over majority viewpoints within the organization. As a result, some stakeholders have renounced their CEMA membership in frustration.

The second phase of the *Lower Athabasca River Water Management Framework* was released by CEMA's Phase 2 Framework Committee (P2FC) in February 2010. As with Phase 1, this second-phase also failed to reach consensus among all stakeholders.¹¹⁹ The obstacle to consensus was differences of opinion around the need for a specified EBF. While the potential merit of an EBF was generally accepted, industry stakeholders were unwilling to go as far as to include a specified EBF in the P2FC recommendation, citing potential conflict with their existing water rights.¹²⁰ The committee's recommendations were nonetheless "forwarded to provincial and federal regulators,"¹²¹ for consultation with the public and First Nations.¹²²

Alberta government calling for a temporary moratorium on the new oil sands licenses until 2011. Christine Kenning (CEMA Office Manager). Email to Francis Scarpaleggia. 6 July 2010.

¹¹⁸ "Fisheries and Oceans Canada's scientists have stated that the interim IFN [inflow needs] methods and framework are not protective of fisheries in the Athabasca River. As has been reported elsewhere, our attempts to manage fisheries by consensus and compromise have resulted in widespread failures of freshwater fisheries." [Dr. William F. Donahue. *Changing Water Supply in the Athabasca River, and Implications for Water-Intensive Development in Northeastern Alberta.* Brief to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009.]

¹¹⁹ "The P2FC did not reach consensus on a set of rules to govern water withdrawals. Hence, the P2FC report deliberately refers to a set of rules supported by some committee members, but not other members, as 'Option H', not the 'Phase 2 Water Management Framework'...To be clear: during the first half of 2010, Alberta Environment and the Department of Fisheries and Oceans are expected to produce a Draft Phase 2 Water Management Framework that could well be modified during consultations with First nations and the public based on P2FC's report." [WWF-Canada. No Consensus on Water Withdrawal Recommendations for the Lower Athabasca River. 5 February 2010. 18 April 2010 <<http://www.wwf.ca/newsroom/?6540/No-Consensus-on-Water-Withdrawal-Recommendations-for-the-Lower-Athabasca-River>>.]

¹²⁰ "The key area of disagreement revolved around issues associated with the EBF exemption. While full agreement on the existence of and level of an exemption to the EBF was not reached, there was agreement on the following principles: there is a low flow at which continued minimum water withdrawals could pose an unacceptable risk to the aquatic ecosystem; at such flow, it may be appropriate for all water withdrawals to cease; this would require the investigation of the legal, administrative and policy options for doing this in a manner consistent with water rights granted to licensees under the *Water Resources Act* and preserved in the *Water Act*. [Dan Ohlson, Graham Long and Todd Hatfield. Phase 2 Framework Committee Report. British Columbia: Compass Resources Management and Solander Ecological Research, 2010. pp. 110-111.]

¹²¹ Cumulative Environmental Management Association. "CEMA's Recommendations for Water Withdrawal from the Athabasca." 4 February 2010. CEMA. Print.

¹²² WWF-Canada. No Consensus on Water Withdrawal Recommendations for the Lower Athabasca River. 5 February 2010. 18 April 2010 <<http://www.wwf.ca/newsroom/?6540/No-Consensus-on-Water-Withdrawal-Recommendations-for-the-Lower-Athabasca-River>>.

Particularly disappointing given the risks to the Athabasca from industry water-takings at a time when climate change also threatens river flow is the inability of the Alberta government, under its *Water Act*, to impose an EBF and the apparent unwillingness of the federal government to do so using its legal powers under the *Fisheries Act* to protect fish and fish habitat.¹²³

Water rights in Alberta's *Water Act* "are based on first in time and first in right and each water user has the right to take their entire allocation in accordance with their licenses and the terms and conditions on those licenses."¹²⁴ While there are conditions on water licenses, "if one were to look at these conditions you'd see that the conditions are different on all the licenses. Some of them...are legally specious in that they seem to have been added after the licenses were issued and I'm not sure the government would actually be enforcing these conditions." Furthermore, the Alberta government does not have the power under the act to expropriate licences unless "there is truly an emergency...[and] the courts will not allow that kind of power, at least to be declared for too long. There are provisions in the *Water Act* where human health is at risk, the government can step in, but if it's just aquatic ecosystem issues, like there are fish dying then under our [Alberta's] *Water Act*, the government can step in for licences issued after 1999 if the effect on the aquatic ecosystem wasn't foreseeable when that licence was issued."¹²⁵ It is worth noting, in terms of Alberta's *Water Act* limitations, that the act "just continues on legislation that was started in 1894 when there were no water issues, and although the *Water Act* has improved a lot of the situation, it's still the water rights holders who are truly ruling here."¹²⁶

However, not only does Ottawa have the constitutional right to protect aquatic ecosystems from the destructive effects of low river flow, DFO's *Policy for the Management of Fish Habitat (1986)* explicitly commits the federal government to

¹²³ It has been argued that section 35 of the *Fisheries Act* [harmful alteration, disruption or destruction of fish habitat, HADD] does not apply to pre-1977 water licenses, namely Syncrudes's and Suncor's. However, in answer to a question on the matter, committee witness Arlene Kwasniak, Associate Professor in the Faculties of Law and Environmental Design stated: "...the Department of Fisheries and Oceans has recently issued a policy that states that the HADD provisions do apply to pre-1977 structures and frameworks. So by extension they should apply to pre-1977 water licenses as well." [Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence*. (Meeting No. 21, May 13 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.]

¹²⁴ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence*. (Meeting No. 21, May 13 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

¹²⁵ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence*. (Meeting No. 21, May 13 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

¹²⁶ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence*. (Meeting No. 21, May 13 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

ensuring the flow conditions required to maintain the health of fish and fish habitat: “The Department will ensure a uniform and equitable level of compliance with statutes, regulations and policies, as necessary to manage and protect fish habitats in jurisdictions where the federal government manages fisheries. The *Fisheries Act* contains powers to deal with damage to fish habitat, destruction of fish, obstruction of fish passage, *necessary flow* [our emphasis], the screening of water intakes and the control of deleterious substances.”¹²⁷ Nor is this federal commitment an isolated one. The *Application of the Habitat Protection Provisions of the Fisheries Act to Existing Facilities and Structures (2007)* states: “...the act includes provisions allowing the federal government to regulate impacts to fish and fish habitat related to fish passage, *instream flow needs* [our emphasis] for fish, harm to fish habitat and killing of fish; in a manner that supports the conservation and protection of fish habitat...”¹²⁸

The commitment to ensuring necessary flow conditions for healthy fish and fish habitat has not been confined to departmental policy statements and handbooks. DFO and Canadian Environmental Assessment Agency (CEAA) project reviews and management plans have gone further, clearly advocating for setting an EBF. For example, in its 2006 departmental review of the Phase 1 water management framework for the Athabasca, DFO, through its Centre for Science Advice, demonstrated support for the EBF concept. DFO biologist Rick Courtney, in commenting on the Phase 1 framework “proposed a more protective approach in 2006 for the Instream Flow Needs (IFN) for the Lower Athabasca River...”¹²⁹ Moreover, in their approval of Imperial Oil’s Kearl Oil Sands Project in 2007, the Canadian Environmental Assessment Agency and the Alberta Energy and Utilities Board joint review panel strongly recommended that AENV and DFO incorporate an EBF into the final *Water Management Framework for the Lower Athabasca River*. The Government of Canada subsequently accepted the recommendation.^{130,131}

¹²⁷ Fisheries and Oceans Canada. The Department of Fisheries and Oceans. [Policy for the Management of Fish Habitat](#). Ottawa, Ont: Fish Habitat Management Branch, 1986. Catalogue number Fs 23-98/1986E. 28 pages. p. 12.

¹²⁸ Fisheries and Oceans Canada. The Department of Fisheries and Oceans. [Application of the Habitat Protection Provisions of the Fisheries Act to Existing Facilities and Structures](#). Ottawa, Ont: Canada Department of Fisheries and Oceans, 2007. Catalogue number Fs23-529/2007E-PDF. p. 1.

¹²⁹ Tony Maas (Director, Freshwater Program, WWF-Canada). “Athabasca.” Email to Francis Scarpaleggia. 30 March 2010.

¹³⁰ Department of Fisheries and Oceans Canada. *The Government of Canada’s Response to the Environmental Assessment Report of the Joint Review Panel on the Kearl Oil Sands Project*. Ottawa: Canadian Environmental Assessment Agency, 2007. Canadian Environmental Assessment Registry 05-07-16237.

¹³¹ Alberta Energy and Utilities Board (EUB) and Canadian Environmental Assessment Agency (CEAA). *Report of the Joint Review Panel Established by the Alberta Energy and Utilities Board and the Government of Canada: “Imperial Oil Resources Ventures Limited, Application for an Oil Sands Mine and Bitumen Processing Facility (Kearl Oil Sands Project) in Fort McMurray Area.”* Edmonton, AB: EUB, 27 February 2007. EUB Decision 2007-013.

The federal government has various means at its disposal to circumvent the P2FC process and establish an EBF. Ottawa need not remain the prisoner of a deadlocked multi-stakeholder process with an oil-sands industry veto.

First, Ottawa could make setting an EBF a condition for a project to obtain authorization for harmful alteration, disruption or destruction of fish habitat (HADD) under the *Fisheries Act*. While DFO cannot compel an oil sands operator to seek an authorization beforehand to destroy fish habitat (only prosecute after the fact), in the normal case where a project proponent does seek authorization in advance of construction the department could make maintaining an EBF a condition of authorization. Currently, *Fisheries Act* authorizations do in fact impose conditions on project proponents for maintaining flows, but they do not set and enforce an EBF.

Second, *Fisheries Act* sentencing provisions offer another avenue for setting and enforcing an EBF. In 1991, the act was amended to give courts the ability to impose a variety of prohibitions. As a result, the court may not only make orders prohibiting activities that are in violation of the act, it may direct any action the court considers appropriate to remedy or avoid any harm to any fish, fishery, or fish habitat that resulted or may result from the commission of the offence. Again, like the first option, this second approach would be an *ex post facto* way of achieving the goal of setting and enforcing an EBF. It would also be an uncertain instrument owing to the vagaries of judicial decisions.

Third, the *Canada Waters Act* also provides Ottawa with a legislative vehicle for instituting an EBF. Under the act, the federal government has the power to formulate Cabinet-approved comprehensive plans for “water resource management” defined to include the control and regulation of water quantity and quality. When the waterway in question is either solely federal or inter-jurisdictional (e.g. the Athabasca River), Ottawa may act alone without provincial acquiescence if Cabinet is satisfied that all reasonable efforts have been made to reach agreement with the provincial government and those efforts have failed. Similarly, the federal government can act alone where water quality management of any inter-jurisdictional waters has become an issue of urgent national concern, but again only if there has been failure of all reasonable efforts to resolve the matter with the provinces or territories involved.

Fourth, the *Canadian Environmental Assessment Act* can be amended to set specific environmental requirements for projects that trigger the federal environmental assessment process. However, the Conservative government’s decision to insert into its 2010 budget provisions to effectively weaken federal environmental assessment forecloses any hope it would use the act to render energy projects, like those in the oil sands, more environmentally-sustainable. Of note, however, is the fact that four panel reviews have set flow standards for the Athabasca River in their environmental

assessment decisions. Of these four, one (the Kearl oil sands project) recommended an EBF.

Fifth, the *National Parks Act* requires the federal government to keep the preservation of ecological integrity a priority in its management of Canada's national parks. Since the Wood Buffalo National Park is bounded by the Athabasca River, Ottawa could use its jurisdiction over national parks to require the maintenance of flows needed to protect not only the fish and fish habitat in the park but non-fisheries aquatic ecosystems and deltaic ecology as well.

Finally, the federal government could establish a legally-enforceable EBF using its legal authority, under the general regulation-making power in section 43 of the *Fisheries Act*, to make regulations for the proper management and control of the sea-coast and inland fisheries. The Conservative government shows no sign, however, that it intends to avail itself of this option, apparently preferring to let the matter of an EBF languish in the P2FC.

As for the fact federal action to establish an EBF under the *Fisheries Act* would conflict with provincial legislation, namely the Alberta *Water Act*, "where there is inconsistency or conflict between a federal law and a provincial law, the federal law prevails. A provincial law cannot excuse the proper enforcement of federal law."¹³²

The need of federal leadership to monitor water levels and obtain baseline data on fish habitat—in both cases with the goal of establishing an EBF for the Athabasca River—is even more relevant in light of claims the Alberta government may lack sufficient rigour in discharging its own responsibilities for protecting the province's water resources. According to a recent report by the province's acting auditor general, the "Alberta government is not systematically following up on whether water licence holders—including irrigation collectives, corporations or towns and cities—are illegally withdrawing too much water..."¹³³ In other words, "once an approval for water withdrawals or a diversion is granted, little attention is focused on 'ensuring that activities in the field comply with authorized conditions.'"¹³⁴

Establishing a legally-binding EBF for the Athabasca could simultaneously address another key concern for the basin's ecosystem health and integrity: the preservation of ecologically-vital wetlands. This concern arises partly from news reports the oil sands

¹³² Environmental Defence Canada, et al. Submission to the Commission for Environmental Cooperation Pursuant to Article 14, North American Agreement on Environmental Cooperation, Montreal, Qc. 14 April, 2010.

¹³³ Kelly Cryderman. "Province falls short on water management: Numerous 'non-compliant' cases found." *Calgary Herald* 15 April 2010, Final ed.: News, A5.

¹³⁴ Kelly Cryderman. "Province falls short on water management: Numerous 'non-compliant' cases found." *Calgary Herald* 15 April 2010, Final ed.: News, A5.

industry and other resource sectors in the province are currently working together behind closed doors to weaken Alberta's draft wetlands policy.

Following three years of consultations, a multi-stakeholder group established by the Alberta Water Council to develop guidelines for wetlands conservation in the province "produced a rough draft of its policy—one supported by 23 of its 25 members."¹³⁵ (Alberta does not have at a policy to protect or restore wetlands in the northern half of the province, including in the wetlands-rich oil sands region.)¹³⁶ The two dissenting members of the group were the Canadian Association of Petroleum Producers (CAPP) and the Alberta Chamber of Resources (ACR). The former allegedly opposed the recommendation for a "no-net-loss" policy for wetlands, which would require "companies that destroy such areas...to either restore them, bolster a nearby depleted wetland or build a new one somewhere else in the province."¹³⁷ The ACR and CAPP are believed to have recommended that wetland restoration be discretionary, while the ACR further recommended that "the province not include any existing oil sands projects in any wetlands policy."¹³⁸ Even when a wetland in the oil sands has been "reclaimed," environmentalists maintain that the new wetland resembles little the one earlier destroyed.

The Oil Sands and Groundwater

Groundwater is an invisible yet crucial resource for the oil sands industry. Despite ongoing efforts to map aquifers in the oil sands, still not enough is known about these underground reservoirs or about the interaction of the region's groundwater and surface water. Yet an accurate picture of both is vital to assessing the impacts of oil sands mining—both surface and *in situ*—on northern Alberta's freshwater supplies. In the words of Dr. Jim Bruce, member of the Council of Canadian Academies' (CCA) 2009 Expert Panel on Groundwater, oil sands megaprojects have proceeded with a "completely inadequate understanding of the groundwater regime in the area" even though these projects "are having significant impacts on the groundwater regime."¹³⁹

¹³⁵ Howell, Trevor S. News - Wetlands policy under water. 17 June 2010. 26 June 2010 <<http://www.ffwdweekly.com/article/news-views/news/lobbying-threatens-wetlands-policy-warn-conservationists-5860/>>.

¹³⁶ "Big Oil can't afford to repair wetlands?" Red Deer Advocate 11 March 2010: Front, A1, A2.

¹³⁷ "Big Oil can't afford to repair wetlands?" Red Deer Advocate 11 March 2010: Front, A1, A2.

¹³⁸ "Big Oil can't afford to repair wetlands?" Red Deer Advocate 11 March 2010: Front, A1, A2.

¹³⁹ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence*. (Meeting No. 26, June 9, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

The oil sands industry boasts that *in situ* mining (where steam made from a mix of saline and non-saline water is injected underground to force bitumen to the top)¹⁴⁰ uses a high proportion of recycled water (up to 95 per cent) compared to open-pit mining where massive amounts of water are needed to separate bitumen from sand. Surface mining after all is what attracts the lion's share of media and public attention when it comes to the industry's destructive environmental impacts. But despite high rates of water recycling in *in situ* oil sands production, "1 m³ of bitumen produced still requires about 0.2 m³ of *additional* [our emphasis] groundwater (NEB, 2008). [And] Eventually, most of the groundwater used for steam injection or processing ends up either being deep-well injected or stored in tailings ponds...lost as a resource for consumptive use."¹⁴¹ Moreover, "The original hope was that they'd be able to use saline groundwater, but there are some real problems in terms of what they do with salt water after they take it out. So they are using substantial quantities of natural groundwater."¹⁴² According to Dr. Bruce, there need for better information on "how much of the water being used in these operations is saline and how much is freshwater."¹⁴³

Another fact offered by oil sands optimists to minimize fears about ongoing environmental degradation from oil sands development is that since "90 per cent of the bitumen is underground,"¹⁴⁴ there will be more and more reliance in future on SAGD (Steam Assisted Gravity Drainage) mining, with its less obtrusive well pads, than on "large industrial site[s] with monster trucks delivering oil sand to giant machines that belch steam and CO₂ into the atmosphere and spew hot waste water into greasy tailing ponds that snare unwary ducks."¹⁴⁵ While it is true that in future oil sands activity will more toward *in situ* extraction, there remain large undeveloped surface-mineable areas. According to the Government of Alberta, there are 4,800 square kilometres of surface-mineable area in the province of which 1,352 square kilometres have been approved for surface mining as of January 2009.^{146,147,148}

¹⁴⁰ "In situ recovery methods are used to extract the bitumen at depths typically greater than 75 metres." [The Expert Panel on Groundwater. The Sustainable Management of Groundwater in Canada. Ottawa: Council of Canadian Academies, 2009. p. 143.]

¹⁴¹ The Expert Panel on Groundwater. The Sustainable Management of Groundwater in Canada. Ottawa: Council of Canadian Academies, 2009. p. 144.

¹⁴² Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence*. (Meeting No. 26, June 9, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

¹⁴³ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence*. (Meeting No. 26, June 9, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

¹⁴⁴ Alastair Sweeney. "Canada's oilsands blessing." The Windsor Star 17 May 2010, Final ed.: Editorial/Opinion, A7.

¹⁴⁵ Alastair Sweeney. "Canada's oilsands blessing." The Windsor Star 17 May 2010, Final ed.: Editorial/Opinion, A7.

¹⁴⁶ Government of Alberta. FACTS ABOUT Alberta's oil sands: The Resource. June 2010. 6 July 2010 <www.oilsands.alberta.ca/documents/The_resource.pdf>.

In any event, according to the CCA, although “more than four-fifths of the total bitumen reserves in Alberta are accessible only by *in situ* methods, the demand for groundwater for *in situ* production could be as great as or greater than the demand for surface water for oil-sands mining, unless new extraction processes are adopted [such as compressed-air or solvent-assisted *in situ* extraction].”¹⁴⁹

The Expert Panel further noted that “Knowledge is lacking as to whether the aquifers in the Athabasca oil-sands region can sustain these groundwater demands and losses.”¹⁵⁰ It remains unknown, for example, if “low-flow levels in the Athabasca River affect shallow groundwater”¹⁵¹ and whether “aquifer dewatering...affects surface systems.”^{152,153} As Dr. Mary Griffiths told the committee, the impacts of oil sands projects on groundwater are calculated on a project-by-project basis only.^{154,155} Because

¹⁴⁷ As new surface-mineable areas are exploited many of these may be in areas with less clay. “This could be a double-edged sword because this would a) allow greater separation of liquid from solid since it is the clay that is causing the settling problems in the current ponds, but b) current tailings ponds seal themselves with the clay particles so that these other ponds would have greater leaching potential.” [Tim Williams (Analyst, Resources and Environment Section, Parliamentary Information and Research Service, Library of Parliament). “Re: Environment Committee.” Email to Francis Scarpaleggia. 6 July 2010.]

¹⁴⁸ “Seepage, I think, is certainly going to be a continuing problem in the operational phases of these plants. Newer oil sands tailings operations are forced, really by geography, to be located closer to or on top of sandy aquifers, so the potential for water to move into those aquifers and to move away is enhanced.” [Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. James Barker*. (Meeting No. 28, 16 June 2009). 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.]

¹⁴⁹ The Expert Panel on Groundwater. The Sustainable Management of Groundwater in Canada. Ottawa: Council of Canadian Academies, 2009. p. 146.

¹⁵⁰ The Expert Panel on Groundwater. The Sustainable Management of Groundwater in Canada. Ottawa: Council of Canadian Academies, 2009. p. 146.

¹⁵¹ The Expert Panel on Groundwater. The Sustainable Management of Groundwater in Canada. Ottawa: Council of Canadian Academies, 2009. p. 148.

¹⁵² The Expert Panel on Groundwater. The Sustainable Management of Groundwater in Canada. Ottawa: Council of Canadian Academies, 2009. p. 148.

¹⁵³ “In fact, surface water and groundwater are essentially one resource. It is estimated that 15-25% of river channel flows in north-eastern Alberta are directly contributed by groundwater. Groundwater seepage can be a useful contribution to winter flows in rivers, when the surface sources and tributaries are frozen.” [Dr. Mary Griffiths. *Brief to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development*. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009. p. 6.]

¹⁵⁴ “The Surface Water Working Group of the Cumulative Environmental Management Association (CEMA), a multi-stakeholder organization established to provide effective regional environmental guidelines, objectives and thresholds noted ‘there are currently no collaborative water-related research projects being undertaken by the industry.’ [The Expert Panel on Groundwater. The Sustainable Management of Groundwater in Canada. Ottawa: Council of Canadian Academies, 2009. p. 146.]

¹⁵⁵ “A regional understanding and conceptual hydrogeological model for the [oil sands] area remains incomplete in the absence of coordinated and focussed studies. The preglacial buried aquifers and the glacial channel aquifers, although potential sources of freshwater, only have rough estimates of regional-scale groundwater-surface-water interactions, despite over three decades of hydrogeological attention.”

groundwater recharge rates may be naturally slow, these “recharge rates may be impacted not only by *water used by other operators* [our emphasis] but by climate change.”¹⁵⁶

The growing shift from open-pit mining to *in situ* extraction (whether steam-assisted or using new compressed-air or solvent-based technologies) will not suddenly eliminate the problem of groundwater contamination nor reduce the need for greater scientific study of industry-related groundwater issues. According to the CCA study, “A thorough understanding of the hydraulic controls on SAGD operations [steam-assisted gravity drainage] critical for constraining the injection and production fluids and preventing cross-formational migration and contamination of productive aquifers is absent. The key parameters that control the extent of leakage, the confining pressures in the overlying layers, the integrity of aquitards¹⁵⁷ and the presence of downward gradients, are generally difficult to measure comprehensively and therefore not well characterised. Away from the bitumen, the degree of hydraulic connectivity to down-cut and often buried glacial scours and to modern river courses need to be better understood before more underground injection sites are approved.”¹⁵⁸

Dr. Griffiths warns “It is important to improve monitoring to learn as much as possible about the aquifers used by *in situ* operations and to improve modelling of the interrelationships between surface water and groundwater. Only when the hydrology of an area is fully understood is it possible to develop more realistic models of the cumulative impacts of projects.”¹⁵⁹

While the Alberta Geological Survey has actively been mapping groundwater in the oil sands, Dr. Griffiths believes “a great deal more needs to be done to provide good quality data to enable the detailed mapping of non-saline resources. Data are, for example,

The Sustainable management of Groundwater in Canada. [The Expert Panel on Groundwater. [The Sustainable Management of Groundwater in Canada](#). Ottawa: Council of Canadian Academies, 2009. p. 146.]

¹⁵⁶ Dr. Mary Griffiths. *Brief* to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009. p. 1.

¹⁵⁷ Aquitards are “soil and rock formations like clays and silts that permit slower movement of groundwater. Although these materials can be saturated with groundwater, they are not able to yield sufficient water to a well. Flow within aquitards is limited within small areas, but regionally they may transmit significant volumes of water. Aquitards can therefore significantly affect the flow and quality of groundwater because they influence recharge and the flow between aquifers.” [Elisabeth Mance. “Chapter 1: Groundwater.” [A Landowner's Guide to Well Water Management](#). Saskatchewan Watershed Authority, 2008. 6.]

¹⁵⁸ The Expert Panel on Groundwater. [The Sustainable Management of Groundwater in Canada](#). Ottawa: Council of Canadian Academies, 2009. pp. 146-147.

¹⁵⁹ Dr. Mary Griffiths. *Brief* to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009. p. 8.

extremely sparse between Cold Lake and the Ft. McMurray area. Alberta Environment is in partnership with the Alberta Geological Survey to map groundwater resources in the province, but their work is currently focused on the Edmonton-Calgary corridor. The federal government could assist through the Natural Resources Canada Groundwater Mapping Program.”¹⁶⁰ Dr. Alfonso Rivera, manager of the groundwater mapping program at Natural Resources Canada, assured the committee that the federal government has begun working with the Alberta Geological Survey on detailed mapping of this area.^{161,162}

Knowledge of *regional* groundwater flow patterns is needed to gain a proper understanding of the industry’s impacts on groundwater. In other words, it is crucial to discover “where does groundwater flow from the areas in which the *in situ* and the [surface] mining takes place, and what are the impacts in those areas to which the groundwater moves.”¹⁶³ Current environmental impact statements deal only with the question of “whether [for example] an *in situ* well would affect anybody else’s groundwater, any farmer, or anybody right nearby. So it was a very local assessment...What the Alberta Research Council is saying what we need to understand is what’s happening to the groundwater and its relationship to the surface water in the whole region.”¹⁶⁴

The Geological Survey of Canada (Natural Resources Canada) has identified thirty major national aquifers. In-depth analysis has been performed on twelve of these. An internal re-allocation of resources has increased annual spending on this project from \$3 million to \$3.9 million such that a detailed description of all thirty aquifers should be completed by 2025.¹⁶⁵ By 2012, the Geological Survey of Canada hopes to have completed an

¹⁶⁰ Dr. Mary Griffiths. *Brief to the Parliament of Canada, House of Commons, Standing Committee on Environment and Sustainable Development*. (Meeting No. 20, May 12, 2009) 40th Parliament, 2nd Session. Ottawa, Ont. 12 May 2009. p. 10.

¹⁶¹ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. Alfonso Rivera*. (Meeting No. 26, June 9, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

¹⁶² The primary focus of the Alberta Geological Survey has been the Paskapoo aquifer which runs between Calgary and Edmonton and thus supplies water to major population centres in Alberta. [Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence*. (Meeting No. 26, June 9, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.]

¹⁶³ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Mr. James Bruce*. (Meeting No. 26, June 9, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

¹⁶⁴ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Mr. James Bruce*. (Meeting No. 26, June 9, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

¹⁶⁵ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence*. (Meeting No. 26, June 9, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

assessment of buried valley aquifers (i.e. paleo valleys buried underneath the rock that existed at one point but have since been filled by sediment, more or less porous). These buried valley aquifers are underground channels that “still take a lot of water through them”¹⁶⁶ and occupy much of the same area as the oil sands. The Geological Survey of Canada is collaborating with the Alberta government (as well as the Saskatchewan government) on this effort to develop a more complete understanding of aquifer dynamics in the oil sands region.

According to Dr. Rivera, there are three fundamental questions that must be addressed in order to fully ascertain the oil sands industry’s impacts on the region’s freshwater systems.

First, safe (i.e. sustainable) yields must be determined for the region’s aquifers.

Second, transport mechanisms for groundwater toxins must be clearly understood. Contaminants may interact with groundwater in different ways. For example, contaminated groundwater can move through pores or fractures. At the same time, contaminants may undergo “molecular diffusion”. Finally, “Groundwater may change the geology and vice versa.”¹⁶⁷

Third, still too little knowledge is available on surface water and groundwater connections in the oil sands. As Dr. Rivera told the committee, “...if you measure sometimes the flow rate of the rivers, part of it is what we call base flow. The base flow—even in the absence of rain the river continues flowing—is in fact groundwater. Some of that amount of [the water in] the buried valleys goes into the river...they have mapped twenty-seven buried channels in the Athabasca area. So what I mean by surface-water and groundwater interaction is that you need extensive monitoring to precisely evaluate what is the discharge...to the river.”¹⁶⁸

Meanwhile, CEMA’s new groundwater working group has commissioned the design of a regional groundwater monitoring network in the Athabasca oil sands north of Fort McMurray.

¹⁶⁶ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence Dr. David Boerner*. (Meeting No. 26, June 9, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

¹⁶⁷ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. Alfonso Rivera*. (Meeting No. 26, June 9, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

¹⁶⁸ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Dr. Alfonso Rivera*. (Meeting No. 26, June 9, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

Clearly, oil sands projects have been approved without the benefit of information on overall project impacts on groundwater; and, more importantly from a federal perspective, on surface water through groundwater-to-surface-water connections. This fact not only betrays an “act-now-ask-questions-later” attitude to economic development, it raises doubts about the integrity of the federal environmental assessment process. It further begs the question as to whether the intent of the Harper government’s decision, in its 2010 Budget, to move responsibility for environmental reviews of energy projects from the Canadian Environmental Assessment Agency to the National Energy Board and simultaneously give the environment minister free reign to define projects for the purposes of assessment was simply to meant to further weaken federal oversight in the oil sands.

Carbon Capture and Storage and Groundwater

Another link between oil sands development and aquifer health—today of more intellectual than practical interest but worthy of investigation—is the possibility carbon capture and storage (CCS) could affect groundwater.

CCS has been touted as the magic-bullet for reducing GHGs emissions from the oil sands that contribute to making Alberta the largest per-capita emitter of carbon dioxide in Canada.¹⁶⁹ For example, “Premier Ed Stelmach has assured Albertans that CCS will allow the province to green the oil sands and reduce provincial CO₂ emissions from ‘business as usual’ by 70 percent by 2050.”¹⁷⁰

But the benefits of CCS—should the technology ultimately prove successful—would accrue only if applied to point sources of GHG emissions—e.g. cement plants, coal-fired power plants, and steel factories. Its potential for reducing emissions in the oil sands is thus limited. As Graham Thomson testified before the committee: “When it comes to the actual extraction process on the ground in the Athabasca oil sands, it seems very doubtful at this point that they can use carbon capture, because, for example, in the mining of the oil sands, most emissions there come from things like giant trucks they use to haul the tar sands. Also, when it comes to *in situ* development, it means burning a lot of natural gas [to produce steam], and the natural gas effluent stream is very expensive to capture the CO₂. So it seems that the extraction process does not lend itself well to carbon capture.”¹⁷¹

¹⁶⁹ Graham Thomson. Burying Carbon Dioxide in Underground Saline Aquifers: Political folly or climate change fix? Program on Water Issues, Munk Centre for International Studies. Toronto: University of Toronto, 2009. 63. (p. 9).

¹⁷⁰ Graham Thomson. Burying Carbon Dioxide in Underground Saline Aquifers: Political folly or climate change fix? Program on Water Issues, Munk Centre for International Studies. Toronto: University of Toronto, 2009. 63. (p. 11).

¹⁷¹ Committee hearing, March 30, 2010.

Even oil companies have backed away from rhetoric surrounding the promise of CCS as it has become clear the technology's use in "greening" the oil sands would mainly apply to reducing emissions from the production of hydrogen used in upgrading bitumen.¹⁷² Shell's *Quest* pilot project, for example, will use CCS to capture CO₂ from three hydrogen manufacturing units at the Scotford upgraders.

In light of the expected continued expansion of oil sands production to meet the growing energy needs of a world still dependent on fossil fuels, and given the Prime Minister's recent statement that Canada will insist raw bitumen be upgraded in Canada rather than exported for value-added processing elsewhere, it is pertinent to ask how large-scale deployment of carbon capture and storage in the oil sands—namely in bitumen upgrading—might impact on groundwater?

CCS works by injecting liquefied CO₂ underground, preferably into deep saline-water aquifers.¹⁷³ Industry attention is therefore rapidly turning to these potential underground CO₂ storage sites. Enbridge, for example, is already leading a thirty-five company initiative to "identify deep saline aquifers in Alberta that could be used in a carbon dioxide sequestration pilot project."¹⁷⁴

According to Graham Thomson, there is very little existing knowledge about how saline aquifers might react to large injections of liquid CO₂ through CCS. Quoting the U.S. Department of Energy's *Carbon Sequestration Atlas of the United States and Canada*: "[M]uch less is known about saline formations [as compared to other sources of sequestration like mature oil and natural gas reservoirs and deep unmineable coal seams] because they lack the characterization experience that industry has acquired through resource recovery from oil and gas reservoirs and coal seams."¹⁷⁵ Meanwhile, Robert C. Burruss, a research geologist with the U.S. Geological Survey, informed a U.S. House of Representatives subcommittee hearing in 2008 that depending on the quantities being injected the storage process CCS could displace large quantities of water underground. For example, "...large movements of saline formation water have the potential to disturb regional groundwater flow systems, possibly displacing saline

¹⁷² Graham Thomson. [Burying Carbon Dioxide in Underground Saline Aquifers: Political folly or climate change fix?](#) Program on Water Issues, Munk Centre for International Studies. Toronto: University of Toronto, 2009. 63. (p. 43).

¹⁷³ "The United States Department of Energy has studied the deep geologic formations suitable for storage [of CO₂] in North America (the U.S. and Canada) and believes that only saline aquifers offer centuries' worth of capacity—theoretically holding at least 3,900 billion tonnes of carbon dioxide." [Graham Thomson. [Burying Carbon Dioxide in Underground Saline Aquifers: Political folly or climate change fix?](#) Program on Water Issues, Munk Centre for International Studies. Toronto: University of Toronto, 2009. 63. (p. 1).]

¹⁷⁴ Enbridge Inc. [Alberta Saline Aquifer Project](#). 2010. 4 July 2010 <www.enbridge.com/ASAP.aspx>.

¹⁷⁵ Graham Thomson. [Burying Carbon Dioxide in Underground Saline Aquifers: Political folly or climate change fix?](#) Program on Water Issues, Munk Centre for International Studies. Toronto: University of Toronto, 2009. 63. (pp. 12-13).

formation water laterally or vertically to near-surface environments where it could contaminate shallower drinking water supplies or impact ecosystems.”¹⁷⁶ For his part, CCS expert David Keith has said “It seems unlikely that large-scale injection of CO₂ can proceed without at least some leakage.”¹⁷⁷

Although groundwater is a provincial resource, as various experts informed the committee there are physical connections between aquifers and surface water. Aquifer dynamics can thus implicate—although indirectly—federal responsibility for the health of surface-water systems.

However, CCS impacts on transboundary aquifers (i.e. those shared by Canada and the U.S.) could involve the federal government more directly. Owen Saunders, Executive Director of the Canadian Institute of Resources Law at the University of Calgary, has raised numerous questions in relation to using transboundary saline aquifers for CO₂ storage: “Suppose the Alberta government were to approve significant injections into a deep saline transboundary aquifer. Under current legislation, it is not clear how the federal government could even trigger the federal environmental assessment process...if the injections [of CO₂] led to transboundary harm, the potential for significant international liability is clear. And of course that liability, should it arise, would as a matter of international law attach not to the Government of Alberta but to the Government of Canada—with the costs ultimately borne by all Canadians.”¹⁷⁸

Should CCS evolve into an economically-viable means of burying CO₂ from natural gas used in *in situ* mining, there will be more reason for governments to step up research into the potential consequences of this technology for groundwater. The U.S. has already begun to move on the issue, through regulatory proposals and stakeholder consultations beginning as far back as 2005. In Canada, progress appears slow and tentative. In the summer of 2009, Natural Resources Canada (NRCan) “helped create a federal-provincial CCS Network to coordinate various provincial and federal departments that are working on issues such as the protection of groundwater.”¹⁷⁹ But owing to the opacity of the process, it is unclear “what role Environment Canada will play in the protection of groundwater since NRCan appears to be taking a lead role in

¹⁷⁶ Graham Thomson. Burying Carbon Dioxide in Underground Saline Aquifers: Political folly or climate change fix? Program on Water Issues, Munk Centre for International Studies. Toronto: University of Toronto, 2009. 63. (pp. 17-18).

¹⁷⁷ Graham Thomson. Burying Carbon Dioxide in Underground Saline Aquifers: Political folly or climate change fix? Program on Water Issues, Munk Centre for International Studies. Toronto: University of Toronto, 2009. 63. (p. 25).

¹⁷⁸ Graham Thomson. Burying Carbon Dioxide in Underground Saline Aquifers: Political folly or climate change fix? Program on Water Issues, Munk Centre for International Studies. Toronto: University of Toronto, 2009. 63. (p. 38).

¹⁷⁹ Graham Thomson. Burying Carbon Dioxide in Underground Saline Aquifers: Political folly or climate change fix? Program on Water Issues, Munk Centre for International Studies. Toronto: University of Toronto, 2009. 63. (p. 40).

this area. Like much of the CCS regulatory development in Canada, the workings of the provincial-federal CCS Network is a closed-door process that is difficult for the public to unlock.”¹⁸⁰

Preparing for Inter-Jurisdictional Water Conflict

The oil sands were the focus of one of many case studies contained in the 2009 Canada Council of Academies (CCA) report on groundwater management in Canada. One issue the report raised was the impact oil sands development could have on relations between and among political jurisdictions within Canada (e.g. Alberta and the Northwest Territories). In light of the potential for inter-jurisdictional friction around water, the CCA report discussed the need for a greater federal role in preventing or mediating future disputes that could arise around the negative impacts of one jurisdiction’s activities on another’s freshwater supplies.

The CCA report posed a number of questions that help outline possible sources of cross-boundary tension from oil-sands industry activity. For example, “Do planned [oil sands] developments have adverse impacts on water in adjoining jurisdictions (e.g. Northwest Territories or Saskatchewan) and downstream ecosystems?”¹⁸¹ In other words, could low flows in the Athabasca River, resulting from industry withdrawals compounded by the effects of climate change (i.e. retreating glaciers and diminished snowpack causing a reduction of the river’s headwaters), affect both groundwater and surface water in the Northwest Territories and Saskatchewan? Could industry pollution affect water quality in those downstream jurisdictions? As mentioned, downstream water quality could be impacted in two ways: “One is if the groundwater [polluted by leaking toxic tailings ponds] seeps into the surface water—and there’s evidence that’s happening—and that surface water gets carried downstream a long way. The other thing is that atmospheric transport of contaminants could well be contaminating water in the downstream areas in other jurisdictions.”¹⁸²

This potential for oil sands development to affect water resources across political boundaries in Canada has led Dr. Bruce to recommend that the “federal government try to help ensure that under the Mackenzie Basin Agreement [Mackenzie River Basin Transboundary Waters Master Agreement, MRBMA] negotiations should be completed

¹⁸⁰ Graham Thomson. Burying Carbon Dioxide in Underground Saline Aquifers: Political folly or climate change fix? Program on Water Issues, Munk Centre for International Studies. Toronto: University of Toronto, 2009. 63. (p. 40).

¹⁸¹ The Expert Panel on Groundwater. The Sustainable Management of Groundwater in Canada. Ottawa: Council of Canadian Academies, 2009. p. 148.

¹⁸² Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Mr. James Bruce.* (Meeting No. 26, June 9, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

for a binding water sharing and water quality protection agreement between Alberta, the Territories, and Saskatchewan, and also B.C., and the Yukon.”¹⁸³

In his testimony before the committee, J. Owen Saunders, Executive Director of the Canadian Institute of Resources Law at the University of Calgary, was struck by the “highly deferential role that the federal government has played in the negotiation of the inter-jurisdictional agreement on the Mackenzie [MRBMA].” He also pointed to the “consequent weakness of the agreement itself” and the “poor track record of jurisdictions in concluding the subsequent bilateral agreements necessary to give some substance to the master agreement.” In conclusion, he reminded the committee “there are important federal interests here and a clear need for federal leadership, which has largely been abdicated by the federal government over the past three decades.”¹⁸⁴

The call by Dr. Bruce, J. Owen Saunders, and others for a federal leadership role in encouraging closer cooperation among jurisdictions on water issues linked to the oil sands is shared by the Government of the Northwest Territories (NWT). When NWT Deputy Premier Michael Miltenberger appeared before the committee in Edmonton he passionately advocated for “revitalizing and strengthening of the transboundary mechanisms through the Mackenzie River Basin transboundary agreement” given that the agreement “has been quietly sitting, almost in neutral...[and] has not had any funding increases since 1997.”¹⁸⁵ He also pointed out that the “ministers [of all the governments party to the agreement] have yet to gather around the table. We see this as a mechanism that has tremendous potential if it’s revitalized, if the players, led by the federal government, come to the table to talk about how we manage the water on an integrated watershed management approach in the Mackenzie River Basin. That has yet to happen.”¹⁸⁶

Those who negotiated the MRBMA foresaw that its long-term effectiveness would depend on the signatories eventually signing specific bilateral agreements on issues of

¹⁸³ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence*. (Meeting No. 26, June 9, 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

¹⁸⁴ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence*. (Meeting No. 21, May 13 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

¹⁸⁵ The agreement operates with an annual budget of \$250,000. [Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Hon. J. Michael Miltenberger*. (Meeting No. 20, May 12 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.]

¹⁸⁶ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Hon. J. Michael Miltenberger*. (Meeting No. 20, May 12 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

common interest such as groundwater mapping and management.¹⁸⁷ However, “After 11 years...there’s only one [bilateral agreement] that exists, and it’s between the Northwest Territories and the Yukon.”¹⁸⁸ In essence, this bilateral agreement “provides for the protection of aquatic resources through specific water quality and quantity objectives that must be monitored over time.”¹⁸⁹

As for the Northwest Territories and Alberta, they have been discussing a bilateral agreement on transboundary water management since 1982.¹⁹⁰ The Northwest Territories today eagerly awaits a final agreement that will hopefully address their growing concerns about the downstream effects of oil sands activity on their watersheds. But according to the Pembina Institute, “Alberta has less incentive to sign a bilateral agreement with downstream jurisdictions without having an agreement with their upstream jurisdiction, British Columbia.”¹⁹¹ Moreover, “Historically there has been no compelling incentive for British Columbia to sign agreements with downstream jurisdictions. [And] Federal jurisdictions have not provided leadership in the development of these agreements.”¹⁹²

There is little excuse for Ottawa not to take a proactive interest in bringing the parties to the MRBMA to the table to work out bilateral agreements for preventing and managing future cross-jurisdictional conflict around freshwater management. The federal government has the legislative levers at its disposal—namely the *Fisheries Act* and the *Canada Water Act*—to actively encourage and influence provincial and territorial cooperation. Ottawa may need to start pressing on these levers given the MRBMA may not be strong enough to achieve real binding action from the parties: “There is no way for a jurisdiction to hold another jurisdiction legally to the terms of the agreement. [And] Although a dispute resolution process is outlined within the master agreement,

¹⁸⁷ The Mackenzie River Basin agreement is silent on the issue of groundwater: “The one reference in it is that groundwater can be discussed if it’s agreed to at the bilateral level, between individual provinces and territories.” Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence Evidence from Hon. J. Michael Miltenberger*. (Meeting No. 20, May 12 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

¹⁸⁸ Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Hon. J. Michael Miltenberger*. (Meeting No. 20, May 12 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.

¹⁸⁹ Peggy Holroyd and Terra Simieritsch. The Waters That Bind Us: Transboundary Implications of Oil Sands Development. Drayton Valley, AB: Pembina Institute, 2009. p. 37.

¹⁹⁰ Peggy Holroyd and Terra Simieritsch. The Waters That Bind Us: Transboundary Implications of Oil Sands Development. Drayton Valley, AB: Pembina Institute, 2009. p. 37.

¹⁹¹ Peggy Holroyd and Terra Simieritsch. The Waters That Bind Us: Transboundary Implications of Oil Sands Development. Drayton Valley, AB: Pembina Institute, 2009. p. 38.

¹⁹² Peggy Holroyd and Terra Simieritsch. The Waters That Bind Us: Transboundary Implications of Oil Sands Development. Drayton Valley, AB: Pembina Institute, 2009. p. 38.

any party may release itself from these [bilateral] agreements by giving notice at any time.”¹⁹³

Restoring Federal Water Science: The Oil Sands and Beyond

Whether it is lack of rigorous monitoring of pollutants and water levels in the Athabasca River, or the absence of baseline data on fish habitat, or gaps in understanding the dynamics of groundwater systems and how they interact with surface water, one thing is clear: the oil sands are being developed without the necessary scientific data to draw accurate conclusions about industry impacts on freshwater supplies. Not only is this lack of information an obstacle to the effective regulation of current oil sands operations, it also undermines sound environmental assessment of future projects.

Rigorous environmental assessment is fundamental to the sustainable development of Alberta’s oil sands. Not only must we “get the science right” when reviewing the environmental impacts of proposed projects, the assessment process itself must be independent and above reproach—and be seen to be so. The best way to ensure the integrity of federal environmental reviews in the oil sands is to ensure they are conducted under the auspices of the Canadian Environmental Assessment Agency (CEAA). The Conservative government’s decision to transfer responsibility for all large energy-project environmental assessments from CEAA to the “Calgary-based, oil and gas industry-friendly National Energy Board”¹⁹⁴ should therefore be reversed. The same for the 2010 Budget provision that gives the federal environment minister the blanket power to “break apart the environmental assessments of contentious projects so that they can be handled piecemeal with no overall evaluation of their impact on land, water and air quality, not to mention climate change and human and other life.”^{195,196}

If we are to ensure rigorous gathering, analysis, and transparent dissemination of information on the environmental impacts of a rapidly growing oil sands industry, the

¹⁹³ Peggy Holroyd and Terra Simieritsch. The Waters That Bind Us: Transboundary Implications of Oil Sands Development. Drayton Valley, AB: Pembina Institute, 2009. p. 38.

¹⁹⁴ Russell, Frances. “New peril in oilpatch.” Winnipeg Free Press 21 April 2010, Print ed.

¹⁹⁵ Russell, Frances. “New peril in oilpatch.” Winnipeg Free Press 21 April 2010, Print ed.

¹⁹⁶ Environmental assessment plays a useful role in mediating constitutional powers in areas of joint federal-provincial responsibility. Thus, attempts to weaken the federal environment assessment process may undermine the cooperative management of federal-provincial issues and objectives, especially in the oil sands. As stated by J. Owen Saunders when he appeared before the committee in Calgary, “One of the primary tools for integrating federal concerns into the process of natural resources management in recent decades, of course, has been environmental assessment. Over the years, federal and provincial cooperation on EA has enabled the federal government to introduce its specific concerns with particular projects into approval processes for projects that are primarily of provincial interest. The value of EA is beyond doubt...” [Canada. Parliament. House of Commons. Standing Committee on Environment and Sustainable Development. *Evidence from Mr. J. Owen Saunders*. (Meeting No. 21, May 13 2009) 40th Parliament, 2nd Session, 2009. Ottawa: Public Works and Government Services Canada, 2009.]

federal government will have to assert its constitutional responsibility to protect fish, fish habitat, and, by extension, the integrity of Canada's freshwater.

Federal responsibility for fish and fish habitat is not simply an arcane constitutional wrinkle with little connection to Canadians' practical day-to-day lives. It is not merely a quirk of constitutional history without relevance to our 21st-century reality. Fish are the new "canaries in the coal mine". The health of fish, while a legitimate environmental concern in its own right, is also a proxy for the quality of the water we drink—and, most notably, that our First Nations drink.

Information is power. Thus, the best way for Ottawa to exercise its rightful but limited responsibility over oil sands activity is to commit the resources to develop the base of scientific knowledge needed to stand up to those interests, private-sector or governmental, that would err to the side of compromising the quality and quantity of the region's freshwater for the sake of short-term economic gain. This urgent need for quality science in the oil sands is one of the major points that emerged from the expert testimony given to the House of Commons environment committee during its long, sometimes arduous, study on oil sands and water. Only when the federal government is finally in possession of sound, complete, and up-date scientific data on the state of aquatic ecosystems in the oil sands can it play an informed, confident and assertive leadership role in multi-stakeholder initiatives like RAMP and CEMA.

This need, at the federal level, for reliable scientific knowledge on the state of the Athabasca River basin provides Ottawa an opportunity to transform the tired old narrative of environmental shame and blame surrounding the oil sands into a proud and inspiring story of the renaissance of federal water science. It is a commonplace that, over the years and across successive governments, federal water science has wilted, and along with it, federal leadership on national water issues. A major commitment to increasing funds for federal water science to allow the federal (and Alberta) governments make better-informed decisions about oil sands development could be the launching pad for a broader effort to rebuild federal capacity in all relevant areas of water science and policy. This new commitment to oil-sands-related water research could, for example, be given tangible expression in the creation of an inter-departmental "Office of Oil Sands and Mining Water Science." The office would pool scientific personnel, and other resources, from Environment Canada, Natural Resources Canada, Fisheries and Oceans Canada, and other relevant departments and agencies toward water-based research related to the oil sands and other mining industries. In addition, the office could be tasked with developing a recruiting plan with a post-secondary internship component to attract a new generation of water scientists.

Conclusion

The oil sands have transformed Canada's geopolitical position as well as its domestic economy and politics. This monumental energy resource, however, has until now been developed without sufficient attention to its impacts on surface aquatic systems and underground water supplies.

The beginnings of the oil sands industry pre-date concern—national and international, public and governmental—for the impacts of GHG emissions on global warming and climate change. Likewise, the consequences of oil sands development on Canada's freshwater were for too long an afterthought of the rush to approve the world's largest megaprojects. We still, today, lack proper knowledge on the state and dynamics of the region's water resources and how they will react to years of oil sands mining, both surface and *in situ*. Yet oil sands development is accelerating. It is as though the oil sands have been, and are being, developed within the confines of a neo-classical political and economic mindset that ignores externalities—in this case, the cost of economic development on the country's valuable freshwater assets.

Governments have reacted defensively to warnings from environmental groups and scientists alike about how the oil sands industry might be impacting on water supplies. Instead, they have sought refuge in the science of public relations. Only after pressure from House of Commons committee hearings, the independently-published research findings of some of Canada's most celebrated water scientists, and the clarion call of two First Nations living downstream from the oil sands, did federal environment minister Jim Prentice finally admit to the possibility the industry might actually be polluting the Athabasca River.

The government's last-minute, long-overdue decision (announced, incidentally, after the summer adjournment of the House of Commons) to take steps to begin looking at oil-sands industry freshwater impacts does not absolve it of blame for a history of foot-dragging on such an important environmental and health issue. Rather, the government's long-time stubborn denial of such potential impacts now gives rise to suspicion about the real commitment behind its recent announcement to start investigating the issue. Regardless, Liberal members of the committee remain hopeful that Canada is at the start of a long road ahead of much-needed federal vigilance of oil sands industry impacts on Canada's most valuable resource—freshwater.

Recommendations

1. The government should conduct a longitudinal study of cancer rates in Fort Chipewyan in order to determine the possible human health impacts of upstream oil sands activity.

2. The government should require industry to report releases of naphthenic acids to the *National Pollutant Release Inventory* and place naphthenic acids on the *Petroleum Sector Stream Approach Substances List*.
3. The government should conduct a long-overdue follow up review of the Regional Aquatic Monitoring Program (RAMP) to highlight ongoing weaknesses in the program, including as relates to the program's lack of transparency.
4. The government should conduct a comprehensive, expertly-designed, year-round longitudinal study of water quality in the Athabasca River. The study should be accompanied by appropriate changes to current water-monitoring methods in the area. The study should be overseen by a committee of independent experts and include annual public reports.
5. The government should assert its constitutional responsibilities in the oil sands and actively enforce section 36 (deleterious substances) of the *Fisheries Act*. It should deploy federal enforcement officials to monitor oil sands activity and renegotiate the 1994 *Canada-Alberta Administrative Agreement for the Control of Deposits of Deleterious Substances* under the *Fisheries Act* to reflect the new stronger federal role in protecting freshwater in the oil sands.
6. The government should require that federal environmental assessments of oil sands projects include analysis of cumulative groundwater impacts.
7. The government should fund research on the state of fish habitat in the Athabasca River basin as a step toward setting an Ecological Base Flow (EBF) for the river. This initiative should be accompanied by a proper federal water-level monitoring program for the Athabasca River. DFO should enforce the EBF through federal inspectors on the ground.
8. The government should monitor wetlands in the oil sands in partnership with the Canadian Space Agency and Ducks Unlimited as part of the long-overdue completion of the *Canadian Wetlands Inventory*.
9. The government should conduct a study of the relationship between groundwater and surface water in the oil sands. This study should, among other things, focus on the contribution of groundwater discharge to the flow of the Athabasca River.
10. The government should conduct a study of the potential consequences of both SAGD (Steam Assisted Gravity Drainage) and carbon capture and storage on the region's groundwater.

11. The government should return responsibility for the environmental assessment of oil sands (and other large energy) projects from the National Energy Board to the Canadian Environmental Assessment Agency. The government should remove the discretionary power of the Minister of the Environment to define projects for the purposes of environmental assessment.
12. The government should make significant new capacity-building investments in federal water science to support federal decision-making in the oil sands, including at the level of environmental assessment.
13. The government should increase its annual funding in support of the *Mackenzie River Basin Transboundary Waters Master Agreement*.
14. The government should convene a meeting of the governments of Alberta, British Columbia, Saskatchewan, the Northwest Territories, and Yukon to modernize the *Mackenzie River Basin Transboundary Waters Master Agreement* and identify areas of potential water conflict among and between parties to the agreement.
15. The government should use its legislative powers to encourage parties to the *Mackenzie River Basin Transboundary Waters Master Agreement* to sign bilateral agreements for managing common water issues and future water conflicts. The government should turn its attention first to helping bring about bilateral agreements involving Alberta, British Columbia, and the Northwest Territories.