

DE BEERS GROUP

Gahcho Kué Mine

**2020 Aquatic Effects Monitoring Program
Fish Habitat and Community Response Action
Summary**

December 2020

ABBREVIATIONS AND ACRONYMS

Abbreviation / Acronym	Definition
AEMP	Aquatic Effects Monitoring Program
De Beers	De Beers Canada Inc.
DFO	Fisheries and Oceans Canada
Golder	Golder Associates Ltd.
i.e.	that is
KLM watershed	Streams and Lakes in the K, L and M watersheds, downstream of Kennedy Lake
Mine	Gahcho Kué Mine
MVLWB	Mackenzie Valley Land and Water Board
PIT	passive integrated transponder
Q	discharge
SWE	snow water equivalent
WSE	water surface elevation
YOY	young-of-year

UNITS OF MEASURE

Unit / Symbol	Definition
%	percent
<	less than
mm	millimetre
m ³	cubic metre
m ³ /s	cubic meters per second

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1 INTRODUCTION

De Beers Canada Inc. (De Beers) monitors fish habitat and the fish community as well as supporting information such as hydrology in streams downstream of the Gahcho Kué Mine (Mine) and Area 8 of Kennady Lake (Area 8) on an annual basis as a component of the Aquatic Effects Monitoring Program (AEMP; De Beers 2016). The AEMP is a requirement of the Water Licence MV2005L2-0015, issued by the Mackenzie Valley Land and Water Board (MVLWB, the Board; MVLWB 2018). The fish habitat and community component of the AEMP evaluates the potential effects of the Mine on fish populations and provides information on potential effects on traditional uses of fish. The hydrology monitoring component of the AEMP evaluates potential changes to water quantity in the water bodies downstream of the Mine.

The results of the 2020 fish habitat and community monitoring suggest that Arctic Grayling were either absent or at very reduced levels of occupancy in study watercourses and waterbodies within the KLM watershed (i.e., study area). This is consistent with results summarized for 2017, 2018, and 2019 monitoring programs (De Beers 2018a, 2019a). De Beers has submitted annual AEMP Response Plans for the fish habitat and community component of the AEMP in fulfillment of Part I, Condition 7 of the Water Licence (i.e., De Beers 2018b, 2019b, 2020). As part of the 2019 AEMP Response Plan (De Beers 2020), De Beers committed to providing the Board with a Response Action Summary report of the flow and fish catch results of the 2020 monitoring program and associated Response Actions carried out in 2020. This summary will also be provided to Fisheries and Oceans Canada (DFO) as part of De Beers' commitment to ongoing engagement with DFO on the *Fisheries Act* Authorization (Authorization 03- HCAA-CA6-0057.1) for the Mine.

The Response Actions detailed in the current AEMP Response Plan (De Beers 2020) include the following:

- Confirmation of Low and Moderate Action Level exceedances in 2020, in terms of spatial and temporal extent. This includes a continuation of the 2018 Special Effects Study in 2020, using the same methods as were used in 2018, to determine if Arctic Grayling are present within the KLM watershed, and to determine if they are present in further downstream reaches.
- Updating the underwater video surveys from the pole-mounted underwater cameras used in 2018 to the use of an alternative method to improve fish detection, specifically the use of underwater drones to detect fish within Area 8, Lake M4, and Lake M3 in 2019; given the inherent challenges of underwater detection of fish on imagery using cameras, continued investigation of an alternative was proposed that included the detection of fish in deeper lake habitats.
- Continuation of the Slimy Sculpin density surveys as part of the 2020 AEMP field program. The purpose is to examine whether there are any significant changes in the density of Slimy Sculpin over time within selected habitats in key streams within the study area, compared to selected habitats in reference streams. Additional reference sites in the N and P watersheds were selected to increase the spatial scale and improve uncertainty in the reference site density estimates.

Preliminary fish catch and downstream flow monitoring data from 2020 and an update to the ongoing Response Actions from 2019 are summarized in this report.

2 ACTION LEVEL EXCEEDANCES

The currently approved Action Levels and an annual summary of exceedances are presented in Table 2-1.

In 2020, the Low Action Level was exceeded based on the following:

- Arctic Grayling adults not moving to spawning areas within the normal spring period (as per baseline information); and
- Arctic Grayling fry not present in the system and/or not distributed similar to baseline.

In 2020, the Moderate Action Level was exceeded based on observed continued absence of Arctic Grayling compared to the previous year. No confirmed Arctic Grayling were observed during the 2020 spring, summer, or fall programs (Section 3). There were three unconfirmed sightings of fish at the Lake 410 outlet in August 2020, which were likely Arctic Grayling based on habitat, feeding behaviour, and the previous presence of Arctic Grayling in this area .

In 2020, the High Action Level was not exceeded. The High Action Level, which was approved by the Board under the 2018 AEMP Response Plan (De Beers 2019b), includes criteria related to the presence of Arctic Grayling as well as other fish species (i.e., Northern Pike and Slimy Sculpin). Although there is a sustained absence of Arctic Grayling adults moving into spawning areas within the normal spring period, Northern Pike and Slimy Sculpin are found throughout the KLM watershed and preliminary results indicate that the density of Slimy Sculpin is similar to reference sites. A complete analysis of Slimy Sculpin densities will be presented in the 2020 AEMP Annual Report.

This report serves as notification that the Low and Moderate Action Level thresholds related to Flow Mitigation were triggered in 2020.

Table 2-1 Summary of Action Levels and Annual Exceedances for the Fish Habitat and Community Component of the Aquatic Effects Monitoring Program

Action Level	Streams Downstream of Area 8	Criteria for Exceedance Met			
		2017	2018	2019	2020
<p>Low-level exceedance^(a) <i>Effects are measurable but well below the Significance Threshold – trigger meant as a warning and requirement for further evaluation</i></p>	<p>During operations, for the years where flow mitigation is provided, downstream flows are <0.4 m³/s during the period of Arctic Grayling migration^(b)</p> <p>OR Arctic Grayling adults are not moving to spawning areas within the normal spring period (as per baseline information)</p> <p>OR Arctic Grayling fry are not present in the system and/or not distributed similar to baseline</p>	✘	✔	✔	✔
<p>Moderate-level exceedance^(c) <i>Effects are measurable and are trending towards the Significance Threshold, but still well below it</i></p>	<p>Arctic Grayling are absent during the subsequent monitoring year</p>	✘	✔	✘	✔
<p>High-level exceedance^(d) <i>Measured effects continue to trend towards the Significance Threshold</i></p>	<p>Sustained absence of Arctic Grayling adults moving into spawning areas within the normal spring period</p> <p>OR Sustained absence of Arctic Grayling young-of-year (YOY) from the KLM watershed for a period of four consecutive years</p> <p>AND Northern Pike are not detected for two consecutive years at Area 8 and Stream K5</p> <p>OR Slimy Sculpin YOY are absent during two consecutive years within the KLM watershed and relative to reference locations</p> <p>OR Slimy Sculpin density shows a statistically significant decreasing temporal trend across a four-year period within the KLM watershed and relative to reference locations</p>	✘	✘	✘	✘

a) The Low Action Level was approved as part of the AEMP Design Plan Version 5 (De Beers 2016).

b) Not triggered by sustaining downstream flow in Stream K5 at 0.4 m³/s or above during the period of Arctic Grayling migration, which may occur between late May and the end of June depending on annual ice-out conditions.

c) The Moderate Action Level was approved under the 2017 Aquatic Effects Monitoring Program Response Plan - Fish Habitat and Community – Version 2 (De Beers 2018b).

d) The High Action Level was approved under the 2018 Aquatic Effects Monitoring Program Response Plan – Fish Habitat and Community – Version 3 (De Beers 2019b).

✘= criteria for exceedance not met; ✔= criteria for exceedance met.

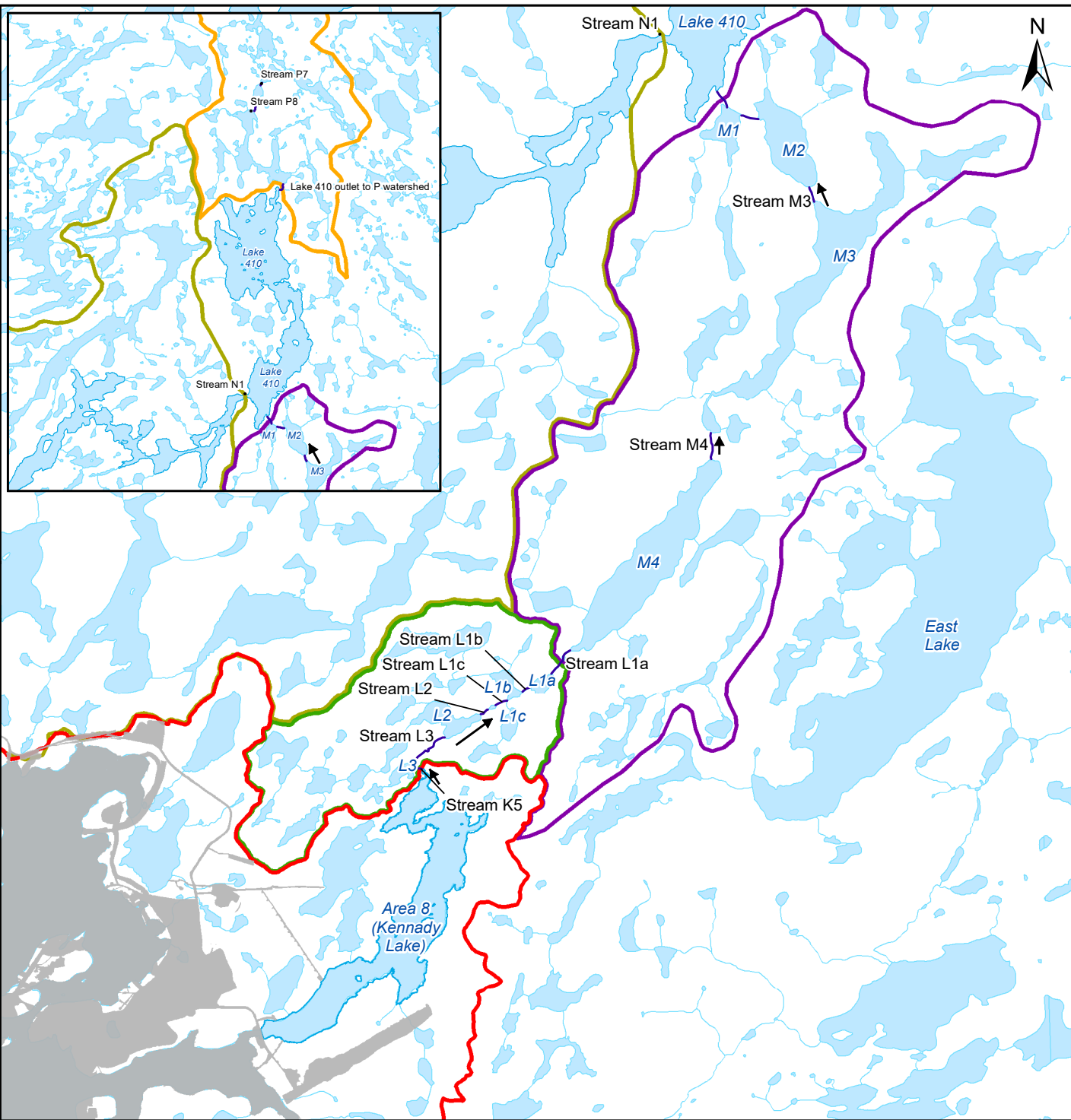
3 FIELD PROGRAM SUMMARY

In 2020, three field surveys were conducted during the open-water season, covering a range of flow conditions and life history stages of Arctic Grayling:

- June 16 to June 30, 2020 covered an extended period over late spring conditions (Spring Survey);
- July 28 to August 11, 2020 covered summer conditions (Summer Survey); and
- August 25 to September 8, 2020 extended over low-flow conditions during late summer and overlapped with ramp-down of flow augmentation (Fall Survey).

The same study area (Map 3-1) and sampling and survey methods used in 2018 and 2019 were repeated in 2020:

- Downstream flow monitoring:
 - seasonal manual discharge and *in situ* water quality measurements in Streams K5 and L1a;
 - continuous water temperature monitoring in Streams K5 and L1a between the Spring and Fall Surveys;
 - seasonal fish passage and barrier assessments between Area 8 and Lake 410, at previously identified barriers to fish passage; and
 - seasonal depth and velocity measurements in study watercourses within the KLM watershed between Area 8 and Lake 410, including measurements at the hydrometric stations located in the outlet channels of Area 8, Lake L1a, Lake M4, and Lake M2.
- Fish species presence and distribution monitoring:
 - spring fish fence operation in Streams K5 and L1a;
 - continuous passive integrated transponder (PIT) tag monitoring program of tagged fish at antenna sites in Streams K5 and L1a; and
 - Extended sampling and visual observations at selected streams and lakes between Area 8 (Kennedy Lake) and Stream P7 in the P watershed, including single beam sonar surveys, combined with angling methods to improve species detections in Area 8, Lake M4 and Lake M3 in 2020;
 - Slimy Sculpin density surveys in targeted streams within the KLM watershed and reference sites in the N and P watersheds. In 2020, two additional sites (Streams N1 and P7) were added and two of the three sampling sites in the outlet of Lake 410 were removed to increase the spatial extent of the reference sites.
- Seasonal, targeted angling in Area 8, Lakes M4 and M3, and Lake 410 outlet.



LEGEND

- Downstream Flow Monitoring Stream
- Flow Direction
- Watercourse
- Waterbody
- 2020 Mine Footprint
- Watershed Boundary**
- Kennady Lake Watershed
- L Watershed
- M Watershed
- N Watershed
- P Watershed

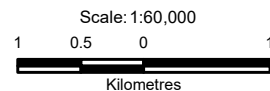
NOTES

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GAHCHO KUÉ MINE

Fish Habitat and Community Study Area, 2020

PROJECTION: UTM Zone 12 DATUM: NAD83



DE BEERS GROUP

FILE No: AEMP-2020-GIS-FishStudyArea_Extent_Rev0 DATE: November 18, 2020

JOB NO: 19128209 REVISION NO: 0

OFFICE: GOLD-CAL DRAWN: AK CHECK: CS

Map 3-1

3.1 Fish Community Surveys

In 2020, fish were sampled and surveyed in streams and lakes throughout the KLM watershed with a fish fence program, visual observation surveys, backpack electrofishing, and angling. Fish habitat and fish community were successfully characterized by these data collections. The results presented here are preliminary in nature and will be finalized for the 2020 AEMP Annual Report.

3.1.1 Fish Fence Catch

Two fish fences were installed in Stream K5 and Stream L1a on June 18 and June 19, 2020, respectively, immediately after ice-out in each stream. The fish fence in Streams K5 was removed on July 2, 2020 and the L1a fence was removed on July 3, 2020, after 14 days of continuous operation at each site. A summary of the fish fence catch at Stream K5 and Stream L1a is presented in Table 3-1.

Table 3-1 Fish Fence Catch and Directional Movement Data in Streams K5 and L1a, Spring 2020

Stream	Date	Method	Northern Pike (Adults)	Direction of Movement	Calculated Daily Mean Q (m ³ /s)
K5	19-Jun-20	Fish Fence	1	Upstream	0.53
	20-Jun-20	Fish Fence	2	Downstream	0.50
	21-Jun-20	Fish Fence	1	Upstream	0.48
	21-Jun-20	Fish Fence	1	Downstream	0.48
	22-Jun-20	Fish Fence	1	Upstream	0.51
	23-Jun-20	Fish Fence	1	Downstream	0.58
	24-Jun-20	Fish Fence	8	Upstream	0.56
	26-Jun-20	Fish Fence	9	Upstream	0.54
	26-Jun-20	Fish Fence	1	Downstream	0.54
	27-Jun-20	Fish Fence	3	Upstream	0.52
	28-Jun-20	Fish Fence	1	Upstream	0.51
	29-Jun-20	Fish Fence	2	Upstream	0.49
01-Jul-20	Fish Fence	1	Upstream	0.40	
L1a	20-Jun-20	Fish Fence	1	Upstream	0.79
	20-Jun-20	Fish Fence	2	Downstream	0.79
	21-Jun-20	Fish Fence	1	Upstream	0.75
	21-Jun-20	Fish Fence	3	Downstream	0.75
	22-Jun-20	Fish Fence	2	Downstream	0.72
	23-Jun-20	Fish Fence	1	Upstream	0.70
	23-Jun-20	Fish Fence	2	Downstream	0.70
	24-Jun-20	Fish Fence	1	Upstream	0.71
Total			45		

Notes: All results presented are preliminary and will be finalized in the 2020 AEMP Annual Report.

Q = discharge calculated from an open-water rating curve from a daily mean of continuous water surface elevation (WSE) recorded by a transducer in Area 8 (applicable to Stream K5 Q) and in Lake L1a (applicable to Stream L1a Q); N/A = not applicable.

No Arctic Grayling were documented moving through the fish fences in 2020 (Table 3-2), which is consistent with the observations made in 2017, 2018, and 2019. Adult Northern Pike was the only species captured during 2020 fish fence operations, in both the Stream K5 and Stream L1a fish fences. Of the 45 Northern Pike captures, representing 40 individual fish (i.e., 5 Northern Pike were captured twice), 66% were fish moving in an upstream direction. Captures of Northern Pike at Stream L1a were elevated compared to 2019 catch (13 versus 4 captures). Captures of Northern Pike at the Stream L1a appear to coincide with the operation of the flow augmentation program. Northern Pike captures at the Stream K5 fish fence have remained consistently higher than captures at the Stream L1a fish fence over the monitoring years.

Table 3-2 Total Catch by Species at Streams K5 and L1a, 2014 To 2020

Year	Stream K5			Stream L1a	
	Species			Species	
	Arctic Grayling	Northern Pike	Lake Trout	Arctic Grayling	Northern Pike
2014	25	8	5	1	2
2015	7	-	-	-	-
2016	3	26	-	-	-
2017	-	19	-	-	-
2018	-	6	-	-	-
2019	-	28	-	-	4
2020	-	32	-	-	13

- = no fish observed.

3.1.2 Visual Observations

Visual observational surveys were conducted in streams K5 and M2, and Lake 410 outlet during the Spring Survey, and in streams K5 and L2 during the Summer Survey, and in Stream K5, Area 8, Lake M4, Lake M3, and Lake 410 outlet during the Fall Survey. A summary of the visual observations of large-bodied fish species is presented in Table 3-3, and includes observations from the visual observational surveys, as well as incidental observations from the fish fence, angling, and backpack electrofishing surveys.

Table 3-3 Large-Bodied Fish Observations in Streams and Lakes Downstream of Kennady Lake in 2020

Habitat	Location	Date	Fish Species Observed		
			Northern Pike	Burbot	Unconfirmed Arctic Grayling
Stream	K5	20-Jun-20*	7	-	-
		22-Jun-20	1	-	-
		26-Jun-20	2	-	-
		29-Jul-20*	2	-	-
		01-Aug-20*	1	-	-
		06-Aug-20*	1	-	-
	28-Aug-20*	1	-	-	
	L2	01-Aug-20*	2	-	-
	L1a	20-Jun-20	1	-	-
		21-Jun-20	1	-	-
		22-Jun-20	1	-	-
	M2	24-Jun-20*	1	-	-
	M4	03-Aug-20	-	2	-
	N1	08-Aug-20	-	2	-
	L410 Outlet	27-Jun-20*	1	-	-
		31-Jul-20	1	-	-
		05-Aug-20	2	-	-
28-Aug-20*		-	-	3 ^(a)	
P7	08-Aug-20	1	-	-	
Lake	Area 8	09-Aug-20	8	-	-
		28-Aug-20*	5	-	-
	M3	30-Aug-20*	1	-	-
	M4	28-Jun-20	1	-	-
		04-Sep-20*	1	-	-
Total			42	4	3

Note: *systematic visual shoreline surveys (other records are incidental observations); a) Unidentified fish species observed rising to surface to feed at tail end of riffle/pool habitat. Species and size could not be confirmed but the observed fish were suspected to be Arctic Grayling based on habitat and feeding behaviour (i.e., rising to surface to feed) and previously confirmed Arctic Grayling observations at the same location in 2018.

- = no fish observed.

Fish were observed throughout most of the streams and lakes between Area 8 and the outlet of Lake 410 into the P watershed in 2020. No confirmed sightings of Arctic Grayling, including young-of-year (YOY), were recorded in any of the streams and lakes between Area 8 and the outlet of Lake 410 into the P watershed. Three fish of unverified species were observed during visual surveys completed on 28 August 2020 in the Lake 410 Outlet, rising to the surface to feed within a riffle-pool sequence. Species and size

could not be confirmed but the observed fish were suspected to be Arctic Grayling based on habitat and feeding behaviour (i.e., rising to surface to feed) and previously confirmed Arctic Grayling observations at the same location during a snorkel survey in 2018.

The systematic visual observational surveys, which were completed at streams K5, L2, and M2, Lake 410 outlet, and lakes M3, and M4, yielded 23 Northern Pike observations, including adults (n=11), juveniles (n=10), and two of unknown age class. Other observations of Northern Pike included 19 incidental observations made while completing other surveys. Incidental observations of small-bodied fish such as Slimy Sculpin (n=110) were noted during backpack electrofishing efforts. Slimy Sculpin that were observed but not captured during an electrofishing pass were likely to be captured during subsequent passes within an isolation area. Other species observed during backpack electrofishing included Burbot (n=4), Northern Pike (n=2), and unknown species (n=1).

In addition to the visual observations reported in Table 3-3, the abundance and distribution of fish targets identified during single beam sonar surveys of lakes M3 and M4, and Area 8 were qualitatively described in the field during angling surveys. The sonar data will be presented in the 2020 AEMP Annual Report.

3.1.3 Backpack Electrofishing Catch

Single-pass backpack electrofishing was conducted once in Lake 410 outlet during the 2020 Summer Survey. Multi-pass backpack electrofishing was also conducted in selected streams during the 2020 Summer Survey. The multi-pass efforts specifically targeted Slimy Sculpin habitat, which was conducted in isolated sections of targeted streams within the L, M, N, and P watersheds (i.e., Streams L2, L1a, and L1b, and Streams M2, M3, M4, N1, and P7). Streams N1 and P7 were added locations in 2020 to expand the spatial extent of reference sites downstream of Lake 410 and to better address density estimate uncertainty by selecting more suitable Slimy Sculpin habitat for sampling. Two sites that had been sampled within the Lake 410 outlet in the 2019 season were removed in 2020 because they produced highly uncertain density estimates due to low catches and difficulties with sampling due to the complex cover provided by large boulders at the sites. Within the isolated areas of each stream section, three to four electrofishing passes were conducted for the capture and removal of Slimy Sculpin.

A summary of the combined backpack electrofishing catch, by stream, is presented in Table 3-4. Detailed analysis of the targeted multi-pass electrofishing data and Slimy Sculpin densities will be presented in the 2020 AEMP Annual Report. Fish, primarily Slimy Sculpin, were captured in all of the sampled streams between Area 8 and the Lake 410 outlet into the P watershed. No Arctic Grayling were captured in 2020.

Table 3-4 Backpack Electrofishing Catch in Streams Downstream of Kennady Lake in 2020

Stream	Date	Fish Species Captured			
		Burbot	Northern Pike	Slimy Sculpin	Lake Chub
L410 Outlet ^(a)	31-Jul-20	1	-	3	-
L410 Outlet -Site 1	05-Aug-20	1	-	4	-
L410 Outlet -Site 2	07-Aug-20	2	2	7	-
L410 Outlet -Site 3	07-Aug-20	1	2	1	-
L1a	02-Aug-20	-	-	31	-
L1b	31-Jul-20	-	-	8	-
L2	01-Aug-20	-	3	6	1
M2	04-Aug-20	11	1	26	-
M3	04-Aug-20	23	-	49	-
M4	03-Aug-20	16	1	44	-
N1	08-Aug-20	5	-	16	-
P7	08-Aug-20	-	4	-	-
Total		60	13	195	1

a) Single pass backpack electrofishing; all other electrofishing surveys included multi-pass electrofishing
- = no fish captured.

3.1.4 Angling Catch

Angling was conducted in three of the larger lakes within the study area (i.e., Area 8, and Lakes M3 and M4) as well as in the Lake 410 outlet during the 2020 Spring and Summer Surveys. A summary of the angling catch data is presented in Table 3-5. Northern Pike were caught in all three lakes and the Lake 410 outlet. Lake Trout were caught in Lake M3 and Lake M4. No Arctic Grayling were caught in 2020.

Table 3-5 Angling Catch in Area 8, Lakes M3 and M4, and Lake 410 Outlet in 2020

Lake	Date	Fish Species Captured	
		Northern Pike	Lake Trout
Area 8	09-Aug-20	14 (6)	-
Lake M3	08-Aug-20	1	7
Lake M4	18-Jun-20	-	-
	28-Jun-20	1 (1)	-
	01-Aug-20	-	-
	06-Aug-20	-	1
Lake 410 Outlet	27-Jun-20	1	1
	05-Aug-20	-	-
Total		17 (7)	9

Notes: All results presented are preliminary and will be finalized for the 2020 AEMP Annual Report. All angled fish in 2020 were adults based on the measured size of the fish. Fish that were observed but not captured are presented in parentheses.
- = no fish captured.

3.2 Downstream Flow Summary

Flows downstream of Area 8 were monitored in 2020 as part of the AEMP hydrology component and downstream flow monitoring programs. In addition, flow mitigation pumping rates were monitored by De Beers.

Pumping activities for the 2020 open-water season were identified prior to ice-out based on a late-winter snow water equivalent (SWE; Golder 2020), to allow for the necessary pumping infrastructure to be in place by the time the downstream channels were free of ice (Golder 2012). The information used to estimate hydrological conditions included the previous fall (i.e., 2019) water surface elevation of Area 8, prior to ice-up, as well as the 2019/20 winter snowpack, recorded between April 10 and April 16, 2020. Results indicated a weighted average SWE of 141 mm for the Area 8 watershed. Based on this result, prediction of the likely hydrologic conditions for the spring freshet indicated an “Above Average” hydrologic year (Golder 2020). Details of the AEMP hydrology results will be provided in the 2020 AEMP Annual Report. Preliminary results are presented below in support of the Response Action Summary.

3.2.1 Flow Mitigation Pumping

Flow mitigation pumping from Lake N11 to Area 8 began under-ice on May 29, 2020 in anticipation of ice free conditions to follow within a few days and was ramped up to idling conditions by June 2. Cool temperatures and overcast conditions in early June delayed the melt period later than had been expected. Based on photographs at the outlet of Area 8, the outlet channel was still fully obstructed by ice on June 9, with some minor water ponding beginning to be visible at surface the morning of June 8. Ponded water began to proliferate on June 10 throughout the day and by June 11 at 16:00 a continuous flow path was visible though anchor ice appeared to persist until the afternoon of June 12. The Area 8 outlet appeared to be completely ice free by the morning of June 13.

Pumping was maintained at idling conditions due to a late spring delaying ice free conditions until June 12 when it was temporarily stopped to avoid contribution to flooding at the Area 8 outlet. Pumping was re-started on June 16 and ramped up to 0.41 m³/s by June 26. Pumping fluctuated from 0.39 m³/s to 0.41 m³/s between June 26 and July 6. On July 6, pumping rates ramped down to 0.20 m³/s where they were maintained at that rate between July 8 and August 2, before ramping down to zero on August 4. The total measured volume pumped from Lake N11 to Area 8 during the 2020 Downstream Flow Mitigation was 1,216,373 m³ with an average daily pumping rate of 19,006 m³/day and an average flow rate of 0.22 m³/s.

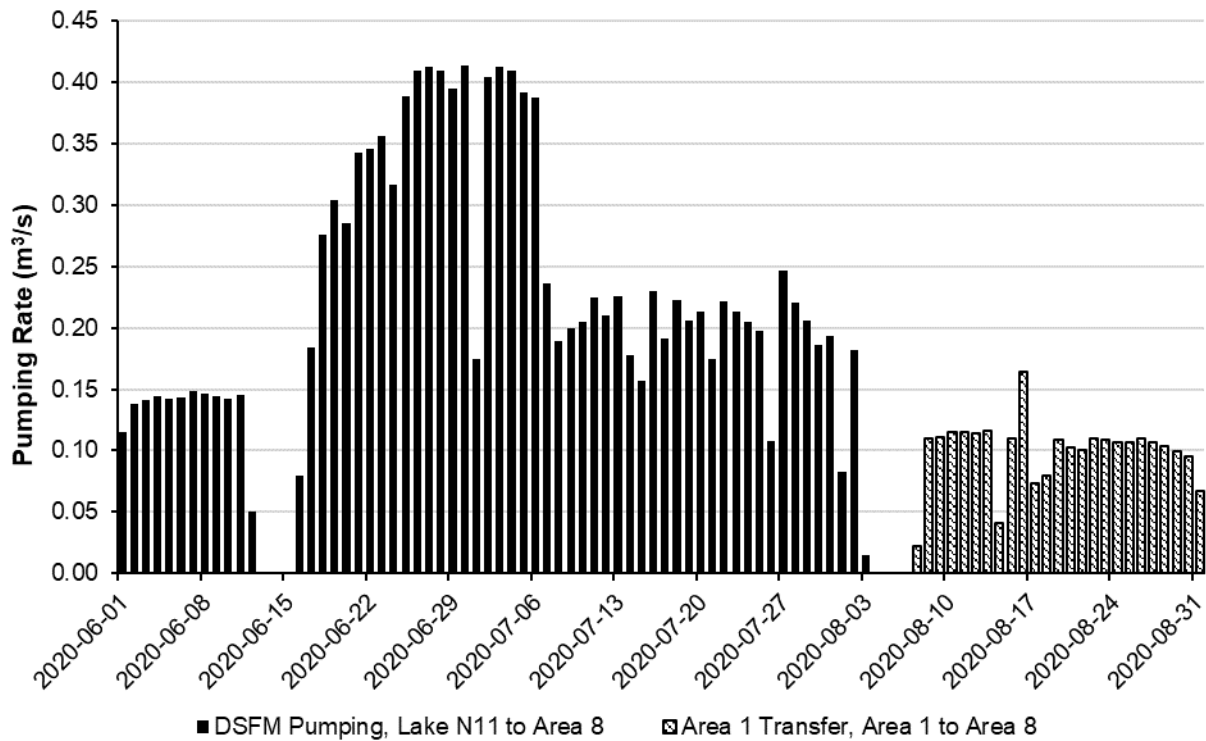
Water transfers from Area 1 to Area 8 occurred in 2020 to draw down Area 1. The pumping from Area 1 to Area 8 began on August 7, ceased on August 31, and totalled 215,570 m³ with an average daily pumping volume of 8,623 m³/day and an average flow rate of 0.10 m³/s.

Minimal operational issues were encountered during the 2020 flow mitigation pumping:

- Pumping was temporarily stopped between June 12 and June 16 to avoid contribution to flooding at the Area 8 outlet.
- Routine pump maintenance resulted a single-day reduction in pumping rate on July 1, 2020.

A summary of the 2020 flow mitigation pumping is presented in Figure 3-1. Flow mitigation pumping was deemed successful in 2020, as the desired flow rates at the outlet of Area 8 was achieved. De Beers will continue to monitor the success of the actions undertaken in 2020 and modify if required.

Figure 3-1 Flow Mitigation Pumping Rates in 2020

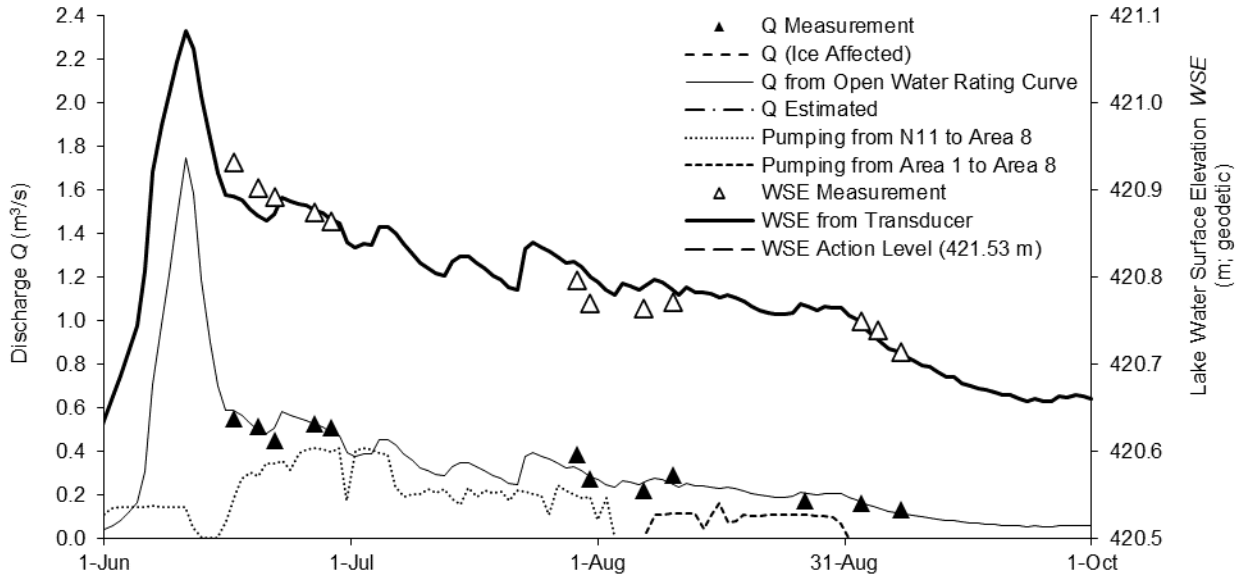


3.2.2 Downstream Flow Monitoring

Downstream flow monitoring included water level monitoring in Area 8 via the De Beers Surveillance Network Program (SNP) stations, as well as water level logging as part of the AEMP hydrology program at Area 8, and Lakes L1a and M4. In addition, manual discharge measurements were recorded during the AEMP hydrology and the downstream flow monitoring field programs. A summary of the preliminary 2020 downstream flow monitoring data at Stream K5 is presented in Figure 3-2.

Calculated discharge values in Stream K5 indicated that the 0.4 m³/s flow target desired for fish passage between Area 8 and Lake 410, was met on June 6, 2020, 2019 and was sustained until July 2, 2020. In addition, the 0.1 m³/s flow target desired for the remainder of the open-water season was achieved to September 9, 2020 when calculated discharge at Stream K5 receded below 0.1 m³/s. The recommended flow mitigations and infrastructure improvements that were implemented in 2020 were considered to have been successful. Finalized results of the collected hydrometric data will be presented in the 2020 AEMP Annual Report.

Figure 3-2 Preliminary Results Flow Mitigation Pumping Rates to Area 8 and Stream Discharge for Stream K5 in 2020



Notes: All results presented are preliminary and will be finalized for the 2020 AEMP Annual Report. Discharge for Stream K5 is calculated from the Area 8 open-water rating curve.

Q = discharge; WSE = water surface elevation.

4 SUMMARY OF FINDINGS

In 2020, a both the Low and Moderate Action Level exceedance for Flow Mitigation were documented. This report serves as notification to the MVLWB on the exceedance for the absence of Arctic Grayling.

Adult Northern Pike were documented in the Stream L1a fish fence operations in the spring, which is the second consecutive year of Northern Pike and third annual record since they were first captured in 2014 in Stream L1a; detections that are concurrent with the flow mitigation program during fish fence operations. It is hypothesized that flow augmentations and generally higher water conditions in 2020 may have increased aquatic connectivity throughout the L watershed and promoted seasonal dispersal of Northern Pike and other species into the stream. Both Lake Trout and Northern Pike remain common large-bodied species in the large lakes, although no Lake Trout were detected in Area 8 in 2020. Slimy Sculpin were found in comparable densities throughout the KLM watershed based on a preliminary analysis of the catch data.

It was predicted that 2020 was to be an “Above Average” hydrologic year (Golder 2020) and hydrology monitoring during the year confirmed above-average flow conditions in the region. Flow mitigation pumping was deemed successful in 2020, as the desired pumping rates and duration of pumping was achieved with minimal operational issues. De Beers will continue to monitor the success of the actions undertaken in 2020 and modify if required.

Calculated discharge values in Stream K5 indicated that the spring flow target desired for fish passage between Area 8 and Lake 410 was met and sustained for the month of June. The flow target desired for the remainder of the open-water season was also achieved. The recommended flow mitigations and infrastructure improvements implemented in 2020 were considered to have been successful. There is some evidence that Northern Pike are benefitting from the flow mitigations, as evidenced by increased captures during flow mitigation, although naturally higher seasonal water levels during 2020, in particular, may also have improved aquatic connectivity and dispersal of Northern Pike through the L watershed.

An AEMP Response Plan will be developed to address the Action Level exceedance that occurred in 2020.

5 REFERENCES

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