MINING IN ONTARIO

A deeper look

Ontario Nature

Acknowledgements

Report written by Rike Burkhardt, Peter Rosenbluth and Julee Boan

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Executive Summary

The economic opportunity for new mines in northern Ontario is clear. Global demand for minerals has been soaring, and there's a tremendous opportunity to create new jobs and economic opportunities. In Canada, Ontario has been a leader in mining for almost a century; responsible for one-third of Canada's total mined metal production.

Significant mineral finds, such as the "Ring of Fire", and recent court cases supporting Aboriginal and treaty rights with respect to mining activity, make it a critical time for a greater understanding of the environmental and social impacts of mining in Ontario. For many communities, mining holds attractive potential for economic benefits in the short-term. However, it is also important to understand what mining means in the long-term for northern ecosystems and community health and prosperity. While the life of a mine can last a few years, the footprint it leaves on the land can be permanent.

This report provides an overview of the mining process and related environmental and social impacts to support dialogue on land use decisions in northern Ontario. It also summarizes resources available to help communities engage in the planning processes associated with mineral exploration and mine development.

Moose: Richard Bennett; float plane: Lawrence Lue; Queen's Park protest: Rainforest Action Network

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Mining in Ontario – A Deeper Look

The life of a mine can last from a few years to a few decades, but the footprint it leaves on the landscape can be permanent – mining can change the land forever.

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In Ontario, the mining industry is currently booming due to high commodity prices: exploration and development interest are high. Mineral resources are non-renewable and represent a resource owned by the people of Ontario but once they are dug up they become private property. Collectively, we only have one chance to get the economic benefits. As well, we may only have one chance to avoid significant environmental impacts.

Other reasons that make it a critical time for northern communities to participate in mining planning include:

- Significant mineral finds in northern areas of the province, such as the "Ring of Fire";
- Recent court cases supporting Aboriginal and treaty rights with respect to mining activities; and
- Ontario's *Far North Act,* the province's Mineral Development Strategy and other new policies and legislation are setting the stage for massive infrastructure and development in Ontario's Far North.

Josh and Karen Tanenbaum

The intense global interest in Ontario's mineral resources demands a transparent and public conversation about what kind of development is desirable in northern landscapes and who should profit from it.

For many communities, mining holds attractive potential for economic benefits in the short term. However, it is also important to understand what mining means in the long term for northern ecosystems, for the provincial economy and for community health and prosperity, once a mine stops producing revenue. Mining development can be fast paced and the impacts can extend far beyond one community. This workbook provides an overview of the mining cycle and some of the environmental and social implications of mining development in Ontario's north.

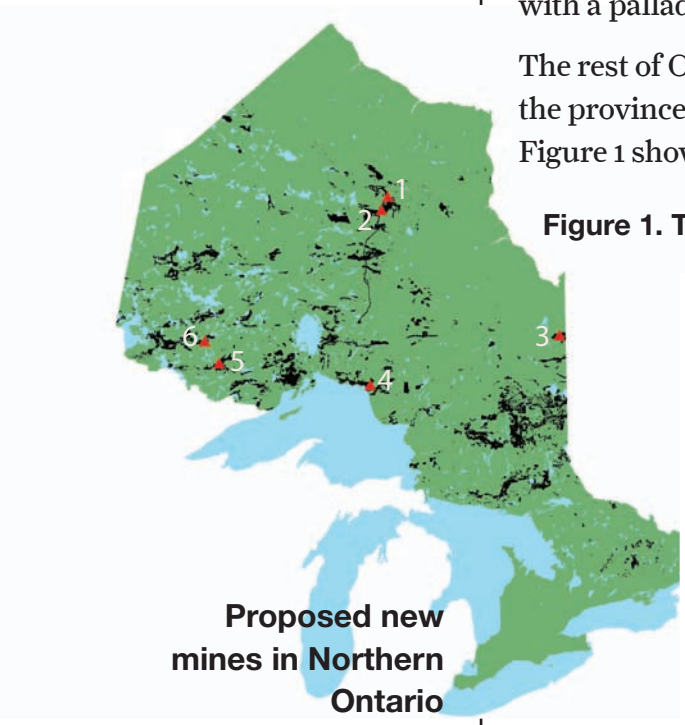
In 2010, the total value of mineral production in Ontario was estimated at $7.7 billion (MNDMF 2011). That same year, the province committed $10 million to community-based land-use planning in the Far North (OMNR 2011).

About 78% of the gold consumed each year is used to make jewelry. Gold mining uses mercury and cyanide to separate the metal from ore, and leaves behind more than 20 tonnes of waste to make one gold ring (www.geology.com).

Overview of Ontario's Mining Industry

In 2011, there were 33 operating mines in Ontario[1]. Approximately two-thirds of these were gold or base metal (iron, nickel, lead and zinc) mines, with a palladium and a diamond mine also in operation.

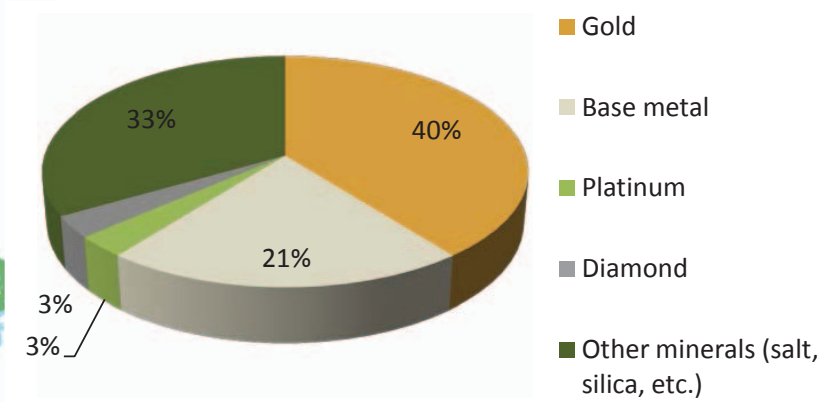
The rest of Ontario's mines are mainly located in the southern part of the province and produce minerals such as silica, gypsum, talc and salt. Figure 1 shows the breakdown of mines in Ontario.



Proposed new mines in Northern Ontario

1. Cliffs Chromite Mine (Cliffs Natural Resources)
2. Eagle`s Nest Metal Mine (Noront Resources Inc.)
3. Detour Lake Gold Mine (Detour Gold Corp.)
4. Marathon Copper Mine (Stillwater Canada Inc.)
5. Hammond Reef Gold Mine (Osisko Hammond Reef Gold Ltd.)
6. Josephine Cone Iron Mine (Bending Lake Iron Ore Group Ltd.)

Figure 1. Types of mines operating in Ontario (MNDMF 2011)



The "Ring of Fire"

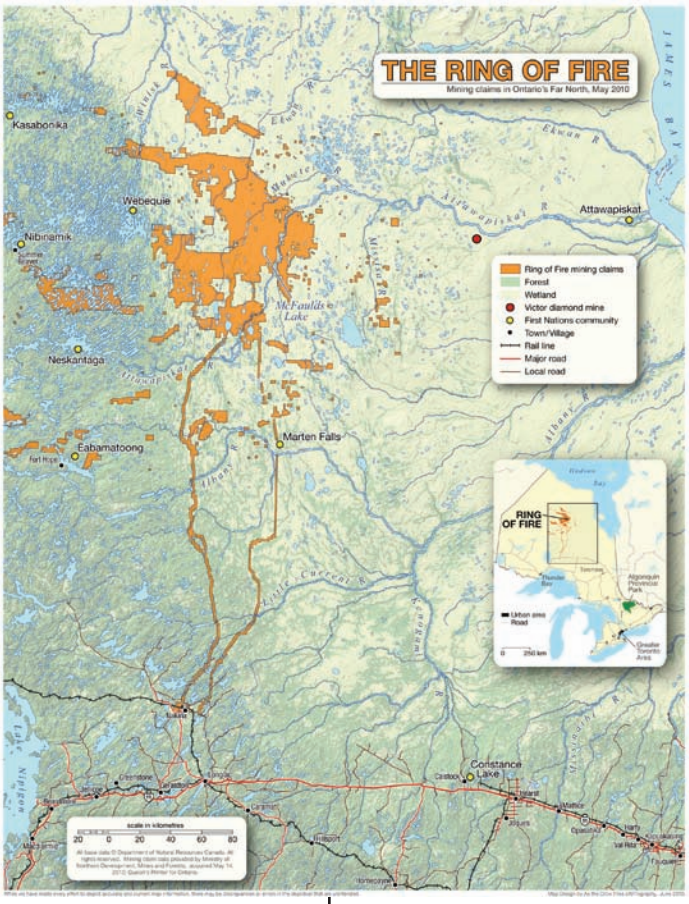
The Ring of Fire is a recent mineral find, consisting of one of the world's largest chromite discoveries. It is located about 500 kilometres northeast of Thunder Bay. The deposit has attracted international attention from the mining industry and is estimated to be worth about $30 billion. International mining companies have staked 9,000 claims covering 480,000 hectares[2]. The Ring of Fire also includes significant nickel and copper deposits.

Demand for chromite is high worldwide, particularly in countries like China, which is the largest consumer (50% of global production) of ferrochrome, an alloy made from chromite used to produce stainless steel[3].

The consequences of the scale of industrial development proposed in the Ring of Fire are huge. Over the next 10 years, the infrastructure needed to develop the mineral resources in the Ring of Fire could open up a vast area of northern Ontario through air, rail and road links to future mineral and other kinds of resource development.

Due to the location of the find, remote First Nations communities will experience most of the social and environmental impacts from this project. Raising awareness of the implications of large-scale development is important. Once development is approved in the Ring of Fire, change will come fast to Ontario's northern communities.

The demand and prices for metals go through periods of growth and periods of decline. When mineral prices go up, mines are quickly built, benefitting the communities around the mine with jobs, development and money. The increase in mineral value makes the cost benefit of extraction great enough to spur mining development – this is the 'boom'. Eventually a point is reached where the mineral at the mine location is depleted, or the mineral market is saturated, and prices begin to decline. The results are layoffs, downsizing and eventually mine closures. This 'bust' can happen gradually, or it can happen over the course of a few years, leaving many host communities with social, economic, and environmental challenges including high unemployment, youth and labour pool out-migration, and environmental damage left behind by many mines[4].



The Ring of Fire chromite deposits have attracted global attention from the mining industry and are estimated to be worth $30 billion.

The price for metals is the main influence on the amount of money that is invested in projects throughout the mining sequence. Extracting minerals is expensive and the economic viability of every project depends on a minimum price the mining company can get for the mineral(s) produced. As mineral prices rise, more projects become potentially viable and there is more interest from investors. When prices drop, projects in development and even operating mines may become unprofitable and cease operations.

Open Pit vs. Underground Mining

Mines in Ontario are either open pit or underground, depending on the type of ore and its location. Open pit mining is generally used for large, low-grade mineral deposits that are close to the surface while underground mining is generally used for deeper, concentrated deposits[5].

Steve Velo

Open pit mining is used to extract ore deposits that are located close to the surface, since, on average, the cost per tonne of ore mined is lower than that for underground mining. Open pit mines result in a larger area of surface disruption and tend to produce much larger amounts of waste rock[6].

Waste rock is rock at a mine site that does not possess useful or profitable concentrations of the targeted mineral(s) in question. Waste rock is blasted and removed so that the valuable mineral rocks (ore) can be accessed. In underground mines, the ore is removed using shafts and

Tailings pond, Elliot Lake, Ont.

ramps as well as other underground infrastructure and the ratio of waste rock to ore generated tends to be much lower[7].

The total volume of waste rock generated will depend on the scale of the project but mid-size projects typically generate several hundred million tonnes of waste rock.

Kidd Mine mine near Timmins, Ont. includes both an open pit and deep underground operations — in fact it's the deepest mine in the world.

Life Span of a Mine

The average operating life span of a mine in Canada is relatively short, generally lasting between 15 and 20 years. However, the entire process of opening and closing a mine requires activities that might continue over hundreds of years.

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This includes the up-front work to find and develop suitable mineral deposits (the chances of a mining claim developing into an operating mine are estimated to be around 1 in 10,000[8]) and the long-term monitoring and remediation that are often needed to avoid environmental contamination once a mine site has closed.

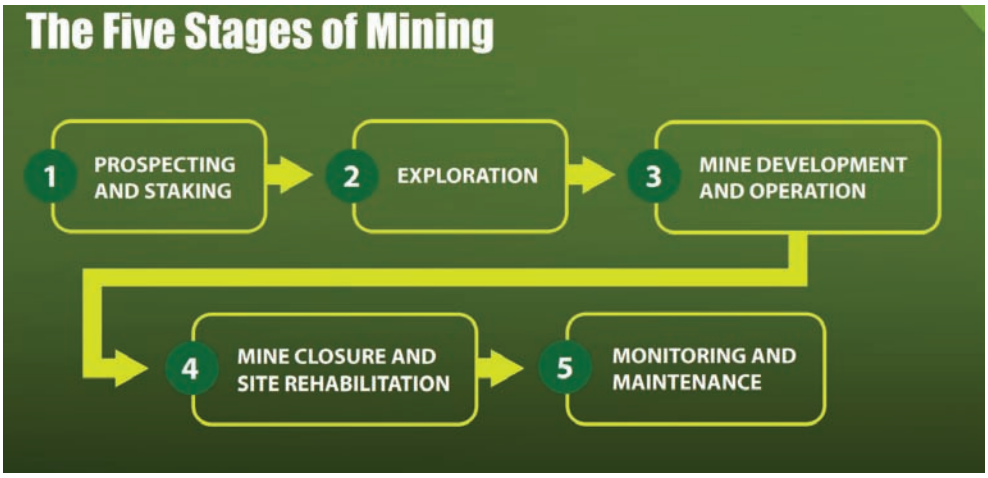
The set of activities that describe the different stages of mining is called the mining sequence. It is helpful to understand the mining sequence, as each part of this sequence comes with different demands on communities and the environment. Figure 2 below shows the phases of the mining sequence that will be explained in following sections.

The Ontario Mining Association estimates the life of a mine as follows:

- Staking and Surveys: 1-2 years
- Basic Exploration: 3-4 years
- Advanced Exploration: 5-10 years
- Development and Production: 20 years
- Closure and Rehabilitation: 2-10 years
- Monitoring: 5-100 years

In 2006, Ontario recorded 66,926 new mining claims (MNDM 2011).

Figure 2. The mining sequence



The Mining Sequence (Stages of Mining)

1. Prospecting and Staking

Prospecting is the process by which minerals and metals are discovered. It often involves searching rock formations on the ground and/or geological data for clues about possible mineral deposits. If prospectors believe that an area is worth further geological investigation, they will stake a claim that gives them exclusive rights to do more work on the property in the hopes of finding mineral deposits that are valuable enough to develop a mine.

Ron Schott

In Ontario, claims are usually staked on the ground using claim posts and by blazing lines on trees and the ground. Ontario now has map staking in some parts of the province as an intermediary step to online staking. Some provinces use online map staking, which allows those who have prospecting licenses to claim exclusive mineral rights directly from their computers without ever setting foot on the property. Ontario is moving toward an online staking system over the next few years[9].

In Ontario, the ownership of surface rights and mining rights are different from one piece of land to the next. Prospecting and staking are based on the "free entry system". Free entry means that almost any area of open Crown Land can be staked, including land traditionally used by Aboriginal people and communities. Private property is also open to staking if the owner of the surface rights does not also hold the mineral rights on the property. However, the new *Mining Act* gives property owners in the "near north" the opportunity to request that their properties be off limits to staking. The province can refuse the request if it is deemed there is significant mineral potential. In southern Ontario, all private properties that didn't have claims were closed when the new Mining Act was passed. As claims over private property in southern Ontario lapse, the property will be closed to future staking.

The concept of free entry assumes that mining should have priority over all other land uses. For this reason, a prospector or mining company can stake a piece of land without notifying or asking for consent from anyone who uses the land for other purposes (e.g., First Nations and Metis people, cottagers, recreationists). One of the problems with a free-entry claims system is that mining automatically takes priority over lands that may have other important economic, cultural or environmental values.

Some exceptions to free entry and areas that cannot be staked include:

- Land on an Indian Reserve;
- Land in a registered plan, subdivision or town site;
- Provincial parks or other protected areas; and
- Land already staked by another prospector or mining company

Historically, the government recommended (but did not require) that companies communicate their intentions when undertaking preliminary exploration activities near Aboriginal communities.

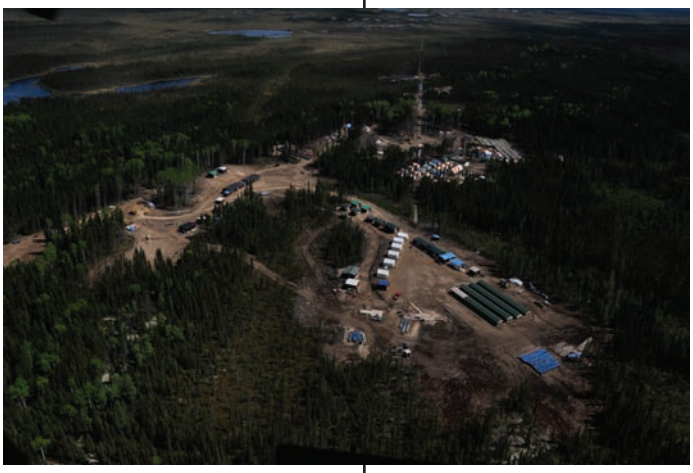
Mine closure is the last stage of the mining cycle. In Ontario, a mine closure plan describes the activities required to convert an operating mine to a closed site that is environmentally stable and will not present any future safety or environmental hazards.

2. Exploration

Once a claim has been staked, exploration begins. Exploration determines whether there is enough ore of good quality to make it worth developing a mine. Historically, the government recommended (but did not require) that companies initiate contact when undertaking preliminary exploration activities near Aboriginal communities. However, under Ontario's new *Mining Act*, this will be a requirement.

There are two levels of exploration — preliminary and advanced. Preliminary exploration can involve the following activities[10]:

- Ground surveys;
- Airborne surveys;
- Limited stripping and trenching (removal of vegetation and soil up to 10,000 m^3, with a lower threshold if within 100 m of a water body);
- Limited bulk sampling (removal of large quantities of ore up to 1,000 tonnes from the surface);
- Various forms of drilling to remove rock samples from deep in the rock; and
- Trail, road and water crossing construction.



Mining exploration camp.

In advanced exploration, activities such as more extensive trenching, stripping, bulk sampling, and the construction of underground access tunnels may occur. De-watering of underground tunnels may also be necessary, which involves the removal or draining of ground or surface water from a mine site by pumping or evaporation. The construction of more permanent access routes may be required and the construction of more substantial buildings and camps usually happens at this stage (many early exploration sites have basic camps especially in remote areas).

During advanced exploration, an area may be permanently altered because of the leveling of the site, removal of vegetation and soil, and drainage associated with construction[11]. The *Mining Act* is limited in its regulation of some of these potentially damaging activities. For instance, surface stripping that displaces less than 10,000 m^3 or extraction of less than 1,000 tonnes of material from the ground is not considered advanced exploration under the *Act*. Therefore no closure plan that describes how the landscape will be restored is required. The new

exploration permits will require a description of what will be done to remediate a site.

The environmental effects of exploration can include:

- The loss of options to protect culturally or environmentally important lands from development;
- Trail/road and trenching erosion, which can lead to water and soil quality issues;
- Disruption of wildlife habitat as well as harvesting and fishing activities;
- Contamination from fuel, hydraulic fluids, garbage and sewage;
- Noise pollution; and
- Acid mine drainage, where exposure of certain minerals in rocks creates acidic runoff from a mine site.

Exploration activities are often done by smaller "junior" companies that raise money from investors that bet on a company finding a potentially valuable deposit. These companies are not very stable and may only last a few years before they go bankrupt, re-form themselves or are bought by another company. Projects are also often bought and sold between companies. Most junior companies do not have ambitions to open a mine, hoping instead to "sell up" their claims and potential project to a buyer that can take it to another level. This is a challenging reality for communities that are trying to engage with the industry as efforts put into building positive relationships can be rendered futile when a project is sold.

Johs Morten

Exploration activities may leave behind waste and contaminants.

Cyanide vat: Cyanide may be used to separate minerals from ore.

3. Mine Development and Operation (Mining and Milling Phase)

If feasibility studies show that mineral extraction is possible and economically worthwhile then a mine may be built. This is the mining and milling phase during which operations consist of the following activities:

- Mine construction (also known as pre-production);
- New roads and power corridors for remote mines;
- Stripping/storing of soil and vegetation overburden;
- Ore extraction;
- Crushing or grinding of ore;
- Flotation or chemical concentration of ore;
- Mine and surface water treatment; and
- Storage of waste rock and tailings.

Environmental effects of the mining and milling stage can include:

- Contamination of surface water and groundwater;
- Increased erosion and sedimentation of lakes and streams;
- Wildlife and fisheries habitat loss;
- Heavy metal leaching from acid mine drainage;
- Changes in local water balance;
- Potential acid generation from waste rock and pit walls;
- Noise and windborne dust; and
- Lands and forests covered by waste rock piles and tailings disposal areas (land alienation).

The Timmins Kidd Creek site stores 100 million tonnes of base metal sulphide tailings in a pile that is 1.2 kilometres wide and 25 metres high. The waste site is surrounded on three sides by Porcupine River tributaries (www.tailings.info).

Tailings disposal at Kidd Creek Mine.

The concentrated ore that has been separated from the tailings is usually transported offsite for further concentration or smelting.

Milling – Extracting Ore

The milling process that is used to extract valuable minerals from the ore can require the use of large amounts of poisonous substances, such as sodium cyanide and sulfuric acid. Cyanide is commonly used to separate gold from the host rock. The problem with the use of these chemicals is that they can be acutely toxic to humans and wildlife. Fish and aquatic invertebrates are particularly sensitive to cyanide exposure if it gets into streams or lakes. Cyanide is toxic to many living organisms at very low concentrations[12]. Freshwater fish are one of the most cyanide-sensitive groups of aquatic organisms. Hazards to fish, wildlife and livestock are well documented. Massive kills of freshwater fish by accidental discharges of cyanide wastes are not uncommon[13].

In one case, cyanide-containing mine effluents from a Canadian tailings pond released into a nearby creek killed more than 20,000 steelhead[14]. In the 1990s there was a spill from one of the Hemlo mines that impacted the drinking water source for the Pic River First Nation.

Tailings Ponds – Storing Mine Waste

The crushed rock, water and chemicals that are left over from milling create a sludge called "tailings." Tailings include the materials that remain after the valuable portion is separated from the uneconomic portion of an ore. Profitable concentrations of minerals range from 5% for base minerals to .00005% for precious metals such as gold. This means that, generally speaking, a minimum of 95% of the processed ore becomes tailings waste[15].

Tailings represent the most significant long-term environmental liability created by mining projects. Because of the extreme hazard they present to human health and the environment, tailings need to be contained and are usually kept on site as tailings ponds. Tailings ponds often require clearing more land to hold mine waste than the rest of the mine combined. The failure of containing structures (tailing dams) that hold this waste can result in a massive release of toxic tailings material.

Although major dam failures do not occur often in Canada, the potential for environmental damage is significant when they do. A tailings dam failure in near Matachewan in 1990, for example, released over 195,000 cubic metres of tailings and washed out 1.5 kilometres of highway. A large portion of the tailings were released into a nearby creek leading to the Montreal River[16]. Other recent examples in Canada are a failure of a tailings dam near Chapais, Que., release of mercury tailings into Pinchey Lake in British Columbia, and a tailings spill at Ekati diamond mine in the Northwest Territories.

One example of a large tailings disposal facility is the Kidd Creek Metallurgy site owned by Falconbridge near Timmins, Ont. The site processes copper and zinc ore. The Kidd Creek mine includes a disposal site that stores more than 100 million tonnes of base metal sulphide tailings. The tailings pile is 1.2 kilometres wide and 25 metres high. The site is surrounded on three sides by Porcupine River tributaries, increasing the potential for significant contamination of fish-bearing waters if the containment structure fails.

Improperly maintained tailings ponds can also result in a slow, ongoing release of pollutants into the environment that may go undetected if tailings ponds are not monitored regularly. As such, they are of great environmental concern[17].

For example, more than 80 years of silver mining around Cobalt, Ont. has led to widespread contamination of water with arsenic[18]. Metal leaching from mine wastes in the area has led to the contamination of parts of the watershed, with dissolved arsenic concentrations much higher than what is allowed by law in drinking water (e.g., exceeding Canadian drinking water criterion of 0.025 mg/L[19]). Repeated exposure to arsenic can lead to long-term liver, kidney, and central nervous system damage. In this case, the mine is owned by a large, profitable mining company – Agnico Eagle.

A 2005 report by the Environmental Commissioner of Ontario noted that about half the closed mine sites that require regular follow-up inspections had not been inspected in over five years.

Coniagas Mine, Cobalt, Ont.

More than 80 years of silver mining in the Cobalt, Ont. area has led to widespread contamination of water with arsenic. Repeated exposure to arsenic can lead to long-term liver, kidney, and central nervous system damage (www.environmentalhealth.ca).

Ontario's track record on mine closure

- There are at least 5,700 abandoned mine sites in the province, dating from the early 1900s;
- **4,000 of the abandoned mine sites may be hazardous to public health and safety;**
- 250 of these sites pose an environmental risk due to potential leaching of minerals and other contaminants from mine tailings;
- Closure plans were not in place for 18 of the 144 mine sites that were required to have them in 2005;
- In 2005 about half of the closed mine sites that require regular follow-up inspections had not been inspected in over five years; and
- The Ministry has little evidence to prove that the financial assurances provided by mining companies are enough to make sure mines are closed and maintained properly.

(2005 Ontario Auditor General's Report)

4. Mine Closure and Site Rehabilitation

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All mines have one thing in common – no matter how long they last, production will end at some point[20]. In the past, many mines were abandoned without proper reclamation. Today, the government requires companies to prepare mine closure plans. The goal of a mine closure plan is, as much as possible, to return a mine to a safe, environmentally sound and productive state by removing structures, grading roads and covering the mine site with vegetation. Each closure plan will be different, depending on the nature of the mine and the level of site remediation required. The closure must follow a plan filed with the government and must be backed by financial assurances for rehabilitation, mitigation and monitoring costs.

Skytruth

Cleaning up a large mine site can cost millions of dollars and long-term monitoring will still be required.

Under Part VII of the *Mining Act*, a mining company must provide financial assurance to the Ministry to cover the closure costs identified in the site's closure plan[21].

Financial assurances are supposed to ensure that there are sufficient funds available for the proper closure of a mine in the event that a mining company cannot (or will not) meet its closure plan obligations (for example, as a result of bankruptcy). Having enough financial assurance is supposed to protect taxpayers from paying for mine closure costs that can run from several million to several hundred million dollars per mine[22].

There are several issues with assurances. Is the amount sufficient? Are the assurances transparent? And should a company be allowed to "self assure"? Essentially, should we assume that large companies are unlikely to fail? And, has there been an independent review of the closure costs?

As with operating mines, one of the biggest challenges in mine closure is to protect the water around the mine site. While rehabilitating the surface of an old mine may be re-shaped, buildings removed, topsoil added and grass planted – the key concerns are what is going on underneath the surface and the long-term integrity of tailings impoundments.

Forecasting mine site reclamation costs is an inexact science and costs associated with long-term maintenance, like the costs required for water management, can be substantial[23]. Problems arise when the mining company is no longer operating or goes bankrupt. If the financial assurance is not enough to cover the cost of mine closure and reclamation, the government is forced to pay the difference. Since 2002, Canada's federal, provincial and territorial governments have spent close to $1 billion to manage the 10,000 plus abandoned sites across Canada and prevent new ones[24]. In Ontario, the government spent $88 million between 1999 and 2008 to rehabilitate the highest priority abandoned mine sites at the taxpayers' expense[25].

PennState

Acid mine drainage.

5. Monitoring and Maintenance – Continuing Upkeep

Almost all mines will require ongoing monitoring, maintenance and/or water treatment. Some will require monitoring for generations beyond the actual closing of the mine. A monitoring program (usually developed by the company and approved by government) is used to assess how well reclamation measures are working after a site is shut down and also to identify corrective actions where needed[26].

Tailings pond at Elliot Lake, Ont.

The length of the monitoring phase is reviewed when the mine closes and depends on the potential impacts and risks to the environment. If the site needs long-term care and maintenance, the mining company remains responsible for the site, including remediation of any additional environmental issues arising after closure. In theory, Ontario can take back a mine site from a solvent mine lease holder but so far this has never happened.

Problems arise when a closed mine site remains so hazardous that it requires monitoring forever. As with any industry, mining companies come and go, which raises the question of who will be responsible once the mining company is gone?

A 1996 panel report by the Canadian Environmental Assessment Agency[27] on how to manage uranium mine tailings near Elliot Lake, Ont. illustrates the potential lasting nature of a mine's legacy long after it has stopped production: "Given the permanent nature of the hazards presented by the tailings, the panel recommends that an adequate containment system must be supported in perpetuity by effective care and maintenance programs."

Experiences in Ontario with the failure of tailings containment structures and the inherent difficulty of predicting long-term environmental impacts (for example, on water quality), means that no mine can simply be walked away from.

Just like mine development, mine closure also has impacts on a community. This includes the loss of jobs and income used to support the growth of a community while the mine was operating. It also has a direct and indirect impact on local employment, businesses, and the sale of goods and services. Communities need to consider how mine closure will affect not only the health and local environment but also the social structure of the community after a mining operation's end.

Jeremy Craigs

When fish are exposed directly to compounds from acid mine drainage through their gills, they may suffocate from acute toxicity. Chronic effects tend to impact reproductive and digestive functions.

Environmental Impacts of Mining

A single mine is the centre of a web of development that includes the construction of roads, power-generating facilities and transmission lines, impoundment areas, and dams. The energy used by the mining industry represents 7% of Ontario's industrial electrical power use[28]. Cliffs' proposed ferrochrome production plant required for their proposed Ring of Fire development would be the single largest user of electricity in the province, equivalent to a city of 350,000 people. Mining can permanently change the character of the landscape in a number of ways, from stripping and flooding productive lands, to limiting opportunities to pursue other land-based activities.

The Impacts of Mining on Waters

Some of the worst environmental offenders from the mining industry in Canada have left water bodies so polluted that they are unfit for human use and cannot sustain healthy ecosystems. In British Columbia, the Mt. Washington Mine near Comox produced copper for only three years but since then, toxic copper leachate has been contaminating the headwaters of the Tsolum River for decades[29] and ruined a multi-million dollar salmon fishery. As a result of local citizens' efforts, restoration activities, although very costly, have been able to bring back some of the salmon

population. Some of the effects of mining on water are documented in the following sections.

Acid Mine Drainage

Acid mine drainage has been identified as the biggest environmental liability facing the Canadian mining industry and is estimated at $2 to 5 billion[30]. The possibility, severity and timing of acid mine drainage can be very hard to predict, which makes it difficult to plan for mitigation of impacts.

Ron Schott

Acid mine drainage.

Acid mine drainage occurs when waste rock or tailings that contain sulphides are exposed to oxygen and water to generate sulfuric acid. The chemical reactions dissolve heavy metals from the rock and combines with the acids, which produces a toxic mixture. Acidic runoff from these rocks into local streams and lakes can have devastating impacts on aquatic life. As water acidity increases, the number and abundance of fish, macroinvertebrates (e.g. crayfish, snails, clams) and aquatic insects decrease. The metals may have acute or chronic toxic effects on aquatic organisms, many of which are more sensitive to metals than humans.

The abandoned Britannia copper mine in British Columbia has been releasing acid mine drainage into local waters for many years. A 2000 study of the mine's impacts compared fish abundance, distribution and survival at contaminated and non-contaminated areas[31]. Chum salmon fry abundance was significantly lower near the impacted waters. The investigators also reported that acid mine drainage from the Britannia Mine was toxic to juvenile chinook and chum salmon. A costly rehabilitation program has now brought this largely under control.

Although there are a number of ways to reduce the development of acid mine drainage and treating mine effluents, there are no technologies that allow a company to close a mine and walk away from it. In most cases, any mine that exposes metal sulphide-bearing rocks will need to be monitored and potentially treated for hundreds of generations after the last miner has worked there. It could take hundreds to thousands of years for some sites to become "acid neutral" and stop leaching into the environment[32].

Toxins and Heavy Metal Pollution

Many acid rock discharges also contain elevated levels of toxic metals like nickel and copper, with lower levels of a range of other compounds like arsenic, manganese, lead, and aluminum. This occurs because as the

acid solution moves through tailings or waste rock material, these metals leach out into the solution. Leached metals can be poisonous for many aquatic species as well as humans.

ᑭᓄᖓᑦ ᒥᓇ ᑯᑕᑭᔭᑦ ᐊᐃᔭᓯᓴᑦ ᓂᐱᑲᑦ ᑲᔭᐊᔅᒻ ᓇᐱᒻ ᐅᐁᔅᑦᑭᖕᐃᑯᓇᐊᔅ ᐱᑭᐳᐃᔅᓇᑦ ᑭᒡᐱᑦ ᓂᐱᑲᑦ ᑲᐃᓱ ᐱᓇᓱᑲᐃᔅᑭᑦ. ᑲᐃᔅᑦ ᒥᑦᑕᖕᐃ ᐱᑭᐳᐃᔅᓇᐳ ᑭᐃᓯᔭᑦ ᑭᓂᓯᑯᐊᔅᒻ ᑭᓄᖓᑦ ᒥᓇ ᑯᑕᑭᔭᑦ ᐊᐃᔭᓯᓴᑦ ᓂᐱᑲᑦ ᑲᔭᐊᔅᒻ.

Acid mine runoff isn't the only means by which toxins from mines can enter water sources. Processing ore requires the use of chemical agents mixed with water that contain such toxins and environmental contaminants as cyanide, hydrochloric acid and chlorine. These chemicals are often discharged either intentionally or accidentally into local water supplies. Mine effluents may also have hydrocarbons from exhausts, leaking equipment, spills, etc.

Toban Black

Heavy metals can be toxic to aquatic creatures and humans.

ᑲᒪᐊᔅᑑᓪᑲᑭᑦ ᐱᑭᐳᐃᔅᓇᑦ ᑲᐃᑭᑲᑐᑦ ᐃᐁᔅ ᐱᑭᐳᐃᔅᑦ ᑲᒪᐊᑦᑐᓪᑲᑭᑦ ᐃᒪ ᑭᑎᑲᓂᑦ, ᐊᐃᔭᓯᓪᑲᑦ ᒥᓇ ᐅᐱᒪᑎᑦ ᐃᔭᐃᔅᑦ. ᐱᑭᐳᐃᔅᓇᑦ ᑲᔭᑭᑦ ᐃᒪ ᑭᑎᑲᓂᑦ ᐅᒥᑭᓇᐊᔅ ᐊᐃᔭᓯᓴᑦ. ᐁᑲᔅ ᑕᓪ ᑯᑕᑭᔭᑦ ᐊᐃᔭᓯᓴᑦ ᐅᑕᓂ ᐊᒪᔅᐊᔅᑦ ᐃᑫᔅᓂᐊᔅᑦ ᐊᐃᔭᓯᓴᑦ. ᒥᓇ ᐅᐱᒪᑎᓴᑦ ᐅᑕᒪᔅᐊᔅᑦ ᐃᑫᔅᓂᐊᔅᑦ ᐊᐃᔭᓯᓴᑦ. ᐁᑲᔅ ᑕᓪ ᑭᓇᐃᔅᑦᐟ ᐃᓪᑲᔅᔭᒻ ᑲᐊᒪᔅᔭᑦ ᐃᑫᔅᓂᐊᔅᑦ ᐊᐃᔭᓯᓴᑦ, ᐃᐁᔅ ᐱᑭᐳᐃᔅᑦ ᒪᐊᔅᑦᑐᓪᑲᒪᑲᓄᑦ ᐃᒪ ᒥᓇ ᐊᓂ ᐱᒥ ᓇᑦᑭᖕᐅᒪᑲᓄᑦ.

Toxic mine drainage with elevated metals can occur without acid mine drainage. It is a problematic assumption that if there isn't acid mine drainage or the acid mine drainage risk is low, the risk of water problems is low. Neutral mine drainage can still have concentrations of zinc, selenium, and arsenic.

The mix of chemicals in mine effluents may have synergistic effects. Downstream monitoring required by regulations shows that mines – even those that are meeting regulations – are still having impacts on aquatic ecosystems. Determining which chemicals in the mine effluent are the cause of the problems can be a real challenge.

Ontario has established water quality standards enforced through the *Ontario Water Resources Act* (OWRA), which are supposed to protect water resources from pollution levels above established thresholds. Unfortunately, the province has allowed the mining industry to continue its long-standing practice of dealing with waste by releasing effluent into otherwise healthy water bodies and relying on rivers and streams to dilute pollution levels. These areas where pollution levels are allowed to exceed Provincial Water Quality Objectives are called "mixing zones."

Where mixing zones have not been approved, or discharge levels have been exceeded, charges can be laid, but this generally does not happen. For example, there were 50 breaches of established water pollution thresholds by the mineral sector in northern Ontario in 2005 but no convictions. An examination of the provincial database of environmental exceedances is telling. In 2010, one Ontario mine exceeded the acute lethality test on trout 12 times.

Some of the processes for de-watering mines (like those used in the De Beers Victor diamond mine) flood areas that naturally contain mercury and convert it to a highly toxic form called methyl mercury. Methyl mercury affects the central nervous system and, in severe cases, irreversibly damages areas of the brain[33].

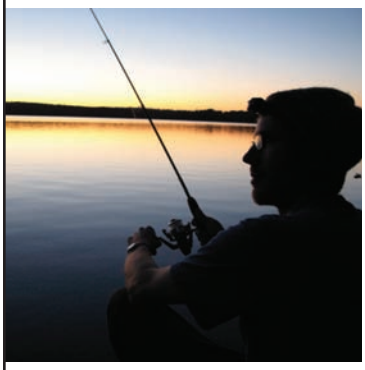
ᐃᒪ ᒪᖅᑭᑯᐊᓪᓗ ᐊᖏᐃᓐ ᓇᓇᑐᑕᐃᓐᑭᑫᑐᒋᑫᐃᓐᑲᒥᑦ ᐅᐱᒥ ᓇᓇᑲᒋᖕᐊᐊᓐᑐ ᑭᓄᖓᑐ ᐃᒪ ᐊᕝᕙᐸᓂ ᒥᓇ ᐊᑕᐊᓐᐱᖕᑲᑊ ᓯᐱᑐ ᐁᑲᓐ ᑕᖅ ᒥᖅᑕᖏᐃ ᐅᒥᑲᓇᐊᓐ ᐱᒋᐳᐃᓐᑐ ᐱᐊᓐᐱᑯᑲᓂᑦ ᑲᐅᑐᑖᓱᑲᐃᓐᑦ, ᑲᒪᒋᑐᑕᑫᒪᑲᑭᑐ ᑭᓇᐃᓐᑐᑊ ᑲᐱᒪᑎᓯᔭᑦ. ᒥᑕᖅ ᑲᑭ ᐃᑭᑐᓇᓂᐊᓐᑦ, ᐅᑐᐅᕝᐃᔪ ᐅᑭᒪᐃᓐᑐ ᐃᑭᑐᐊᓐᑦ ᐊᖏᐱᑕ ᐁᑕ ᒋᐊᒪᓐᑲᓄᒻ ᑭᓄᖓ ᐊᐃᓐᔭ ᑲᐊᒪᓐᒻ.

Recently, the Mushkegowuk Environmental Research Centre has been sampling fish in the Albany and Attawapiskat Rivers and finding higher than normal levels of methyl mercury[34]. As a result, Ontario's Ministry of the Environment changed its fish consumption advisory for a stretch of the river near the mine – an important First Nations' fishery – to four meals a month, from the previous eight. This is just one example of how mining can have far-reaching effects beyond the actual boundaries of a mine site.

Sediments and Turbidity

Most mining activities (including exploration activities) like soil stripping, trenching, road building, ore extraction and others, can lead to the release of soil and sediment (fine soil particles) into nearby streams and lakes. Water quality and aquatic habitats can also be affected by increased amounts of sediment in the water column and settling on streambeds.

When it is suspended in the water column, sediment can cause tissue rot or even directly kill fish. When sediment settles it can smother fish eggs and aquatic plants that can decrease both reproductive and survival rates for affected species. Increased turbidity, where light that is unable to penetrate the water due to suspended particles, can decrease water temperatures and make it hard for fish to locate food.



Travis Pritchard

Fish sampled in the Albany and Attawapiskat Rivers by the Mushkegowuk Environmental Research Centre showed high levels of methyl mercury and led to an advisory to reduce fish consumption.

The Victor mine ore contains about one diamond for every 100 tonnes of material excavated from the open pit mine (Ontario Technologist, Volume 52, No. 3 May/June 2010).

Felix O

Mining operations use huge quantities of water.

ᐱᐊᑉᐱᑯᑲᓂᑦ ᑲᐋᐃᑉᓂᑲᑌᑭᑦ ᑲᐸᑭᑎᓂᑲᑌᑭᑦ ᓂᐱᑲᑦ ᑭᓄᖓ ᐅᐊᑉᑯᓂᑦ ᐃᓴᒪᑲᓄᑦ ᒥᓇ ᐱᑯ ᑭᑎᑲᓇᑦ ᑲᔭᑭᑦ. ᐅᑲᑭ ᓂᓯᑯᓇᐊᑉ ᓇᑦᑕ ᑲᔪ ᑲᐃᑉᑦ ᓇᐦᐱᑉ ᑕᑭ ᐅᑦᒋ ᓇᑦᑭᐅᓯᐊᑉᑦ ᑭᓄᖓᑦ. ᐅᑫᑉᓂᐊᑉᑦ ᐱᐃᑉᓂᑲᓇᑦ ᑲᔪ ᐅᑦᒋ ᐊᑉᓴᑯᑐᒪᑲᓄᑦ ᐊᓈᒦᑦᑎᑊ ᐁᑲᑉ ᑕᐩ ᑲᐃᑉᑦ ᐊᐦᐸᑦ ᒋᑭ ᒥᐦᑲᒧᐊᑉᑦ ᑲᒥᒋᐊᑉᑦ ᑭᓄᖓᑦ.

Water Consumption

Water is essential to many phases of the mining sequence. The mineral sector is the fourth largest industrial water user in Canada, using about 1.7 billion cubic metres of fresh water per year. Of these 1.7 billion cubic metres, 78% is discharged directly into lakes and rivers without being treated.

ᐱᐊᑉᐱᑯᑲᑦ ᒥᑦᑕᐦᐃ ᓂᐱ ᐅᑕᐸᒋᑐᓇᐊᑉ. ᑲᓲᑦᓯᐸᒋᑫᒪᑲᑦ ᓂᐱ ᐊᐸᑕᑦ ᐁᑭᓯᓇᒧᐊᑉᑦ ᐊᐩᑭᑭ ᒥᓇ ᑭᑎᑲᓇᑦ ᐁᑲ ᒋᑭᒋ ᐸᐩᑭᓄᔭᐊᑉᑭᔭᑦ ᐃᐩᐱᒥᑦ ᒣᑲᑉᑦ ᑲᐱᐊᑉᐱᑯᑲᓂᐊᑉᑦ, ᒥᓇ ᓂᐱ ᐊᐸᑕᑦ ᐁᐅᑦᒋ ᐸᐱᐦᑭᓱᒋᑲᑌᑭᑦ ᐃᑫᑉᓂᐊᑉᑦ ᓇᓂᔭᐊᑉᓯᓂᓯᔭᑦ ᐊᓯᓂᑳᑦ ᑲᐅᑦᑎᓂᑦᑕᑉ. ᐃᒪ ᑕᐩ ᒥᐩᑕᐦᐃ ᑲᐃᓱᐊᐸᑕᑦ ᓂᐱ ᑲᐅᑕᐱᓂᑲᑌᑦ ᓂᐱ ᐃᒪ ᐊᑉᓇᐦᐃᑲᓂᑦ ᐁᑲ ᒋᓂᐱᐊᑉᑦ ᐱᐊᑉᐱᑯᑲᓂ ᐊᑉᓇᐦᐃᑲᓂᑦ.

Todd Radenbaugh

Testing for water contamination.

High pressure water is used to strip soil and vegetation, to keep dust down during construction, to separate ore during milling, and to flood tailings and waste rock areas. However, the activity that places the largest demand on freshwater supplies is the de-watering of mine pits and shafts. De-watering is required to keep the mine dry and reach the ore. This water comes from surface and groundwater sources. The process of de-watering can sometimes result in large-scale landscape slumps or depressions.

Acute Lethality Testing and the Metal Mining Effluent Regulations

One of the requirements of the Metal Mining Effluent Regulations is to conduct acute lethality testing on rainbow trout and an aquatic "bug" called the water flea or *Daphnia*. The effluent passes this test if more than one-half of the test animals survive in the effluent for 96 hours. While most mines in Ontario pass this relatively crude test, most of the time there are important exceptions. In 2010, the McWatters Mine, southeast of Timmins, failed 12 of their 23 rainbow trout tests. [46] Of course, impacts on aquatic ecosystems occur at much lower concentrations of toxics than those that cause acute lethality.

The Impacts of Mining on Lands

Mining Waste

The actual footprint of many mine sites will continue to endure, even after reclamation efforts have been undertaken. An open pit mine site may be as large as 5,000 hectares; however the actual footprint of a mine, including areas impacted by exploration and de-watering, can be as much as 300,000 hectares or 600,000 soccer fields.

Mining is one of the least efficient extractive industries in Canada. Of all of the material removed from the ground by a typical Canadian mine, 42% is immediately rejected as waste rock. Of the remaining 58% nearly all of it – 96% – is turned into slag and toxic tailings. Only 2% of what is removed from the ground can be converted into value.

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All told, over the course of a given mine's life, it may produce hundreds of millions of tonnes of waste, much of which will remain hazardous in perpetuity due to the risk of acid mine drainage and heavy metal pollution.

ᐅᖕᐱᓂᑲᓇᐳᐃᖕ ᓴᑲᖕᐃᑲᓂᑲᓇᓗ ᐃᓯᓴ ᐃᒪ ᐯᖕᑲ ᒥᓇ ᐱᑯ ᐅᐱᒥ ᐸᑭᑎᓂᑲᑌᑭᓗ ᐱᒋᐳᐊᖕᐳᓗ ᓄᒪᕿ ᑕᒡ ᒋᐱᒥ ᑲᓇᑕᖕᐅᓗᒋᑲᑌᑭᓗ ᐊᐱ ᑲᐃᒡᑲᖕ ᑭᐸᑯᓯᔅ ᐱᐊᖕᐱᑯᑲᓗ.

Soil Contamination

The process of producing metal from its ore is called smelting. Smelting represents another layer of potential environmental impacts associated with mine productions. Emissions from smokestacks have improved greatly since the days when Sudbury, one of Canada's foremost ore processing locations, was also considered one of the most polluted cities in North America. That being said, smelters and blast furnaces continue to release airborne pollutants from smokestacks.

Mercury, lead, benzenes, arsenic, chromium, lead, manganese, dioxins, furans and a number of other highly toxic compounds are released and end up settling in predictable plumes downwind of the release points. Once in the soil, some of these toxins are taken up by vegetation and can then move through the food chain becoming more concentrated through the process of bioaccumulation. Bioaccumulation is the increasing con-

The mining sector is the fourth largest industrial water user in Canada, requiring about 1.7 billion cubic metres of fresh water per year – roughly half of the entire volume of Lake Nipissing, Ontario's fifth largest lake.

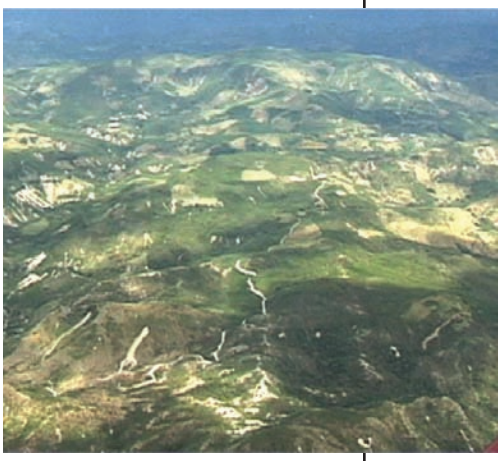
centration of toxic substances (such as pesticides, or other organic chemicals) as it moves up the food chain. As the highest on the food chain, humans eating contaminated wildlife or plants will have the highest concentrations of toxins in their body tissues.

Another concern is the impact of fuel spills at exploration sites. It is unclear how often fuel spills at exploration sites go unreported as these usually occur in remote areas that have little to no regulatory oversight. Although companies are required to document and clean up fuel spills, 2010 anecdotal accounts of fuel drums lost in bogs at an exploration site near McFauld's Lake indicate that large spills may not always be properly reported.

Cutting up the Land ("Landscape Fragmentation")

In Ontario's boreal region, access roads and transmission lines that serve remote mines cut through the forest and interrupt the landscape. Biologists call this "landscape fragmentation" because it divides the continuous forest landscape into smaller pieces.

See Figure 3 for an example of the changes to the land that often occur when roads and transmission lines are opened in previously hard-to-reach areas.



Area fragmented by roads, clearcuts, mine sites, etc.

Fragmentation reduces the quality of forest habitat for wildlife and provides travel corridors for predators like wolves. This interferes with normal predator-prey relationships and increases the chances that wolves will catch prey species like deer, moose and caribou. Fragmentation also increases access for human predators, which can lead to increases in hunting and fishing pressure.

Landscape fragmentation is the primary reason for the loss of Ontario's woodland caribou populations, a species that tells us about the overall health of the boreal forest. There are also clear relationships between building accessible roads in the boreal forest and the decline of other species like lake trout. As far back as 1991, a Ministry of Natural Resources report made the link between the decline in the lake trout population from overfishing in Ontario, among other factors[35]. The level of fishing in a particular lake is directly linked to how accessible it is by road or other means.

Often the larger-scale impacts from mining occur indirectly, from activities such as road-building and infrastructure development (hydroelectric dams, transmission lines, etc.). Experience in Ontario suggests that building roads into the forest tends to have a multiplier effect. One road creates many new access points, which in turn attracts

Figure 3. The cascading impacts of roads

Illustrations: Tim Yearington, courtesy CPAWS Wildlands League

New roads can be the beginning of bigger landscape changes. They open the way for resource development, including logging and mining, and increase human use and presence on the landscape. They become pathways for predators like wolves and for invasive species. Once use is established, it becomes difficult to control or limit access to previously remote fisheries or hunting sites. Meanwhile, species from songbirds to caribou that require undisturbed forest disappear from what is now a puzzle-piece landscape.

more use and further fragments an area. The competition for resources between users becomes more intense and puts pressure on wildlife and fish populations. Once a road is built, it is very difficult to get public support to close the road once the original use is finished. A mine may be in production for only 15 years but the irreversible and long-term impacts of fragmenting land for mining are rarely considered.

Foreclosing Other Land-Use Opportunities

The most intrusive aspect of mining on the land base may be the huge area of land that is reserved for mining but never actually developed.

Currently, over 5.4 million hectares of Ontario's lands are under active mining claims, representing an area larger than Prince Edward Island. If minerals of economic value are found on any of these lands, they could be developed into mines whether the land is privately owned, subject to First Nation or Metis land claims, or already used for other purposes that are incompatible with mining.

The reason that so much of Ontario is already reserved for mining is that obtaining a claim under the "free entry" system is extremely easy; individuals who pay $25 to obtain a prospector's license can stake as many claims as they like as long as they pay a nominal claims registration fee and perform at least $400 annually of assessment work. Compare this to the millions of dollars and the many years spent by communities doing land-use planning, public consultations and review before other land uses (e.g., transportation, forestry, protected area, or agriculture) are allowed to proceed.

Over 5.4 million hectares of Ontario's lands are under active mining claims, which is equal to an area larger than Prince Edward Island.

The free entry system, which prioritizes mining over other land uses, is leading to major conflicts between mining companies and communities. Communities like the Ardoch and Shabot Obaadjiwan Algonquin First Nation, the Matawa First Nations of Webequie, Marten Falls, and Constance Lake, and the Mushkegowuk communities of Attawapiskat, Fort Albany, Kashechewan, Moose Cree, Taykwa Tagamou, Chapleau Cree and Missanabie Cree have had to issue moratoriums, or stage blockades to protest unwanted mining activity on their lands.

Derek Hollerday

Revenue from mining can be used to pay for infrastrutcture, such as new schools (above).

The Social Impacts of Mining

Mining has social impacts, both positive and negative. Positive social impacts that can result from mining in the short term include:

- Creation of jobs and training opportunities;
- Increased infrastructure spending (though the priority may be for industrial uses over the needs of First Nations); and
- Government revenue through sales, payroll, corporate and mining taxes.

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However, even when mineral development results in economic growth, the benefits are not always shared equitably and local communities closest to the source of mineral development can suffer the most after a mine closes and stops producing revenue. In the longer term, communities exposed to fast-paced resource development can experience the following negative social impacts:

- Increase in crime and antisocial behaviour;
- Change to community social character and identity;
- Strained relationships and family breakdown from time spent away;
- Increased cost of living;
- Decreased community cohesion and attachment; and
- Economic downturn following mine closure.

Compared with other major mining areas of Canada, Ontario has the lowest return to government for the value of minerals produced (1.5%) from the mining tax. Of the limited amounts paid on the value of mineral production, none of it is targeted to northern communities to support infrastructure development and maintenance or deal with negative social impacts.

The readiness of communities for the change in lifestyle that sudden economic development brings is something that should also be considered as part of understanding the impacts of a mining project.

Methyl mercury contamination in fish, along with fish consumption advisories, have the potential to disrupt people's eating habits, fishing traditions, and the livelihoods of people involved in the capture, distribution, and preparation of fish (The Science of the Total Environment 259 (1–3): 23–9).

After a series of mine closures in Elliot Lake, Ont., domestic disturbances tripled, weapons use and demand for social services increased, and student enrolment dropped. The community's overall wellbeing was "seriously and negatively affected." (2008 "Boom to Bust" report by the Pembina Institute)

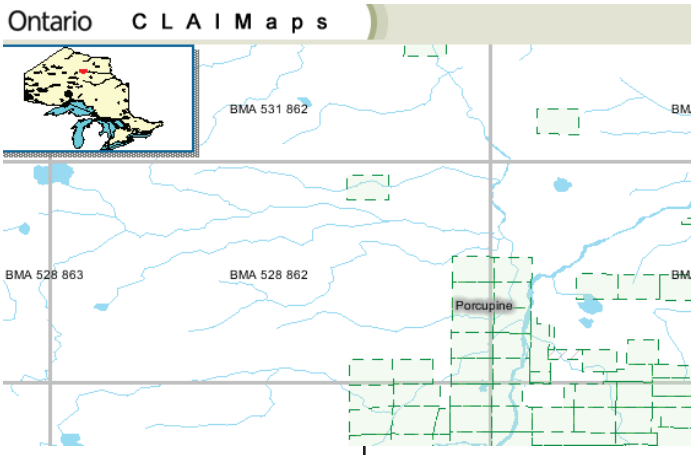
Frequently Asked Questions: Tools to Protect Lands and Waters

Often communities and citizens near mining operations who are concerned about their health and the environment don't know where to go to find reliable information and resources. Below are some examples of tools, resources and strategies that are used by some communities to protect their lands and waters.

Where is exploration happening?

Ontario's CLAIMaps

Too often, people don't know until after they have been stripped of vegetation, drilled and explored, that areas they use regularly have been designated for mining. If you have concerns about an area, contact the claim holder sooner rather than later to improve the chances that sensitive areas or those with important cultural values can be protected. The Ontario government has a catalogue of current mining claims that can be



seen online in a database called CLAIMaps (see Resources below).

Property owners, recreationists, First Nations, Metis and others are advised to check CLAIMaps regularly to see if areas important to them have already been staked and registered with the government. Where there is an owner of the surface rights, the claim holder must give only one day's notice before starting work on a claim. The new *Mining Act* will require companies to file exploration plans and request permits that could increase the transparency and accountability around exploration and requires Aboriginal consultation. The details, however, remain to be determined.

An environmental assessment (EA) is a process to predict and minimize the environmental effects of development projects before they are carried out. The sooner communities are involved in an EA, the better the chances of influencing the outcome.

Concerned individuals should request that they be given advanced notice of any work done on the land or any change to the status of the claim including the transfer to another individual or company. If you encounter difficulties with the claims holder or can't get the information you need, ask your Member of Provincial Parliament (MPP) for help. (To find your MPP, visit the Elections Ontario website.) Call, write, fax or send an email to your MPP describing the problem. You can also contact your regional Mining Recorder.

How can I get involved prior to mine development?

It is important to engage in a mining project at the earliest phase possible. A project will gain momentum the further along in the mining sequence it gets. Establishing concerns to be addressed or trying to stop a project is much easier at the earliest stages of a project.

The Environmental Assessment Process

Mine development projects often trigger environmental assessment requirements under both the *Canadian Environmental Assessment Act* (CEAA[37]) and the *Ontario Environmental Assessment Act*. The type of

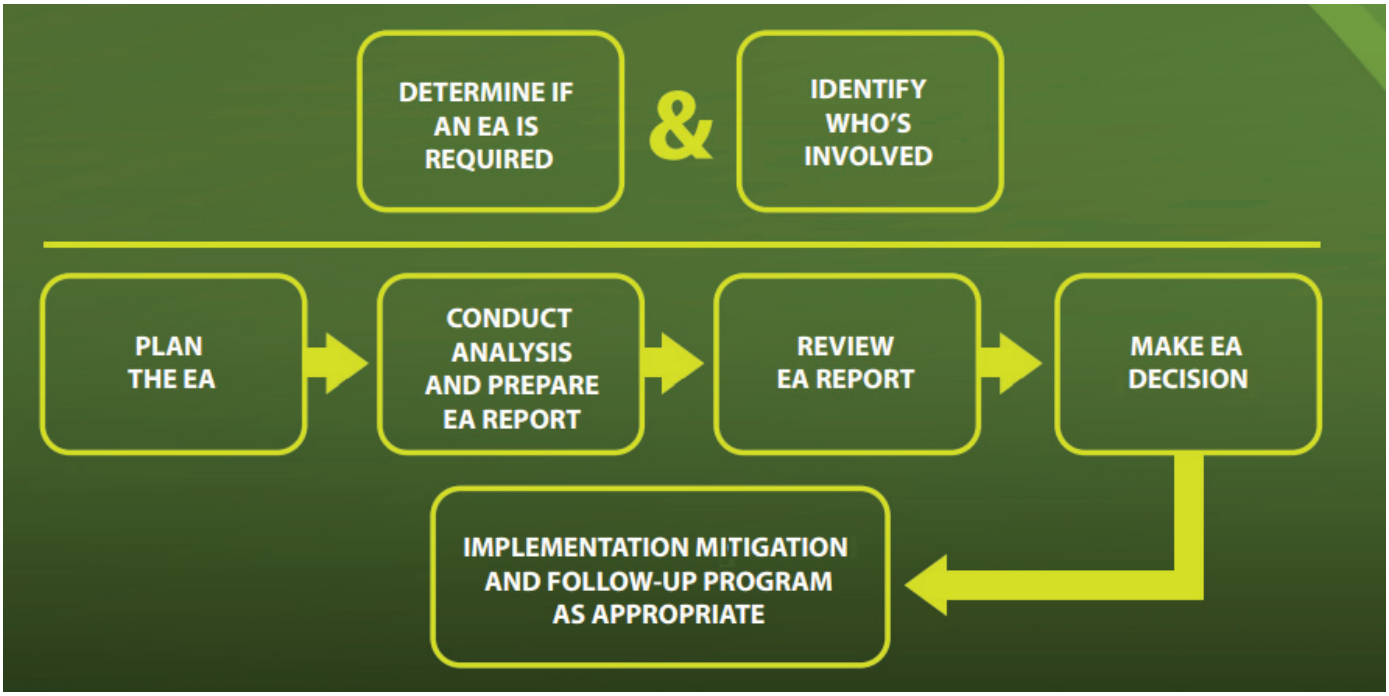
Resources

Find your Member of Provincial Parliament at Elections Ontario: fyed.elections.on.ca/fyed/en/form_page_en.jsp

Find mining claims in your area at the CLAIMaps website: www.mndm.gov.on.ca/mines/claimaps_e.asp

Find your regional Mining Recorder: www.infogo.gov.on.ca

Figure 4. Environmental assessment process (Source: Government of Canada)



Other important steps include developing a Draft Terms of Reference, consultation and finalization of the Terms of Reference.

environmental assessment usually depends on the kind of "regulatory trigger" (in other words, what kind of development activity is being proposed). However, the new *Canadian Environmental Assessment Act* will not have triggers; instead, it will have a project list.

The EA process can either be simple or very complicated, depending on the type of project. It can take the form of a simple screening of company documents or it can involve detailed research and extensive hearings. It can be carried out at the provincial level, the federal level or both. For example, Cliffs' proposed chromite mine in the Ring of Fire is in the early stages of an EA under both the federal and provincial *Environmental Assessment Acts*[38].

Ontario, however, doesn't automatically require the application of the *Environmental Assessment Act* to mining projects. Various elements of a mine may be subject to the *Act*, but a complete evaluation of a mining project is not required because the province maintains that it is a private project and that there is no provincial "decision" to allow a mine to go ahead – it assumes a mine will go ahead providing it meets the technical permit requirements. This is an unusually regressive stance and is unique in Canada.

Rigorous ongoing monitoring is crucial to minimizing environmental impacts.

Recently major mining projects have voluntarily submitted themselves to the *EA Act* as this gives them the advantage of reducing consultation requirements during more detailed technical permitting phases.

Serdar Uckun

Caribou are very sensitive to habitat disturbance.

Ideally, every EA is designed to be a participatory public process where First Nations and stakeholder concerns can influence the outcome. In some cases, groups can apply for government funding to participate in the federal EA process (see Resources listed below). However, it can be very challenging for individuals, groups or communities to access the resources or technical expertise needed to successfully represent themselves in a complex EA process.

Citizens should not rely on an EA to run its course and deliver the safeguards they seek if they are not actively involved in the process. Concerned individuals can participate by attending open houses and sharing their ideas, submitting comments to the EA agency, participating in public hearings should there be any, and encouraging others to do the same.

What can be negotiated directly with mining companies?

Independent Monitoring Agreements

A common concern regarding mining operations is the quality of environmental monitoring that occurs, public access to monitoring reports and the transparency of information related to spills, contamination, water chemistry, impact to wildlife and other environmental and safety hazards. As pointed out by Ontario's Environmental Commissioner, the province has fallen short in the past regarding the proper monitoring of closed mine sites[39].

Resources

First Nations Environmental Assessment Toolkit: Provides information and advice to help First Nations participate effectively in EA processes.

List of Environmental Assessment Projects: Ontario Ministry of the Environment's website links to a current list of projects going through an Environmental Assessment in Ontario.

Canadian Environmental Assessment Registry: Directory allows a search of environmental assessments by geographic location.

Participant Funding Program (includes the Aboriginal Funding Envelope): May provide financial support to individuals, non-profit organizations and Aboriginal groups interested in participating in federal environmental assessments.

Over the last 40 years there have been many changes to the way mining companies operate. Some companies have worked with local communities to develop and finance independent monitoring agencies to oversee various aspects of the mine operation. One example of a monitoring agreement includes the Ekati Diamond Mine's Independent Environmental Monitoring Agency. The 1997 Environmental Agreement was negotiated to deal with concerns not covered by legislation and regulations and was signed by three parties: BHP Billitons Diamond Inc., the Government of Canada and the Government of the Northwest Territories. Its purpose was to provide independent third-party monitoring of the mine.

Impact Benefit Agreements

An Impact and Benefit Agreement (IBA) is a contractually binding agreement made between a community and a company that provides Aboriginal consent or support for a project to proceed[40]. The agreements have been the principal means by which impacts on Aboriginal and treaty rights are dealt with. Though none have been signed in Canada there is also an example of an IBA-like agreement with a non-indigenous community in the United States – Stillwater's Good Neighbor Agreement. These agreements can also be known by other names: participation agreements, benefits agreements, etc. The name often just depends on what a mining company and a community choose to call their agreement. Although each agreement is unique, most cover issues like profit-sharing, capacity building, jobs, infrastructure development and considerations for environmental and cultural values that may be affected by mining.

Since 2005, there have been at least four agreements signed between De Beers and several Mushkegowuk communities along James Bay for the Victor Mine including[41]:

1. IBA with Attawapiskat First Nation;
2. Working Relationship Agreement with the Taykwa Tagamou Nation;

Travis S.

Jobs training and employment are important benefits for local communities.

Resources

Independent Environmental Monitoring Agency: Information on the BHP Billiton Ekati™ Diamond Mine Independent Monitoring Agency in the Northwest Territories.

Stillwater and Sweet Grass Counties' Good Neighbor Agreement with Stillwater Mining Company: Describes the partnership between citizens in Stillwater and Sweet Grass counties and the Stillwater Mining Company, which operates two platinum/palladium mines in the area.

3. IBA with Moose Cree First Nation; and

4. IBA with Kashechewan and Fort Albany First Nations.

It is difficult to assess exactly how well these agreements are working because many of the terms are confidential. However, a review of IBA case studies by the Canadian Business Ethics Research Network that relied on interviews with community members said the following about the Attiwapiskat agreement:

Total value of payments in 2010 to eight communities associated with two De Beers mines in Canada was around $5.2 million.

Total value of diamonds sold by De Beers in 2010 was approximately $446 million (2010 De Beers report).

"...the community had great success in securing employment opportunities during the construction phase of mine development, but since operations began in 2008 it has been a struggle to educate, train, and retain local workers for positions that require industrial certifications and advanced training."

The review also found that:

"The difficulty of hiring highly-skilled professionals to fill important roles in the community, has impacted the First Nation's ability to take full advantage of the IBA, and led to frustration within the community."

In February 2009, an 18-day community blockade was staged in protest of the terms of the IBA. The roadblock was established when local frustrations erupted as community members felt De Beers was not living up to the terms of the IBA.

The resolution of divergent rights – the right to explore or develop a mine versus the community's right to manage its traditional territory – remains an issue in several regions of Canada[42]. Some First Nation communities who have found mining companies unresponsive to their concerns have been forced to assert their rights in court.

Aboriginal people in Canada have unique constitutional rights, which require that they be consulted and that reasonable steps be taken to accommodate their concerns should a development project infringe on these rights. Legal action is preferably the last resort as it tends to be expensive, time- and resource-consuming and can be divisive within and between communities.

See IBA Resources on the next page.

Mine Closure Plans

Companies are required to post their draft closure plans for public comment. Information based on Part VII of the Ontario *Mining Act* and enabling regulations on how to review and comment on a mine closure plan is available as a PDF file (2005) at www.canaryinstitute.ca/publications/Ontario_Closure_Brochure.pdf

Resources

IBA Case Studies - Canadian Business Ethics Research Network: Reviews the results of specific agreements between Ontario First Nations and mining companies.

Impact Benefit Agreements Community Toolkit: An excellent resource describing how to negotiate an IBA agreement with a mining or resource extraction company.

Dealing Full Force: Lutsel K'e Dene First Nation's Experience Negotiating with Mining Companies: Describes one Aboriginal community's experience with mining negotiations.

The Aboriginal Mining Guide: A handbook for negotiating lasting benefits for Aboriginal communities.

Kitchenuhmaykoosib Inninuwug Case Study

In 1999, the community of Kitchenuhmaykoosib Inninuwug (KI) in northern Ontario discovered that Platinex Inc. had staked claims on their territory without notifying them. After several years of dialogue, the community asked the company to suspend development until land-use planning that considered all potential land uses had been completed and the community was properly consulted. Platinex continued to drill, maintaining that their claim gave them rights to continued exploration despite community land claims. On March 18, 2008, Ontario Superior Court Judge Patrick Smith sentenced Chief Donny Morris and five other council members from KI to six months in jail for obstructing exploration on their land. In 2009, Platinex received $5 million plus mediation for ceding their claim to KI Lands. In March 2012, Ontario withdrew 23,181 square kilometres from mineral exploration and development[43].

Resources

Mining companies, First Nations clashing over Ring of Fire: 2012 article about conflicts between First Nations and Ring of Fire proponents.

Kitchenuhmaykoosib Inninuwug website: Gives background on the KI mining conflict.

West Moberly First Nations v. British Columbia: A precedent-setting case confirming that the Government of British Columbia has an obligation to ensure that incremental intrusions, including mining, on the habitat of an at-risk-species (caribou) do not deprive a First Nation of its Treaty Rights.

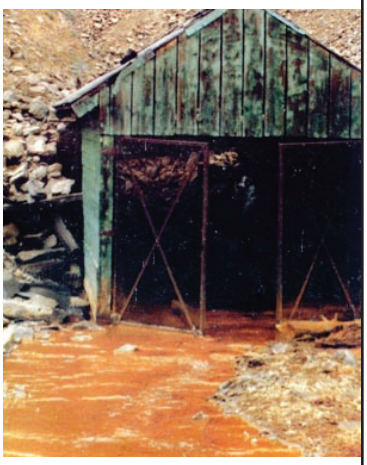
Wahgoshig First Nation v. Her Majesty the Queen in Right of Ontario et. al: The Ontario Supreme Court recently sent a message to proponents seeking to engage in mining activities on First Nations' Treaty lands: public consultation and accommodation with affected First Nations must occur before such activities begin.

How can I monitor mines already in operation?

The National Pollutant Release Inventory

For citizens concerned about mines already in operation, Environment Canada maintains a self-reporting inventory of pollutants released to the water, air and land for industries across Canada. The National Pollutant Release Inventory (NPRI)[44] provides information on over 400 pollutant materials including potential health effects from exposure and best available current information on safe exposure thresholds.

Data on the kind and amount of toxic substance released from smelters and ore-concentrating facilities can be found in the NPRI. A recent legal challenge also forced the federal government to collect and report data on the toxic pollutants in waste rock and tailings areas. Among the pollutants released from the mine through on-site disposal are ammonia, arsenic, cadmium, copper, lead, mercury and others.



savethewildup

The end of mining does not mean an end to environmental impacts.

The Metal Mining Effluent Regulations

The Metal Mining Effluent Regulations (MMER) were registered on June 6, 2002 under subsections 34(2), 36(5) and 38(9) of the *Fisheries Act*. The MMER apply to all Canadian metal mines (except placer mines) with an effluent flow rate in excess of 50 cubic metres per day that were in commercial operation, under development or reopened after the day the Regulations were registered.

The MMER require metal mines to report on the presence of a number of substances in mine effluent. These reporting requirements apply to arsenic, copper, cyanide, lead, nickel, zinc, total suspended solids and radium 226, as well as pH and acute lethality. Comprehensive reporting is also required to address the environmental effects monitoring provisions of the Regulations. It is important to note that the MMER require reports of releases of only a limited number of NPRI substances to water.

Richard C. Bennett

Forest food sources need to be carefully monitored for contamination.

Reports on compliance with the MMER are available from Environment Canada. Data on environmental effects monitoring is not being made publicly available at this point. MiningWatch is challenging Environment Canada on this.

Most mines have sewage discharge permits. Compliance reports are found at www.ene.gov.on.ca/environment/en/industry/compliance_and_enforcement/environmental_compliance_reports/index.htm

Ontario: Airborne Contaminant Discharge Monitoring and Reporting Regulation (for Smelter Discharge)

The Airborne Contaminant Discharge Monitoring and Reporting Regulation (O. Reg 127/01)[45] came into force in May 2001. Facilities in Ontario that meet the reporting requirements for air releases will be required to report emissions of any of 358 contaminants, from a wide range of industrial sectors, including metal, non-metal and coal-mining facilities. The Regulation (O. Reg 127/01) requires reporting of air emissions from all types of mining activities, including releases from tailing areas and road dust. As of 2005, all reports are available to the public through the NPRI.

Information on emissions from smelters is available through the National Pollutant Release Inventory.

Resources

National Pollutant Release Inventory: Data on the kind and amount of toxic substances released from smelters and ore-concentrating facilities.

Metal Mining Effluent Regulation – Factsheet: Department of Fisheries and Oceans factsheet describing the use of natural lakes for storing mine tailings in Canada.

A Citizen's Guide to Airborne Contaminant Reporting in Ontario: The guide describes who is required to report airborne contaminants, what substances are reported, when the information must be reported, what is done with the reports and how the public can gain access to the reports.

Resources

The Aboriginal Mining Guide

A handbook for negotiating lasting benefits for Aboriginal communities.

The First Nations Environmental Assessment Toolkit

A toolkit that provides in-depth information about the environmental assessment process.

Guidebook for Evaluating Mining project EIAs

Helps grassroots advocates and communities understand mining environmental impact assessments (EIAs) and explore ways that proposed mining projects could be made socially and environmentally acceptable.

The Good Neighbor Campaign Handboook

A handbook on building constructive relationships with polluting companies.

The IBA Community Toolkit

A resource for First Nation, Inuit and Metis communities in Canada considering impact and benefit agreements with mining companies.

Rehabilitating Abandoned Mines in Canada: A Toolkit of Funding Options

Provides a basic understanding of financial options open to government officials who have the responsibility of managing abandoned mining hazards that have become the responsibility of the Crown.

National Pollutant Release Inventory

Provides information on over 400 pollutant materials including potential health effects from exposure and best available current information on safe exposure thresholds.

Mine the Gap: Connecting Water Risk and Disclosure in the Mining Sector

Includes a list of questions to ask about mining projects to understand how they will impact waters.

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214 King Street West, Suite 612
Toronto, ON M5H 3S6

Tel: 416-448-8419
Toll free: 1-800-440-2366
Fax: 416-444-9866
E-mail: info@ontarionature.org

Boreal Conservation Office
Centre of Change
96 North High Street, Room #703
Thunder Bay, ON P7A 5R3
Tel: 807-286-1789

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