

TRIP REPORT

*State of Alaska
Department of Fish and Game*

Field Date(s): July 6 - 11, 2020

Location(s): **Red Dog Mine/ Anarraaq Prospect**

Objective(s): Periphyton, aquatic invertebrate and mussel sampling

Participant(s): Audra Brase and Maria Wessel

Weather: Two days of low clouds & light rain, remainder were sunny and pleasant

Access: Pick-up truck and helicopter

On July 6, we flew to Red Dog Mine to perform a portion of the annual biomonitoring projects in the area. Specific tasks we planned to perform were: 1) collect periphyton and aquatic invertebrate samples; 2) survey for aquatic mussels; 4) document current conditions at the Kaviqsaq seep on upper Middle Fork Red Dog Creek; and 5) document turbidity that continues to be observed in the area's drainages.

Periphyton and Aquatic Invertebrates

A total of 12 sites were visited and sampled for periphyton and aquatic invertebrates and 5 additional sites were sampled for just periphyton (Table 1). Water levels were low and weather conditions were good which allowed for successful sampling and surveying at all locations (Figure 1).



Figure 1. Periphyton sampling at Ikalukrok Creek downstream of Cub Creek (left), robust mosquito population at Sled Creek (right).

Table 1. List of the locations sampled for periphyton (P), aquatic invertebrates (AI) and/or mussels (M), July 2020.

Sample Site/Name	Sample Program*	Station #	Samples
Upper North Fork Red Dog Creek	APDES	N/A	AI, P, M
Bons Creek, u/s of Bons Pond	WMP	N/A	AI, P
Buddy Creek, u/s of haul road	WMP	221	AI, P
Bons Creek, u/s of Buddy Creek	WMP	220	AI, P
Ikalukrok Creek, u/s of Red Dog mouth	APDES/WMP	9	AI, P
Ikalukrok Creek, d/s of mouth of Dudd	WMP	160	AI, P
Mainstem Red Dog Creek	APDES/WMP	10	AI, P, M
Buddy Creek, below falls	WMP	N/A	AI, P
Middle Fork Red Dog Creek	WMP	20	AI, P
North Fork Red Dog Creek	APDES/WMP	12	AI, P, M
Mainstem Red Dog Creek	APDES/WMP	151	M
Ikalukrok Creek u/s of WF Ikalukrok Creek	Anarraaq	206	P, M
West Fork Ikalukrok Creek	Anarraaq	205	P, M
Ikalukrok Creek d/s of Cub Creek seep	Anarraaq	207	P, M
East Fork Ikalukrok Creek	Anarraaq	208	P, M
Grayling Junior Creek	Anarraaq	209	P, M
Sled Creek	Anarraaq	212	AI, P
Volcano Creek	Anarraaq	N/A	AI, P

* APDES – Alaska Permit Discharge Elimination System; WMP – Waste Management Plan

Mussels

A total of nine sites were surveyed for the presence of freshwater mussels (Table 1). At each of the sample locations we visually surveyed for evidence of mussel presence in slow moving water such as back eddies and/or pools (Figure 2). This included looking for trails in the substrate, live mussels and/or shells from dead mussels. In areas where the visibility was low, we used an Aquascope to obtain a clearer view (Figure 2). No evidence of live or dead mussels was observed at any of the locations.



Figure 2. Utilizing the Aquascope while surveying for mussels at Station 151 Mainstem Red Dog Creek (left) and an example of slow moving back eddy located near Station 206 Ikalukrok Creek upstream of the West Fork (right).

Turbidity

Several streams that are typically clear during our July sampling event were very turbid and either milky white or yellowish orange (Table 2, Figures 3-9). While surveying for mussels, we noted an unidentified white crystalline precipitate on the banks of both West Fork Ikalukrok Creek and Ikalukrok Creek above the West Fork (Figure 10).

Table 2. Descriptions of water at various sampling sites, July 2020.

Sample Site/Name	Station #	Water Notes
Upper North Fork Red Dog Creek	N/A	Clear
Bons Creek, u/s of Bons Pond	N/A	Clear
Buddy Creek, u/s of haul road	221	Clear
Bons Creek, u/s of Buddy Creek	220	Clear
Ikalukrok Creek, u/s of Red Dog mouth	9	Very turbid
Ikalukrok Creek, d/s of mouth of Dudd	160	Very turbid
Mainstem Red Dog Creek	10	Turbid – rocks red
Buddy Creek, below falls	N/A	Clear
Middle Fork Red Dog Creek	20	Very turbid
North Fork Red Dog Creek	12	Very murky
Mainstem Red Dog Creek	151	Turbid – rocks red
Ikalukrok Creek u/s of WF Ikalukrok Creek	206	Milky/ bluish
West Fork Ikalukrok Creek	205	Reddish
Ikalukrok Creek d/s of Cub Creek seep	207	Milky
East Fork Ikalukrok Creek	208	Clear
Grayling Junior Creek	209	Milky
Sled Creek	212	Clear
Volcano Creek	N/A	Clear



Figure 3. Station 151 Mainstem Red Dog Creek - August 2018 (left), July 2020 (right).



Figure 4. Station 10 Mainstem Red Dog Creek - July 2016 (left), July 2020 (right).



Figure 5. West Fork Ikalukrok Creek's confluence with Ikalukrok Creek – August 2018 (left), July 2020 (right).

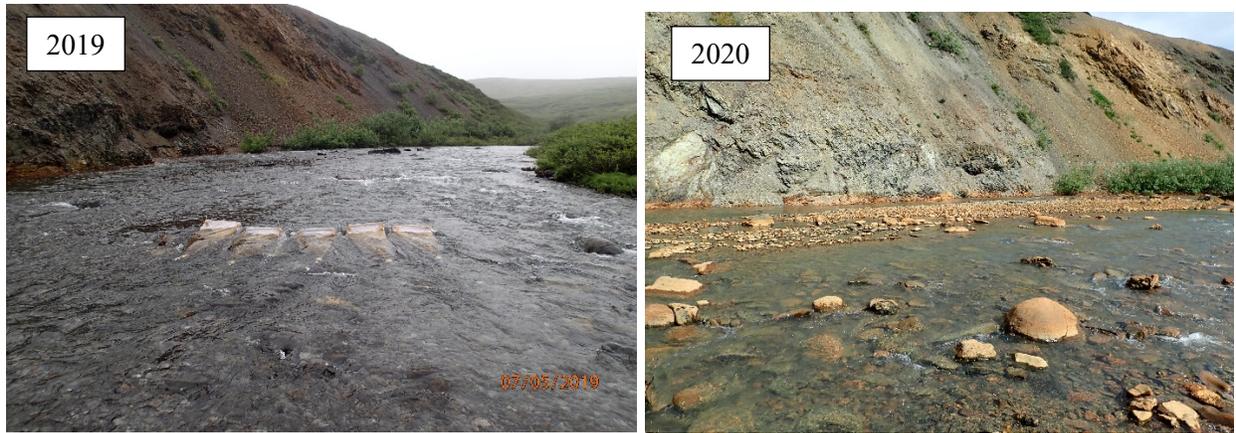


Figure 6. Station 209 Grayling Junior - July 2019 (left), July 2020 (right).



Figure 7. Station 206 Ikalukrok Creek upstream of West Fork - July 2018 (left), July 2020 (right).



Figure 8. Station 9 Ikalukrok Creek upstream of Red Dog Creek - July 2019 (left), July 2020 (right).



Figure 9. Station 160 Ikalukrok Creek downstream of Dudd Creek – July 2018 (left), July 2020 (right)



Figure 10. Unknown white precipitate on riverbank near Station 206 Ikalukrok Creek upstream of West Fork.

Aerial Survey – mineral seeps

On July 11 we utilized the helicopter to fly a circuit to observe and document the status of the various mineral seeps that appear to be impacting the turbidity of the local drainages. There did not appear to be any large scale permafrost slumps and/or other indicators as to what is causing the increased seep activity¹. Several of the seeps appear to be originating in the tundra and are not located near any active mining/ drilling activities (Figures 11 & 12). Ikalukrok Creek is very turbid at Station 160 (Figure 13) and contributes to turbidity in the Wulik River (Figure 14).

During the aerial survey we came across a large herd of caribou in the Upper Ikalukrok Creek drainage (Figure 15), and since the helicopter disturbed them we flew higher and didn't explore the full extent of the upper part of the drainage.

¹ Disclaimer – since both observers are fisheries biologists rather than geologists, we may have missed something.



Figure 11. “Beaver Pond Seep” in tundra adjacent to North Fork Red Dog Creek (left), North Fork Red Dog Creek where water from Beaver Pond Seep is entering the creek (right), July 2020.

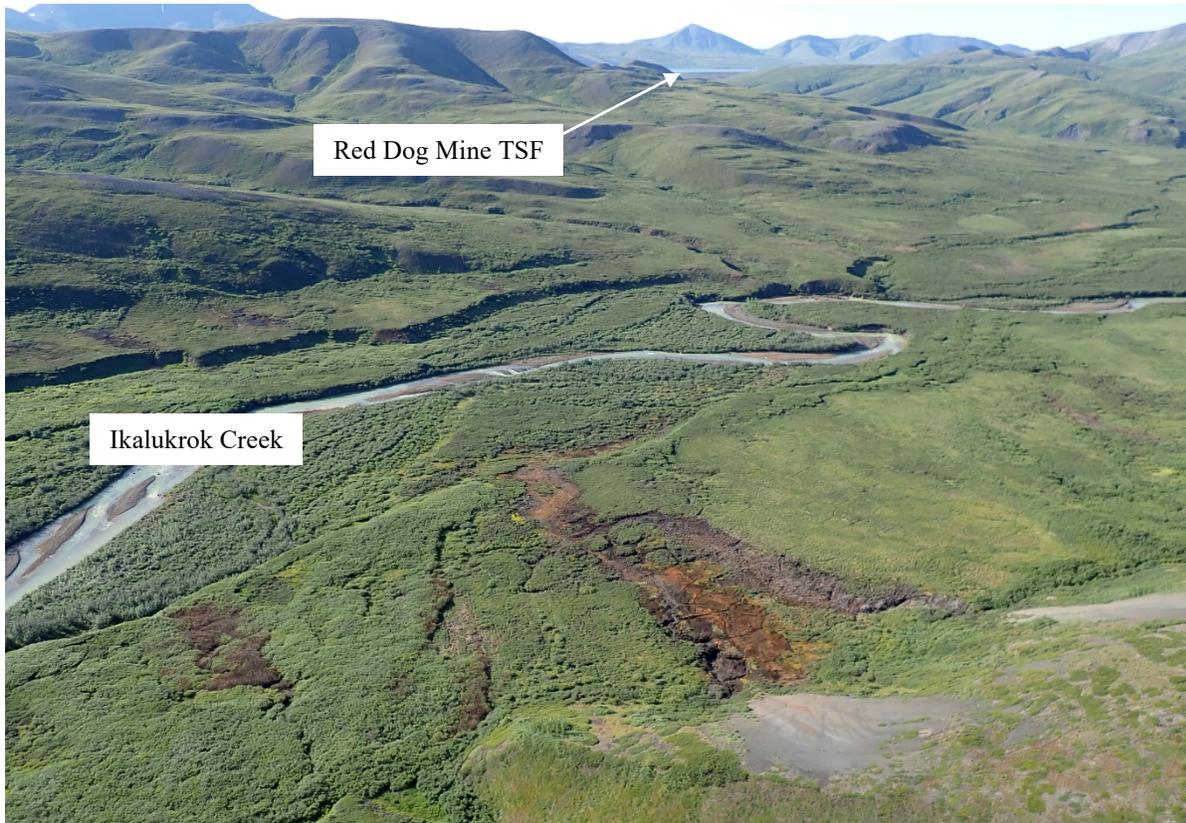


Figure 12. Mineral seeps in tundra adjacent to Ikalukrok Creek above Red Dog Mine site, note the mine TSF in distance, July 2020.



Figure 13. Turbidity at Station 160 Ikalukrok Creek downstream of Dudd Creek, July 2020.



Figure 14. Turbid Ikalukrok Creek entering clear Wulik River, July 2020



Figure 15. Portion of caribou herd in upper Ikalukrok Creek drainage, July 2020.

Glaciated Area

The area where TSF water was pumped to and frozen during the winter has fully drained and the vegetation has greened up. Drainage ditches and berms are still visible (Figure 16).



Figure 16. Formerly “glaciated” upland area where TSF water was pumped and frozen for temporary winter storage, July 2020.

Aerial survey Kaviqsaaq Seep

We flew over the Kaviqsaaq Seep to document current conditions. The seep appears less active than previous years, but there are two seeps upstream of it that appear to be contributing to the staining in the drainage at and below Kaviqsaaq (Figure 17). Frank Bendrick (Red Dog Mine Environmental) made a similar observation a few days after we performed our survey (email to Audra Brase & Chelsea Clawson 7/15/20).



Figure 17. Two unnamed active mineral seeps upstream of Kaviqsaaq Seep, July 2020.