

MEMORANDUM

State of Alaska

Department of Fish and Game
Division of Habitat

TO: Jackie Timothy
Southeast Regional Supervisor

DATE: October 25, 2017

SUBJECT: Transboundary Mines Site Visits
Trip Report September 11-13,
2017

FROM: Nicole Legere *NL*
Habitat Biologist

PHONE NO: (907) 465-6979

On September 11-13, 2017, I visited five exploratory, reclaimed, or active mine sites in the Unuk and Stikine transboundary watersheds in British Columbia (Figure 1) with Department of Natural Resources Office of Project Management and Permitting Associate Director, Kyle Moselle.

Seabridge Gold, owner of the exploratory Kerr-Sulphurets-Mitchell (KSM) and Iskut^a properties in British Columbia, hosted our tour of their properties. We also viewed the Snip Mine tailings management facility and the reclaimed Eskay Creek Mine site via helicopter, and toured the active Red Chris Mine site on the ground.

On September 11, I flew to Hyder, Alaska with Mr. Moselle via commercial float plane where we were picked up by Kirsten Knutson, Matrix staff and logistical coordinator for Seabridge Gold, and Brent Murphy, Seabridge Gold Vice President of Environmental Affairs. We drove over the international border to Stewart, British Columbia where we transferred into an Astar helicopter to begin our tour. Included in the tour was Mary-Jane Piggott, Klohn Crippen Berger Project Manager, and Robert Simpson, PR Associates Owner.

KSM Project

The KSM Project is located in the coastal mountains of northwestern British Columbia, approximately 60 km northwest of Hyder, Alaska. The proponent proposes to mine the Sulphurets, Kerr, Mitchell, and Iron Cap deposits, establish mine support facilities in the non-fish bearing Mitchell and McTagg Creek valleys, and store and treat contact water before discharging the effluent into Sulphurets Creek which drains to the Unuk River. A fish passage block about 500 m upstream of the Sulphurets/Unuk confluence prevents the few Dolly Varden char documented in lower Sulphurets Creek from moving upstream. The Unuk River supports anadromous fish and flows into Alaska about 30 km downstream of the confluence and then into the Pacific Ocean.

^a Includes the former Johnny Mountain Mine and associated tailings storage facility.

The proponent also proposes a processing and tailing management facility in upper Teigen and North Treaty creeks, which support Dolly Varden char in the project area, and drain to the Bell-Irving River. The Bell-Irving River supports anadromous fish and flows into the Nass River which enters the Pacific Ocean in British Columbia. The mine site and tailings facility will be connected by two parallel 23 km tunnels.

We flew over the KSM camp located approximately 250 m from the outlet of Sulphurets Lake (Figure 2). We landed on the Sulphurets Deposit (Figure 3) and looked south at the Kerr Deposit and the Sulphurets and Kerr glaciers (Figure 4). Next we landed on the Mitchell Deposit at the toe of the Mitchell Glacier. We observed a bright blue, naturally oxidized copper sulfate stain originating from a spring on the mountainside (Figure 5). Mitchell Creek is glacier-fed and the upper reach has naturally occurring acid rock drainage due to high mineralization in the area (Figures 6–8). At the toe of the Mitchell Glacier, mean pH values range between 4.22 to 4.59^b. More recently, sampling has shown a lower mean pH in that area (Brent Murphy, personal communication). We flew down Mitchell Creek to its confluence with the glacier-fed Sulphurets Creek and observed a difference in the colors of the two water bodies (Figure 9). Continuing downstream, Sulphurets Creek flows through a narrow canyon cascade that is a barrier to fish passage^c (Figure 10). Approximately 500 m downstream of the fish passage barrier is the confluence with the glacier-fed Unuk River, where we again observed a difference in the colors of the two water bodies (Figure 11). We flew down the Unuk River to the Alaska border (Figure 12) and then returned to the project area and landed below the rim on the Kerr Deposit (Figures 13, 14). We flew over an active exploratory drill platform on the Iron Cap Deposit (Figure 15) and the proposed location of the processing and tailing management facility in the upper Teigen Creek/North Treaty Creek valleys (Figures 16, 17).

^b Rescan. 2012. KSM Project: 2007 to 2011 baseline water quality report, Vol. 3, Appendix 14-A, Sec. 4.1.1, p. 4-1. Prepared for Seabridge Gold Inc., by Rescan Environmental Services Ltd., Vancouver, British Columbia.

^c British Columbia Environmental Assessment Office (2014), KSM Project Assessment Report, Table 4 & Figure 7, p. 39-40.

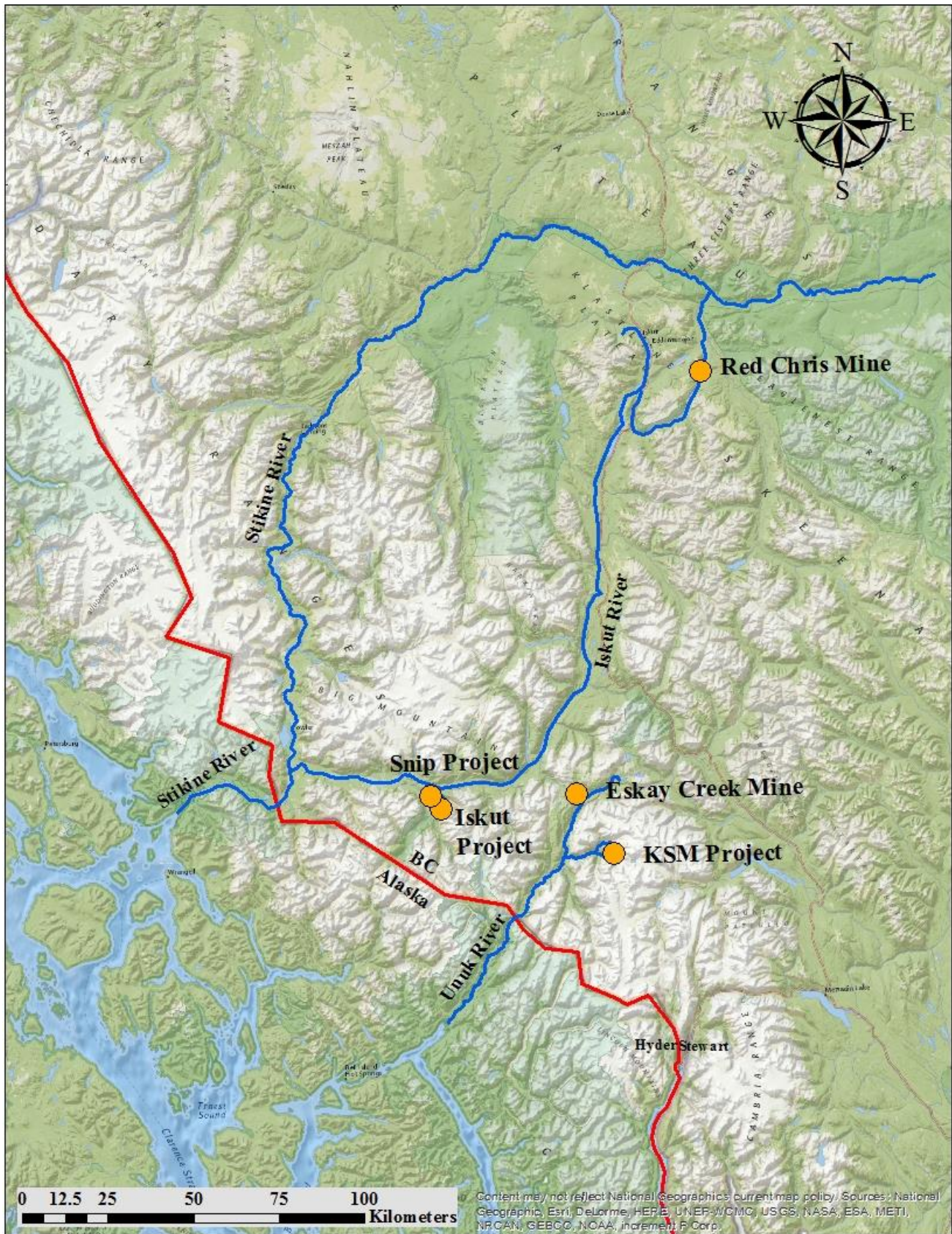


Figure 1.–Map of transboundary mine sites tour.



Figure 2. –Looking downstream at the non-fish bearing Sulphurets Lake and Creek and KSM camp.



Figure 3. –Standing on the Sulphurets Deposit.



Figure 4. –Standing on the Sulphurets Deposit looking south at the Kerr Deposit and the Sulphurets and Kerr glaciers.

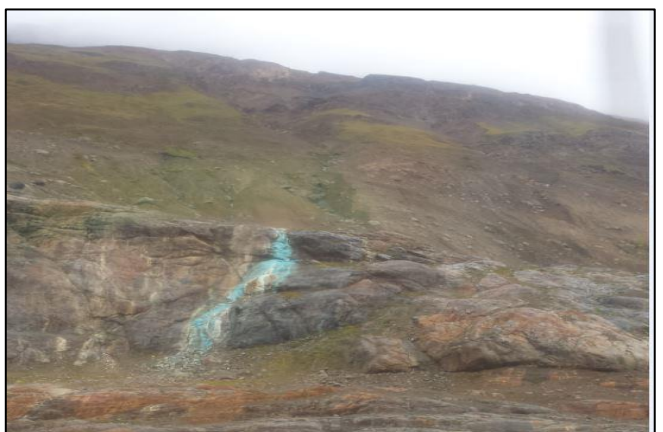


Figure 5. –Copper sulfate stain on the Mitchell Deposit.

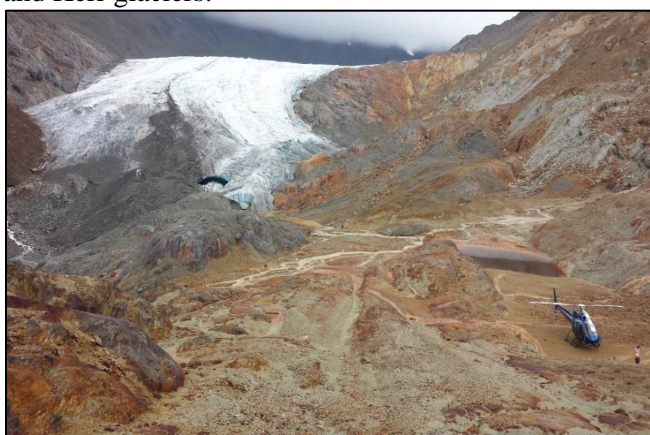


Figure 6. –Standing on the Mitchell Deposit looking east at the Mitchell Creek and glacier.



Figure 7. –Standing on the Mitchell Deposit looking west down the Mitchell Valley.



Figure 8.–Naturally acidic pool near the toe of the Mitchell Glacier.



Figure 9.–Looking upstream at the confluence of Mitchell (left) and Sulphurets (right) creeks. Non-fish bearing.

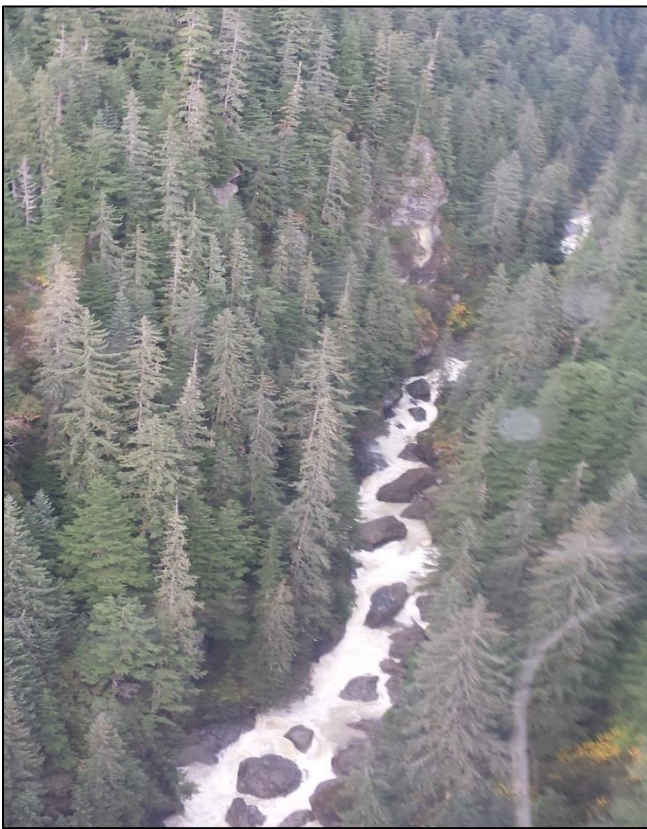


Figure 10.–Sulphurets Creek fish barrier.



Figure 11.–Looking upstream at the confluence of Sulphurets Creek (right) and the Unuk River (left). A few Dolly Varden char inhabit Sulphurets Creek at this location. The Unuk River supports anadromous fish.



Figure 12.—Unuk River downstream of the Alaska border.



Figure 13.—Standing on the Kerr Deposit looking north at the Sulphurets Deposit.

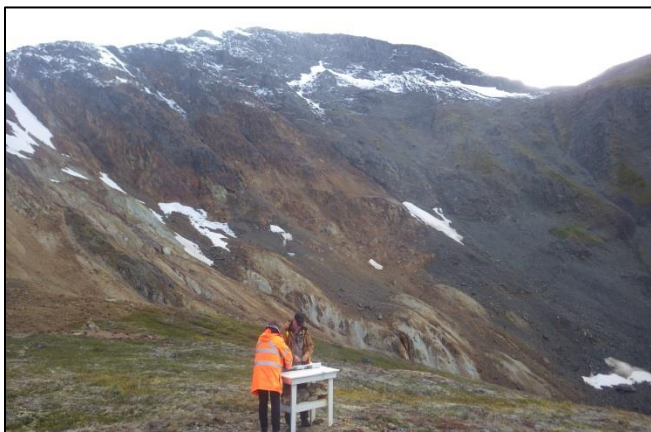


Figure 14.—Mr. Murphy and Ms. Piggott standing on the Kerr Deposit.



Figure 15.—Active exploratory drill platforms on the Iron Cap Deposit (yellow).



Figure 16.—North Treaty Creek supports Dolly Varden char in the proposed project area.

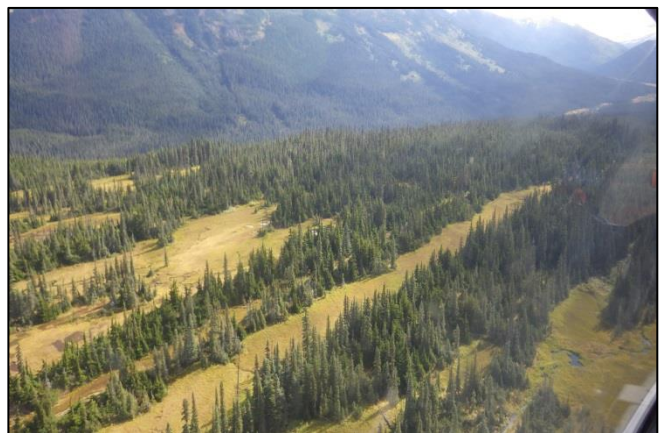


Figure 17.—Proposed processing and tailing management facility and upper South Teigen Creek valley.

Iskut Project

The Iskut Project consists of the existing Bronson Slope airstrip and camp^d and the former Johnny Mountain Mine. It is a closed underground gold mine located in the coastal mountains of northwestern British Columbia, approximately 100 km northwest of Hyder, Alaska. The glacier-fed non-fish bearing Johnny Creek, and the glacier-fed Stonehouse and Sky creeks that are also non-fish bearing within 3 km and 4 km downstream of the mine site respectively, are the main Johnny Mountain site drainages. Johnny Creek drains to Bronson Creek, and Sky and Stonehouse Creeks drain to the Craig River. Bronson Creek supports anadromous fish at its outlet, Sky and Stonehouse creeks support anadromous fish about 1 km from their outlets^e, and the Craig River supports anadromous fish. Bronson Creek and the Craig River drain into the anadromous fish bearing Iskut River which drains to the Stikine River which enters Alaska approximately 65 km downstream of the mine site.

In June 2016, SnipGold Corporation (SnipGold), a subsidiary of Seabridge Gold, purchased the former Johnny Mountain Mine property which operated discontinuously between November 1988 and November 1993. The mine site and mine camp were never fully reclaimed and SnipGold is restoring the disturbed lands^f. During our tour we observed some reclamation work SnipGold has completed at the site since acquisition. SnipGold is also exploring areas above the Johnny Mountain Mine site, though we did not see the area.

We landed at the old mine site and observed all three of the adits were closed. Piezometers were installed throughout the area to monitor groundwater (Figure 18). Mill cleanup had started and will continue through the next field season (Figure 19, 20). Twenty-six tanks in the tank farm were emptied, broken down, and staged for removal (Figures 21, 22). Mr. Murphy stated the soil in the tank farm is contaminated and they are considering methods to remove the hydrocarbons from the soil, including land farming. They are also considering capping the tailings storage facility (Figure 23).

We also flew over the Bronson camp, airstrip, and creek. Vegetation has recently been cleared from the airstrip, the banks of Bronson Creek are being reinforced with larger rocks using heavy equipment, and the legacy fueling area appears organized and clear of old fuel and oil barrels (Figures 24, 25).

^d The Bronson Slope airstrip and camp also used to service the former underground Snip Mine.

^e BC MOE. 2017. Habitat Wizard. <http://maps.gov.bc.ca/ess/sv/habwiz/>. (Accessed October 2017).

^f Amec Foster Wheeler. 2017. Single Volume 2017 Execution Plan, Johnny Mountain Mine reclamation, Project No. 194047. Prepared for SnipGold Corporation, Vancouver, BC.



Figure 18.–Piezometers installed near mill building to monitor groundwater.



Figure 19.–Old mill building.



Figure 20.–Scrap metal staged in mill building for removal.



Figure 21.–Tank farm after tank removal.



Figure 22.–Broken down tanks from tank farm staged for removal.



Figure 23.–Tailings storage facility.



Figure 24.—Cleared Bronson airstrip and reclaimed fuel area (yellow).



Figure 25.—Machinery stabilizing the bank of Bronson Creek.

Snip Project

The former Snip Mine[§] is now known as the Snip Project and is located in the coastal mountains of northwestern British Columbia, approximately 100 km northwest of Hyder, Alaska.

In 2017, Skeena Resources Limited acquired the past producing Snip Mine from Barrick Gold Corporation. We flew over the Snip Project tailings management facility, located downstream of the Iskut Prospect (Figures 26, 27). The tailings management facility is a closed tailings impoundment area located on a drainage divide. Monsoon Lake and Monsoon Creek drain to Bronson Creek, and Sky Creek drains to the Craig River. Bronson and Sky creeks both support anadromous fish downstream of the tailings management facility. Bronson Creek and the Craig River drain into the anadromous fish bearing Iskut River which drains to the Stikine River which enters Alaska approximately 60 km downstream of the site.



Figure 26.—Overview of tailings management facility (main dam in foreground).



Figure 27.—Tailings management facility (back dam in foreground).

[§] Located near the former Johnny Mountain Mine.

Eskay Creek Mine

We flew over the Eskay Creek Mine camp and Tom MacKay Lake (Figures 28-30). Barrick Gold Corporation currently manages the closed Eskay Creek Mine located in the coastal mountains of northwestern British Columbia, about 80 km northwest of Hyder, Alaska. The Eskay Creek Mine operated from 1994 to 2008 and tailings were deposited into the high alpine, non-fish bearing Albino and Tom MacKay lakes.^h Both water bodies drain to the non-fish bearing Tom Mackay Creek, then to the non-fish bearing Ketchum Creek, then to the Unuk River which is anadromous about 10 km downstream of the mine,ⁱ entering Alaska approximately 40 km downstream of the mine.



Figure 28.—Reclaimed Eskay Creek Mine camp.

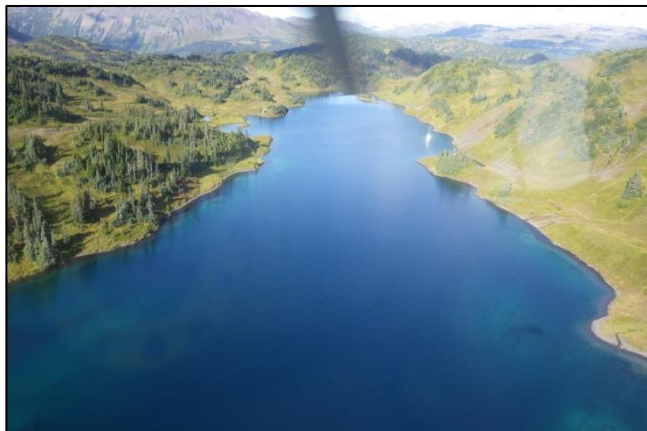


Figure 29.—Tailings are deposited in Tom MacKay Lake.



Figure 30.—Outlet at Tom Mackay Lake (yellow).

^h Shelbourn, S. 2014. Eskay Creek Gold Mine (closed) Tom MacKay Lake tailings storage facility dam safety inspection report. http://mssi.nrs.gov.bc.ca/EskayCreek/EskayCreek_2014_DSI_TomMacKayLk.pdf (Accessed October 2017).

ⁱ McGurk, M., Landry, F., and MacGillivray, R. 2006. Eskay Creek Mine environmental effects monitoring program and its implications for closure planning. <https://open.library.ubc.ca/cIRcle/collections/59367/items/1.0042508> (Accessed October 2017).

Red Chris Mine

Ms. Knutson drove me and Mr. Moselle to the Red Chris Mine site off of Highway 37 in northwestern British Columbia, approximately 195 km north of Hyder, Alaska (Figure 31). The Red Chris Mine is an active open pit copper and gold mine that began operation in late 2014.

Amber Marko, Red Chris Development Company Ltd. (RCDC) Geologist, and Morgan Cox, RCDC Senior Quality Control Technician provided us a tour of the mine site. The tailings impoundment area straddles a natural watershed divide with dams on the north (Figures 32, 33) and south ends^j (Figure 34). From the south tailings dam, water drains into rainbow trout bearing Trail Creek through the rainbow trout bearing Kluea, Todagin, Totogga and Kinaskan lakes through the anadromous Iskut and Stikine rivers and into the Pacific Ocean about 375 km downstream of the tailings impoundment area (Figure 35). From the north tailings dam, water drains through Quarry Creek and the resident fish bearing Klappan and Stikine rivers to the Pacific Ocean about 381 km downstream of the tailings impoundment area. We stopped to look at the active open pit operation (Figure 36) before driving back to Stewart, British Columbia.



Figure 31.—Entrance of Red Chris Mine.



Figure 32.—Overview of the tailings impoundment area (North tailings dam in foreground).

^j A dam will also be constructed on the northeast end which drains to Nea' Creek, the resident fish bearing Klappan and Stikine Rivers to the Pacific Ocean about 378 km downstream of the tailings impoundment area.



Figure 33.–North dam.



Figure 34.–South dam.

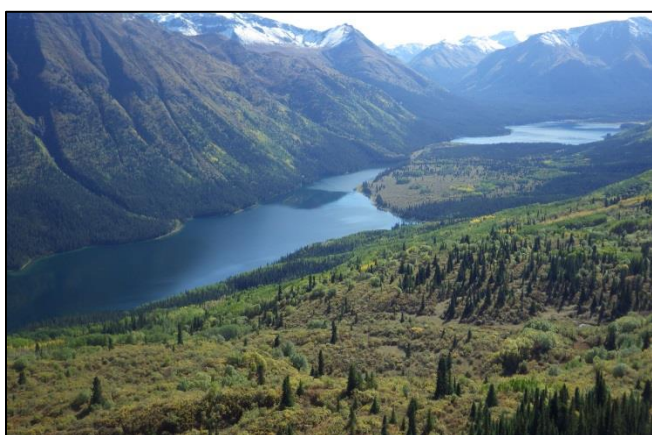


Figure 35.–Kluea Lake (left) and Todagin Lake (right).



Figure 36.–Open pit mine operation.

Email cc:

- Al Ott, ADF&G Habitat, Fairbanks
- ADF&G Habitat Staff, Douglas
- David Rogers, ADF&G Habitat, Juneau
- Judy Lum, ADF&G SF, Douglas
- Lowell Fair, ADF&G CF, Douglas
- Kyle Moselle, DNR OPMP, Juneau
- Brent Murphy, Seabridge Gold, Toronto
- Kathy Eichenberger, EMPR, BC