

B.C. PLACER MINING

HIGH ENVIRONMENTAL IMPACTS VS. LOW ECONOMIC RETURN



*Commissioned by FNWARM
Originally Published March 2017*

*Updated March 2019
Based on data available as of December 2018*

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or reuse it, rather than releasing it directly into a stream.¹³ If done correctly, this practice stops harmful amounts of sediment from entering streams and hurting fish.

Suspended sediment can carry contaminants. Tests downstream of placer mines discharging directly into streams have found levels of aluminum, arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, vanadium, and nickel that exceed drinking water guidelines.¹⁴

British Columbia has established riparian setbacks (the distance required between mining activity and the edge of a water body) to protect waterbodies from placer mining. Riparian setbacks are important because they slow down and filter surface rainwater flowing into streams and rivers, so less sediment enters the water body.

Despite their potential for destroying habitat, placer mining setbacks are smaller than the riparian setbacks required for other industrial land uses (Figure 1). Placer mining setbacks are usually 10 metres and allow work on un-vegetated gravel bars,¹⁶ where mineral exploration setbacks

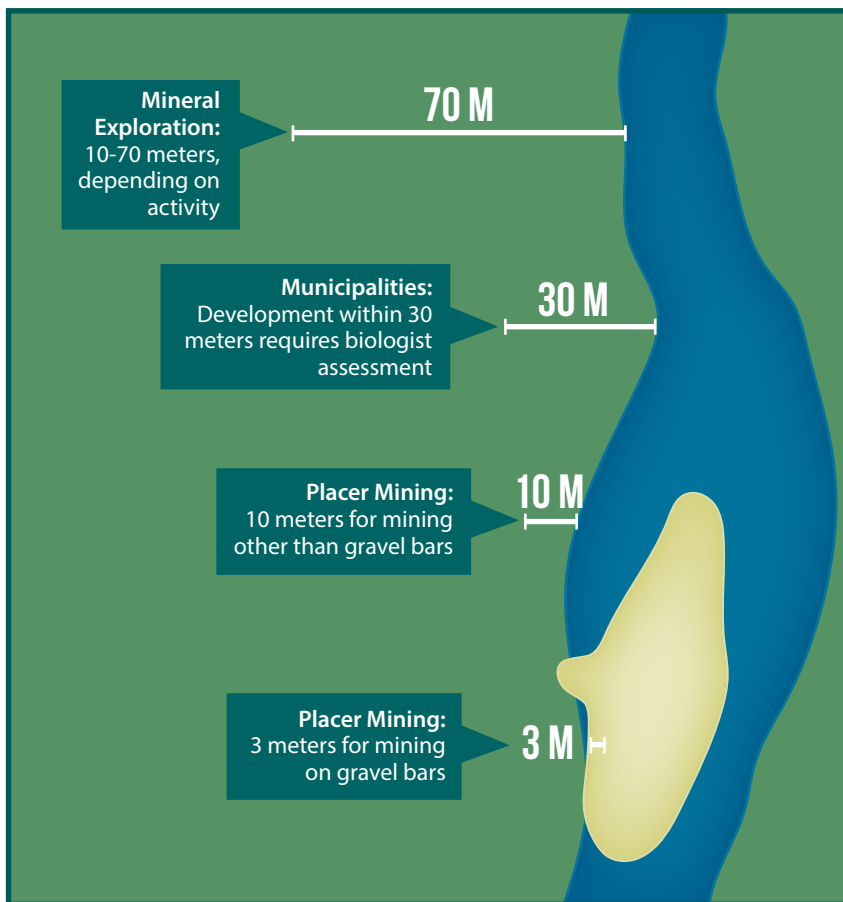


Figure 1. Comparison of Riparian Setback Requirements for Various Land Uses. For placer mining, Information Update Number 38 “Acceptable Practices for Placer Hand Mining In British Columbia,” requires riparian setbacks of 10m from the high-water line, except on un-vegetated gravel bars, for which a 3m setback is required. Gravel bars on the Fraser River require a 10m setback and 1m of elevation above the current water level.



NO RECLAMATION AT VAST MAJORITY OF B.C. PLACER MINES

The Ministry of Environment Placer Audit found only one of the 26 mines visited were undertaking the reclamation work required by their mine permit.¹⁵

We suspect that part of the reason that mines are not being reclaimed is due to low reclamation bond amounts. A miner pays the government a reclamation bond before they start working, and once work is finished, the government pays the miner back if the site has been reclaimed. If this amount is too low, the miner may not bother reclaiming the mine.

Tests downstream of placer mines discharging directly into streams have found levels of Aluminum, Arsenic, Barium, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Vanadium, and Nickel that exceed drinking water guidelines.¹⁴

Modern placer miners are not allowed to use mercury in their sluice boxes in B.C.³⁰ However, there doesn't appear to be a law against them using it later to separate fine gold particles from the mixture of other heavy minerals called 'black sand.'

Records from the Cariboo region report the extensive use of mercury during the gold rushes: some sources claim as much as 25 lbs of mercury was used per sluice box per day during the mid-1800s,³¹ while a United States Geological Survey estimated that placer mines in California during the same era discharged several hundred pounds of mercury a season.³² Some mercury flowed down the Fraser River and is in ocean sediment in the Strait of Georgia.³³ Other mercury is probably trapped in the sediment in former Gold Rush areas such as the Cariboo region in central B.C., and the Atlin region in northwestern B.C.

Despite serious environmental and health concerns with mercury in B.C.'s waterbodies, we found only one study examining mercury levels in historical placer mine areas: a 1995 study of the Lillooet River in the Port Douglas area which found elevated levels of mercury at some sites (at one site 200 times higher than expected background levels).³⁴ Recent conversations with B.C. placer miners confirm that mercury is commonly recovered with gold in some areas. Online placer miner discussion forums contain conversations about methods for separating gold from gold amalgam (the combination of mercury and gold),³⁵ suggesting either the discovery of historic gold amalgam or the current use of mercury in placer mining. Yet the Cohen Commission noted in 2012 that the government was not monitoring the Fraser River, or other B.C. waterbodies, for pollutants like mercury.³⁶

IF YOU MINE, THE INSPECTORS WON'T COME

Why did the Ministry of Environment find so many placer miners were breaking the rules? Governments use tools like inspections, fines, and incarceration to encourage businesses to obey rules. For these tools to work, fines need to be big enough to provide a financial incentive, inspections need to be regular and unannounced, and jail time substantial.

A placer mine needs a Notice of Work permit to operate legally. Figure 2 shows the number of Notice of Work permits active in B.C. from 1980 to present. The average percentage of Notice of Work sites inspected each year, over the past decade has been 26%, or about 1 in 4.

The penalty for environmental violations is low. Discharging sediment into a stream could result in a \$575 fine.³⁷ Working in a stream without a permit could result in a \$230 fine under the Water Sustainability Act.³⁸ Coupled with a low inspection rate, these fines are too low to curtail bad mining practices.

We also found few inspections for placer hand mining, a small-scale mining activity that does not use machinery to excavate. Table 2 shows 2,917 placer claims reporting work in 2015, a dramatic increase from



BUT THE GOVERNMENT TESTS THE RIVERS FOR MERCURY, RIGHT?

The monitoring of the levels of contaminants such as mercury in major watersheds should be a roll filled by government ministries. However, in 2012, the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River (Cohen Commission) stated:

"Contaminant monitoring as it relates to the health of Fraser River sockeye salmon has been neglected by DFO and Environment Canada for jurisdictional reasons. It matters little whether Environment Canada considers its jurisdiction to cease at the end of an outfall pipe, or that DFO's decision to cut its Toxic Chemicals Research Program nearly a decade ago and to disband its Pacific Region Water Quality Unit was done without consultation. The effect is that neither department is currently monitoring contaminants in freshwater or marine habitat that may negatively affect Fraser River sockeye productivity."³⁶

1,188 in 2005. (As factors other than placer hand mining influence this statistic, it should be viewed as a general trend of placer hand mining.)³⁹ MEM employs two inspectors that focus on non-permitted mineral titles, which would include placer hand mining operations. According to ministry sources, they inspected approximately 150 placer sites in 2016,⁴⁰ suggesting that the annual inspection rate for this type of activity is about one in 20.

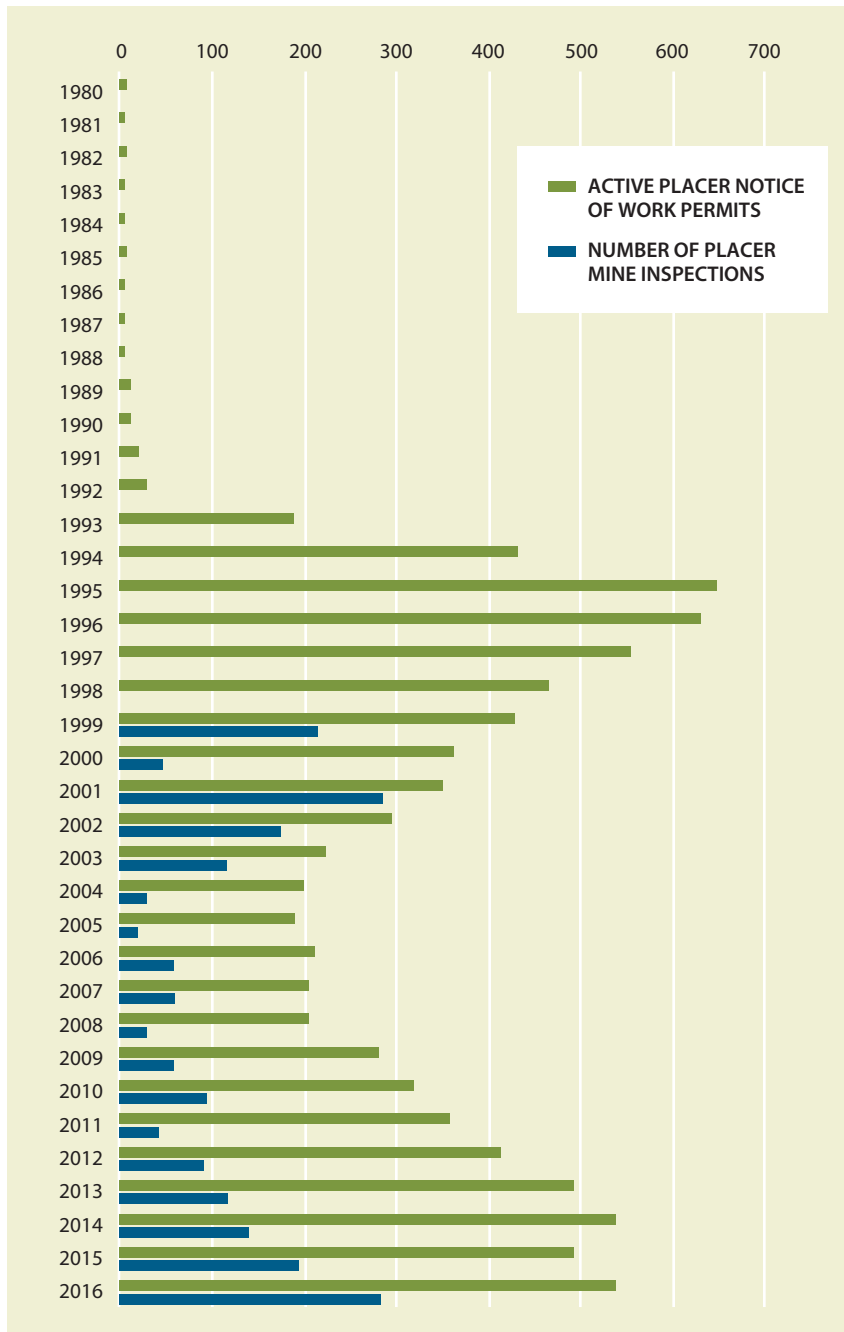


Figure 2. Number of active Notice of Work permits calculated from data in FOI Request - EGM-2016-63772. Number of inspections from British Columbia, Ministry of Energy and Mines, "Annual Report of the Chief Inspector of Mines" (2001-2014). FOI Request - EGM-2017-70745 (2015, 2016)



Sediment-laden water flowing from a placer mine site. These sediments can carry contaminants, such as aluminum, arsenic, and chromium—sometimes in levels that exceed drinking water standards.

“MEM (Ministry of Energy and Mines) has a limited compliance and enforcement program and weak planning, and therefore its regulatory oversight activities are inadequate.”

– AUDITOR GENERAL

Our findings of inadequate enforcement are consistent with the B.C. Auditor General's 2016 report "An Audit of Compliance and Enforcement in the Mining Sector." The Auditor General found that "MEM has a limited compliance and enforcement program and weak planning, and therefore its regulatory oversight activities are inadequate."⁴¹

Although placer mining does not have high economic returns, as noted by the 2003 B.C. Mining Task Force, the industry is centered in areas that need a high level of environmental protection to ensure the health of B.C.'s fish stocks and drinking water supplies. Yet the Mining Task Force recommended that the industry be de-regulated in response to low government returns.⁴² As apparent in Table 2, the inspection rate dropped following the Task Force report. This low inspection rate may have helped create the situation noted in the MoE audit, which found a significant portion of placer miners breaking the rules. Thus, the savings gained by the provincial government from de-regulating the placer industry likely has a steep cost to fisheries, drinking water, and at-risk species, costs which should be assessed and accounted for.



Despite the large size of some mines, only one in four mine sites were inspected on average each year in the past decade.

A	B	C	D	E	F
Year	Placer NoW Permits Issued	Total Number of NoWs Within Stated Operating Period	Number of Placer Mine Inspections	Inspection Rate	Placer Claims Reporting Work
2002	169	292	182	62%	no data
2003	207	221	123	56%	no data
2004	205	197	29	15%	no data
2005	176	187	19	10%	1188
2006	195	209	54	26%	1349
2007	167	203	61	30%	1455
2008	164	204	28	14%	1350
2009	208	278	49	18%	1496
2010	190	316	96	30%	1640
2011	153	356	39	11%	1694
2012	185	410	82	20%	2557
2013	368	488	110	23%	2595
2014	234	531	134	25%	2712
2015	213	539	190	32%	2917
2016	210	556	280	50%	no data
2017	185	558	210	38%	no data
2018	109	539	no data	no data	no data

Table 2. Column C calculated from data in FOI Request - EGM-2016-63772. Columns B and D, 2000 to 2014, from: British Columbia, Ministry of Energy and Mines, "Annual Report of the Chief Inspector of Mines" (2001-2014); Column B and Column F, 2015, from: Mineral Titles Branch official, E-mail Communication to FMC, British Columbia Ministry of Energy and Mines, April 26, 2016. Column B and C, 2016 to 2018, from: FOI Request - EGM-2016-63772 and FOI Request - EMP-2018-87582. Column F, 2005 to 2014 from: British Columbia, Ministry of Energy and Mines, Mineral Titles, "Physical Work on Mineral and Placer Claims, 2014" January 26, 2015. Column D, 2015 to 2016 from: FOI Request - EGM-2017-70745. Column D, 2017, from FOI Request EMP-2018-87591.

CITATIONS

1. British Columbia, The B.C. Mining Task Force of the Government Caucus "Restoring the British Columbia Mining Industry", at 47; online: <<http://ralphsultanmla.ca/wp-content/uploads/sites/60/2014/07/>>.
2. Mineral Tax Act, RSBC 1996, C 292, s 2.2.
3. Ministry of Energy and Mines official, E-mail Communication to FMC, British Columbia Ministry of Energy and Mines, March 2, 2016.
4. British Columbia, Data Catalogue, BC Metal Shipments From 1858 Onwards, online: <<https://catalogue.data.gov.bc.ca/dataset/bc-annual-metal-shipments-from-1858-onwards>>.
5. Ministry of Energy and Mines official, E-mail Communication to FMC, British Columbia Ministry of Energy and Mines, March 2, 2016.
6. Mineral Tax Act, RSB.C. 1996, C292, s 12 (2.1).
7. BC Ministry of Forests, Lands and Natural Resource Operations, BC Ministry of Environment, and Fisheries and Oceans Canada, "Fish-stream crossing guidebook", Rev ed (Victoria: Queen's Printer, September, 2012) at 11; online: <<https://www.for.gov.bc.ca/hfp/fish/Fish-Stream%20Crossing%20Print.pdf>>. British Columbia, Ministry of Environment, Online BC Species and Ecosystems Explorer lists many riparian community types as imperiled or special concern; online <<http://a100.gov.bc.ca/pub/eswp>>. The designation of imperiled or special concern indicates, among other attributes, that they host rare and endangered species, and provide habitat connectivity. (British Columbia, Ministry of Environment, Sensitive Ecosystems Inventories, "Values of SEI"; online: <<http://www.env.gov.bc.ca/sei/>>.) See also: Adrian de Groot, Jim Polar, 'Sensitive Ecosystems of the Atlin-Taku Planning Area'. (Smithers: Bulkley Valley Centre for Natural Resources, Research and Management, February, 2009) at 4.1; online: <<http://www.env.gov.bc.ca/sei/atlin-taku/index.html>>.)
8. Seakem Group Ltd. 1992. Yukon Placer Mining Study. Volume 1 Executive Summary. Prepared for the Yukon Placer Mining Implementation Review Committee. Sidney, British Columbia, p 17. As cited in: Birtwell, I.K. 1999. The effects of sediment on fish and their habitat. DFO Can. Pacific Science Advice and Review Committee Habitat SubC. ommittee Res. Doc. Canadian Stock Assessment Secretariat Research Document 99/139, p 24. online < <http://www.dfo-mpo.gc.ca/Library/240698.pdf>>: "Un-mined creeks with turbidities of about 23 NTUs supported a standing stock of fish 40 times that of placer-mined streams with turbidities of 440 to 465 NTUs (about 500 mg/L)."
9. Seakem Group Ltd. 1992. Yukon Placer Mining Study. Volume 1 Executive Summary. Prepared for the Yukon Placer Mining Implementation Review Committee. Sidney, British Columbia, p 17. As cited in: Birtwell, I.K. 1999. The effects of sediment on fish and their habitat. DFO Can. Pacific Science Advice and Review Committee Habitat Subcommittee Res. Doc. Canadian Stock Assessment Secretariat Research Document 99/139, p 24. online <<http://www.dfo-mpo.gc.ca/Library/240698.pdf>>.
10. 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>>. Also, "Fish Are Worth Their Weight in Gold: A Review of The Effectiveness of the Yukon Placer Authorization", Yukon Conservation Society, 2002, at 7.
11. Chapman Geoscience and Dobson Engineering Ltd., "An Inventory of Watershed Conditions Affecting Risks to Fish Habitat in the Cariboo: Cottonwood & Horsefly Watershed" Vol 1, Cariboo River Watershed (Williams Lake: Cariboo Region Interagency Management Committee, November 1997) at iv; online: <<http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=8420>>.
12. For a review of reclamation best practices, see: Atlin Placer Mining BMP Guidebook, Atlin Placer Miners Association, Ministry of Forests, Lands, and Natural Resource Operations, Ministry of Energy and Mines, Taku River Tlingit First Nation, at 44-53; online: <http://www.env.gov.bc.ca/wld/documents/bmp/Skeena/Atlin%20Placer%20Mining%20BMP%20Guidebook_FINAL%20June%2030%202014.pdf>.
13. Placer Mining Waste Control Regulation, B.C. Reg 107/89, s 3(b)(iv).
14. British Columbia Ministry of Forests, Lands and Natural Resources Operations. E W Smith, D Wilford. "Water Quality, Stream Sediments and Hydrology in the Atlin Placer Mining Area – A Pilot Study" (2013) at 58-70; online: <http://a100.gov.bc.ca/appsdata/acat/documents/r48553/Smith_Wilford_2013_WaterQualitySedimentandHydrolo_1431727552401_1726872381.pdf>
15. British Columbia, Ministry of Environment, 2010 Placer Mining Audit, July & August 2010, online: <<https://cariboominingassociation.com/2012/11/19/b-c-ministry-of-environment-does-clandestineaudit-of-cariboo-placer-miners/>>. Authors of the audit noted that reclamation was not assessed at all sites.
16. British Columbia, Ministry of Energy and Mines, Mineral Titles Information Update, No. 38, "Acceptable Practices for Placer Hand Mining In British Columbia," April 12, 2016; online: <<http://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/mineral-titles/news-notice-announcements/information-updates>>.
17. Health, Safety and Reclamation Code for Mines in British Columbia Part 9, Table 9.1, s 9.5.1; <online: <http://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/health-safety/health-safetyand-reclamation-code-for-mines-in-british-columbia>>
18. Riparian Areas Regulation, B.C. Reg 376/2004, s 1(1), "riparian assessment area" means (a) for a stream, the 30 meter strip on both sides of the stream, measured from the high water mark".
19. Seth Wenger, "A Review of the Scientific Literature on Riparian Buffer Width, Extent and Vegetation" (Athens: University of Georgia Institute of Ecology, March, 1999) at 3; online: <http://www.memphremagog.org/FCKeditor/ckfinder/userfiles/files/Centre_de_documents/EN/Review-scientific-literature.pdf>.
20. British Columbia, Ministry of Environment, 2010 Placer Mining Audit, July & August 2010, s 4.1; online: <<https://cariboominingassociation.com/2012/11/19/b-c-ministry-of-environment-does-clandestine-audit-of-cariboo-placer-miners/>>.
21. Ibid, Table 1.
22. Ibid, s 4.1.
23. World Health Organization. Mercury and Health, Fact Sheet, updated January 2016; online: <<http://www.who.int/mediacentre/factsheets/fs361/en/>>.
24. Ibid
25. D W Boening, "Ecological Effects, Transport, and Fate of Mercury: A General Review", Vol 40, Issue 2, June 2000; online: <<http://www.ncbi.nlm.nih.gov/pubmed/10789973>>.

CITATIONS

26. United States Environmental Protection Agency, "Mercury in Your Environment, How People Are Exposed To Mercury"; online; <<https://www.epa.gov/mercury/how-people-are-exposed-mercury>>.
27. D W Boening, "Ecological Effects, Transport, and Fate of Mercury: A General Review", Vol 40, Issue 2, June 2000; online: <<http://www.ncbi.nlm.nih.gov/pubmed/10789973>>."
28. California Water Boards Staff Report, "Mercury Losses and Recovery During a Suction Dredge Test in the South Fork of the American River", May 2005, at 48; online: <http://www.waterboards.ca.gov/publications_forms/publications/general/docs/mercurystaffreport2005.pdf>.
29. World Health Organization. Mercury and Health, Fact Sheet, updated January 2016; online: <<http://www.who.int/mediacentre/factsheets/fs361/en/>>.
30. Placer Mining Waste Control Regulation, BC Reg 107/89
31. M M Veiga and J A Meech, "A Brief History of Amalgamation Practices in the Americas", 16th Brazilian Symposium on Ore Processing and Hydrometallurgy, Vol 1, Sept. 17-22, 1995, at 581-594.
32. United States Geological Survey, "Mercury Contamination from Historical Gold Mining in California", FS-061-00; online: <<https://pubs.usgs.gov/fs/2000/fs06100/pdf/fs06100.pdf>>.
33. S Johannessen, R Macdonald, and M Eek, "Historical Trends in Mercury Sedimentation and Mixing in the Strait of Georgia, Canada", Environmental Science and Technology, 2005, 39 (12), at 4361-4368.
34. M M Veiga and J A Meech, "A Brief History of Amalgamation Practices in the Americas", 16th Brazilian Symposium on Ore Processing and Hydrometallurgy, Vol 1, Sept. 17-22, 1995, at 581-594.
35. Gold Prospector's Network; online: <<http://gpex.ca/smf/index.php?topic=1618.0>>. Beginning 2010, conversations regarding mercury moved to the member's-only area.
36. Bruce I. Cohen, "The Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River" Vol 1, Chapter 6, Habitat Management (Vancouver: Queen's Printer, October 2012) at 322.
37. British Columbia, Ministry of Environment, Environmental Violations Database, Search Criteria: Environmental Management Act Section6(3); online: <<https://a100.gov.bc.ca/pub/ocers/searchApproved.do?submitType=menu>>.
38. British Columbia, Ministry of Environment, Environmental Violations Database, Search Criteria: Water Act Section 93(2)(q); online: <<https://a100.gov.bc.ca/pub/ocers/searchApproved.do?submitType=menu>>.
39. 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. Secondly, 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. 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 illegally entirely without a claim.
40. Messmer, M. Chief Gold Commissioner, Mineral Titles Branch, Personal E-mail Communication to FMC, British Columbia Ministry of Energy and Mines, April 7, 2017.
41. British Columbia Ministry of Finance, Office of the Auditor General, "An Audit of Compliance and Enforcement of the Mining Sector" (Victoria: Queen's Printer, May, 2016), at 6; online: <<http://www.bcauditor.com/pubs/2016/audit-compliance-and-enforcement-mining-sector>>.
42. British Columbia, The B.C. Mining Task Force of the Government Caucus "Restoring the British Columbia Mining Industry", at 47; online: <<http://ralphsultanmla.ca/wp-content/uploads/sites/60/2014/07/>>.



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