

Witness

an online magazine



The Price of Oil

Photographs & Text by Garth Lenz

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Situated in the heart of the largest and most intact forest in the world - Canada's boreal forest - is the world's largest energy project. The Alberta tar sands are the largest proven oil reserves on the planet outside of Saudi Arabia and Venezuela, and represent 10% of technically recoverable global oil reserves. Trapped underneath the boreal forest and wetlands of northern Alberta are vast reserves of sticky, tar-like bitumen. The mining and the exploitation of these is creating devastation on a scale that the planet has never seen before.

The Canadian boreal stretches across Northern Canada from the primordial landscapes of Newfoundland and Labrador on the east coast, to the dramatic coastal mountains in British Columbia. It hosts an abundance of wetlands, globally one of the most endangered ecosystems. These critically important ecosystems help to purify air and water, sequester large amounts of greenhouse gases, and are home to a huge diversity of species including almost 50 percent of the 800 bird species found in North America that migrate north each spring and summer to breed and raise their young.

In Ontario, the boreal forest extends south to the north shore of Lake Superior. These incredibly beautiful woodlands were the inspiration for some of the most famous art in Canadian history. In the 1920's, the Group of Seven painters were inspired by this region and their paintings of these forests and landscapes remain some of Canada's most famous works of art.



Canadian Boreal



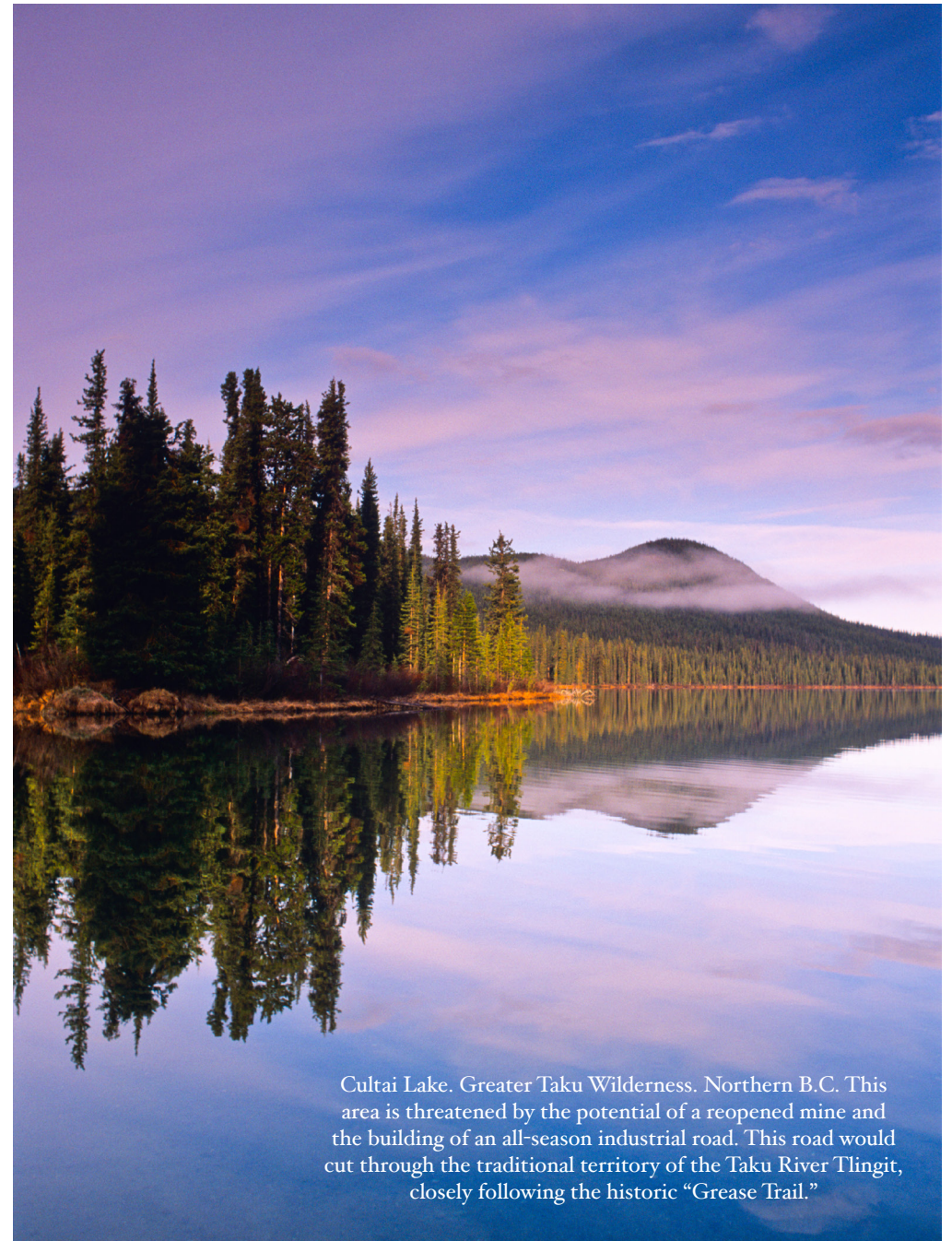
Canadian Boreal & Oil Exploration Areas



Located just east of Fort McMurray, Alberta, the Clearwater River joins the Athabasca River as it winds its way north through the tar sands, accumulating toxic waste leaching from the vast, unlined and tailings ponds which bordering it.



Canada's boreal is a vast mosaic of many of our most famous and historically important rivers. Most Canadians can recall sitting in a classroom and marveling at the exploits of the 'voyageurs and coureur-de-bois' travelers through rivers like the Peace, the Athabasca, the Churchill, the Mackenzie and countless others. Wisely adapting the mode of travel and clothing of the indigenous population, they used massive canoes to traverse these rivers across northern Canada in search of a Northwest Passage for the expansion of the fur trade.





A tributary of the Slave River winds its way through the Athabasca Delta, the world's largest freshwater delta. A 'Ramsar' designated site of international importance, the toxic impact of the Tar Sands, as well as the huge amounts of water drawn from the Athabasca River flowing through it threaten its ecological integrity.



Tourists enjoy the view at the West Coast Rain Forest.

In the far north, the boreal extends almost to the arctic circle where it is bordered by the tundra, and just below that, in the Yukon, by the Tombstone Valley. This valley is the. The Porcupine caribou herd is most known for its dependence on the threatened Arctic National Wildlife Refuge as its breeding ground. This wintering range is essential to the life of the herd and is not protected, leaving the land vulnerable to possible exploitation for gas and mineral rights.

The boreal is home to a broad range of indigenous peoples. Both the remoteness and the size of this almost 95 percent intact wilderness has been a positive factor, and many First Nations communities in the region have retained their native languages, songs, dances and traditions while living sustainably in this ecosystem for over 10,000 years.

In the heart of this ecosystem in northern Alberta are the tar sands. They

are the largest energy project the world has ever seen, the fastest growing and greatest source of greenhouse gas emissions in Canada. They contain the Earth's third greatest oil reserves, which can only be accessed by one of the most polluting, destructive, and greenhouse gas intensive methods of energy production. They are leaving a path of destruction in their wake which can only be described as biblical.

The tar sands, or oil sands as they are also referred to, are comprised of tar-like bitumen embedded with sand, clay, minerals and water and they are found under 90,000 square miles of northern Alberta's boreal forests and wetlands. They contain an estimated 165 billion barrels of oil, and plans are to exploit all of it over time.

The tar-like bitumen is recovered by one of two methods. The shallower deposits that can be found on either side of the Athabasca River are extracted by vast open pit mines. Massive steam shovels and 400 ton capacity dump trucks the size of a 3000 square foot home extract two tons of earth, clay, sand, and bitumen to produce one barrel of oil. Two to four barrels of chemically saturated water is used to separate the bitumen for each of the almost 3 million barrels of oil produced every day. One trillion liters of this toxic cocktail of deadly chemicals and hydrocarbons now sits in vast tailings ponds. These unlined "ponds" are the largest toxic impoundments in the world. They can be seen from space and currently cover about 84 square miles, or the equivalent of 73 New York Central Parks. There are 27 of these "ponds" on either side of the Athabasca River, which flows downstream towards indigenous communities such as Fort Chipewyan.

The other method of extraction is 'in-situ' or SAGD – steam activated gravity drainage – a kind of super charged fracking on steroids. Here, massive amounts of water are superheated and pumped through the ground to liquefy the bitumen so that it can be pumped to the surface. This method of extraction requires a vast network of pipelines, seismic lines, drill paths, and compressor stations. Although not as visually disturbing, this method of extraction is even more damaging in some ways, and it impacts and fragments a much larger area of the wilderness. Studies of these areas have



Alberta Oil/Tar Sands, Northern Alberta, Canada. Syncrude Upgrader, mines, tailings ponds, and Athabasca River.



At the edge of an 80-meter deep mine, sits a massive tar sands machine. The scale of the Tar Sands is truly unfathomable. Alberta Energy has reported that the landscape being industrialized could easily accommodate one Florida, two New Brunswicks, four Vancouvers, and four Vancouver Islands.(above)

shown a 90 percent reduction of key species including woodland caribou and grizzly bears. In-situ processes also consume even more energy and produce at least as much greenhouse gas as the mines do.

The oil produced from either method produces more greenhouse gas emissions than conventional oil, while consuming and polluting large amounts of water and impacting the landscape on a large scale. Another problem with tar sands produced oil is that it requires a great deal of energy to produce, making it an inefficient and expensive energy source with a small profit margin. The energy return on conventional oil is roughly 25:1, meaning that 25 units of oil energy are produced for every unit of energy invested to extract and produce it. Tar sands derived oil, however has a very poor energy return of roughly 5:1 for the tar mines, and as low as 3:1 for the in-situ operations. It is also extremely expensive to produce. Estimated costs of producing tar sands oil from the newly proposed Teck Resources mine could be as high a \$85 CAD per barrel. While production costs vary depending on the installation, the fact remains that tar sands oil is among



Tar Sands roadways and tailings ponds.



Syncrude frozen tailings pond and Mildred Lake Upgrader in background. Dump trucks the size of a house look like tiny toys as they rumble along massive roads in a section of a mine. The largest of their kind, these 400 ton capacity dump trucks are 47.5" long, 32.5" wide, and 25" high. Within their dimensions you could build a 3000 square foot home.

OilSandsTruth.org
Growth of the Tarpits Map #3
Tarpit Footprint, 2006, &
EUB Approved Tarpits, 2007
Approx. 1,120.8 sq km

Petro-Canada/UTS Fort Hills

CNRL Horizon

TOTAL/Deer Creek In-Situ

TOTAL/Deer Creek Joslyn Mine

Fort McKay

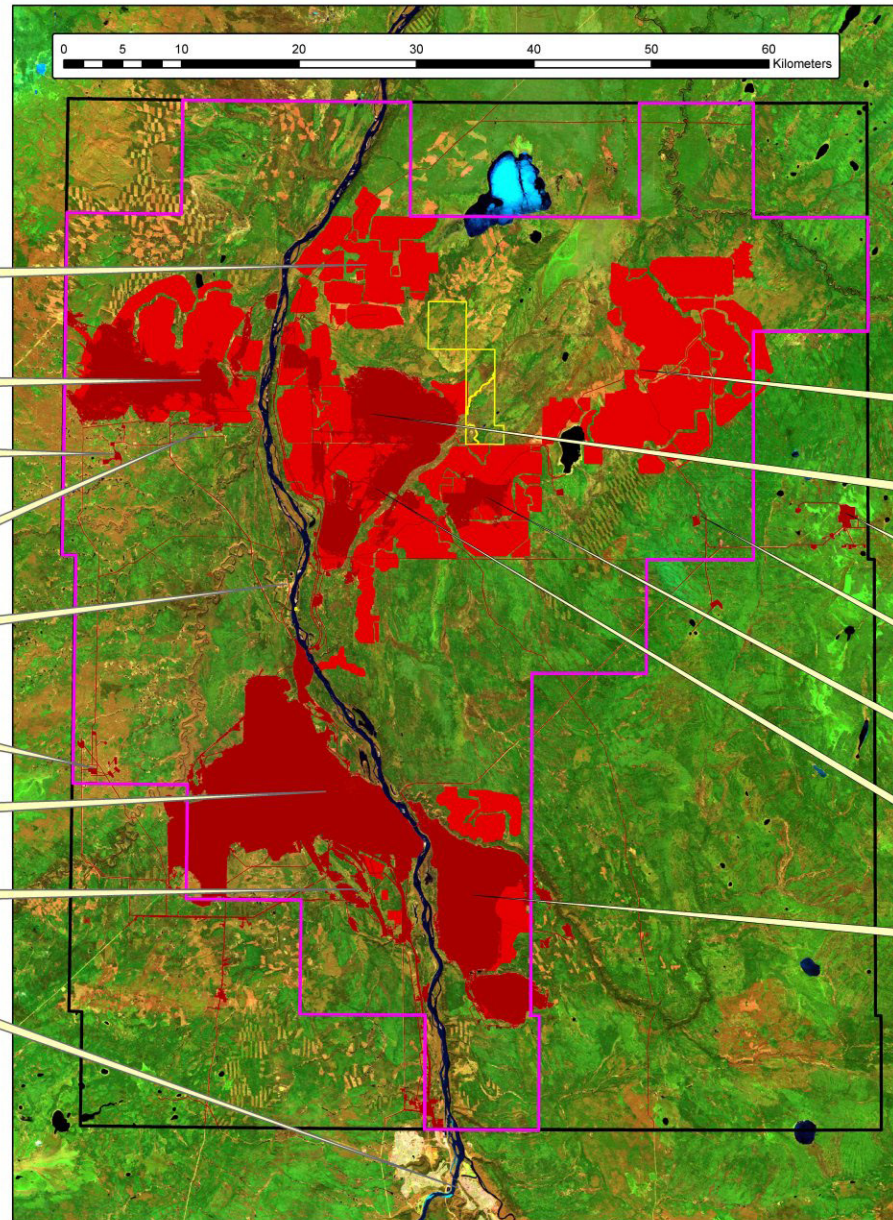
Petro-Canada Dover SAGD

Syncrude Mildred Lake

Suncor Voyageur South

Fort McMurray

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Imperial Oil Kearl

Syncrude Aurora North

Suncor Firebag SAGD

Husky Oil Sunrise SAGD

Shell Jackpine Phase I

Shell Albian Sands

Suncor Millenium and Steepbank

Legend

- Mineable Oil Sands Area
- Study Area
- First Nations Reserve Lands
- Tarpit Footprint (Landsat 2006)
- Approved Tarpits (Digitized from EUB, 2007)



Heavy equipment moves tons of earth every day.

the most expensive to produce, and only when the per barrel price of oil is at the very highest level is it even marginally profitable. This means that a vast amount of oil must be produced, and an equally vast amount of land devastated and resources consumed, in order to realize even a relatively small economic benefit.

Just a few miles downstream from the tar sands is one of the world's

Syncrude Operations effluent pipe and tailings. The toxic effluent ponds are so large that they can be seen from outer space. Every barrel of oil requires 3-5 barrels of fresh water to refine. This is dramatically reducing water levels in the Athabasca River and threatening the Athabasca Delta, one of the World's greatest inland deltas and critical habitat for birdlife. (lower right)



At the edge of an 80-meter deep mine, a massive tar sands machine is dwarfed by the surrounding landscape. (top left & right)

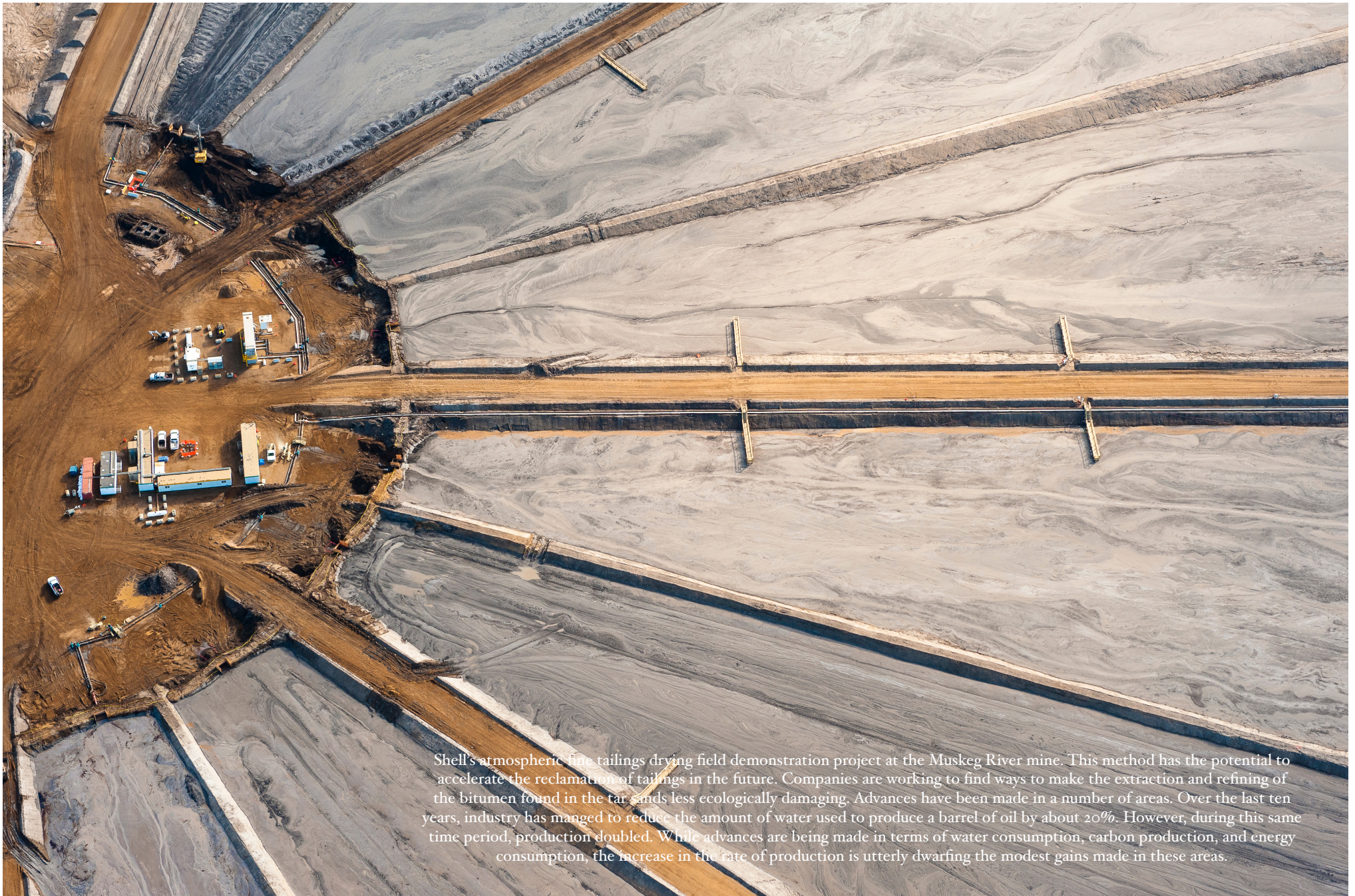




Suncor and Syncrude Upgraders, mines, tailings ponds.



Tailings ponds are vast toxic lakes which are completely unlined. Nearly a dozen of them lie on either side of the Athabasca River. Individual ponds can range in size up to 8,850 acres.



Shell's atmospheric fine tailings drying field demonstration project at the Muskeg River mine. This method has the potential to accelerate the reclamation of tailings in the future. Companies are working to find ways to make the extraction and refining of the bitumen found in the tar sands less ecologically damaging. Advances have been made in a number of areas. Over the last ten years, industry has managed to reduce the amount of water used to produce a barrel of oil by about 20%. However, during this same time period, production doubled. While advances are being made in terms of water consumption, carbon production, and energy consumption, the increase in the rate of production is utterly dwarfing the modest gains made in these areas.

Tar Sands Upgrader in Winter.

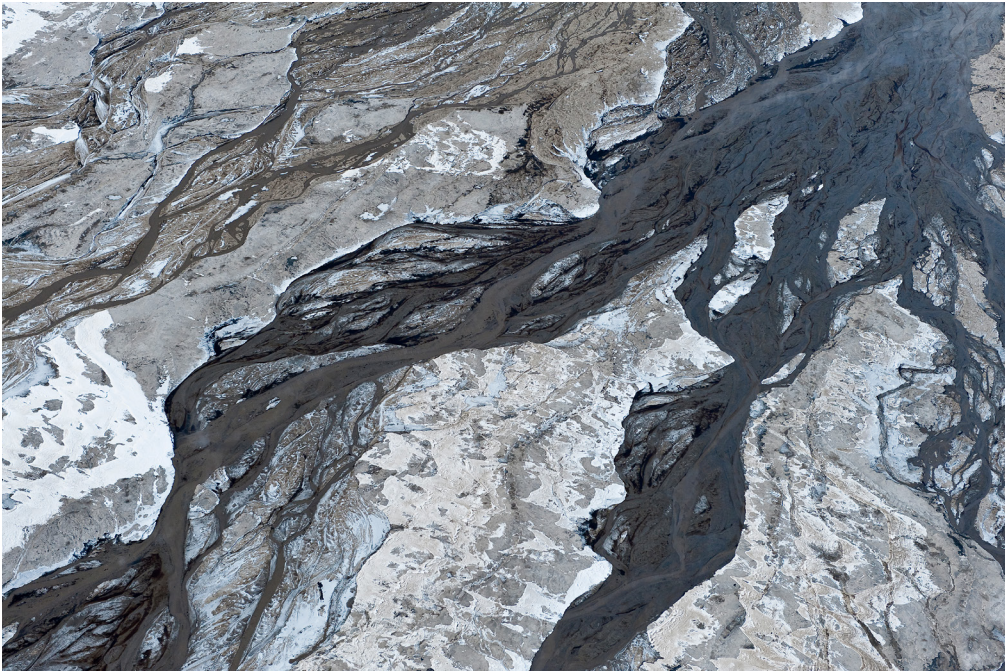




So large are the Alberta Oil Sands tailings ponds that they can be seen from space.



Even in the extreme cold of the winter, the toxic tailings ponds do not freeze.





Highway 63, known to locals as the Highway to Hell, cuts through two tailings ponds as it heads towards an upgrader and into the heart of the Tar Sands.

largest freshwater deltas, the Peace-Athabasca Delta, the only one at the juncture of all four of North America's migratory bird flyways. This is a globally significant, Ramsar - designated wetland which is critical habitat for half the bird species found in North America that migrate here. It is also the last refuge for the largest herd of wild bison in North America, and is land upon which First Nations have depended for millennia for the hunting and gathering of traditional foods. However, these vast wetlands are threatened by the massive amount of water being drawn from the Athabasca River as well as the toxic burden leaching from the unlined tailing ponds into the food chain of all the species downstream.

The most intense tar sands activities happen in and around indigenous populations and the formerly remote regions that have been their home for thousands of years. It is these people who bear the most significant impacts of tar sands toxic pollution. Fort McMurray hosts indigenous populations of Cree and Dene totaling about 6400 along with Metis locals totaling 5000 to 6000 residents. An additional twenty-six indigenous communities sprinkled throughout the Athabasca, Peace River, and Cold Lake tar sands deposits have reported being adversely affected by tar sands developments.

In Fort McKay, a Cree First Nation about 60 kilometers north of Fort McMurray on the banks of the Athabasca River and surrounded by tar sands projects, bottled water had to be brought in for more than two years after the water treatment plant proved to be ineffective at removing some cancer-causing agents from river water. The local doctor there reports patients complaining of skin rashes after taking showers and advises mothers to wash their babies in bottled water.

Although difficult to prove conclusively, many residents of these communities point to higher rates of certain rare cancers and autoimmune diseases as a result of toxic tar sands pollution. Bile duct cancer is one such disease. A particularly lethal cancer, it is often linked to toxic pollution. A 2014 study by two Alberta First Nations and University of Manitoba scientists concluded there is a link between tar sands pollutants and higher levels of heavy metals in wildlife, and higher cancer rates in residents in Fort



A giant dump truck speeds along one of the many industrial roadways kicking up dust and other toxic materials.

Chipewyan. The study reported finding 23 cases of cancer in 94 participants and noted that, "Cancer occurrence increased significantly with participant employment in the oil sands industry and with increased consumption of traditional foods and locally caught fish." It also found total levels of carcinogens in the traditionally hunted foods were higher when compared to similar studies around the world.

Current tar sands production sits at about 2.8 million barrels per day but



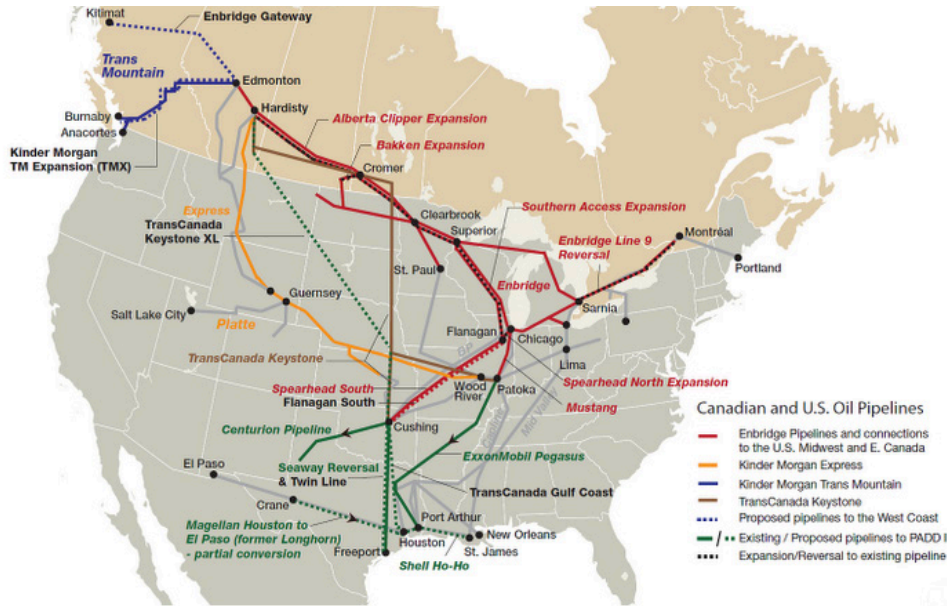
The MaKay River winds through the lush boreal forests with the Alberta Tar Sands in the background.



Many of the indigenous native people still get their food supply from the rivers and land.
Morristown First Nations fishing and research for Canadian Department of Fisheries & Oceans.



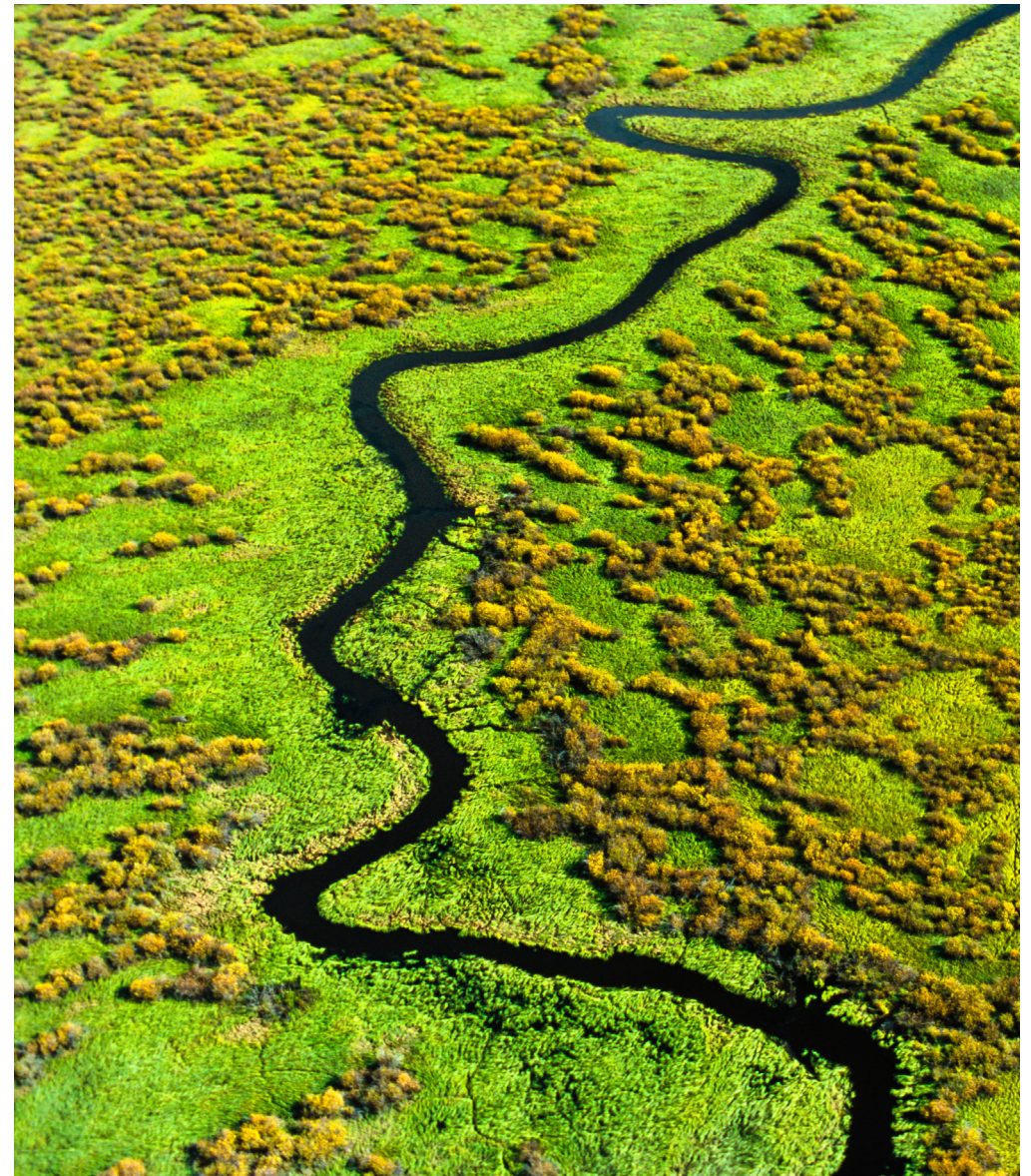
Lonnie Jack fillets fish on Taku River. Northern B.C. This area is threatened by the potential of a reopened mine and the building of an all-season industrial road. This road would cut through the traditional territory of the Taku River Tlingit, closely following the historic "Grease Trail."



Increased Spill Risks and NOAA

A map of current and proposed Canadian and U.S. oil pipelines which carry tar sands oil. It includes the proposed TransCanada Keystone XL pipeline which would cross the U.S.-Canada border and six U.S. states. (Canadian Association of Petroleum Producers/The Facts on Oil Sands Report 2012)

there has been a constant push to increase production. Just a little over a decade ago (in 2006) production was about 1 million barrels per day, or just a little more than a third of what it is today. The other constant has been the push for additional pipelines to aid in the transport of ever-increasing amounts of tar sands crude, and for exports to Asia where it is maintained that tar sands crude will fetch a higher price. Additional pipelines would further entrench dependence on this highly polluting and carbon intensive fossil fuel by committing Canada to further growth of the tar sands while making it virtually impossible to meet the greenhouse gas reduction targets Canada set for itself. Additionally, new pipelines bring with them other environmental impacts. While various pipelines have been proposed, debated, protested, and ultimately abandoned, both the proposed Keystone XL pipeline and proposed Trans Mountain Pipeline continue to be actively promoted. The proposed Trans Mountain Pipeline is a particularly alarming



Alberta Wetland. Wetlands like this are one of the greatest carbon sinks and best defenses against global warming. This example is found in Northern Alberta within the Forest Management Area of logging Company Alberta Pacific Forest Products - ALPAC. Alpac has certified all its lands under FSC certification, making it the largest FSC certified logging operation in the world. These wetlands are also near the Alberta Tar Sands.



Devon's SAGD. Stream Assisted Gravity Drainage operation in the Athabasca Oil Sands.



Kinder Morgan Westridge Marine Tanker Terminal at Burrard Inlet.

proposal and an example of just how committed the Canadian government is to the growth of the tar sands in spite of its vocal support for addressing the threat of climate change.

Almost 800 kilometers from northern Alberta's oil sands the proposed pipeline would emerge from Jasper National Park at the continental divide and enter British Columbia and Robson Provincial Park. The region's dramatic mountain slopes and drainages are the source waters of the Fraser River watershed, which the proposed pipeline expansion would follow. As the river flows inexorably south and west toward the ocean, it builds in volume fed by numerous rivers and streams, linking together a vast freshwater network that is home to the greatest abundance and diversity of salmon species in the world.

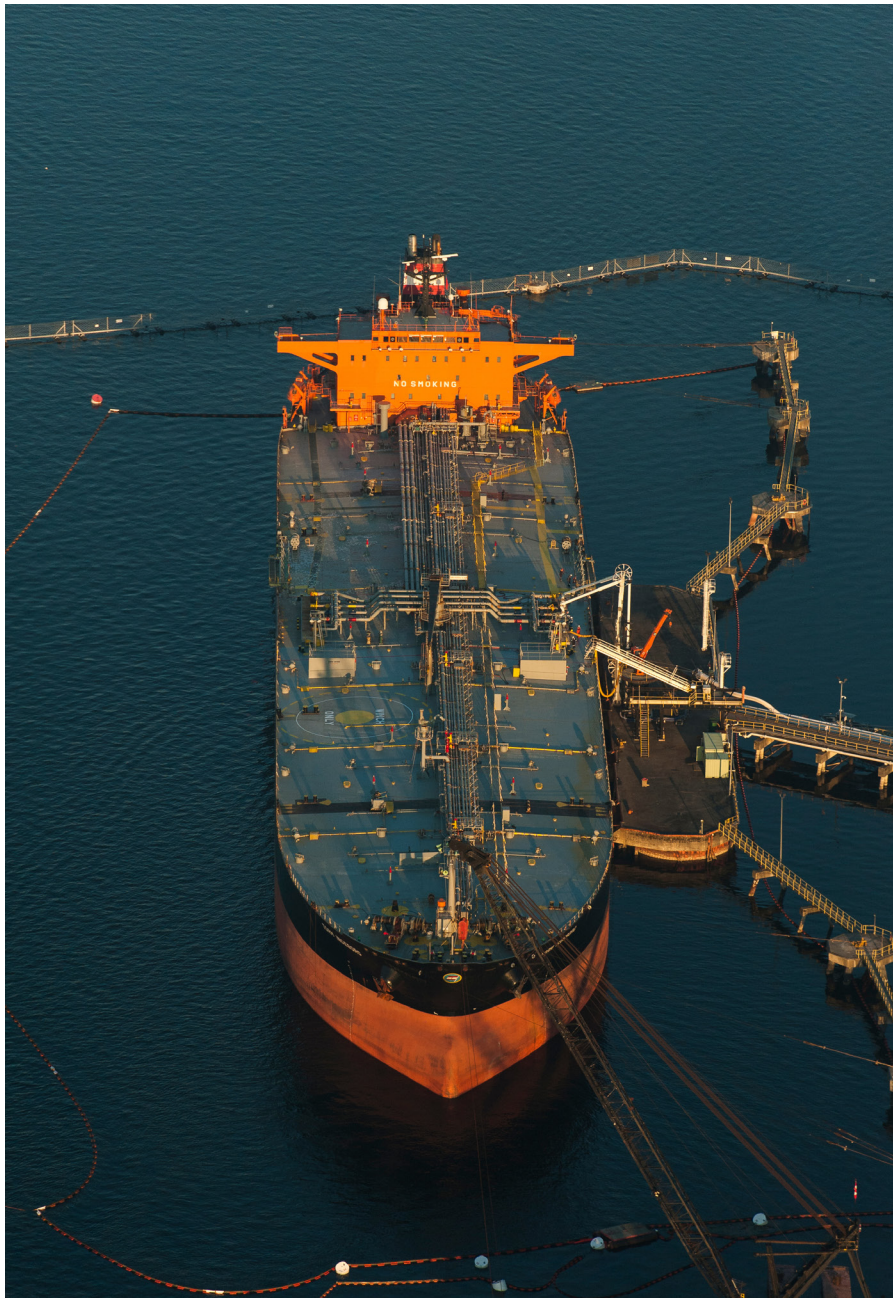
Like the river itself, the pipeline's 800-kilometer route carves through a

diverse landscape that takes in nine of British Columbia's 14 biogeoclimatic zones – everything from dry rolling hills of Ponderosa pine to wet coastal rainforests. Dotted along the way are 22 parks and protected areas.

The bulk of the pipeline route traces the Fraser and its largest and most important tributary, the Thompson River. These two rivers are home to numerous aboriginal, recreational, and commercial fisheries, millions of hectares of forest, the province's most fertile farmlands. It is the region's most valuable real estate, and contains the largest urban populations. After the pipeline reaches the Westridge marine terminal in Burnaby, its content would be disgorged into massive oil tankers that ply the waters of Burrard Inlet and the Salish Sea, threatening the habitat of (arguably) North America's most endangered southern population of orcas or killer whales, already on the edge of extinction.

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Recently, Canada's leading pro-business newspaper, The Globe and Mail, warned that diminishing prices for oil sands products are not a passing problem that can be remedied by pipelines, but a sign of times to come for a high cost producer in a world awash in oil. It further warned that those diminishing prices are a potential threat to the entire economy of Canada. Given the current oil economy, it seems inescapable that the expensive and greenhouse gas intensive production of oil sands crude, a low quality petroleum source harvested far from its target markets, is a difficult and non-competitive proposition. As if to underscore this reality, in May 2018, the owner and proponent of the Trans Mountain Pipeline, Kinder Morgan, came to the conclusion that this pipeline proposal presented too much risk to its share holders and abandoned the project. In response to this, Canada's federal government bought the existing pipeline for \$4.5 billion from Kinder Morgan and took over plans to build a new pipeline alongside



An oil tanker loading at Kinder Morgan Westridge Marine Tanker Terminal.

the old one in an effort to get more diluted bitumen from Alberta's tar sands to British Columbia's west coast.

The boreal forests and wetlands that surround the Alberta Tar Sands are considered the planet's most effective terrestrial carbon sink, sequestering twice the concentration of greenhouse gas emissions per acre as tropical rainforests. Compounding the problem of the tar sands is that in the creation of the mines, large areas of this incredibly effective carbon sink would be sacrificed and replaced by some of the most carbon intensive and largest scale fossil fuel extraction. This situation is made worse by the fact that the objective is to exploit the entire tar sands reserves. This would result in an industrial sacrifice zone – i.e. an area where all other values are deemed second to industrial activities – the size of Florida. Celebrated former NASA climatologist James Hansen has stated that this objective would result in “game over for stabilizing the world's climate” as the exploitation of all tar sands reserves would cause a 2 degrees Celsius rise in global temperatures.

Canada was originally considered to be a climate change hero. It was one of the first signatories of the Kyoto Accord. Now Canada has full-time lobbyists threatening trade wars when there is talk about bringing in legislation to limit the import of high-carbon fuels and greenhouse gas emissions at international conferences on climate change. The continued expansion and exploitation of the tar sands is a global catastrophe in the making, and the primary reason why Canada is not close to meeting its greenhouse gas emissions targets. Tar sand oil production is also a key contributor in making Canada's per capita CO₂ emissions fourth in the world, a figure more double that of China.

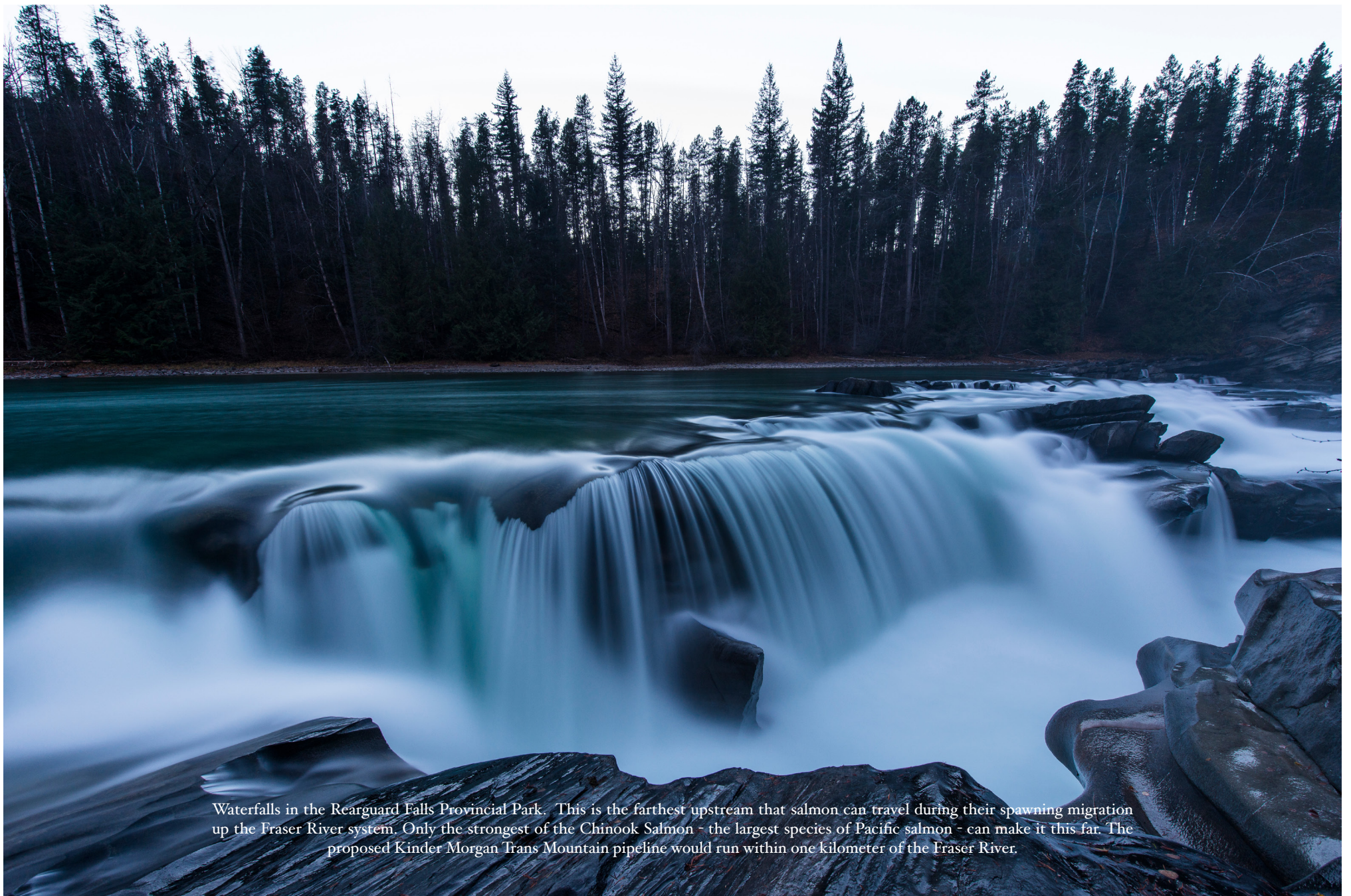
Today, humanity must balance decisions regarding industrial needs and economic growth with their environmental and ecological impact. Any further delay in decisions related to the issue of tar sands oil production places at risk not only the Canadian economy and boreal ecosystems, but constitutes a threat to global climate stability.



Alberta Oil/Tar Sands, Northern Alberta, Canada.
Suncor and Syncrude Upgraders, mines, tailings ponds, and Athabasca River.



Tombstone Valley & the winter home of the famous Porcupine caribou herd. This region will be directly impacted by the proposed MacKenzie Valley Gas Pipeline. The pipeline will bring gas from the Beaufort Sea to fuel the energy need if the Alberta Tar Sands.



Waterfalls in the Rearguard Falls Provincial Park. This is the farthest upstream that salmon can travel during their spawning migration up the Fraser River system. Only the strongest of the Chinook Salmon - the largest species of Pacific salmon - can make it this far. The proposed Kinder Morgan Trans Mountain pipeline would run within one kilometer of the Fraser River.



Boating on the Churchill River.

Garth Lenz

Garth Lenz is an editorial and fine art photographer based on the west coast of Canada. Though originally trained as a classical pianist, Lenz turned to his other lifelong passion, photography, shortly after completing his bachelors degree in Piano Performance.

While global deforestation and the world's old growth forests were major focuses in Lenz's early work, in recent years, much of Lenz's photography has centered around the world of fossil fuel production, climate change, and their associated impacts on the natural environment. Throughout his entire career, the contrast between the industrial and the natural landscape has remained a central theme in Lenz's work.

Lenz often photographs from the air as a means to communicate the unprecedented scale of industrialism's environmental impact as well as to document remaining areas of large intact ecosystems. This is particularly evident in his current exhibit, *The True Cost of Oil*, which continues to receive worldwide attention. Published in some of the most prestigious editorial and fine art publications, *The True Cost of Oil* has been exhibited in New York, Paris, London, Boston, Los Angeles, Montreal, Belgium, Mexico City, at Germany's GDT photography festival and in other major art and photography centers. It has also received significant awards in international photography competitions.

A popular public speaker, Garth Lenz has been invited to address major corporations, government bodies, and academic centers on the issues of conservation and sustainability. His audiences have included The New York Times, the European Parliament, Oxford, Cambridge, and Harvard universities, the Royal Geographical Society, and London's Natural History Museum among many others.

Now translated into 24 languages Lenz's TED talk, *The True Cost of Oil*, has received over 830,000 views online.

In 2009, Lenz was named a Senior Fellow of the International League of Conservation Photographers, one of only 60 photographers in the world to receive this honor.

For more information about gallery representation, prints, speaking engagements, or commissions, please contact the studio:

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