

# THE NEW GOLD RUSH

## PLACER MINING IN THE FRASER WATERSHED



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# SUMMARY

Hundreds of placer mines operate across British Columbia's Fraser Watershed, and the numbers are on the rise. Despite this mounting pressure, placer mining has largely escaped government oversight, putting the watershed, its people, and its salmon at risk.

The Fraser Watershed is home to 2.7 million people and hosts 80 percent of B.C.'s economic activity.<sup>1</sup> It is one of the most productive salmon rivers in the world. Yet placer miners are free to carve out worksites throughout this vital watershed: B.C. allows prospectors to stake claims on private property, First Nations' traditional territory, and salmon spawning grounds.

Placer mining poses a unique threat to clean water and salmon because mines operate along rivers and streams. A 2010 audit of placer mines in the Cariboo region by the Ministry of Environment found 50% of placer mines inspected were not following the law, either by working directly in streams, or discharging tailings into streams. In these cases, operations can deposit or disturb large amounts of sediment potentially laced with mercury, arsenic, lead and other toxins.

Increased sediment levels can harm salmon and suffocate eggs laid in stream beds. One study found that placer-mined streams have 40 times fewer fish than un-mined streams.

Most industries that impact salmon resources are closely regulated, but placer mining is an exception. B.C.'s scrutiny of placer mining is almost non-existent. A review of government data uncovered no record of a placer mine ever having undergone an environmental assessment. And on average, only one in four placer mines with an active permit are inspected each year and fines or illegal activities appear to be too low to deter bad practices.

Meanwhile, no fewer than 300 placer mines have held a permit to operate in the Fraser Watershed since 2014. Smaller-scale hand mining activity is also common. In 2015, there were almost 3,000 claims reporting work in B.C., a significant portion of which were in the Fraser Watershed.

This surge in placer activity comes on top of more than a century of placer mining in the Fraser, with many mine sites still unreclaimed. Between 1858 and 1909, placer mining added an estimated 110 million tonnes of tailings to the Fraser River's natural sediment load. This is more than seven times the amount of solids released by the 2014 Mount Polley mine disaster into the Quesnel watershed.<sup>2</sup>

# KEY FINDINGS



No record was found of a placer mine in the Fraser Watershed - or anywhere in B.C. - having undergone an environmental assessment.



The Cohen Commission noted that placer mining has the potential for severe impacts on sockeye salmon.



Between 1980 and 2016, 1,399 placer mine sites have been established along the Fraser Watershed, and 4,019 Notice of Work permits have been issued.



Since 2014, no fewer than 300 placer mines have held a permit to operate in the Fraser Watershed.



Historic placer mining between 1858 and 1909 released an estimated 110 million tonnes of sediment into the Fraser—equivalent of more than seven times the amount of solid tailings released by the Mount Polley mine disaster.<sup>3</sup>



The cumulative impacts of the hundreds of operational and thousands of abandoned mines in the Fraser Watershed have not been assessed.

# RECOMMENDATIONS

**1. Engage First Nations** as full partners in designing new placer mining legislation and regulations.

**2. Ensure that all placer mining is contingent** upon respecting the principles of Free, Prior and Informed Consent (FPIC), is consistent with the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and reflects the recommendations of the Truth and Reconciliation Commission Report's calls to action.

**3. Safeguard the Fraser River's salmon by:**

- Updating the environmental assessment** laws and regulations to ensure that high-impact placer mines are reviewed, to account for both cumulative impacts from many placer mines and their impacts on sensitive habitat.

- Providing long-term assessment** of placer mining's cumulative effects through: analysis of placer mining's effects on salmon populations and spawning; analysis of sediment for mercury contamination from historic placer mining; monitoring mercury levels in watersheds with high historic and/or current placer activity, and; ongoing monitoring of all contaminant levels in watersheds that have historic and/or current placer mining.

- Increasing the time allotted** for First Nations' response to Notice of Work applications to 90 days, and extending it to 120 days for more complex projects.

# INTRODUCTION

B.C.'s iconic Fraser River is one of the world's most productive salmon rivers. Yet the Fraser's sockeye salmon runs have declined precipitously; the 2016 sockeye return was the lowest on record.<sup>4</sup> Salmon plays a pivotal role in both coastal and interior First Nations culture. It is also important to the majority of British Columbians: a 2011 survey found 70 percent of British Columbians agree with the statement "Wild salmon are as culturally important to the people of British Columbia as the French language is to the people of Quebec."<sup>5</sup> Loss of this important resource would have devastating cultural impacts for all of B.C.

As part of an ongoing study commissioned by First Nation Women Advocating Responsible Mining (FNWARM), this report presents the historical and current prevalence of placer mining in the Fraser Watershed, its potential impacts, and B.C.'s environmental assessment process for placer activity.

## PLACER MINING AND COLONIZATION

Placer mining played a pivotal role in the colonization of British Columbia. Gold was discovered in the Fraser in 1857, just as the gold rush in California's Sierra Nevada region was ending. Some 30,000 miners from California arrived in B.C. in the spring of 1858, and successive gold rushes over the next decades followed,<sup>6</sup> each one encouraging settlement and colonial expansion into the B.C. interior.

Quesnel, Williams Lake, and 100 Mile House were all founded during the gold rush, and the Crown Colony of British Columbia was established to govern and tax placer mining. The gold rush set the stage for modern day land-use laws, which hold mining as the highest and best use of land, pushing aside Indigenous peoples and creating wide-spread environmental and cultural impacts.<sup>7</sup>

Significant clashes between gold miners and First Nations occurred during the Fraser Canyon War, while the Chilcotin War in 1864 was fomented by the building of a route from Bute inlet to Barkerville, the heart of the gold rush. Five Tsilhqot'in Chiefs, told they were attending peace talks to end the Chilcotin War, were hanged in 1864 under crown authority. In 2014, B.C. Premier Christy Clark apologised for the hangings, and exonerated the chiefs.<sup>8</sup>

## ALTERED LANDSCAPES IN THE FRASER WATERSHED

Today, B.C. is experiencing another surge in placer mining activity, and as in the past, it has spurred conflict over rights and title to the land. The B.C. government allows prospectors to stake claims on First Nations' traditional territory, salmon watersheds and private property, leaving local communities to cope with mercury contamination and other risks.

Currently, there are between 300 and 350 placer mines in the Fraser Watershed that hold a Notice of Work permit to operate. A Notice of Work permit generally indicates an intention to use machinery to excavate. (See Figures 1 and 2).



IMAGE D-04061 COURTESY OF THE ROYAL BC MUSEUM AND ARCHIVES

### HISTORIC GOLD RUSHES CREATED TREMENDOUS CHANGE IN THE FRASER WATERSHED, INCLUDING:

*Increased sediment loads that impacted (and are still impacting) fish health, salmon spawning and rearing habitat.<sup>9</sup>*

*Mercury from historic mining that may still be affecting ecosystems, especially when disturbed by modern placer activities - records indicate as much as 11 kilograms of mercury were used per sluice box per day during the mid-1800s.<sup>10</sup>*

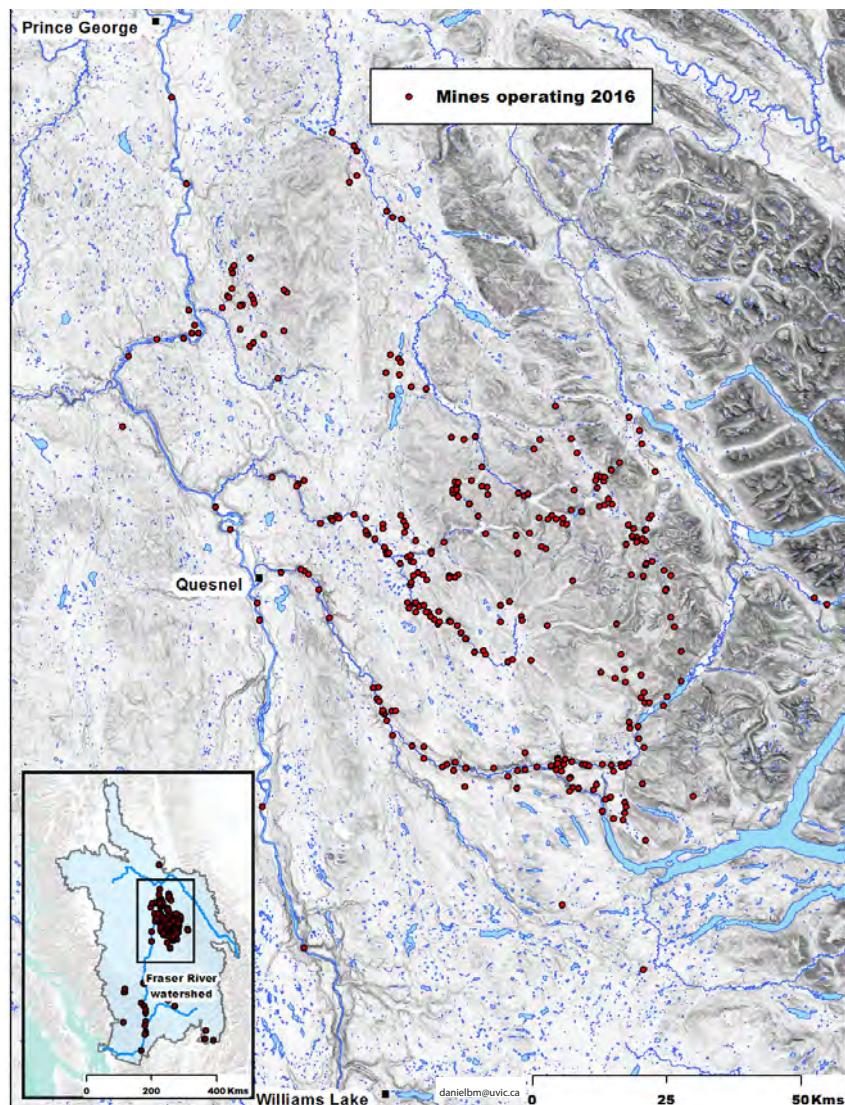
*Extensive changes to river channels, and increased instability of river banks, resulting in long-term increases in sediment entering rivers.<sup>11</sup>*

*Thus, current placer mining and other industrial development in the Fraser River add cumulative impacts to a watershed that has already been altered by gold-rush era placer mining.*

Placer mining played a pivotal role in the colonization of British Columbia. Gold was discovered in the Fraser in 1857, just as the gold rush in California's Sierra Nevada region was ending.

Smaller-scale hand mining activity is also common: in 2015 there were almost 3,000 claims reporting work in B.C., a significant portion of which were in the Fraser Watershed.<sup>12</sup> Conversations with placer miners suggest there is also small-scale placer mining activity undertaken without a claim or permit, so it is difficult to quantify this activity. This report focuses on placer mines with Notice of Work permits, because we have access to government information on the locations and operating periods of these mines. Information on locations and operating periods of small-scale hand mining operation is not publicly available. However, if small-scale placer miners are discharging into waterbodies in contravention of B.C.'s laws, the environmental effects would be similar to those described for larger placer mines.

Since 1980, there have been 1,399 placer mine sites established in the Fraser Watershed, with 4,019 Notice of Work permits issued.<sup>13</sup> A Notice of Work



**Figure 1. Placer Mines with a permit to operate in 2016 in the Fraser Watershed.**  
318 mines had a permit to operate in the Fraser Watershed in 2016. Of these, 298 mines were in the cluster near Quesnel, shown in the large-scale chart. 20 placer mines operated in the remainder of the Fraser Watershed. Data from: FOI Request EGM-2016-63772.



IMAGE D-04118 COURTESY OF THE ROYAL BC MUSEUM AND ARCHIVES

*Between 1858 and 1909, placer mining added an estimated 110 million tonnes of tailings, or 58 million cubic metres to the Fraser River's natural sediment load, and an even greater quantity is sequestered in the upper reaches of the Quesnel River.<sup>24</sup> While a devastating event, the Mount Polley mine disaster discharged 7.9 million cubic metres of tailings solids and construction materials, and another 17.1 million cubic metres of interstitial and supernatant water. Thus, historic placer mining has added over 7 times more solids to the Fraser than Mount Polley.<sup>25</sup>*

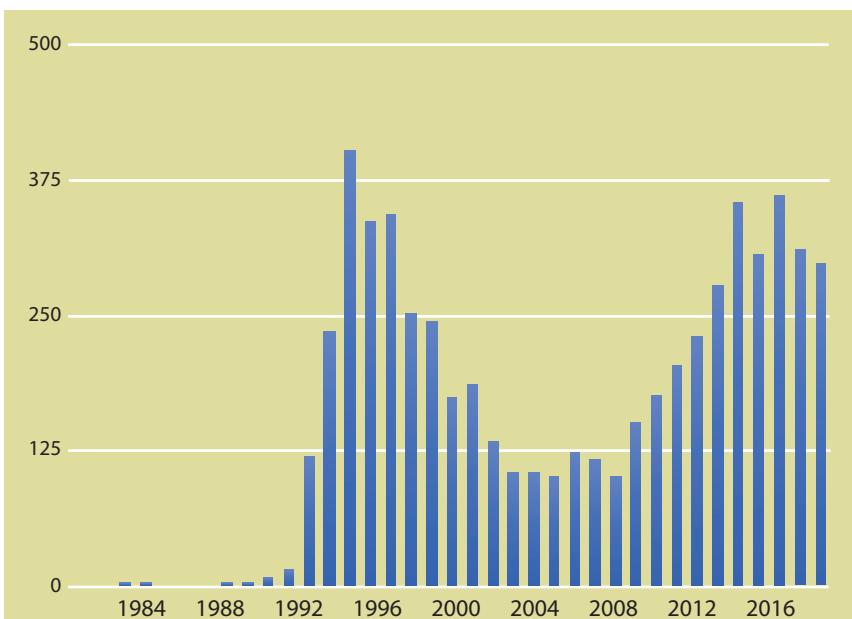
No record was found of a placer mine in the Fraser Watershed—or anywhere in B.C.—having undergone an environmental assessment, despite high potential impacts, high numbers of operations, and the large size of some mines.

permit lasts a maximum of five years.<sup>14</sup> Often, a mine site will be worked for more than five years and have multiple permits issued for the same site. Once work at the mine site is complete, the permit should be closed, but we found many cases of permits still marked open, two or more years after their work-end date.<sup>15</sup> These are shown as squares in Figure 4.

Unreclaimed mine sites can be a continuous source of sediment and other pollutants into waterbodies.<sup>16</sup> Further, direct discharge of sediment-laden water into streams can raise sediment levels with potentially devastating consequences on the viability of fish populations near placer mines.<sup>17</sup>

Sediment from placer mines has been flowing into the Fraser Watershed for more than a century. A 2012 study found that placer mining added an estimated 110 million tonnes of tailings to the Fraser River's natural sediment load between 1858 and 1909, and noted that an even larger amount of tailings was added to the Quesnel River upstream of Quesnel.<sup>18</sup> Figure 3, reprinted from a related study, shows the location and size of the mines along the Fraser. In comparison, the Mount Polley mine disaster in 2014 spilled 24 million cubic metres of tailings and water into Polley and Quesnel Lakes,<sup>19</sup> a devastating event, but only a fraction of the total amount historic placer miners added to the Fraser system. This gold-rush-era placer mining resulted in landscape-scale changes, still visible today on the banks and in the channels of the Fraser.

The negative effects of the placer industry are felt most keenly by First Nations whose territory includes active placer areas. Riparian areas host rare species, have high biological diversity, and are critical areas of First



**Figure 2. Number of placer mines within the operating period stated in their Notice of Work permit in the Fraser Watershed, 1980 to 2016.** Calculated using data from: FOI Request EGM-2016-63772.

**KEY FINDINGS OF FMC'S "B.C. PLACER MINING: HIGH ENVIRONMENTAL IMPACTS VS. LOW ECONOMIC RETURNS," PUBLISHED MARCH 28, 2017:**



High ecological risk from this industry and poor government oversight endangers the health of our fish stocks and watersheds, all for a small economic return.



The majority of placer mine sites are never inspected and riparian setbacks and fish habitat protection laws are unenforced by Ministries, and ignored by some placer miners.



Historic placer mining has likely left a legacy of mercury contamination, which may risk human health when disturbed by current mining activity.



The placer industry is a boom-bust cycle. Activity is increasing; with 538 sites holding an active Notice of Work permit (required to operate a placer mine) in 2018, up from a low of 187 in 2005.



Placer hand mining is also increasing, with 2,917 claims reporting work in 2015, up from 1,188 in 2005.

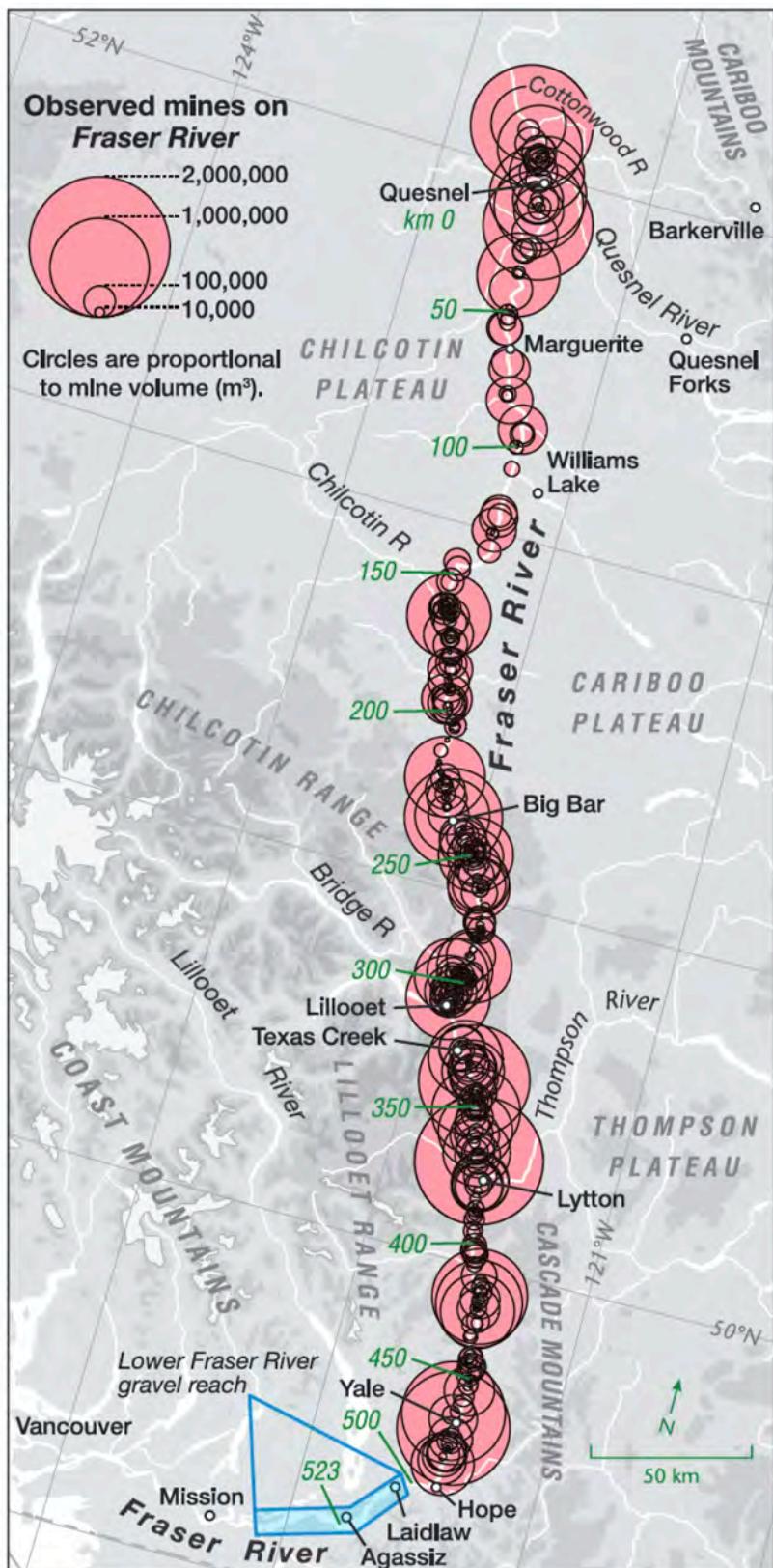


Figure 3: Historical Placer Gold mines in Fraser River, from Quesnel to Hope, operating between 1858 and 1909. These mines ranged in size from 10,000 to 2 million cubic metres, and added an estimated 110 million tonnes of sediment into the Fraser River. Reprinted with permission from Ferguson et al., (2015).



Placer mines interfere with First Nations' access to traditional territory,<sup>20</sup> because the mine manager controls entry to the site;<sup>21</sup> and is required to post notices to this effect at all mine entrances.<sup>22</sup>

Increased sediment levels have been proven to harm salmon and suffocate eggs laid in stream beds. One study found that placer-mined streams have 40 times fewer fish than unmined streams.

Nations' traditional territory. Most placer mining is located in riparian areas. High levels of placer activity in these areas can degrade ecosystems and fisheries on which First Nations and other communities depend. Placer mines interfere with First Nations' access to traditional territory,<sup>20</sup> because the mine manager controls entry to the site;<sup>21</sup> and is required to post notices to this effect at all mine entrances.<sup>22</sup>

Further, as B.C. mining law lacks statutorily-mandated consultation, the permitting process (Notice of Work application) becomes the de facto consultation. In practice, the B.C. government claims to meet its obligation to consult First Nations by providing a 30-day response time on placer mine Notice of Work applications. First Nations report that this time frame is unreasonable in light of the administrative capacity of many First Nations, when added to the burden of referrals from the forestry, energy and mining resource sectors.

The First Nation Health Authority conducted a Health Impact Assessment in 2016,<sup>23</sup> to assess the impacts of the Mount Polley mine tailings dam breach on First Nations in the Fraser Watershed. A primary finding of the project was the concern stated by First Nation representatives for the health of the Fraser River System and viability of salmon. They found: "First Nations health appears to be intrinsically linked to an urgent need to protect the health of the Fraser River system in an integrated manner. This study calls for attention to the health of the Fraser River and to the importance of salmon for First Nations."

## THREATS TO FRASER RIVER SALMON

Over the past twenty years, Fraser River sockeye salmon numbers have declined dramatically, with the sockeye crash of 2009 only eclipsed by 2016, which had the lowest returns ever recorded. The Cohen Commission, appointed to investigate the 2009 sockeye returns, found numerous stressors effecting sockeye salmon and concluded that Fraser River sockeye faced an uncertain future. Placer mining was identified as one of these stressors.<sup>30</sup>

Placer mining threatens fish health because mines are sited almost exclusively near rivers and streams, and through processing, road building and poor reclamation, mines can increase sediment loads in rivers.

Many studies have linked sediment to decreased fish health, including one study which found that placer-mined streams had 40 times fewer fish than streams without mining.<sup>26</sup> High sediment levels harm fish, especially over a long exposure time,<sup>27</sup> by eroding skin and gills, decreasing vision and food consumption, and suffocating eggs laid in stream beds.

Placer mining also has the potential to stir up mercury left over from historic placer operations, and measurements downstream of placer mines discharging directly into streams have found levels of Aluminum,



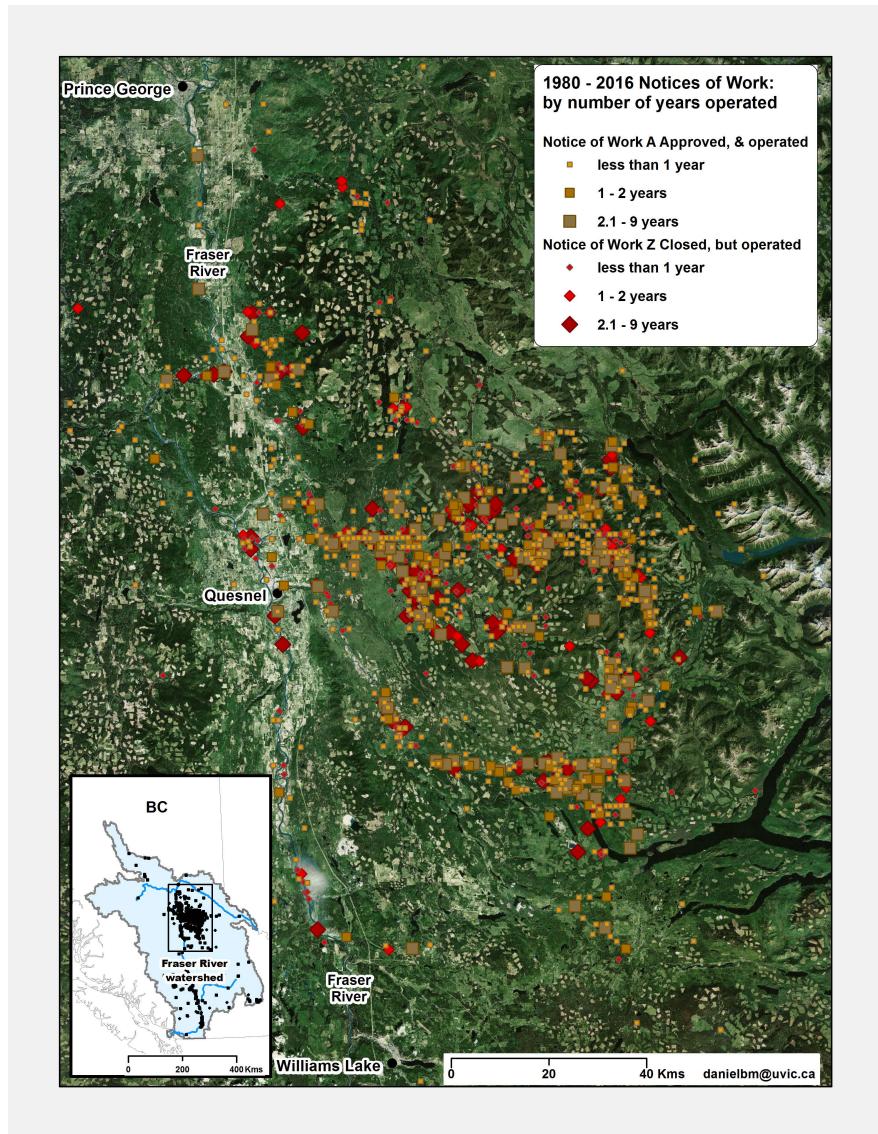
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*Sockeye salmon in freshwater. Salmon are culturally important, and a mainstay in the diet of both coastal and interior First Nations, but in recent years many salmon reaching the interior of BC are diseased and soft.*

**Over the past twenty years, Fraser River sockeye salmon numbers have declined dramatically, with the sockeye crash of 2009 only eclipsed by 2016, which had the lowest returns ever recorded.**

Arsenic, Barium, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Vanadium and Nickel that exceed drinking water guidelines.<sup>29</sup>

In a technical report written for the Cohen Commission, the authors stated: "Placer mining has a potentially severe impact on sockeye salmon because many alluvial deposits are closely associated with existing streams, and because water is often used to separate placer minerals from the gravel matrix."<sup>30</sup> However, the authors noted that the effects of placer mining are likely small, because mining is not prevalent in most of the portion of the watershed used for sockeye salmon spawning, and "the introduction of sediment into fish habitat is prohibited under the Fisheries Act."<sup>31</sup>



**Figure 4. Placer mines in the Fraser Watershed with operating periods between 1980 and 2016.** Squares represent permits that were not officially closed, despite being two years past the work end date stated in their NoW application. Diamonds represent permits that were closed and the reclamation bond returned to the miner. Data from FOI Request EGM-2016-63772.

#### PLACER MINING CAN HAVE MULTIPLE IMPACTS ON SENSITIVE RIPARIAN AND AQUATIC HABITAT:

- Increased sediment loads from processing, road building, and poor reclamation, which have severe consequences for fish health;<sup>41</sup>
- Increased levels of Aluminum, Arsenic, Barium, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Vanadium, and Nickel, all of which have been found at levels exceeding drinking water guidelines downstream of placer mines discharging directly into streams;<sup>42</sup>
- Possible mercury contamination, as modern mines may disturb mercury deposited by historic placer mining activity; and,
- Broad cumulative impacts due to the high number of mines.

The negative effects of the placer industry are felt most keenly by First Nations whose territory includes active placer areas.

The conclusions from the Cohen Commission technical report are questionable. First, a Ministry of Environment audit of the placer industry found 50 percent of placer mines inspected were either working directly in streams, or discharging tailings into streams,<sup>32</sup> and, as noted by the authors of the technical report, "studies on a variety of salmonids species strongly support the idea that increases in sediment loads have negative impacts on egg survival. There are no good data on egg survival among CUs [Conservation Units] for Fraser River sockeye salmon."<sup>33</sup> As sediment has negative impacts on egg survival, and placer mining can increase sediment loads in nearby streams, there may be a link between low salmon egg survival and placer mining.

Second, much of the historical placer mining in the Fraser Watershed pre-dates any records of salmon population levels. We don't know the size of the salmon runs historically, or where they spawned. The highest levels of placer mining activity were in 1860-70s (Figure 5). We could not locate records of salmon stock return rates during, or prior to this time. Although Figure 5 does not hint at any causal relationship between placer mining and decreased salmon stocks, dramatic changes took place in the Fraser Watershed during the gold rush era. As mining practices during the gold rush had little regard for environmental impacts, and placer mining has such a potential for negative effects on fish health, it is likely that the Fraser's salmon populations were impacted by the gold rush. When B.C. began recording Fraser sockeye salmon abundance in 1893, the damage was already done.

Third, the Cohen Commission focused on sockeye salmon, yet chinook, coho, chum and pink salmon all spawn within the Fraser Watershed, and these, as well as freshwater fish species, are all subject to the threats posed by placer mining.

If placer mining has only a small effect - a few percent lower egg survival in certain areas of the watershed, for example, or small reductions in fish health through exposure to suspended sediment, there is a possibility that this could have a significant impact over multiple generations, especially when added to the other stressors affecting salmon stocks. However, there is currently a stark deficit in scientific studies assessing the effect of placer mining on salmon stocks in B.C. Even the Cohen Commission reports, which spanned 3 volumes, thousands of pages and thousands of exhibits, lacked specific studies investigating lingering effects of historic placer mining on current salmon stocks or current placer mining practices on nearby salmon stocks.

**By neglecting environmental assessments of placer mines, B.C. decreases opportunity for First Nations' and the public's input, and endangers the Fraser Watershed by allowing placer activities to grow without substantive consideration of long-term impacts.**



*Historical placer mining operation exemplifies the "mining at all costs" approach that contributes to contaminated watersheds, decimated salmon populations, and poor environmental protections.*

## B.C.'S PLACER MINES – NO ENVIRONMENTAL ASSESSMENT, EVER?

The Environmental Assessment process examines the environmental, social and economic impacts of resource development projects, and allows for input from First Nations and affected communities. This process helps minimize damage from projects and mitigate the impacts of approved projects.

Despite numerous placer mines and their significant potential to cause environmental damage, we were unable to find a single record of a placer mine undergoing a federal or provincial Environmental Assessment,<sup>34</sup> and in emails, staff from B.C.'s Environmental Assessment Office did not recall ever having assessed a placer mining project.

B.C.'s lack of Environmental Assessments can be traced to the Environmental Assessment Act's Reviewable Project Regulation, which treats placer mines very differently from hard rock mines. A placer mine is subject to an Environmental Assessment only if it has an annual production capacity of more than 500,000 tonnes of pay dirt,<sup>35</sup> while a hard rock mineral mine is subject to an Environmental Assessment if it processes more than 75,000 tonnes of ore per year.<sup>36</sup> Thus, placer mines in B.C. can process six times the amount of material as a mineral mine and only be subject to the oversight provided by the Notice of Work Permit.

In contrast, the Yukon has completed Environmental Assessments of 592 placer projects over the past decade.<sup>37</sup> The Yukon Environmental and Socio-Economic Assessment Board conducts more environmental assessments on placer mines than on any other kind of development.<sup>38</sup>



**Settling pond near an active placer mine.**  
Settling ponds retain water used on site so suspended sediment—often containing heavy metals, such as copper, mercury, zinc—can drift to the pond bottom. Some mines add chemicals that help speed up the rate of settling.

	British Columbia	Yukon
Triggers for Environmental Assessment Review	Annual Production greater than 500,000 tonnes	20 distinct triggers, including production of more than 1,200 m <sup>3</sup> per group of bordering claims – equivalent to 2,230 tonnes.
Number of Environmental Assessments of Placer Mines 2015/2016	0	84
Number of Environmental Assessments in Past Decade	0	592

The Yukon's regulatory review process recognizes that assessments of mine impacts should be based on more than a simple tonnage estimate. Instead, the Yukon has established 20 distinct triggers for Environmental Assessments,<sup>39</sup> resulting in significant government oversight of the industry.

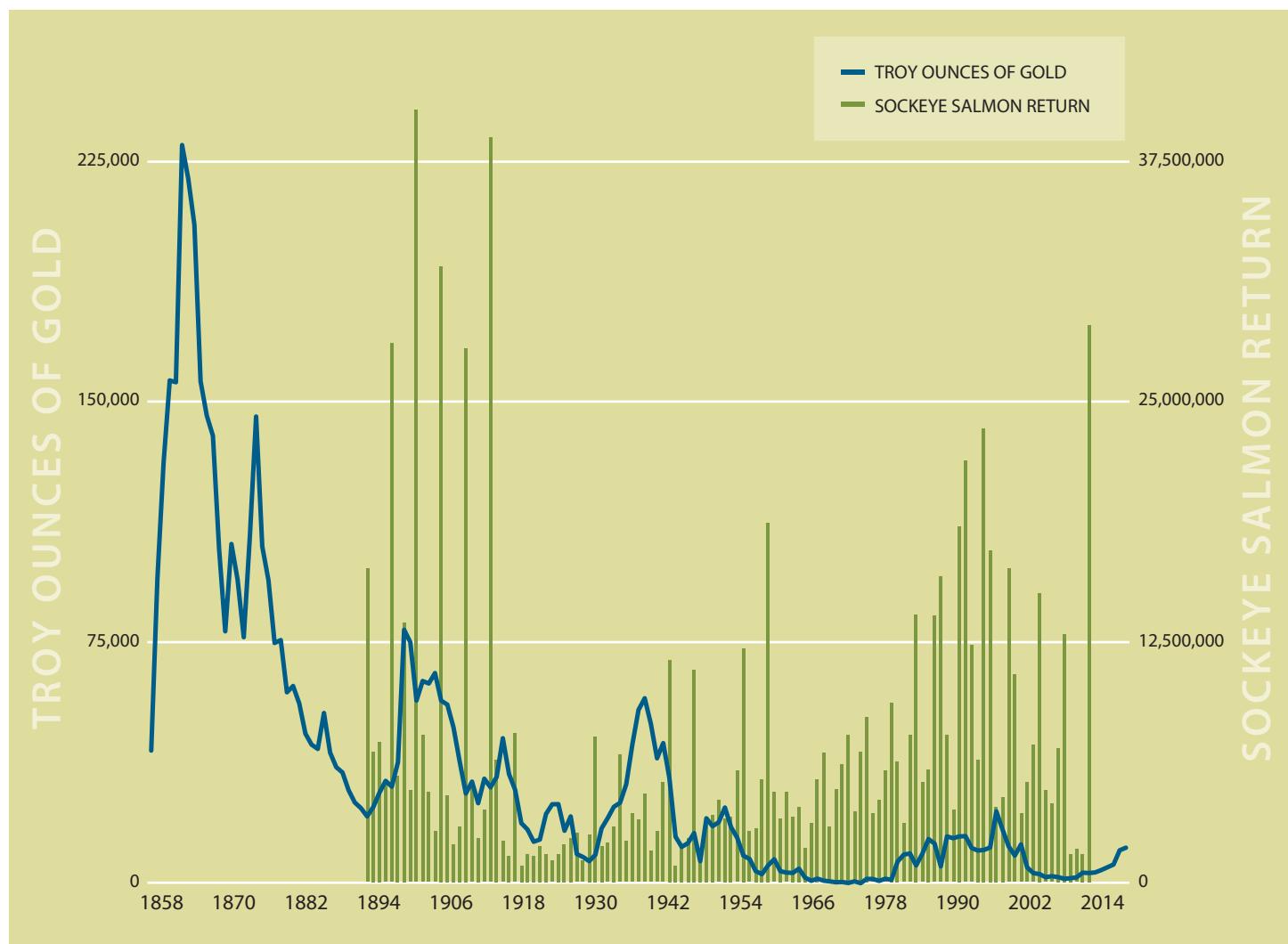
By neglecting environmental assessments of placer mines, B.C. decreases opportunity for First Nations' and the public's input, and endangers the Fraser Watershed by allowing placer activities to grow without substantive consideration of long-term impacts.

Cumulative impacts are not normally considered in B.C.'s Environmental Assessment process, but placer mining is an excellent example of why cumulative impact analysis is important. The large number of mines and their high potential for severe impacts on Fraser salmon stocks,<sup>40</sup> warrant close scrutiny and monitoring.

**The Yukon has completed Environmental Assessments of 592 placer projects over the past decade.<sup>35</sup>**

Placer mining has escaped both environmental assessments and other forms of government oversight. As discussed in our previous report "B.C. Placer Mining: High Environmental Impacts vs. Low Economic Returns," over the last decade, an average of only one in four operating placer mines has been inspected each year. Thus, the placer mining industry has a high potential for environmental impacts, high numbers of mines, high levels of hand mining activity, low government oversight, no environmental assessments, and limited scientific studies.

**Given the vital importance of the Fraser River to the B.C. economy in general and salmon in particular, it seems reckless and short-sighted to ignore the potential impact of placer mining in this region. ■**



**Figure 5. Production of placer gold in B.C. from the gold rush era to present**  
represents the line and is plotted on the left axis; Annual Fraser River Sockeye Return  
represent the columns and is plotted on right axis. Note that most placer gold  
production occurred prior to records on Fraser Salmon Abundance.<sup>43</sup>

## CITATIONS

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2. Mount Polley mine disaster discharged 7,900,000 cubic metres of tailings solids and construction materials, and another 17,100,000 cubic metres of interstitial and supernatant water. (Imperial Metals, "Summary: August 4, 2014 Tailings Storage Facility Breach at the Mount Polley Mine" Retrieved March 23, 2017; online <<https://www.imperialmetals.com/our-operations/mount-polley-mine/mount-polley-updates/remediation-and-monitoring>>). Ferguson et al (2015) notes 58,000,000 cubic meters of tailings were added to the Fraser's natural sediment load.  $58,000,000 / 7,900,000 = 7.3$ , thus historic placer mining added over 7 times more solids to the Fraser than Mount Polley.
3. *ibid*
4. M Meuse "Warm water blamed for lowest sockeye salmon run on record" CBC News, Aug 20, 2016, online: <<http://www.cbc.ca/news/canada/british-columbia/low-sockeye-run-1.3729618>>.
5. Watershed Watch Website, retrieved April 3, 2017; online: <<https://www.watershed-watch.org/wordpress/wp-content/uploads/2011/04/WWSS-SWCT-salmon-poll-summary.pdf>>.
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9. For an overview of the numerous studies linking sediment loads to fish mortality and degraded fish habitat see: Department of Fisheries and Oceans Canada, DFO Pacific Region, Habitat Status Report 2000/01 EC, "Effects of sediment on fish and their habitat: Placer Mining Yukon Territory", at 7; online: <<http://www.dfo-mpo.gc.ca/Library/255660.pdf>>.
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11. M Miles and Associates, "Restoration of Placer Mined Streams: Identification of Strategies to Expedite Recovery", (Victoria: M. Miles and Associates, 2003) at I; online: <<http://yukonriverpanel.com/salmon/wp-content/uploads/2011/02/cre-86-02-restoration-of-placer-mined-streams-identification-of-strategies-to-expedite-recovery.pdf>>. This study, commissioned by the Yukon River Panel, concluded that historic placer mining resulted in "extensive changes to stream channel morphology and instability" and increased the amount of sediment entering water-sheds.
12. British Columbia, Ministry of Energy and Mines, Mineral Titles, "Physical Work on Mineral and Placer Claims, 2014" January 26, 2015. Several factors influence "Placer Claims Reporting Work" statistics. First, this number likely includes full scale placer mines operating under a Notice of Work permit, as these mines would still be required to report work to maintain their claim. Second, by using the Portable Assessment Credit (Mineral Tenure Act, RSBC 1996, C 292, s 31) miners may claim the cost of work in one year and carry it forward as payment in lieu of work in subsequent years without visiting the mine site. Third, miners also commonly spread the costs of work across all adjacent cells and claims, but only perform physical work on one or two claims. Finally, some placer hand miners may work without reporting it, or work without a claim.
13. Number of active Notice of Work permits calculated from data in FOI Request - EGM-2016-63772.
14. The definition of a "mine" in the Mines Act includes: "a place where mechanical disturbance of the ground or any excavation is made to explore for or to produce coal, mineral bearing substances, placer minerals, rock, limestone, earth, clay, sand or gravel." (Mines Act, RSBC 1996, c 293, s 1). Section 10.1.1 of the Health, Safety and Reclamation Code requires that placer mines have an approved Notice of Work prior to commencement of mining. (British Columbia, Ministry of Energy, Mines and Petroleum Resources, Health, Safety and Reclamation Code for Mines in British Columbia (Victoria: Ministry of Energy, Mines and Petroleum Resources, 2008) online: <<http://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/health-safety/health-safety-and-reclamation-code-for-mines-in-british-columbia>>.
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