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## Mackenzie River Watershed - Lakes

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- **Lake 13-562**
- **Lake 13-563**
- **Lake 14-584**
- **Chapman Lake**
- **Pine Lake 1**
- **Second Wye Lake**
- **Two Moose Lake**
- **Watson Lake**
- **Wolverine Lake**
- **Wye Lake**

## Lake 13-562

### Unnamed lake next to Watson Lake



Figure 1. Lake 13-562 and immediate watershed delineated in black. Adapted from Fradette, 2021.

### Lake and watershed information

<b>LAKE SURFACE AREA</b>	<b>WATERSHED AREA</b>
0.23 km <sup>2</sup>	2.43 km <sup>2</sup>
<b>MAXIMUM DEPTH</b>	<b>POPULATION</b>
7 m	3
<b>AVERAGE DEPTH</b>	<b>ELEVATION</b>
4.5 m	698 m
<b>SAMPLING DATE</b>	<b>AREA FOREST FIRES 2014-2019</b>
2019-07-15	0 km <sup>2</sup>

#### Location

Lake 13-562 is located in Southeastern Yukon, about 3 km North of Watson Lake, on the side of the Robert Campbell Highway. The lake coordinates are 60°04'49.6"N 128°44'44.9"W.

#### Land Use

Lake "13-562" has a 2.43 km<sup>2</sup> watershed, of which 81.0% is natural. 9.6% is composed of water (including the lake itself). 9.3% of the watershed is urbanized, while the remaining 0.2% is comprised of forest loss (Figure 3).

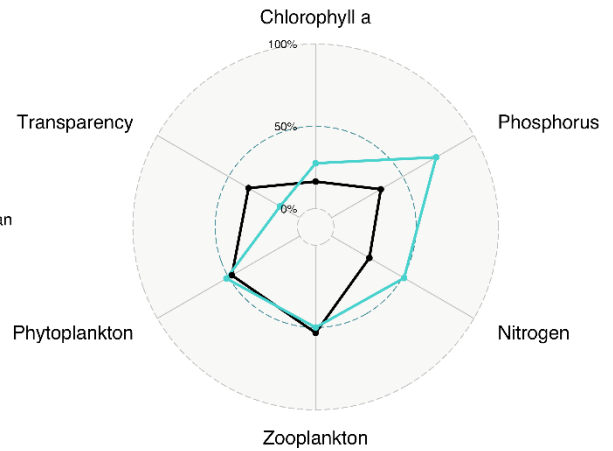


Figure 2. Relative values (rescaled from 0% to 100%) of water quality variables from the mean of all Yukon lakes that were sampled (black) in comparison with Lake 13-562 (blue).

*The results in this report should be interpreted with caution as they represent data collected during a single sampling event. This means that all water quality variables were measured only once during the summer of 2019, and at a single location, for each lake (with the exception of bacteria). For more information on methods please refer to the summary report.*

## Aquatic ecosystem health

### Water color and transparency

Secchi disk depth was measured at 2.8 m on the day of sampling. The color value was of 3.28 mg/L Pt. Dissolved organic carbon had a value of 6.10 mg/L.

### Chlorophyll a, nutrients and trophic status

Total phosphorus (22.55 µg/L) and total nitrogen (0.44 mg/L) values in Lake 13-562 were similar to the Yukon mean (Figure 2). Whereas chlorophyll a (3.07 µg/L) was slightly below the average. According to the Canadian water quality guidelines for the protection of aquatic life, Lake 13-562 is meso-eutrophic.

### Food chain health

Four zooplankton species and 24 phytoplankton species were identified in Lake 13-562, which is similar to Yukon average (Figure 2). Cyanobacteria concentration indicated a low risk of exposure to cyanotoxins, and two potential bloom former / toxin producer species of the cyanobacteria group were identified.

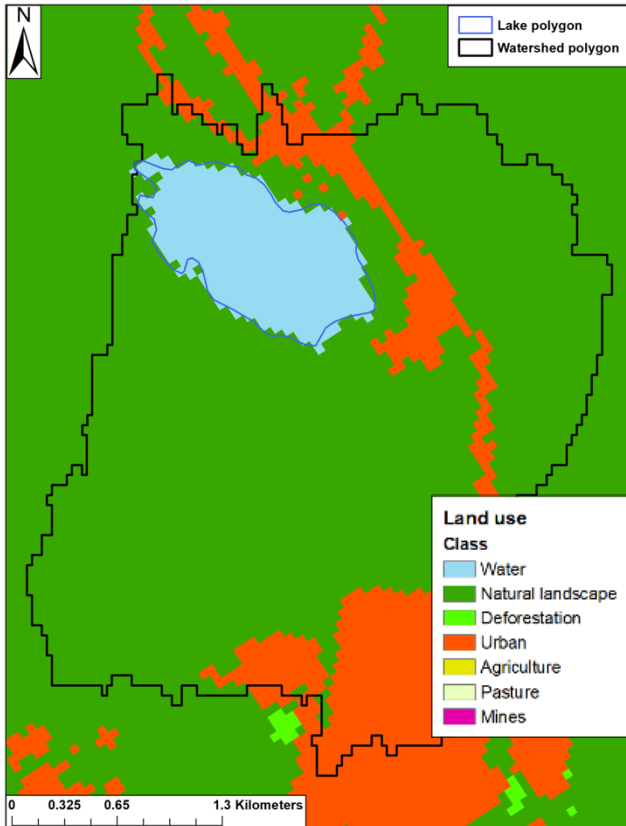


Figure 3. Immediate watershed and land use around Lake 13-562. Figure from Fradette, 2021.

## Did we find contaminants?

### Pesticides

No pesticides, insecticides, or herbicides were found in Lake 13-562.

### Pharmaceuticals

No pharmaceutical products were reported in Lake 13-562.

### Industrial chemicals

No industrial chemicals were reported.

### Fecal coliforms

Fecal coliforms were detected in Lake 13-562, both from the littoral sampling site on the South shore of the lake and from the index site near the deepest point of the lake. However, the fecal bacteria detected were not of the *E. coli* species.

## Change over time

Sediment cores were retrieved from Lake 13-562, but have not yet been analyzed for total metals, diatoms or zooplankton cladoceran temporal changes yet. The longest core was 37.5 cm, which was dated to 1891.



Figure 4. Longest sediment core collected at Lake 13-562.

## Temperature & dissolved oxygen

The temperature profile shows a thermocline at 5.6 m depth, and a hypolimnion at 5.8 m depth on the sampling day (Figure 5). Dissolved oxygen had a value of 102% at the surface of the lake, but reduced to 45% of oxygen in the hypolimnion (Figure 5).

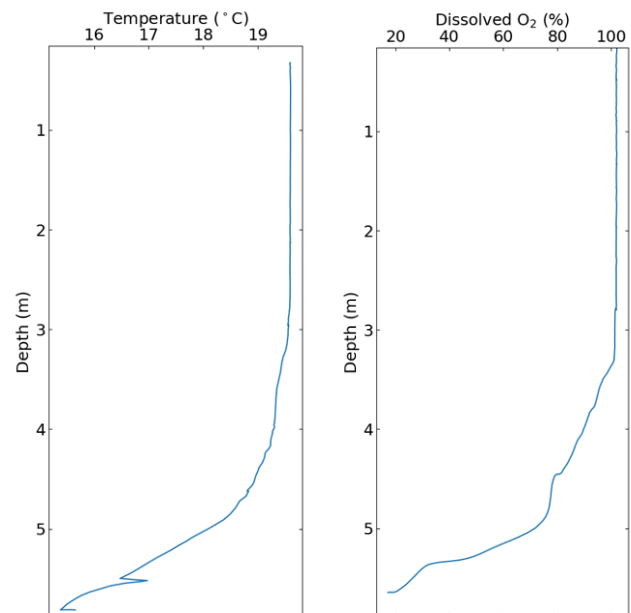


Figure 5. a) Temperature (°C) and b) dissolved oxygen (%) as measured in Lake 13-562. Figures from Fradette, 2021.

## Lake 13-563

Unnamed lake adjacent to Frances Lake



Figure 1. Lake 13-563 and immediate watershed delineated in black. Adapted from Fradette, 2021.

### Lake and watershed information

LAKE SURFACE AREA	WATERSHED AREA
0.12 km <sup>2</sup>	0.61 km <sup>2</sup>
MAXIMUM DEPTH	POPULATION
3 m	0
AVERAGE DEPTH	ELEVATION
2.5 m	831 m
SAMPLING DATE	AREA FOREST FIRES 2014-2019
2019-07-16	0 km <sup>2</sup>

#### Location

Lake 13-563 is located in Southeastern Yukon, 165 km north of Watson Lake. It is located adjacent to the Robert Campbell Highway. The lake coordinates are 61°27'20.4"N 129°44'42.1"W.

#### Land Use

66.0% of Lake 13-563's 0.61 km<sup>2</sup> watershed is natural. 27.5% is composed of water (including the lake itself). Urban land composes 4.4% of the watershed, and the remaining 2.1% is characterized by forest loss (Figure 3).

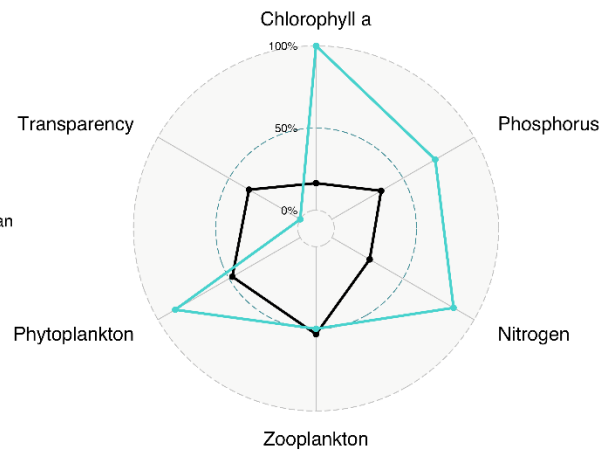


Figure 2. Relative values (rescaled from 0% to 100%) of water quality variables from the mean of all Yukon lakes that were sampled (black) in comparison with Lake 13-563 (blue).

*The results in this report should be interpreted with caution as they represent data collected during a single sampling event. This means that all water quality variables were measured only once during the summer of 2019, and at a single location, for each lake (with the exception of bacteria). For more information on methods please refer to the summary report.*

### Aquatic ecosystem health

#### Water color and transparency

Secchi disk depth was measured at 0.95 m. The color value was 20.86 mg/L Pt. Dissolved organic carbon had a value of 19.60 mg/L Pt.

#### Chlorophyll a, nutrients and trophic status

Total phosphorus (22.37 µg/L) and Chlorophyll a (10.02 µg/L) concentrations in Lake 13-563 were similar to the Yukon average. (Figure 2). Total nitrogen (0.73 mg/L) was above the Yukon average. According to the Canadian water quality guidelines for the protection of aquatic life, Lake 13-563 is meso-eutrophic.

#### Food chain health

Four zooplankton species (also the Yukon mean) were identified in Lake 13-563. Phytoplankton diversity was among the highest of all sampled Yukon lakes, with 36 species identified (Figure 2). Cyanobacteria concentration indicated a low risk of exposure to cyanotoxins, and 2 potential bloom formers / toxin producer species of the cyanobacteria group were identified.

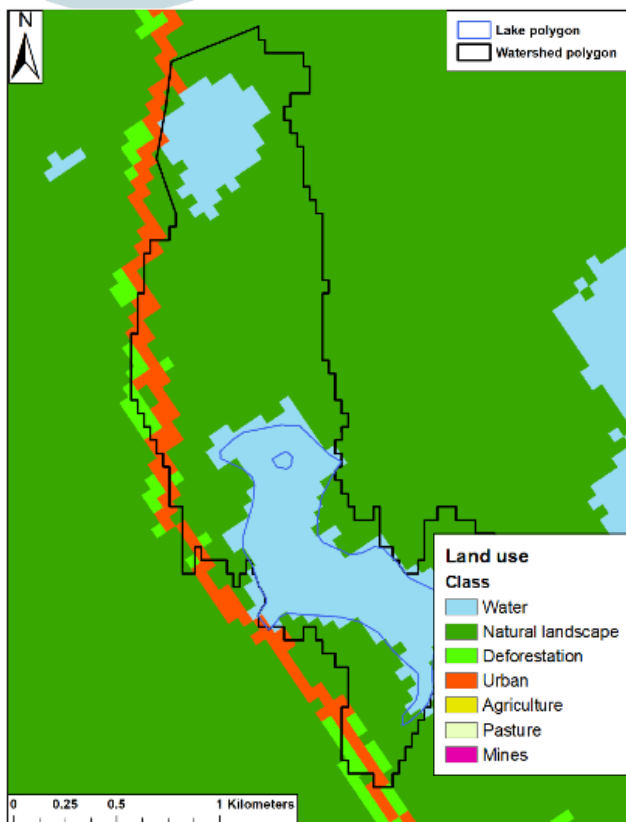


Figure 3. Immediate watershed and land use around Lake 13-563. Figure from Fradette, 2021.

## Did we find contaminants?

### Pesticides

No pesticides, insecticides or herbicides were found in Lake 13-563.

### Pharmaceuticals

No pharmaceutical products were reported in Lake 13-563.

### Industrial chemicals

No industrial chemicals were reported.

### Fecal coliforms

Fecal coliforms were detected in Lake 13-563 at both the littoral sampling site located near the Highway and at the index site near the deepest point of the lake. However, the fecal bacteria detected were not of the *E. coli* species.

## Change over time

The longest core retrieved from Lake 13-563 was 53 cm long (Figure 4a). The bottom of the core was dated to 1946. The analysis of diatom assemblages from the top and the bottom of the core revealed a temporal dissimilarity of 0.47 (Figure 4b).

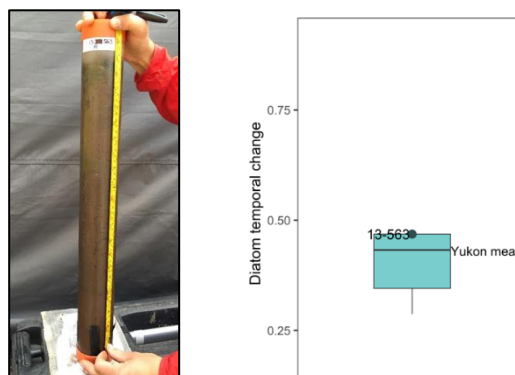


Figure 4. a) The longest sediment core retrieved from Lake 13-563. b) Mean ( $\pm$  Standard error) of Diatom temporal change between the bottom and the top of the core. Lake 13-563 value is indicated with a green point.

## Temperature & dissolved oxygen

Lake 13-563 was not stratified in the 2m temperature profile that was collected. The surface temperature was 17.8°C on the day of sampling (Figure 5a). The oxygen remained elevated throughout the profile, with values around 115% at 2m depth (Figure 5b).

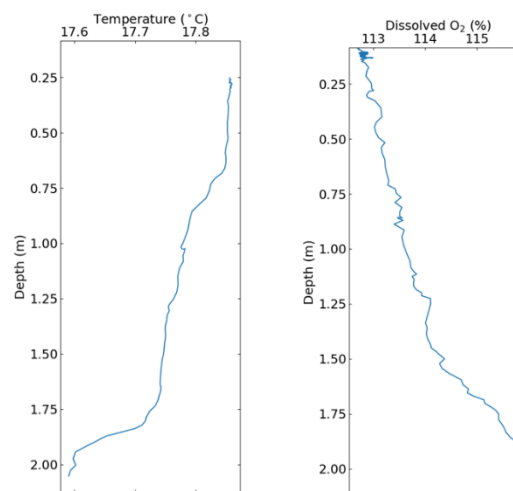


Figure 5. a) Temperature (°C) and b) Dissolved oxygen (%) as measured in Lake 13-563. Figures from Fradette, 2021.

## Lake 14-584

### Unnamed lake in Tombstone Territorial Park

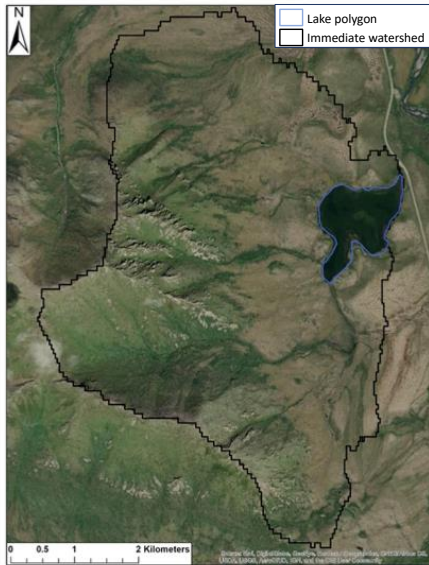


Figure 1. Lake 14-584 and immediate watershed delineated in black. Adapted from Fradette, 2021.

### Lake and watershed information

<b>LAKE SURFACE AREA</b>	<b>WATERSHED AREA</b>
0.21 km <sup>2</sup>	5.04 km <sup>2</sup>
<b>SAMPLING DEPTH</b>	<b>POPULATION</b>
3.3 m	0
<b>AVERAGE DEPTH</b>	<b>ELEVATION</b>
5.3 m	1121 m
<b>SAMPLING DATE</b>	<b>AREA FOREST FIRES 2014-2019</b>
2019-07-26	0 km <sup>2</sup>

#### Location

Lake 14-584 is located in central Yukon, within Tombstone Territorial Park. It lies on the west side of the Dempster Highway. The lake coordinates are 64°39'00.6"N 138°23'31.4"W.

#### Land Use

95.8% of Lake 14-584's 5.04 km<sup>2</sup> watershed is natural. 4.2% is composed of water (including the lake itself). The remaining <0.1% of the watershed is comprised of urbanized land (Figure 3).

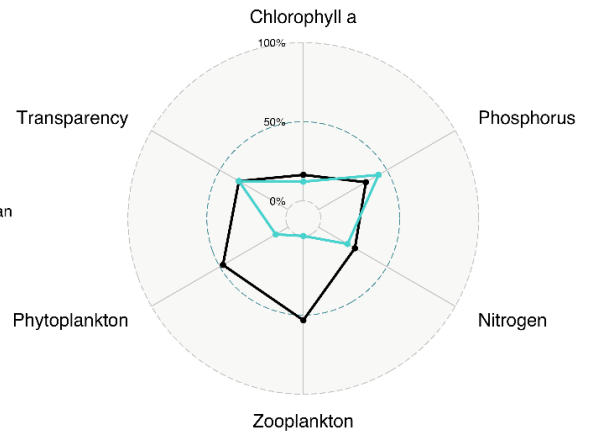


Figure 2. Relative values (rescaled from 0% to 100%) of water quality variables from the mean of all Yukon lakes that were sampled (black) in comparison with Lake 14-584 (blue).

*The results in this report should be interpreted with caution as they represent data collected during a single sampling event. This means that all water quality variables were measured only once during the summer of 2019, and at a single location, for each lake (with the exception of bacteria). For more information on methods please refer to the summary report.*

## Aquatic ecosystem health

### Water color and transparency

Secchi depth was equal to lake depth (secchi was visible at the bottom of the lake at 3.3m depth). The color value was of 16.76 mg/L Pt. Dissolved organic carbon had a value of 7.18 mg/L.

### Chlorophyll a, nutrients and trophic status

Total phosphorus (15.92 µg/L) and total nitrogen (0.20 mg/L) values in Lake 14-584 were both below the Yukon average (Figure 2). Chlorophyll a (1.58 µg/L) was also below the Yukon average. According to the Canadian water quality guidelines for the protection of aquatic life, Lake 14-584 is meso-eutrophic.

### Food chain health

Two zooplankton species were identified in Lake 14-584, which is the lowest zooplankton diversity found in any of the Yukon sampled lakes. Ten phytoplankton species were identified, which was below the Yukon average (Figure 2). Cyanobacteria concentration indicated a low risk of cyanotoxin exposure. One potential bloom former / toxin producer species of the cyanobacteria group was identified.

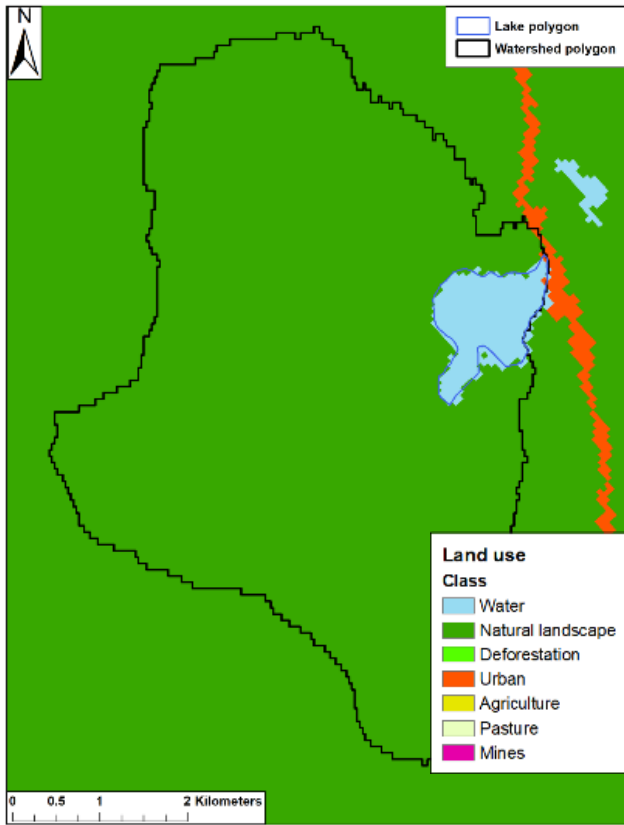


Figure 3. Immediate watershed and land use around Lake 14-584. Figure from Fradette, 2021.

## Did we find contaminants?

### Pesticides

Lake 14-584 was not analyzed for pesticides.

### Pharmaceuticals

Lake 14-584 was not analyzed for pharmaceuticals.

### Industrial chemicals

Lake 14-584 was not analyzed for industrial chemicals.

### Fecal coliforms

No fecal coliforms, including *E. coli* bacteria were detected in Lake 14-584, either from the littoral sampling site near the Dempster Highway from the index site near the deepest point of the lake.

## Change over time

The longest core retrieved from Lake 14-584 was 42 cm long (Figure 4a). The bottom of the core was dated to 1948. The analysis of diatom assemblage from the top and the bottom of the core revealed a temporal dissimilarity of 0.29 (Figure 4b).

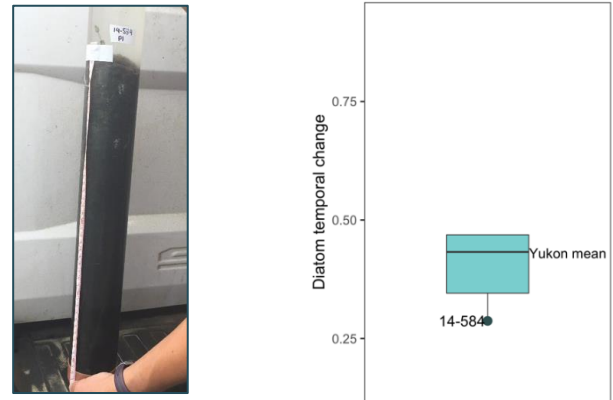


Figure 4. a) The longest sediment core retrieved from Lake 14-584. b) Mean ( $\pm$  Standard error) of diatom temporal change between the bottom and the top of the core. Lake 14-584 value is indicated with a green point.

## Temperature & dissolved oxygen

Stratification was not observed in Lake 14-584. The surface temperature was 15.30°C on the day of sampling. Dissolved oxygen had an average value of 110.4%.

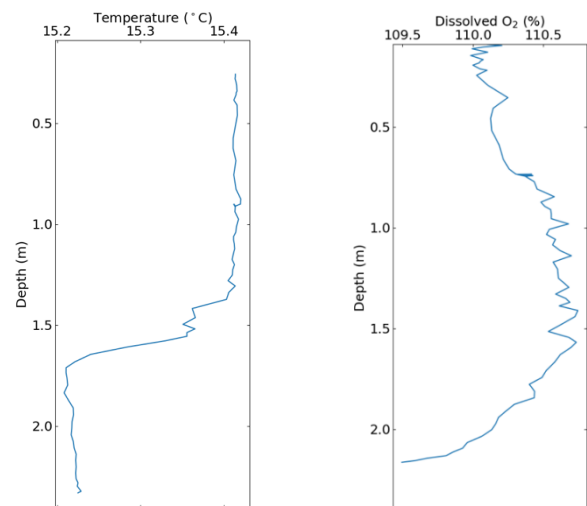


Figure 5a) Temperature (°C) and b) dissolved oxygen (%) as measured in Lake 14-584. Figures from Fradette, 2021.

# Chapman Lake

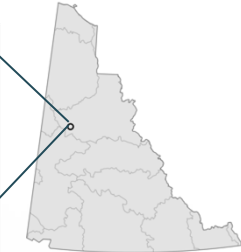


Figure 1. Chapman Lake and immediate watershed. Adapted from Fradette, 2021.

## Lake and watershed information

LAKE SURFACE AREA	WATERSHED AREA
1.29 km <sup>2</sup>	5.30 km <sup>2</sup>
SAMPLING DEPTH	POPULATION
5.2 m	0
AVERAGE DEPTH	ELEVATION
8 m	981 m
SAMPLING DATE	AREA FOREST FIRES 2014-2019
2019-07-27	0 km <sup>2</sup>

### Location

Chapman Lake is located in central Yukon, about 150 km north of Dawson City, on the northwest side of the Dempster Highway.

### Land Use

71.9% of Chapman Lake's 5.30 km<sup>2</sup> watershed is natural. 27.3% is composed of water (including the lake itself). The remaining 0.8% of the watershed comprised of urbanized land including the Dempster Highway (Figure 3).

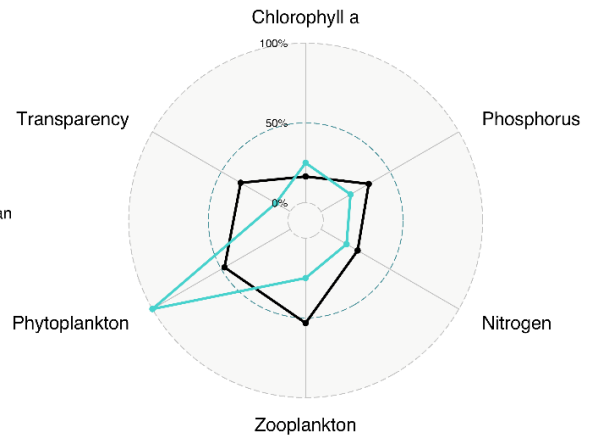


Figure 2. Relative values (rescaled from 0% to 100%) of water quality variables from the mean of all Yukon lakes that were sampled (shown in black) in comparison with Chapman Lake (shown in blue).

The results in this report should be interpreted with caution as they represent data collected during a single sampling event. This means that all water quality variables were measured only once during the summer of 2019, and at a single location, for each lake (with the exception of bacteria). For more information on methods please refer to the summary report.

## Aquatic ecosystem health

### Water color and transparency

Secchi disk depth was measured at 2.4 m on the day of sampling. The color value was 19.44 mg/L Pt. Dissolved organic carbon had a value of 10.58 mg/L.

### Chlorophyll a, nutrients and trophic status

Total phosphorus (10.88 µg/L) and total nitrogen (0.18 mg/L) concentrations in Chapman Lake were below the Yukon mean (Figure 2). Chlorophyll a (2.81 µg/L) was also below the mean. According to the Canadian water quality guidelines for the protection of aquatic life, Chapman Lake is mesotrophic.

### Food chain health

Three zooplankton species were identified in Chapman Lake, which is below the Yukon mean. However, 40 phytoplankton species were identified, which is the highest diversity of all Yukon lakes (Figure 2). Cyanobacteria concentration indicated a low risk of cyanotoxin exposure. Three potential bloom formers / toxin producer species of the cyanobacteria group were identified.



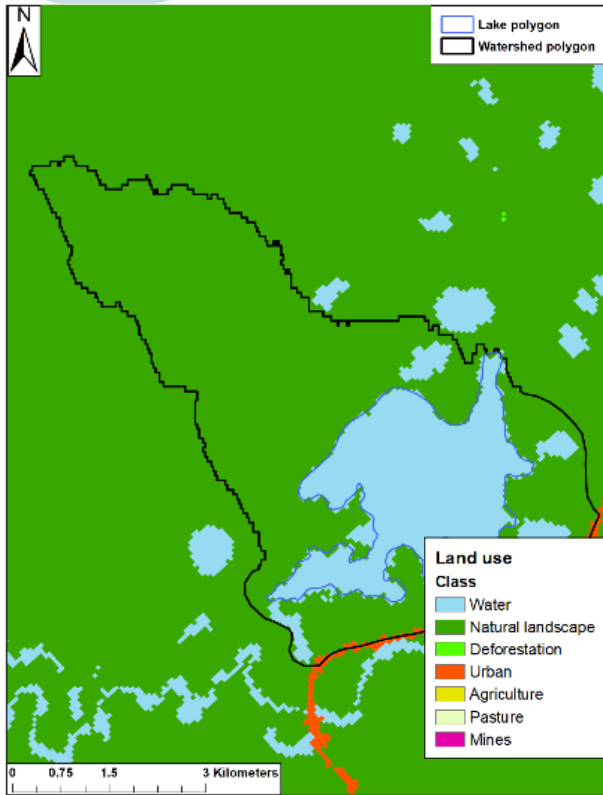


Figure 3. Immediate watershed and land use around Chapman Lake. Figure from Fradette, 2021.

## Did we find contaminants?

### Pesticides

Chapman Lake was not analyzed for pesticides.

### Pharmaceuticals

Chapman Lake was not analyzed for pharmaceuticals.

### Industrial chemicals

Chapman Lake was not analyzed for industrial chemicals.

### Fecal coliforms

Fecal coliforms were detected in Chapman Lake, from the littoral sampling site located on the side of the Dempster Highway. However, the fecal bacteria detected were not of the *E. coli* species and no fecal coliforms were found from the sampling site near the middle of the lake.

## Change over time

The longest core retrieved from Chapman Lake was 48 cm long (Figure 4a). The bottom of the core was dated to 1948. The analysis of diatom assemblage from the top and the bottom of the core revealed a temporal dissimilarity of 0.43 (Figure 4b).

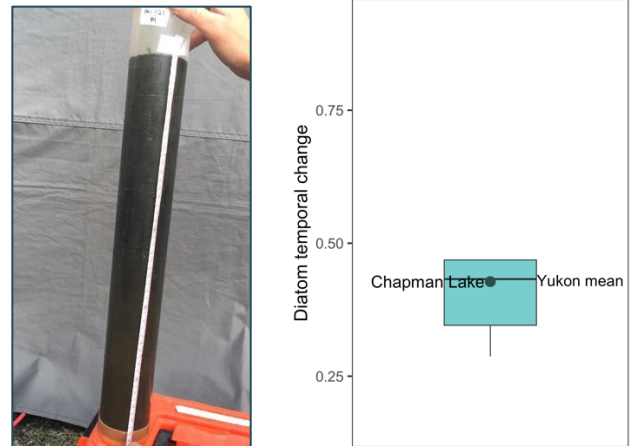


Figure 4. a) The longest sediment core retrieved from Chapman Lake. b) Mean ( $\pm$  Standard error) of diatom temporal change between the bottom and the top of the core. Chapman Lake value is indicated with a green point.

## Temperature & dissolved oxygen

No thermal stratification was observed. The surface temperature was 16.0°C on the day of sampling. Dissolved oxygen had an average value of 102.8%

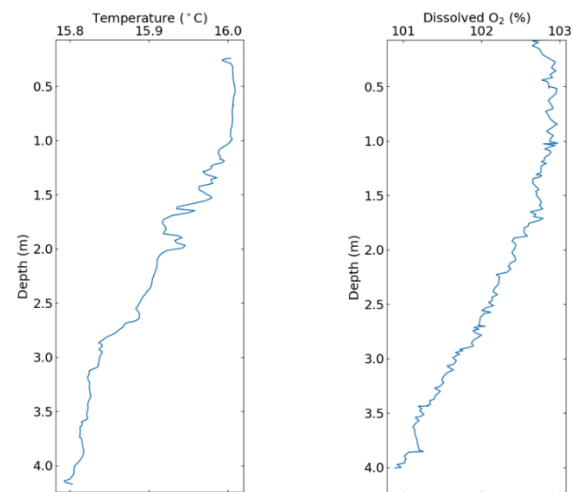


Figure 5. a) Temperature (°C) and b) Dissolved oxygen (%) as measured in Chapman Lake. Figures from Fradette, 2021.

# Pine Lake 1

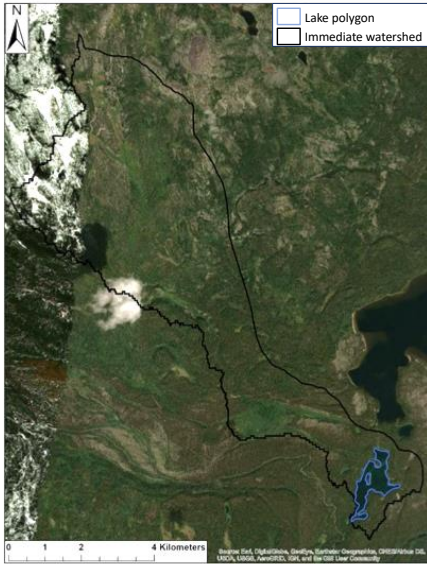


Figure 1. Pine Lake 1 and immediate watershed delineated in black. Adapted from Fradette, 2021.

## Lake and watershed information

LAKE SURFACE AREA	WATERSHED AREA
0.20 km <sup>2</sup>	9.79 km <sup>2</sup>
MAXIMUM DEPTH	POPULATION
10 m	0
AVERAGE DEPTH	ELEVATION
4.6 m	995 m
SAMPLING DATE	AREA FOREST FIRES 2014-2019
2019-07-18	0 km <sup>2</sup>

### Location

Pine Lake 1 is located in Southeastern Yukon, about 15 km north of the Highway Camp at Swift River, and just north of the Pine Lake Airstrip.

### Land Use

96.8% of Pine's Lake 1's 9.79 km<sup>2</sup> watershed is natural. 2.6% is composed of water (including the lake itself). The remaining 0.7% of the watershed is comprised of urbanized land (Figure 3).

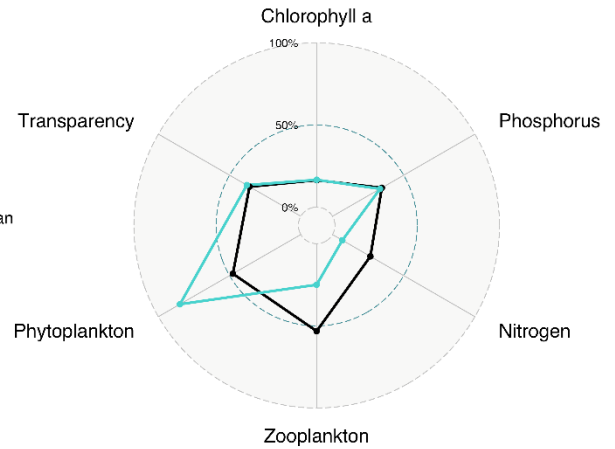


Figure 2. Relative values (rescaled from 0% to 100%) of water quality variables from the mean of all Yukon lakes that were sampled (shown in black) in comparison with Pine Lake 1 (shown in blue).

The results in this report should be interpreted with caution as they represent data collected during a single sampling event. This means that all water quality variables were measured only once during the summer of 2019, and at a single location, for each lake (with the exception of bacteria). For more information on methods please refer to the summary report.

## Aquatic ecosystem health

### Water color and transparency

Secchi disk depth was measured at 6.1 m. The color value was of 2.81 mg/L Pt. Dissolved organic carbon had a value of 2.3 mg/L.

### Chlorophyll a, nutrients and trophic status

Total phosphorus (13.55 µg/L) and total nitrogen (0.08 mg/L) values in Pine Lake 1 were slightly below the Yukon mean (Figure 2). Chlorophyll a (2.02 µg/L) was also below the Yukon mean. According to the Canadian water quality guidelines for the protection of aquatic life, Pine Lake 1 is mesotrophic.

### Food chain health

Three zooplankton species were identified in Pine Lake 1, which is below the sampled Yukon lakes average. However, phytoplankton diversity was above average in Yukon lakes, with 35 identified species (Figure 2). Cyanobacteria concentration indicated a low risk exposure to cyanotoxins, and one potential bloom former / toxin producer species of the Cyanobacteria group was identified.



Figure 3. Immediate watershed and land use around Pine Lake 1. Figure from Fradette, 2021.

## Did we find contaminants?

### Pesticides

Pine Lake 1 was not analyzed for pesticides

### Pharmaceuticals

Pine Lake 1 was not analyzed for pharmaceuticals

### Industrial chemicals

Pine Lake 1 was not analyzed for industrial chemicals

### Fecal coliforms

No fecal coliforms, including *E. coli* bacteria were detected in Pine Lake 1, either from the littoral sampling site on the eastern side of the lake or from the index site near the deepest point of the lake.

## Change over time

The longest core retrieved from Pine Lake was 53 cm long. The bottom of the core was dated to 1947 (Figure 4). Sediment cores have not yet been analysed for total metals, diatoms or zooplankton cladoceran temporal changes.



Figure 4. The longest sediment core from Pine Lake 1.

## Temperature & dissolved oxygen

The temperature profile shows a thermocline at 6.3m, and a hypolimnion at 7.45m on July 18, 2019 (Figure 5a). Dissolved oxygen was around 120% at the surface of the lake, and increased to 149% in the hypolimnion (Figure 5b).

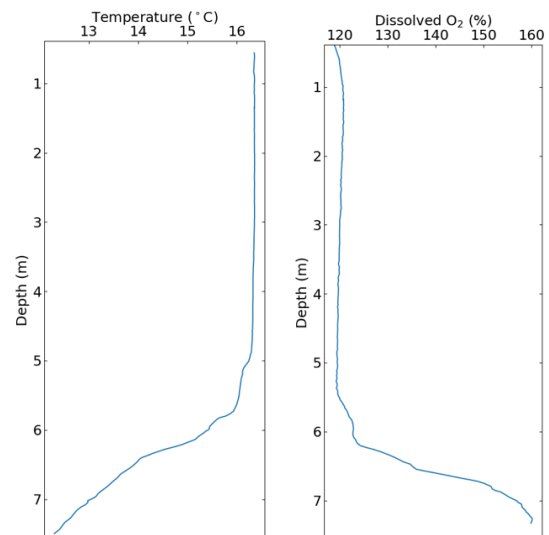


Figure 5. a) Temperature (°C) and b) Dissolved oxygen (%) profiles as measured in Pine Lake 1. Figures from Fradette, 2021.

# Second Wye Lake



Figure 1. Second Wye Lake and immediate watershed delineated in black. Adapted from Fradette, 2021.

## Lake and watershed information

<b>LAKE SURFACE AREA</b>	<b>WATERSHED AREA</b>
0.30 km <sup>2</sup>	22.07 km <sup>2</sup>
<b>MAXIMUM DEPTH</b>	<b>POPULATION</b>
28 m	832
<b>AVERAGE DEPTH</b>	<b>ELEVATION</b>
3.5 m	689 m
<b>SAMPLING DATE</b>	<b>AREA FOREST FIRES 2014-2019</b>
2019-07-16	0 km <sup>2</sup>

### Location

Second Wye Lake is located in Southeastern Yukon, within the community of Watson Lake.

### Land Use

84.1% of Second Wye Lake's 22.07 km<sup>2</sup> watershed is natural. 5.2% is composed of water (including the lake itself). 10.1% of the watershed is urbanized and the remaining 0.6% of the watershed is comprised forest loss (Figure 3).

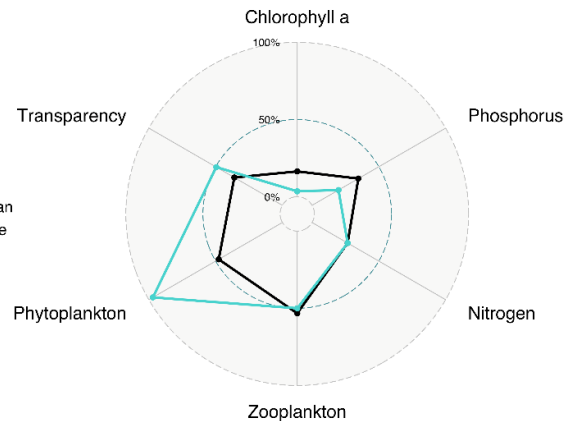


Figure 2. Relative values (rescaled from 0% to 100%) of water quality variables from the mean of all Yukon lakes that were sampled (shown in black) in comparison with Second Wye Lake (shown in blue).

*The results in this report should be interpreted with caution as they represent data collected during a single sampling event. This means that all water quality variables were measured only once during the summer of 2019, and at a single location, for each lake (with the exception of bacteria). For more information on methods please refer to the summary report.*

## Aquatic ecosystem health

### Water color and transparency

Secchi disk depth was measured at 7.7m the day of the sampling. The color value was of 2.95 mg/L Pt. Dissolved organic carbon had a value of 3.6 mg/L.

### Chlorophyll a, nutrients and trophic status

Total phosphorus (10.51 µg/L) and chlorophyll a (0.76 µg/L) values in Second Wye Lake were very similar to their respective Yukon mean (Figure 2). According to the Canadian water quality guidelines for the protection of aquatic life, Second Wye Lake is mesotrophic. Total nitrogen value from this lake was discarded because of bad data quality.

### Food chain health

Four zooplankton species were identified in Second Wye Lake, which is same as the Yukon average. However, phytoplankton diversity was the second highest across all 24 Yukon lakes, with 39 species identified (Figure 2). Cyanobacteria concentration indicated a low risk exposure to cyanotoxins, and two potential bloom formers / toxin producer species of the cyanobacteria group were identified.

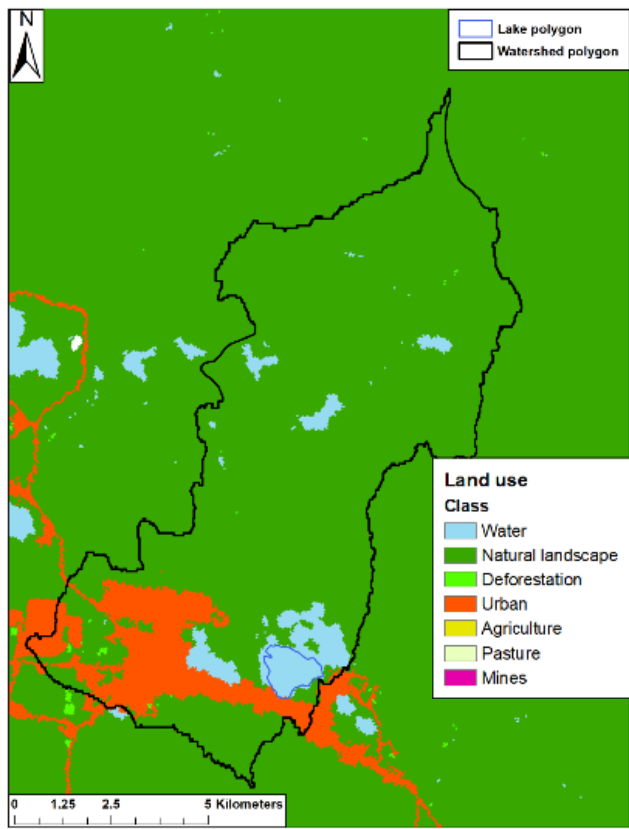


Figure 3. Immediate watershed and land use around Second Wye Lake. Figure from Fradette, 2021.

## Did we find contaminants?

### Pesticides

No pesticides, insecticides or herbicides were found in Second Wye Lake.

### Pharmaceuticals

No pharmaceutical products were reported in Second Wye Lake.

### Industrial chemicals

No industrial chemicals were detected in this Second Wye Lake.

### Fecal coliforms

Fecal coliforms were detected in Second Wye Lake, at the littoral sampling site near 3<sup>rd</sup> St N. The fecal bacteria detected were not of the *E. coli* species.

## Change over time

Sediment cores were retrieved from Second Wye Lake, but have not yet been analyzed for total metal, diatoms or zooplankton cladoceran temporal changes yet. The longest core was 54 cm long.



Figure 4. The longest sediment core retrieved from Second Wye Lake was 54cm long.

## Temperature & dissolved oxygen

The temperature profile shows a thermocline at 5.9m, and a hypolimnion at 9.3m on the sampling day (Figure 5a). Dissolved oxygen had a value of 113% at the surface of the lake, but reduced to 39% of oxygen in the hypolimnion (Figure 5b).

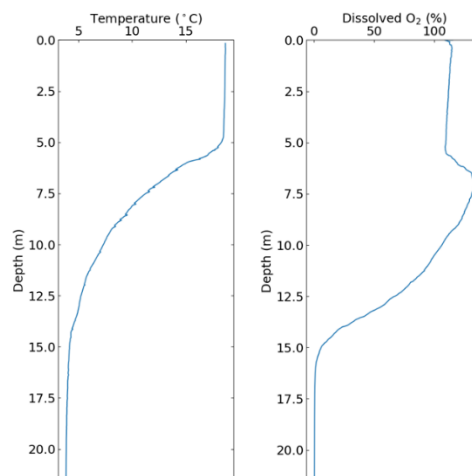


Figure 5. a) Temperature (°C) and b) Dissolved oxygen (%) profiles as measured in Second Wye Lake. Figures from Fradette, 2021.

# Two Moose Lake



Figure 1. Two Moose Lake and immediate watershed delineated in black. Adapted from Fradette, 2021.

## Lake and watershed information

LAKE SURFACE AREA	WATERSHED AREA
0.12 km <sup>2</sup>	0.92 km <sup>2</sup>
SAMPLING DEPTH	POPULATION
1.4 m	0
AVERAGE DEPTH	ELEVATION
5 m	1077 m
SAMPLING DATE	AREA FOREST FIRES 2014-2019
2019-08-12	0 km <sup>2</sup>

### Location

Two Moose Lake is located in central Yukon, about 140 km north of Dawson City in Tombstone Territorial Park. It lies on the west side of the Dempster Highway.

### Land Use

83.4% of Two Moose Lake's 0.92 km<sup>2</sup> watershed is natural. 14.2 % is composed of water (including the lake itself). The remaining 2.5 % of the watershed, including the Dempster Hwy, comprised of urbanized land (Figure 3).

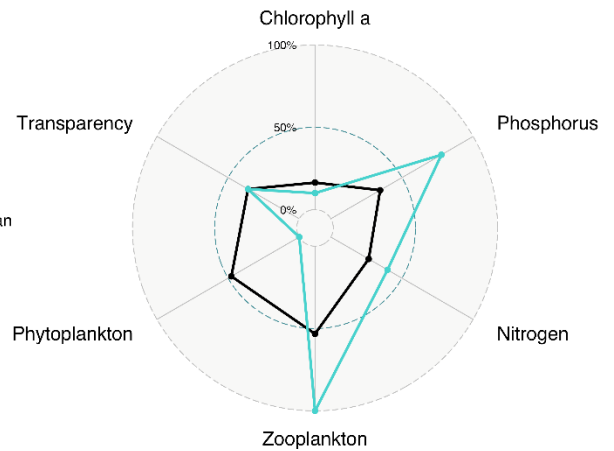


Figure 2. Relative values (rescaled from 0% to 100%) of water quality variables from the mean of all Yukon lakes that were sampled (shown in black) in comparison with Two Moose Lake (shown in blue).

## Aquatic ecosystem health

### Water color and transparency

The Secchi disk depth was equivalent to lake depth (i.e. secchi depth was visible to lake bottom). The color value was 46.63 mg/L Pt. Dissolved organic carbon had a value of 11.51 mg/L.

### Chlorophyll a, nutrients and trophic status

Total phosphorus (23.50 µg/L) and total nitrogen (0.35 mg/L) values in Two Moose Lake were both above their respective mean values (Figure 2). Whereas, chlorophyll a (1.38 µg/L) was slightly below the Yukon mean. According to the Canadian water quality guidelines for the protection of aquatic life, Two Moose Lake is meso-eutrophic.

### Food chain health

Six zooplankton species were identified in Two Moose Lake, which is the highest diversity of all Yukon lakes. However, seven phytoplankton species were identified, which is the lowest diversity of all Yukon lakes (Figure 2). Cyanobacteria concentration indicated a low risk of cyanotoxin exposure. One potential bloom formers / toxin producer species of the cyanobacteria group was identified.

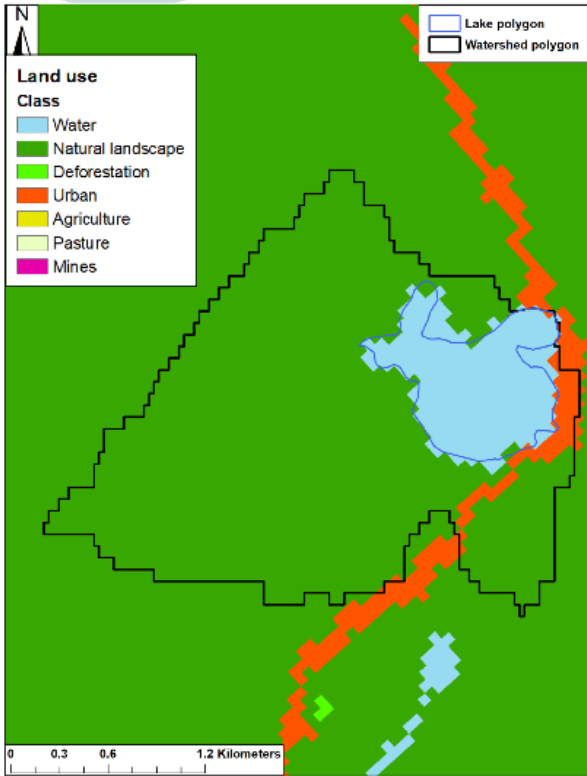


Figure 3. Watershed and land use around Two Moose Lake. Figure from Fradette, 2021.

## Did we find contaminants?

### Pesticides

No pesticides, insecticides or herbicides were found in Two Moose Lake.

### Pharmaceuticals

102 µg/L of carbamazepine, an anticonvulsant drug was detected in Two Moose Lake. This concentration is 10 times over the guideline established by the Canadian Council of Ministers of the Environment.

### Industrial chemicals

No industrial chemicals were detected in Two Moose Lake.

### Fecal coliforms

Fecal coliforms were detected in Two Moose Lake, from the littoral sampling site located on the side of the Dempster Hwy. However, the fecal bacteria detected were not of the E. coli species and no fecal coliforms were found from the sampling site near the middle of the lake.

## Change over time

The longest core retrieved from Two Moose Lake was 48 cm long. The bottom of the core was dated to 1968 (Figure 4a). The analysis of diatom assemblage from the top and the bottom of the core revealed a temporal dissimilarity of 0.34 (Figure 4b).

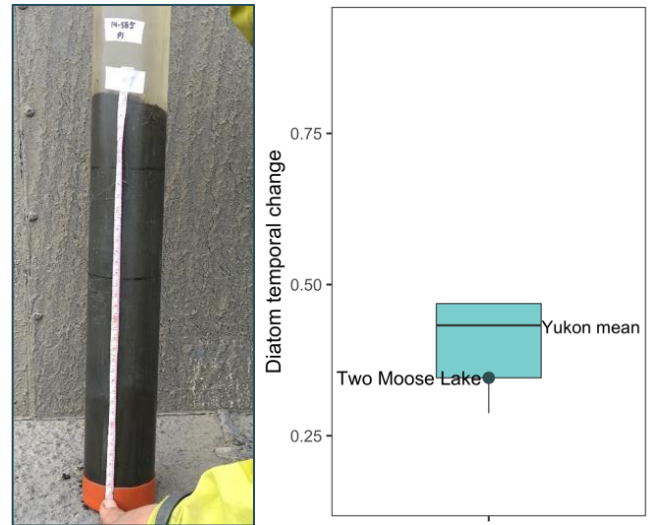


Figure 4. a) The longest sediment core retrieved from Two Moose Lake. b) Mean ( $\pm$  Standard error) of diatom temporal change between the bottom and the top of the core. Two Moose Lake value is indicated with a green dot.

## Temperature & dissolved oxygen

A shallow basin (1.4 m depth) prevented stratification from occurring in Two Moose Lake. The average surface temperature was 11.8°C on the day of sampling. Dissolved oxygen had an average value of 112.6% (Figure 5b). Since only surface measurements were collected, no temperature or oxygen profiles are shown.

*The results in this report should be interpreted with caution as they represent data collected during a single sampling event. This means that all water quality variables were measured only once during the summer of 2019, and at a single location, for each lake (with the exception of bacteria). For more information on methods please refer to the summary report.*





# Watson Lake



Figure 1. Watson Lake and immediate watershed delineated in black. Adapted from Fradette, 2021.

## Lake and watershed information

<b>LAKE SURFACE AREA</b>	<b>WATERSHED AREA</b>
13.44 km <sup>2</sup>	161.29 km <sup>2</sup>
<b>MAXIMUM DEPTH</b>	<b>POPULATION</b>
36 m	28
<b>AVERAGE DEPTH</b>	<b>ELEVATION</b>
12 m	677 m
<b>SAMPLING DATE</b>	<b>AREA FOREST FIRES 2014-2019</b>
2019-07-15	0 km <sup>2</sup>

### Location

Watson Lake is located approximately 4 km north of the community of Watson Lake, in Southeastern Yukon, along the Robert Campbell Highway.

### Land Use

89.1% of Watson Lake's 161.29 km<sup>2</sup> watershed is natural. 9.5% is composed of water (including the lake itself). 1.4% of the watershed is urbanized. The remaining of the watershed comprised of <1% of forest loss and mines (Figure 3).

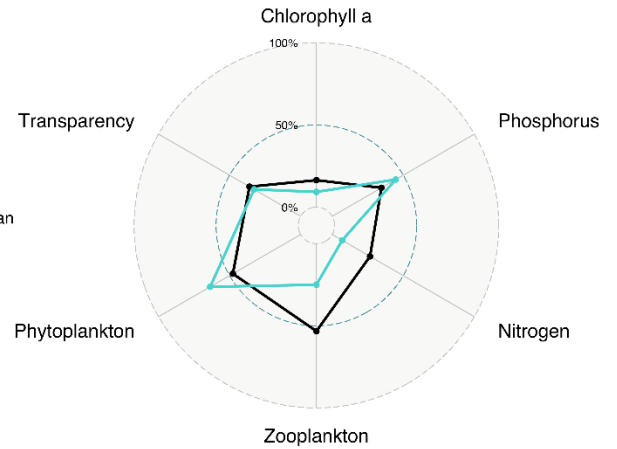


Figure 2. Relative values (rescaled from 0% to 100%) of water quality variables from the mean of all Yukon lakes that were sampled (shown in black) in comparison with Watson Lake (shown in blue).

The results in this report should be interpreted with caution as they represent data collected during a single sampling event. This means that all water quality variables were measured only once during the summer of 2019, and at a single location, for each lake (with the exception of bacteria). For more information on methods please refer to the summary report.

## Aquatic ecosystem health

### Water color and transparency

Secchi disk depth was measured at 5.4 m. The color value was of 2.66 mg/L Pt. Dissolved organic carbon had a value of 3.85 mg/L.

### Chlorophyll a, nutrients and trophic status

Total phosphorus (16.10 µg/L) and total nitrogen (0.08 mg/L) values in Watson Lake were below the Yukon average (Figure 2). Chlorophyll a (1.31 µg/L) was also below the Yukon average. According to the Canadian water quality guidelines for the protection of aquatic life, Watson Lake is mesotrophic.

### Food chain health

Three zooplankton species were identified in Watson Lake, which is below Yukon's mean. However, 28 phytoplankton species were identified, which is above the Yukon mean (Figure 2). The cyanobacteria concentration indicated a low risk exposure to cyanotoxins, and one potential bloom former / toxin producer species of the cyanobacteria group was identified.

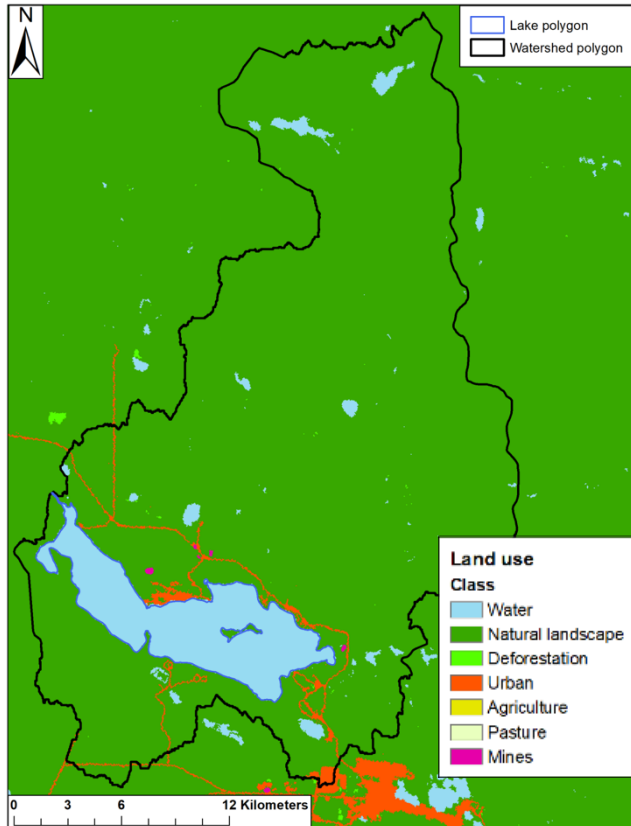


Figure 3. Immediate watershed and land use around Watson Lake. Figure from Fradette, 2021.

## Did we find contaminants?

### Pesticides

No pesticides, insecticides or herbicides were found in Watson Lake.

### Pharmaceuticals

No pharmaceutical products were reported in Watson Lake.

### Industrial chemicals

2 ng/L of Tris(2-chloroethyl) Phosphate (TCEP), a flame retardant was found in Watson Lake.

### Fecal coliforms

No fecal coliforms, including *E. coli* bacteria were detected in Watson Lake, either from the littoral sampling site along the Robert Campbell Highway or from the index site near the deepest point of the lake.

## Change over time

The longest core retrieved from Watson Lake was 47 cm long (Figure 4a). The analysis of diatom assemblage from the top and the bottom of the core revealed a temporal dissimilarity of 0.16, which is was to lowest of all sampled Yukon Lakes (Figure 4b).

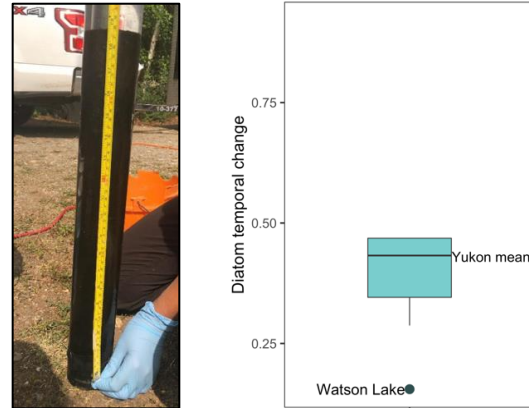


Figure 4. a) The longest sediment core retrieved from Watson Lake. b) Mean ( $\pm$  Standard error) of diatom temporal change between the bottom and the top of the core. Watson Lake value is indicated with a green point.

## Temperature & dissolved oxygen

The temperature profile shows a thermocline at 7.6m and a hypolimnion at 10.9m on July 15, 2019. Dissolved oxygen had a value of 112% at the lake surface but fell to 45% oxygen in the hypolimnion.

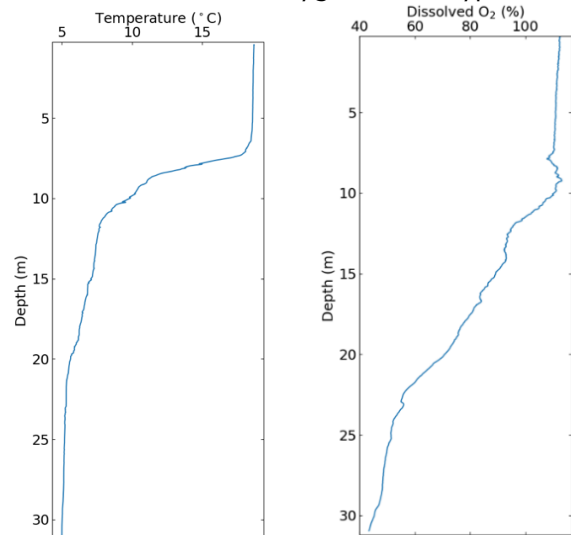


Figure 5. a) Temperature ( $^{\circ}$ C) and b) Dissolved oxygen (%) as measured in Watson Lake. Figures from Fradette, 2021.

# Wolverine Lake

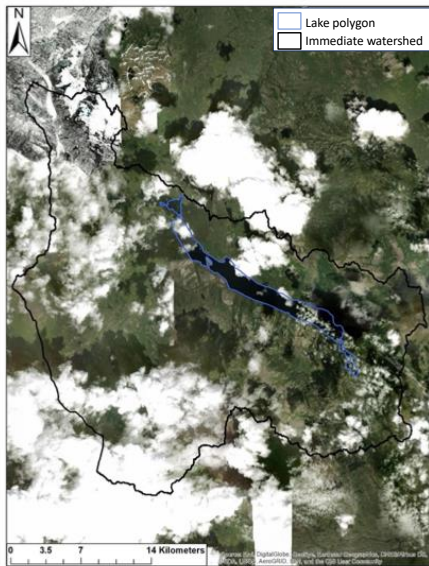


Figure 1. Wolverine Lake and immediate watershed delineated in black. Figure from Fradette, 2021.

## Lake and watershed information

<b>LAKE SURFACE AREA</b>	<b>WATERSHED AREA</b>
7.64 km <sup>2</sup>	195.23 km <sup>2</sup>
<b>MAXIMUM DEPTH</b>	<b>POPULATION</b>
73 m	3
<b>AVERAGE DEPTH</b>	<b>ELEVATION</b>
21.2 m	1115 m
<b>SAMPLING DATE</b>	<b>AREA FOREST FIRES 2014-2019</b>
2019-07-17	0 km <sup>2</sup>

### Location

Wolverine Lake is located in Southeastern Yukon, about 190 km North of Watson Lake. It can be reached using forestry roads from the Robert Campbell Highway.

### Land Use

94.1% of Wolverine Lake's 195.23 km<sup>2</sup> watershed is natural. 5.6% is composed of water (including the lake itself). The remaining 0.3% of the watershed is comprised of forest loss, urban land and mines (Figure 3).

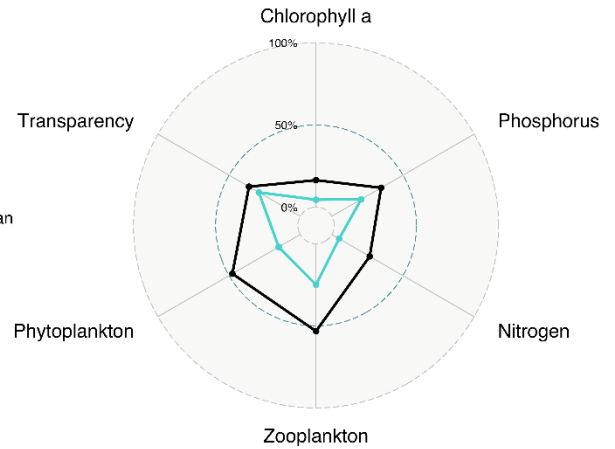


Figure 2. Relative values (rescaled from 0% to 100%) of water quality variables from the mean of all Yukon lakes that were sampled (shown in black) in comparison with Wolverine Lake (shown in blue).

The results in this report should be interpreted with caution as they represent data collected during a single sampling event. This means that all water quality variables were measured only once during the summer of 2019, and at a single location, for each lake (with the exception of bacteria). For more information on methods please refer to the summary report.

## Aquatic ecosystem health

### Water color and transparency

Secchi disk depth was measured at 4.9m the day of the sampling. The color value was of 10.89 mg/L Pt. Dissolved organic carbon had a value of 3.87 mg/L.

### Chlorophyll a, nutrients and trophic status

Total phosphorus (10.69 µg/L) and total nitrogen (0.07 mg/L) values in Wolverine Lake were below their respective Yukon mean (Figure 2). Chlorophyll a (0.86 µg/L) was also below the mean. According to the Canadian water quality guidelines for the protection of aquatic life, Wolverine Lake is mesotrophic.

### Food chain health

Three zooplankton species and 12 phytoplankton species were identified in Wolverine Lake, which is below the Yukon average (Figure 2). Cyanobacteria concentration indicated a low risk of exposure to cyanotoxins, but no potential bloom former / toxin producer species of the cyanobacteria group were identified.

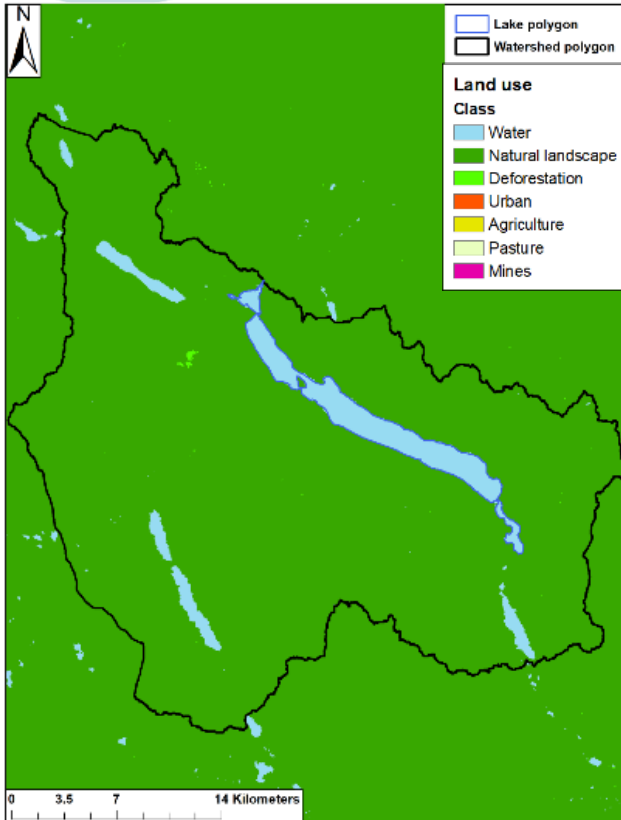


Figure 3. Watershed and land use around Wolverine Lake. Figure from Fradette, 2021.

## Did we find contaminants?

### Pesticides

Wolverine Lake was not analyzed for pesticides.

### Pharmaceuticals

Wolverine Lake was not analyzed for pharmaceuticals.

### Industrial chemicals

Wolverine Lake was not analyzed for industrial chemicals.

### Fecal coliforms

Fecal coliforms were detected in Wolverine Lake, both from the littoral sampling site on the south shore of the lake and from the index site near the deepest point of the lake. However, the fecal bacteria detected were not of the *E. coli* species.

## Change over time

Sediment cores were retrieved from Wolverine Lake, but have not yet been analyzed for total metals, diatoms or zooplankton cladoceran temporal changes. The longest core was 39 cm long.



Figure 4. The longest sediment core retrieved from Wolverine Lake.

## Temperature & dissolved oxygen

The temperature profile shows a thermocline at 9.2 m and a hypolimnion at 9.9 m on the sampling day (Figure 5a). Dissolved oxygen had a value of 110% at the lake surface, and minimal values around 85% oxygen at the lake bottom (Figure 5b).

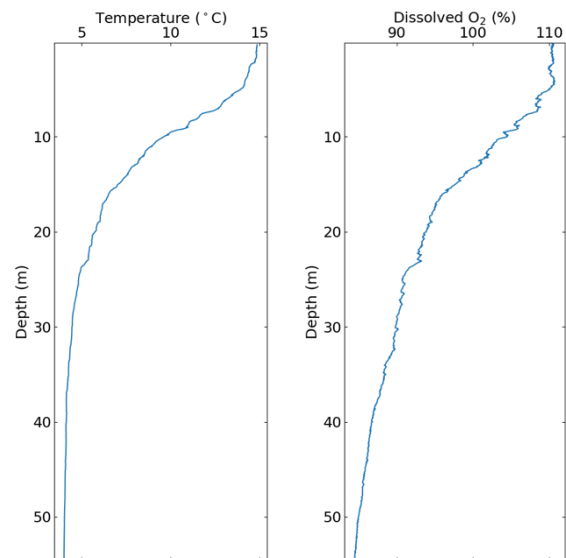


Figure 5. a) Temperature (°C) and b) Dissolved oxygen (%) as measured in Wolverine Lake. Figures from Fradette, 2021.

# Wye Lake

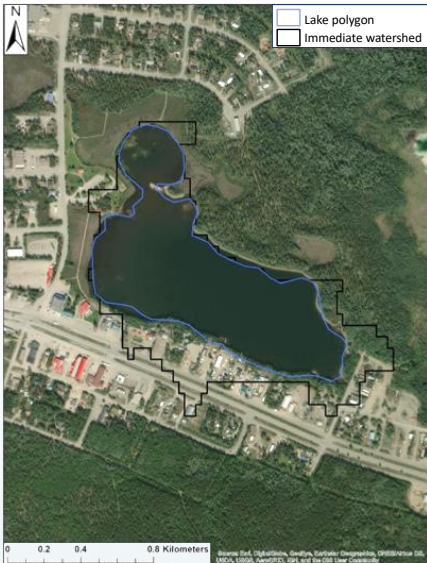


Figure 1. Wye Lake and immediate watershed delineated in black. Adapted from Fradette, 2021.

## Lake and watershed information

LAKE SURFACE AREA	WATERSHED AREA
0.19 km <sup>2</sup>	0.29 km <sup>2</sup>
MAXIMUM DEPTH	POPULATION
5.6 m	13
AVERAGE DEPTH	ELEVATION
2.7 m	692 m
SAMPLING DATE	FOREST FIRES 2014-2019
2019-07-17	0 km <sup>2</sup>

### Location

Wye Lake is located in southern Yukon, within the limits of Watson Lake. It lies on the north side of the Alaska Highway.

### Land Use

Wye's Lake watershed is very small relative to the lake. 10.8% of the 0.29 km<sup>2</sup> watershed is natural. The largest part (64.5%) is composed of water, including the lake itself. The remaining 24.7% of the watershed comprised urban land (Figure 3).

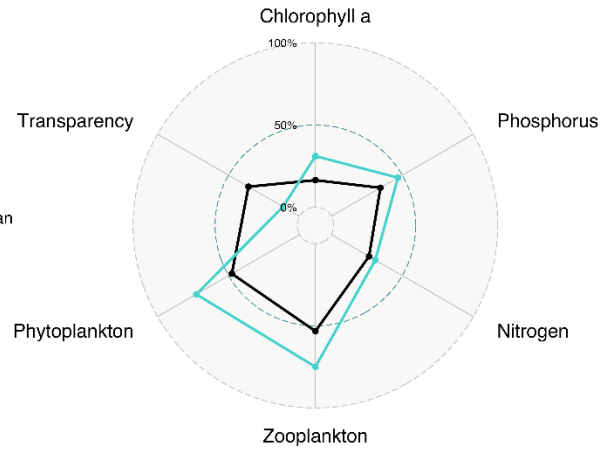


Figure 2. Relative values (rescaled from 0% to 100%) of water quality variables from the mean of all Yukon lakes that were sampled (shown in black) in comparison with Wye Lake (shown in blue).

The results in this report should be interpreted with caution as they represent data collected during a single sampling event. This means that all water quality variables were measured only once during the summer of 2019, and at a single location, for each lake (with the exception of bacteria). For more information on methods please refer to the summary report.

## Aquatic ecosystem health

### Water color and transparency

Secchi disk depth was measured at 2.53 m the day of the sampling. The color value was of 3.39 mg/L Pt. Dissolved organic carbon had a value of 6.95 mg/L.

### Chlorophyll a, nutrients and trophic status

Total phosphorus (16.60 µg/L) and total nitrogen (0.28 mg/L) values in Wye Lake were very similar to their respective Yukon mean (Figure 2). Chlorophyll a (3.40 µg/L) was slightly below the mean. According to the Canadian water quality guidelines for the protection of aquatic life, Wye Lake is mesotrophic.

### Food chain health

Five zooplankton species were identified in Wye Lake, which is above Yukon's average. Phytoplankton diversity was slightly above average, with 31 species identified (Figure 2). Cyanobacteria concentration indicated a low risk of exposure to cyanotoxins, and 2 potential bloom formers / toxin producer species of the cyanobacteria group were identified.

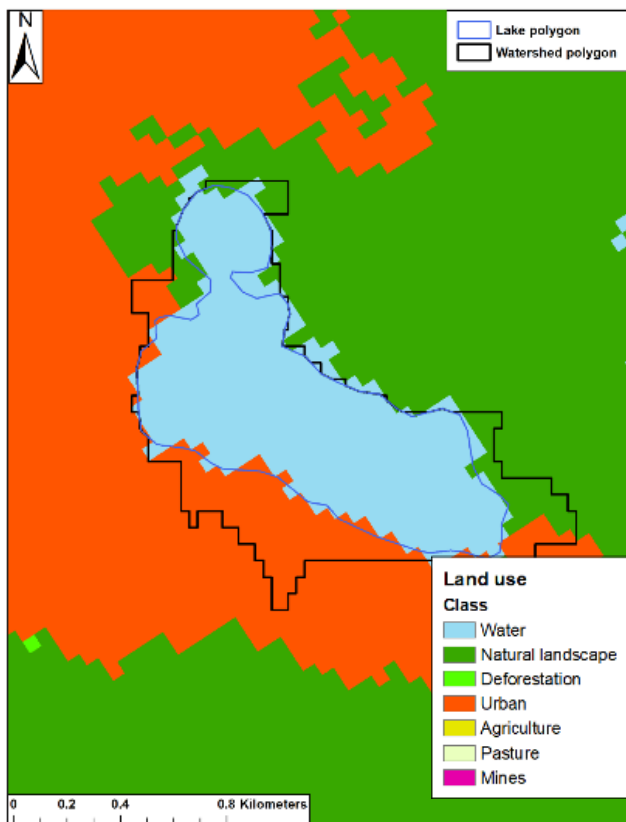


Figure 3. Immediate watershed and land use around Wye Lake. Figure from Fradette, 2021.

## Did we find contaminants?

### Pesticides

Wye Lake was not analyzed for pesticides.

### Pharmaceuticals

Wye Lake was not analyzed for pharmaceuticals.

### Industrial chemicals

Wye Lake was not analyzed for industrial chemicals.

### Fecal coliforms

Fecal coliforms were detected in Wye Lake, from the littoral sampling site located on the shore of Wye Lake park. However, the fecal bacteria detected were not of the *E. coli* species.

## Change over time

The longest core retrieved from Wye Lake was 60 cm long. The bottom of the core was dated to 1830 (Figure 4a). The analysis of diatom assemblage from the top and the bottom of the core revealed a temporal dissimilarity of 0.69. This was the oldest core sample collected across all Yukon lakes.

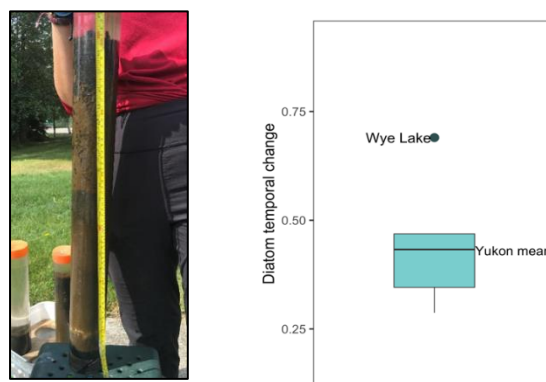


Figure 4. a) The longest sediment core retrieved from Wye Lake. b) Mean ( $\pm$  Standard error) of diatom temporal change between the bottom and the top of the core. Watson Lake value is indicated with a green point.

## Temperature & dissolved oxygen

Wye Lake was not stratified in the 3.5m depth profile. The surface temperature was 19.8°C on July 17, 2019 (Figure 5a). Dissolved oxygen remained elevated throughout the profile, with minimal values around 100% of oxygen at the bottom of the lake (Figure 5b).

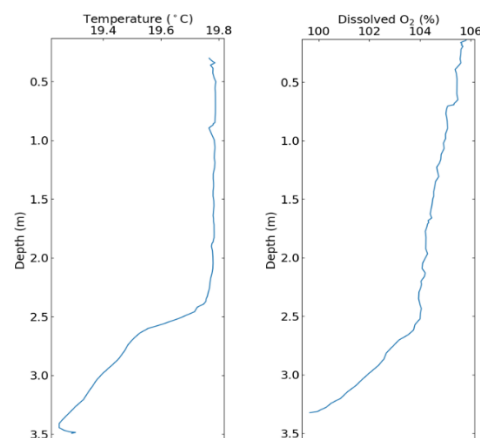


Figure 5. a) Temperature (°C) and b) Dissolved oxygen (%) as measured in Wye Lake. Figures from Fradette, 2021.