

Oil and Salmon Don't Mix

The Enbridge Northern Gateway Project is one of four major pipeline projects proposed for northern British Columbia over the next five years. The project would consist of two 1,200-kilometre pipelines — one to transport petroleum from the Alberta oil sands to tankers on British Columbia's coast, and the other to move petroleum condensate east from British Columbia to Alberta. In total, more than 700,000 barrels of petroleum products would cross the rivers, mountains and valleys of northern British Columbia each day.

The Enbridge oil sands pipelines would cross and in some places run parallel to major salmon rivers in British Columbia's Upper Fraser, Skeena and Kitimat watersheds, which contain some of the highest quality habitat for wild salmon and steelhead trout in Canada. Chinook, sockeye, chum, coho and pink salmon, as well as steelhead trout and many other fish species, use the rivers and lakes in these watersheds for spawning, rearing and migrating.

Pipeline construction, ruptures and leaks all pose serious risks to salmon, making the Enbridge oil sands pipelines a toxic proposal for salmon and the communities that depend on them. Experience indicates that a spill of some sort will inevitably occur. In addition, the pipelines would affect salmon ecosystems that are already under stress. The cumulative impacts could cause irreversible harm. Whether or not the Enbridge project is worth the risk to salmon ecosystems in the province is a question that must be answered by all British Columbians.



Myron Kozak

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A RISK ON THE SCALE OF THE EXXON VALDEZ?

In one day the westbound Enbridge export pipeline would transport almost twice the amount of oil that the Exxon Valdez spilled into Alaska's Prince William Sound in 1989. With a flow rate of roughly six barrels of oil a second, the pipeline would transport enough oil to fill an Olympic-sized swimming pool in 43 minutes.

Jeopardizing a National Treasure

- The Enbridge oil sands pipelines would traverse almost 1,200 kilometres between the Alberta oil sands and tankers on the British Columbia coast and transport up to 700,000 barrels of petroleum products per day.
- The pipelines would cross and at times run parallel to rivers in the Skeena, Kitimat and Upper Fraser watersheds that contain important habitat for wild salmon.
- Salmon ecosystems in British Columbia are already under stress from forestry, mining, agriculture and climate change.
- A petroleum spill along the Enbridge oil sands pipeline route is inevitable, although it is impossible to predict the location and magnitude.
- Enbridge has not yet explained how it would clean up a spill in a fast-flowing river like the Morice-Bulkley or Skeena without causing further harm.
- A moratorium should be enacted on the transportation of oil from the Alberta oil sands to the coast of British Columbia until a comprehensive public inquiry addresses concerns about the environmental impacts.



Olga N. Vasik

Salmon Facts

- A 2006 study valued the wild salmon economy of the Skeena Watershed at \$110 million.
- Chinook salmon can weigh more than 50 pounds.
- Steelhead have the ability to spawn (reproduce) more than once.
- Coho, sockeye, chinook and steelhead live in freshwater for more than a year before heading to the ocean.
- Salmon have been an essential part of the culture and diet of northern British Columbia First Nations for thousands of years.
- Upper Fraser sockeye swim up to 1,100 kilometres to spawn in the stream where they were born.
- The Skeena, Kitimat and Upper Fraser watersheds contain thousands of unique salmon stocks, or spawning populations.

Pipeline Construction Degrades Salmon Habitat

The greatest impact on salmon during pipeline construction occurs when a pipeline is built across a stream or river. Runoff and discharge — from excavating and draining trenches, disposing of fill material, and testing pipes — can end up in rivers and streams. This raises water temperatures and results in increased levels of sediment, including pollutants such as total dissolved solids. Increased sediment in rivers and streams can reduce the availability of food, smother spawning habitat, and irritate the gills of fish, making it more difficult for them to breathe.

Generally, these problems are most severe during pipeline construction and can be minimized by scheduling construction during times when salmon may be less affected. However, the proposed pipelines would cross or run parallel to rivers and streams where millions of salmon fry and juvenile fish, such as coho, chinook and steelhead, reside year-round.



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Pipeline Failures Are Inevitable

Pipeline failures pose a serious danger to salmon. A review of pipelines regulated by the National Energy Board found that large diameter oil pipelines — such as the proposed Enbridge oil sands pipelines — fail from corrosion and stress after 28 years on average. Pipelines can also fail suddenly from third party damage or natural events such as landslides. The pipelines would operate in areas with steep terrain where significant avalanche and landslide dangers exist, increasing the risk of failures.

There is an average of one rupture every 16 years for every 1,000 kilometres of pipeline in Canada, according to the same report. A similar study by the Alberta Energy Utilities Board examined energy-related pipelines of various sizes and found that in 2005 there were 2.4 failures for every 1,000 kilometres of pipeline in Alberta.

Experience indicates that a failure of some sort is inevitable. It is impossible to predict the location and magnitude of a spill, but it is clear that a significant leak or rupture near salmon habitat in the Skeena, Kitimat or Upper Fraser River watersheds could be catastrophic and irreparable.

Oil sands petroleum and condensate, the two products the Enbridge oil sands pipelines would likely carry, are extremely toxic to salmon as well as other fish and wildlife.

Heavier oil sands petroleum, such as bitumen, sinks and collects along riverbeds, logjams and shorelines, slowly releasing toxins over a prolonged period. The toxins can cause chronic growth problems in salmon. Condensate is lighter and more acutely toxic to fish and wildlife. It can impact long distances of river and cause large fish kills before evaporating after several days.

Canada has recently experienced two major oil spills in freshwater ecosystems. One million litres of petroleum spilled from a pipeline into the Pine River upstream of Chetwynd in northeast British Columbia, causing a massive fish kill that extended for over 20 kilometres downstream. Despite \$30 million spent in clean-up costs, the river is still not oil-free. At Lake Wabamun in Alberta, a derailed train spilled 750,000 litres of heavy oil. Despite clean-up efforts, heavy oils still persist on the lake bottom. The Lake Wabamun spill demonstrated that the behavior of heavy oil in freshwater environments is not well understood.

The risk of a major pipeline spill cannot be completely eliminated, even with best practices. Enbridge has not yet explained how it would clean up a spill in a fast-flowing river like the Morice-Bulkley or Skeena without causing further harm.



A pink salmon embryo (lower) that has been exposed to oil compared to an unexposed fry (upper). Courtesy Dr. Mark Carls, NOAA, Alaska Fisheries Science Center.

Pipeline Failure Facts

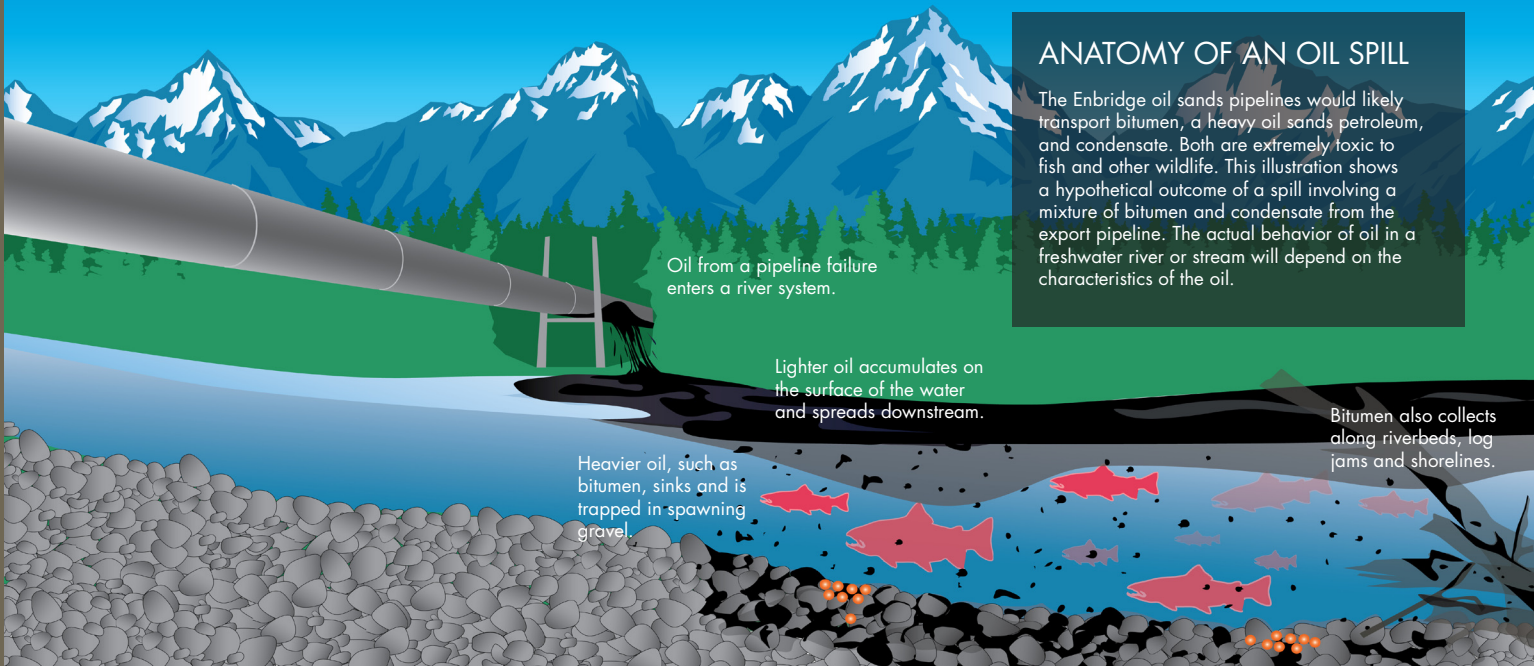
- Between 1971 and 2004 there were 17 breaks in the Pacific Northern Gas Pipeline, the majority of which occurred in the mountainous terrain between Telkwa and Prince Rupert in northern British Columbia.
- The Carrier Sekani Tribal Council has documented eight ruptures in Enbridge's Canadian pipelines since 1992. On average, each rupture spilled over 1.8 million litres of oil products.
- In the U.S., hazardous liquid pipeline incidents are responsible for \$97 million in property damage each year.

U.S. Enbridge Pipeline Project Broke Environmental Laws

In early 2009, Enbridge was found liable in Wisconsin for over 500 violations of U.S. environmental requirements that occurred during the construction of the Southern Access pipeline, a dual parallel pipeline for crude oil. These infringements included 282 wetland violations and 176 land disturbance violations near navigable waters. A state lawsuit was quickly settled after Enbridge paid \$1.1 million in damages for the violations.

“While some of the individual violations were likely of limited direct impact, the incidents of violation were numerous and widespread, and resulted in impacts to the streams and wetlands throughout the various watersheds...”

-Wisconsin Attorney General J.B. Van Hollen



ANATOMY OF AN OIL SPILL

The Enbridge oil sands pipelines would likely transport bitumen, a heavy oil sands petroleum, and condensate. Both are extremely toxic to fish and other wildlife. This illustration shows a hypothetical outcome of a spill involving a mixture of bitumen and condensate from the export pipeline. The actual behavior of oil in a freshwater river or stream will depend on the characteristics of the oil.

Oil from a pipeline failure enters a river system.

Lighter oil accumulates on the surface of the water and spreads downstream.

Heavier oil, such as bitumen, sinks and is trapped in spawning gravel.

Bitumen also collects along riverbeds, log jams and shorelines.

Salmon Ecosystems Under Stress

Many of British Columbia's once thriving salmon ecosystems are already under stress from climate change and activities including forestry, mining and agriculture. In the Skeena region, proposed resource projects, including coalbed methane development and new pipelines, further threaten salmon.

The Pacific Northern Gas pipeline already operates in northern British Columbia. Each new pipeline project will put additional stress on salmon and salmon habitat. In addition to Enbridge's oil sands pipelines, other pipeline projects proposed for the region include:

- Kinder Morgan's Northern Leg of the Trans Mountain oil pipeline
- Pembina Pipeline Corporation's Kitimat to Summit Lake condensate pipeline
- Pacific Trails Pipelines KSL natural gas pipeline

If all of the proposed pipeline projects proceed, an additional 4,000 kilometers of pipelines will cross northern British Columbia – and the cumulative impacts could cause irreversible harm.

Protecting Wild Salmon

The Enbridge oil sands pipelines would put some of the most productive salmon habitat in Canada at risk. Given the likelihood of a pipeline failure and the difficulty of cleaning up spills in fast-moving river systems, even the best construction and operating practices could not eliminate the risks.

Salmon is an integral part of the environment, culture and economy of British Columbia. It is critical that a meaningful public conversation occur about the risks posed by the

Enbridge pipelines. This is particularly important for those in northern British Columbia who depend on salmon for food, culture, livelihood and leisure. If the Enbridge oil sands project proceeds, it could have irreparable impacts on salmon and salmon ecosystems.

The Pembina Institute recommends a moratorium on the transportation of oil from Alberta's oil sands to the British Columbia coast until a public inquiry fully addresses concerns about the environmental impacts. These include the potential impacts on salmon, risks associated with oil tankers on the west coast, and how increased oil sands development as a result of the pipeline will contribute to climate change. Because communities along the pipeline route will be most affected by a spill, ensuring their support for the project before it proceeds is essential.

Want More Information?

For more information about pipelines and salmon, read the full report: *Pipelines and Salmon in Northern British Columbia: Potential Impacts*. It can be downloaded at bc.pembina.org. To learn about sustainable energy alternatives, visit re.pembina.org and communities.pembina.org.