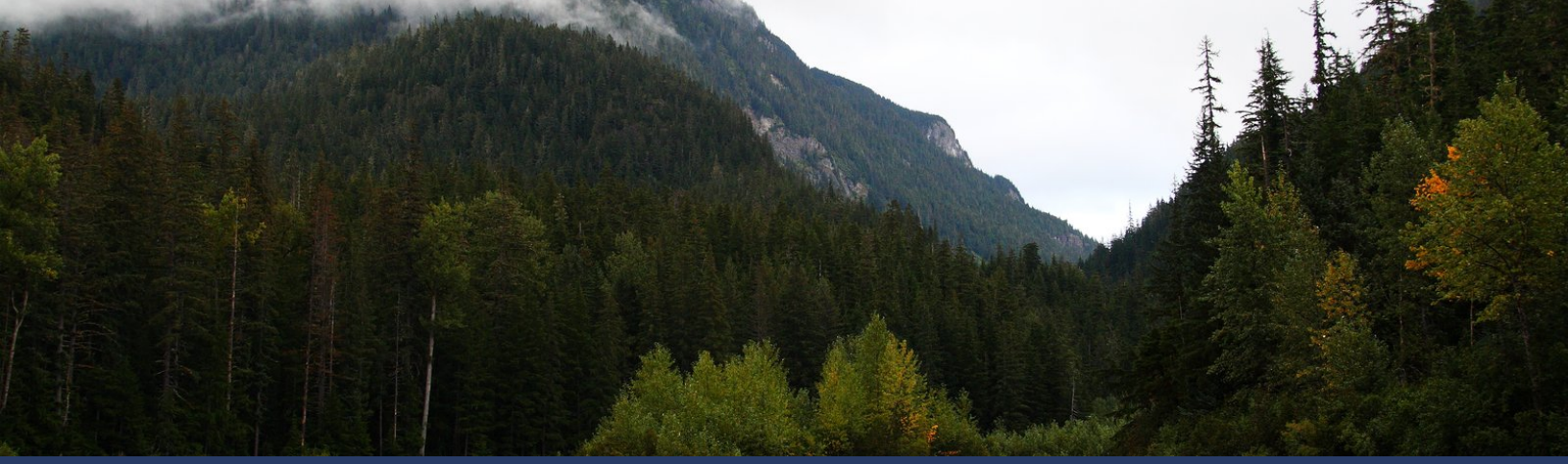


KSM Gold-Copper Prospect

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Ground Truth Trekking

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KSM (Kerr-Sulpheretts Mitchell) is a series of extremely large gold-copper porphyry (http://en.wikipedia.org/wiki/Porphyry_copper_deposit)ore deposits in British Columbia. Located in rugged mountainous terrain near the BC-Alaska border, the prospecting company Seabridge Gold proposes to build one of North America's largest mines at the prospect. KSM has been compared (http://www.mining.com/canada-mining-project-may-suffer-similar-faith-than-pebble-mine-63846/) to the proposed Pebble Mine (/Issues/MetalsMining/pebble-mine-gold-copper-prospect-alaska.html) in scale and potential impacts, although it contains only about ½ as much gold and 1/5 as much copper as Pebble.

KSM's environmental plan was approved by the BC government in late 2014, but the mine still needs various permits, and investors (http://www.alaskapublic.org/2014/10/09/ksm-mine-project-wins-key-permits/) to fund the project. As of preliminary 2012 plans (http://seabridgegold.net/ksm_engineer.php#2012), the mine will operate as a series of open pit mines for its first 25 years. After the surface-accessible lodes are exhausted, it will transition to underground mining using the block caving (/

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Issues/MetalsMining/block-caving-underground-mining-method.html) method. Seabridge envisions using both froth flotation of fine ore powder and cyanide heap leaching to extract metals. The KSM ore has high acid generating (/Issues/MetalsMining/AcidMineDrainage.html) potential.



SULPHURETS CREEK — We walked up the Unuk River in 2007, and crossed this creek to find a bustling mining exploration camp. Since then the identified deposits have become the focus of a large mine proposal (/Issues/MetalsMining/ksm-kerr-sulpheretts-mitchell-gold-copper-mine-prospect.html). — Get Photo (/photos/sulphurets-creek_1/)

KSM sits at the headwaters of the Unuk River (http://riverswithoutborders.org/about-the-region/unuk), which flows from the mine site in Canada into the Misty Fiords (http://en.wikipedia.org/wiki/Misty_Fiords_National_Monument)

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National Monument in Alaska. The KSM site is only 20 miles upstream from the border, and the Unuk is a major salmon river. KSM faces fisheries-centered environmental opposition. Most of the economic benefits of a mine would go to Canada, whereas costs to the commercial fishing industry would fall primarily on US fishermen.

In November 2014, the conservation group Salmon Beyond Borders released a risk analysis (http://www.salmonbeyondborders.org/uploads/3/9/0/1/39018435/ksm_mine_final.pdf) critical of KSM.

Metals & Economic Value

The prospect has (http://seabridgegold.net/projects.php) "proven and probable reserves" of 38.2 million ounces of gold and 9.9 billion pounds of copper, plus lesser (but still large) economic values of silver and molybdenum (http://commonsensecanadian.ca/ksm-mine-promises-epic-gold-copper-jobs-waste/). Exploration is ongoing, but appears to be in the final stages (http://www.petroleumnews.com/pntruncate/121551682.shtml). Seabridge had spent $176 million (http://ksmproject.com/wp-content/uploads/2012/05/Seabridge-Infographic_2014_PRESS1-795x1024.jpg) on exploration as of 2013.

The mine may directly employ roughly 1,000 people during operation, and almost twice that many during construction. Preliminary economic numbers published by Seabridge Gold and prepared by a consulting firm look profitable, though they

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are at this point only a forecast. Seabridge Gold estimates (http://investnorthwestbc.ca/major-projects-and-investment-opportunities/map-view/ksm/ksm-copper-gold-molybdenum-mine) that KSM will contribute $42 billion to Canada's GDP over its lifetime. Canada's 2013 GDP was $1,825 billion.

KSM Mine - Key Numbers

Production
Metals | Gold: 38.2 million oz
Copper: 9.9 billion lbs
Silver: 191 million oz
Molybdenum: 213 million lbs
Mining Methods | Open Pits (3+) for ~25 years
Underground Block Caving for ~30 years
Ore & Tailings Production | 130,000 metric tons/day (pits)
90,000 metric tons/day (underground)
Waste Rock Production | 273,000 metric tons/day (pits)
Not identified for underground
Total Waste Produced | 3.3 billion tons of waste rock
2.2 billion tons of tailings
Maximum Tailings Dam Height | 240 meters (787 feet)
Annual Wastewater Managed | 20 billion gallons
Mining Start Year | 2019
Economics
Start-Up Capital Cost | $5.3 billion USD
Estimated Metals Value* | $17 to $31 billion (current market value)
*Estimated Metals Value is not a fixed number, and is a subject

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of vigorous debate. Seabridge has based its metals value estimates on relatively high metal prices, which reflect the past several years. Longer-term metal prices have been considerably lower. Metal spot prices for all four major deposit metals have recently fallen below the prices Seabridge uses, but it's not clear whether this is a long-term pattern or a short-term dip.

Geology & Environmental Risk

The KSM metal-bearing rock is sulfide ore, and is believed to have a high acid generating potential. Waste material (particularly tailings) from this ore will need to be stored in-perpetuity (/Issues/OtherIssues/perpetual-waste-storage-perpetuity.html). This has raised environmental concerns about the mine, which is expected to produce two billion tons (http://commonsensecanadian.ca/ksm-mine-promises-epic-gold-copper-jobs-waste/) of tailings over its lifetime. Acid mine drainage can mobilize heavy metals in water, which can be very harmful to downstream aquatic life, including salmon (http://pebblescience.org/copper-and-salmon.html). During typical operations, KSM will need to manage or treat roughly 20 billion gallons of water per year - slightly more than the proposed Pebble Mine, and the equivalent of the yearly output of a small creek.

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Fisheries & Transboundary Issues

Embedded photo: **Photo 23** not published.

KSM sits roughly 20 miles from the Alaska Border at the headwaters of the Unuk and Nass Rivers, and is one of several major BC mining projects (http://www.adn.com/article/20141027/laine-welch-southeast-groups-push-protection-canadian-mines-upriver) being developed in the headwaters of Southeast Alaska salmon rivers. The Nass River is BC's third largest salmon river, and the Unuk quickly crosses into Alaska. As a result, Alaskans are major stakeholders who are threatened by potential water pollution from the mine. KSM faces fisheries-centered environmental opposition.

Parallels have been drawn between KSM and Alaska's Pebble Mine, in regard to the prospect's environmental hazards and controversy, as well as to its size and mineral value. In a November 2014 letter, Alaska economist Joe Mehrkens critically outlines (http://www.sitnews.us/1114Viewpoints/110114_joseph_mehrkens.html) some of the difficulties of managing mine-related environmental catastrophes, transboundary water protection, and the ideological polarization of mining policy and debate. Mehrkens was also critical of ANC NOLS selling (/Issues/Forestry/Loss-Selling-Net-Operating-Losses-NOLS-Alaska-Native-Corporations.html) in the mid-1980s.

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The Nisga and Gitxsan First Nations officially support (http://www.huffingtonpost.ca/2014/07/30/seabridge-gold-ksm-mine_n_5635827.html) the project, and Nisga - whose territory the deposit sits in - would reap substantial financial benefits from the mine. The position of other First Nations and Southeast Alaska Native tribes is less clear, though in early 2014 opposition was strong (http://www.tulalipnews.com/wp/2014/05/04/tribes-and-first-nations-unite-to-halt-b-c-mine-that-threatens-salmon-habitat/).

Alaskan officials have expressed concern (http://juneauempire.com/local/2014-08-22/state-amplifies-response-ksm-mine#.VDhUY_ldWNE%20Further%20Reading2012%20KSM%20(Kerr-Sulphuretts-Mitchell)%20Prefeasibility%20Study,%20completed%20by%20Tetra%20Tech%20Wardrophttp://seabridgegold.net/KSM2012ExecSum.pdf) about the mine's potential impact on Alaskan aquatic resources, particularly since the mine is upstream from salmon-harvest areas. The U.S.-Canada Boundary Waters Treaty (http://www.ijc.org/en_/BWT), which prevents damaging pollution from flowing across borders, may be invoked by the U.S.

Ground Truthing Expeditions

In 2014, Felt Soul Media (http://www.feltsoulmedia.com/) did a filming & fishing expedition through the KSM area. Prior to this Erin & Hig of Ground Truth Trekking passed through the area in 2004 on their Journey up the Wild Coast (/Journeys/

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WildCoast.html). The KSM region is rugged, remote, wet, and thickly forested, making backcountry travel difficult and rare in the area.

Further Reading

> KSM 2012 Preliminary Feasibility Study (http://seabridgegold.net/ksm_engineer.php#2012)

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