Water Quality Trends on the Penticton Oxbows and Adjacent Waters

Rick McKelvey & Bob Anderson, November 2020

Friends of the Oxbows (FOTO) have been measuring simple water quality parameters on the Penticton oxbows since 2015. Presented here are the results of sampling in 2020. Data were collected using an Oakton PCTS Tester 50 for pH, conductivity, temperature, salinity, and total dissolved solids. Turbidity data were collected using a Triton Turbidity Wedge, converting those data into Nephelometric Trubidity Units (NTU). As no major water quality issues had been identified in past sampling efforts at monthly intervals, sampling in 2020 was reduced to bi-monthly intervals, and no sampling was attempted when there was ice on any of the waterbodies.

All previous data reports can be found at www.pentictonoxbows.ca/publications.

Temperature

Water temperature ranged from 5 °C to slightly over 25 °C (Fig. 1), which was somewhat cooler than temperatures seen in previous years. The summer hot period in the Penticton area seemed to come somewhat later than normal in 2020, and there were not the long periods of over 30 °C air temperatures seen in the past. Water temperatures reflected air temperatures and were therefore somewhat lower than seen in the past.

pH

pH levels in 2020 started higher than noted in the past, on the average near 8.5, but with some waterbodies recording levels above 9 (Fig. 2). Throughout the course of the year however, pH levels fell, reaching a more normal level late in the year (Fig. 3). The average pH was 7.9, slightly lower than the average from last year (8.0). Why pH fluctuates year to year and within each year is not known. The ranges seen in 2020 are within what is considered safe for drinking water, although measurements over 9 are slightly beyond the safe range.

Conductivity

Average conductivity in 2020 was slightly higher than in previous years (512 µS/cm, 446 µS/cm in 2019, 437 µS/cm in 2018 and before). That may have been a result of data in 2020 being collected at Brandon Avenue following the melting of an early-season snow fall, which resulted in more salts being deposited in the oxbows, and in particular the Brandon Avenue oxbow. Removing the high values from Brandon Avenue for the run-off event in November resulted in an average conductivity closer to those seen previously (473 µS/cm) though still somewhat higher. Conductivity of non-oxbow waters was lower and more consistent than it was in the oxbows, even with the runoff event at Brandon Ave removed from the data (Figs 4a & 4b).

Salinity

Salinity fluctuated below approximately 0.4 pph in 2020, except for the measurements on the Brandon Avenue oxbow in November, following the snow melt event (Fig. 5). With the exclusion of the data from November for Brandon Ave, the average salt content of all waterbodies was approximately 0.2 pph, considerably lower than in 2019.

Total Dissolved Solids

Total dissolved solids exhibited a pattern similar to both conductivity and salinity (Fig. 6). The snow melt runoff event in November at the Brandon Ave oxbow was again evident. The average for all waterbodies over the year was 354 mg/l, including the snow melt at Brandon Ave, or 326 mg/l, when those measurements were removed. This compares to averages of 340 mg/l in 2019, and 337 mg/l in 2018.

Turbidity

Turbidity again fluctuated throughout the year and between oxbows, while it remained very stable on the non-oxbow sites (Figs. 7 a & b). Average turbidity in the oxbows was 50 NTUs, somewhat lower than in 2019. It remained at 40 NTUs in the non-oxbow water bodies throughout the year. Once again, the water in oxbows was slightly more turbid than the surrounding waters, likely as a result of high sediments loads in the oxbows, and disturbance of those sediments by wind and the movement of large fish such as carp.

Conclusions

The oxbows and adjacent waters continued to exhibit characteristics of relative health in 2020, at least for pH, conductivity, salinity and total dissolved solids. Differences between years for all parameters measured are not believed to be significant. Water temperature in the oxbows, because they are of relatively small volume and have limited or no inflow, continued to fluctuate widely throughout the season in response to annual climate. Turbidity also remained higher than surrounding waters. Both of these factors (high temperatures during summer and higher levels of turbidity) are likely to continue to limit general productivity of the oxbows.

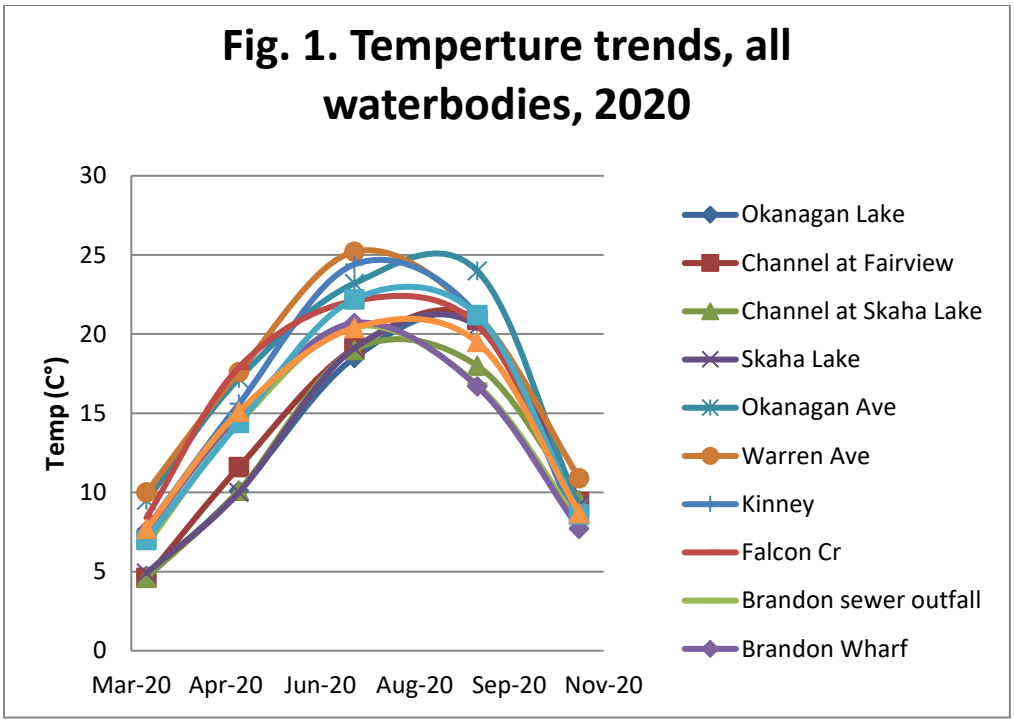


Fig. 1. Temperture trends, all waterbodies, 2020
Temp (C°)
30
25
20
15
10
5
0
Mar-20
Apr-20
Jun-20
Aug-20
Sep-20
Nov-20
Okanagan Lake
Channel at Fairview
Channel at Skaha Lake
Skaha Lake
Okanagan Ave
Warren Ave
Kinney
Falcon Cr
Brandon sewer outfall
Brandon Wharf

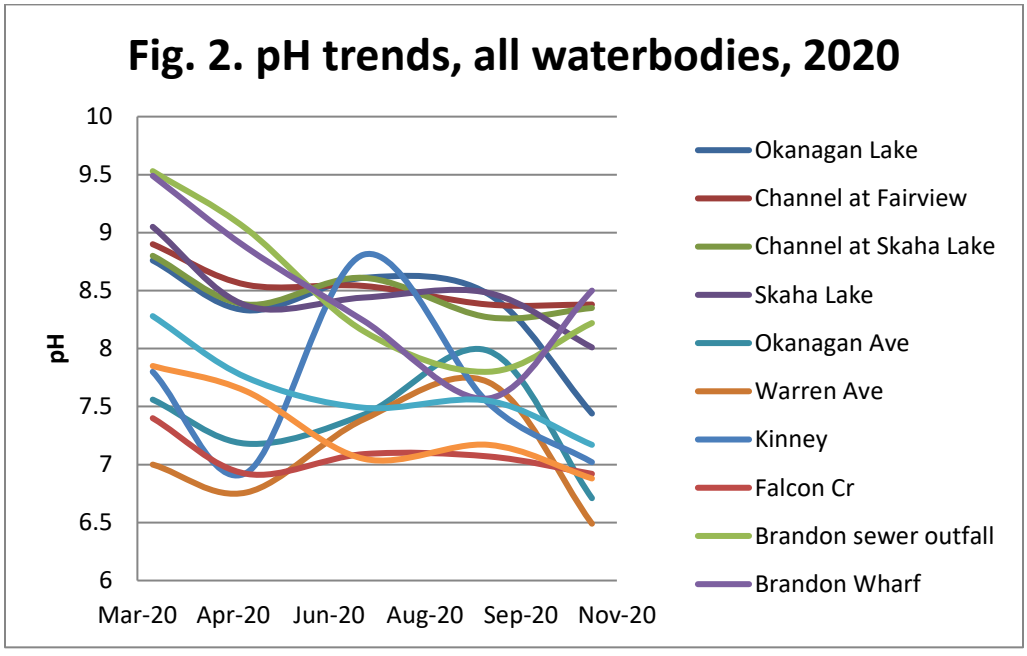


Fig. 2. pH trends, all waterbodies, 2020
pH
10
9.5
9
8.5
8
7.5
7
6.5
6
Mar-20
Apr-20
Jun-20
Aug-20
Sep-20
Nov-20
Okanagan Lake
Channel at Fairview
Channel at Skaha Lake
Skaha Lake
Okanagan Ave
Warren Ave
Kinney
Falcon Cr
Brandon sewer outfall
Brandon Wharf

Fig. 3. Trend in mean pH for all waterbodies combined by month for 2020,

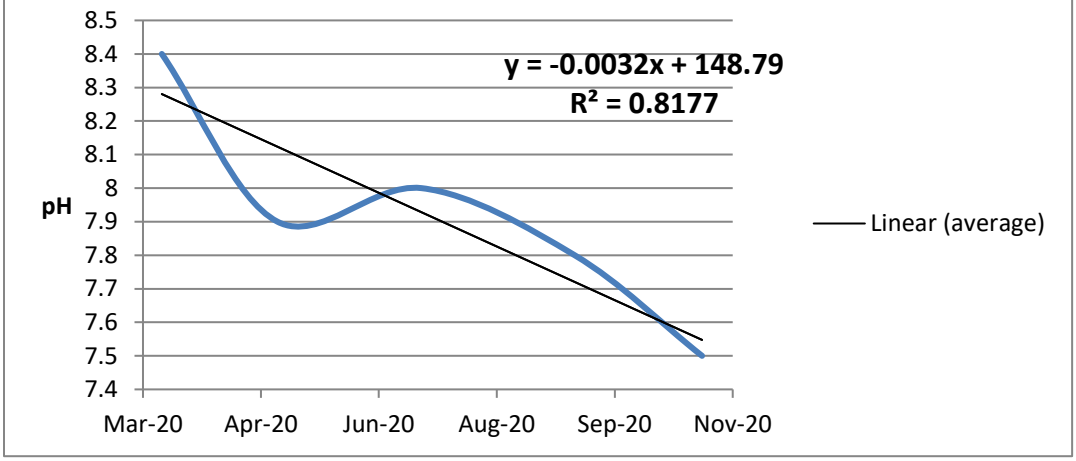


Fig. 4a. Conductivity trends for non-oxbow waterbodies 2020

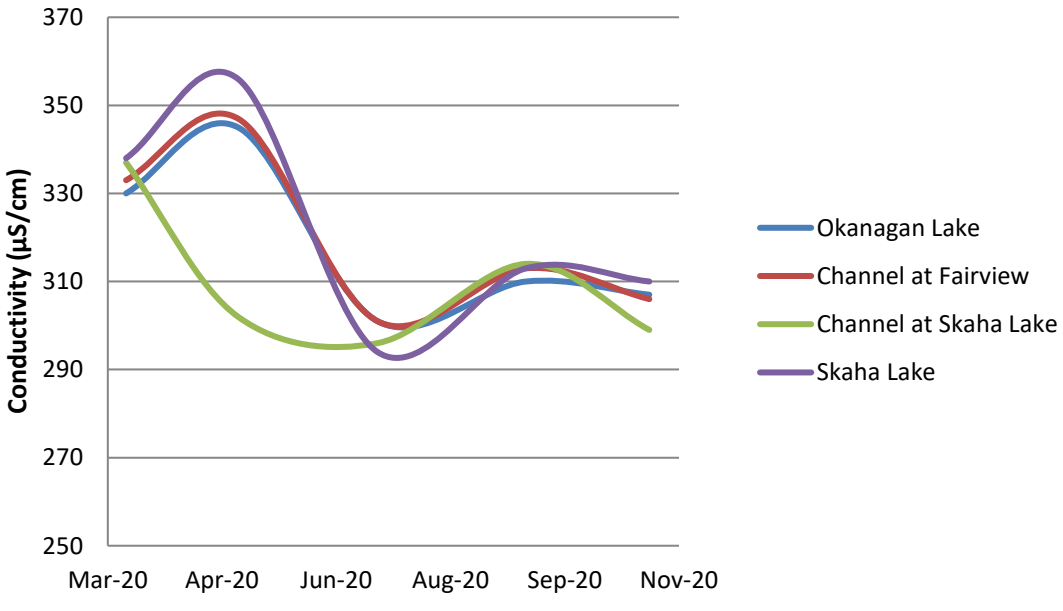


Fig. 4b. Conductivity trends for oxbows 2020

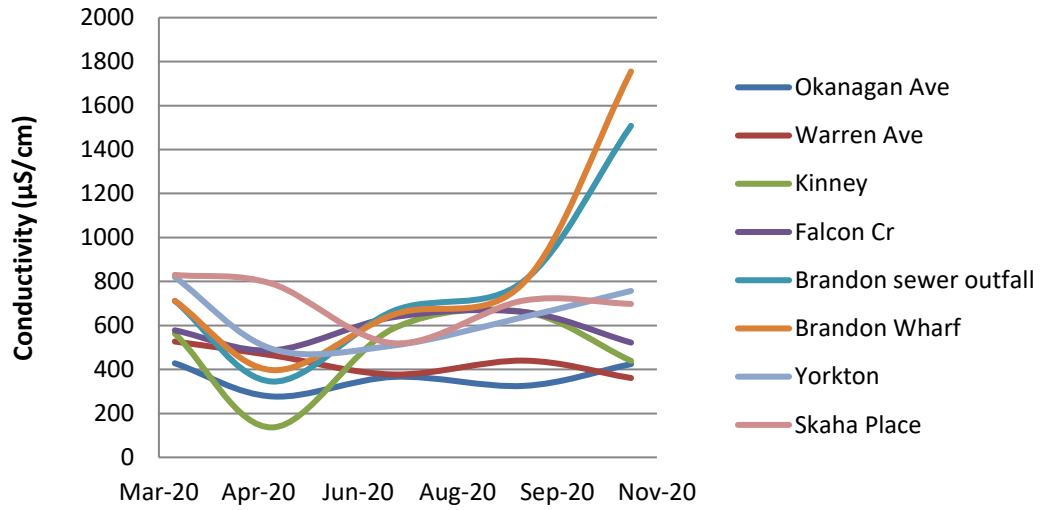
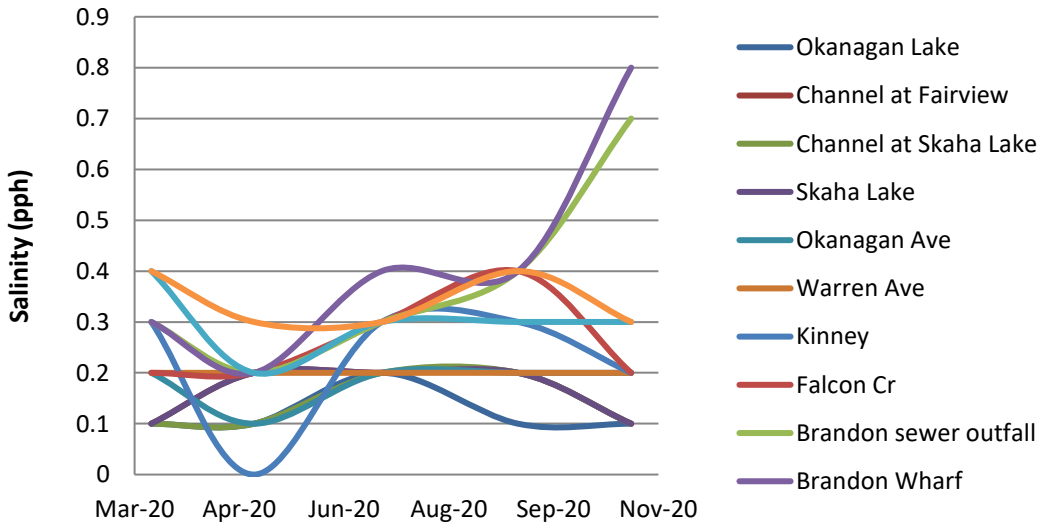


Fig. 5. Salinity of all waterbodies 2020



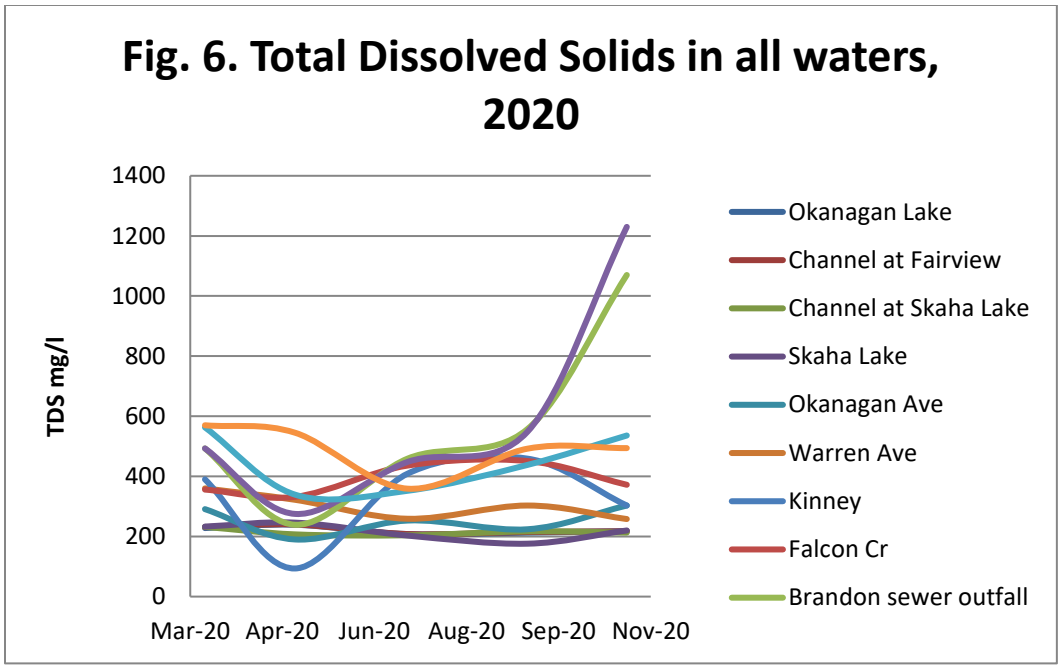


Fig. 6. Total Dissolved Solids in all waters, 2020
TDS mg/l
1400
1200
1000
800
600
400
200
0
Mar-20
Apr-20
Jun-20
Aug-20
Sep-20
Nov-20
Okanagan Lake
Channel at Fairview
Channel at Skaha Lake
Skaha Lake
Okanagan Ave
Warren Ave
Kinney
Falcon Cr
Brandon sewer outfall

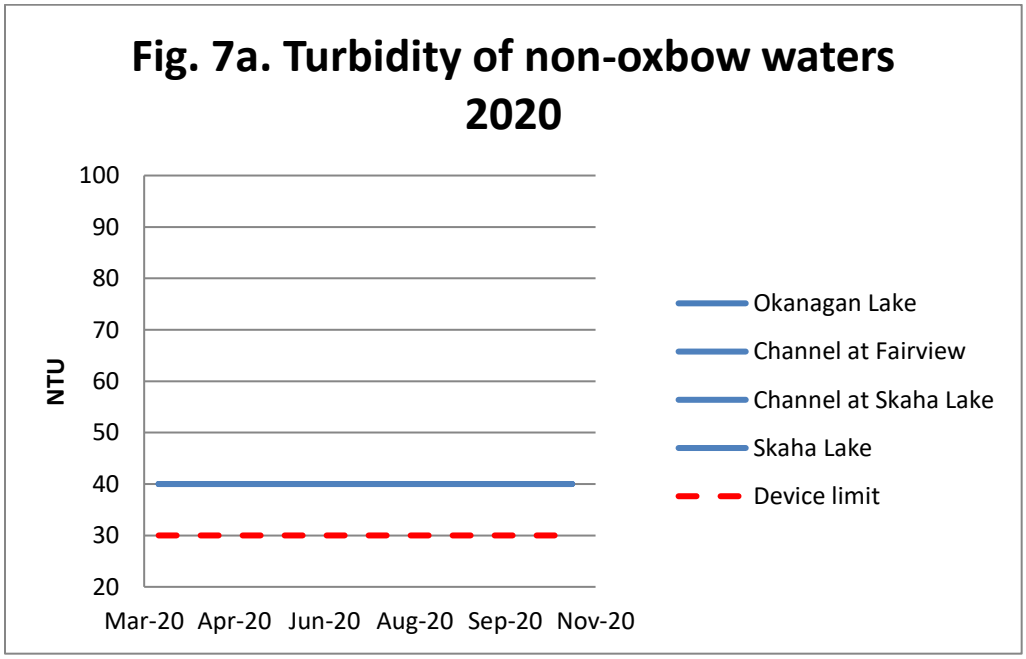


Fig. 7a. Turbidity of non-oxbow waters 2020
NTU
100
90
80
70
60
50
40
30
20
Mar-20
Apr-20
Jun-20
Aug-20
Sep-20
Nov-20
Okanagan Lake
Channel at Fairview
Channel at Skaha Lake
Skaha Lake
Device limit

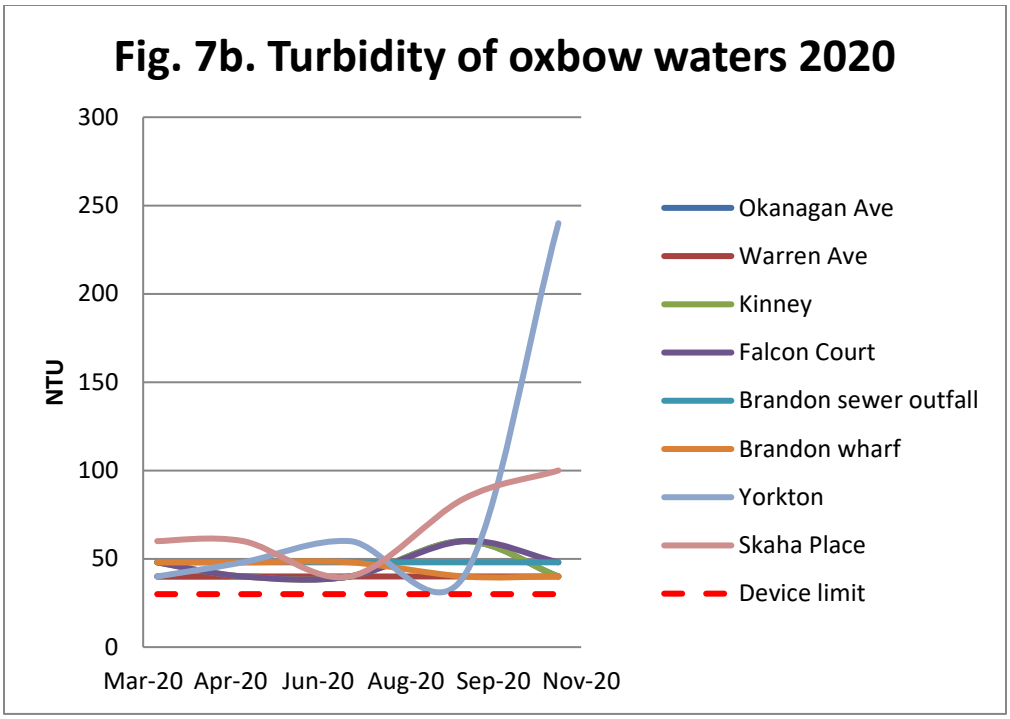


Fig. 7b. Turbidity of oxbow waters 2020
NTU
300
250
200
150
100
50
0
Mar-20
Apr-20
Jun-20
Aug-20
Sep-20
Nov-20
Okanagan Ave
Warren Ave
Kinney
Falcon Court
Brandon sewer outfall
Brandon wharf
Yorkton
Skaha Place
Device limit