

Summary Report: Lake Wahwashkesh Fall Dissolved Oxygen Sampling



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1875A Seymour Street,
NORTH BAY, ON CAN
P1A 0C7

Phone: (705)476-0085
Fax: (705)476-5631
Email: richard.rowe@fricorp.com
WEB: www.fricorp.com

Summary Report: Lake Wahwashkesh Fall Dissolved Oxygen Sampling

FRI Ecological Services was retained to conduct fall hypolimnetic dissolved oxygen sampling on Lake Wahwashkesh at sampling locations established previously (Figure 1).



Hypolimnetic (deep water layer below the thermocline) oxygen concentrations are an indicator of water quality as well as a key element of habitat quality for many cold-water fish species, such as lake trout. Optimal habitat for lake trout has been described as water with greater than 6 mg/L oxygen at less than 10°C, while usable habitat is described as 4 mg/L oxygen and less than 15°C¹.

¹ Ontario Ministry of the Environment Environmental Sciences and Standards Division, Dorset Environmental Science Centre (1996). Technical Bulletin No. DESC-5: Hypolimnetic oxygen: data collection strategies for use in predictive models.

Lake trout habitat volumes are at their minimum each year immediately before the time when surface waters have cooled enough to be usable (<15°C). Therefore, the most appropriate time to measure dissolved oxygen in the hypolimnion is the late summer period, when oxygen concentrations are at their lowest and temperatures are at their highest (i.e. worst-case conditions for lake trout habitat).²

Sampling took place on September 18, 2023, during cool (12°C), slightly windy, overcast conditions using a YSI Professional Optical Dissolved Oxygen meter. Surface water temperatures were still well above 15°C, between 17-19°C. Water temperature and dissolved oxygen measurements were taken at 1-meter intervals from the surface to lake bottom at the specified sites.

In all cases, measured hypolimnetic dissolved oxygen levels were higher in 2023 than previous measurements taken in 2021. Thermoclines were shallower in 2023, likely due to differences in summer weather as well as wind and wave action. In general, dissolved hypolimnetic oxygen levels recorded in 2013 and 2014 were slightly higher than those measured in 2021 and 2023. Different measuring instruments used in 2013/2014 versus 2021 and 2023 may at least partially explain these differences. Oxygen-temperature profiles for each site follow.

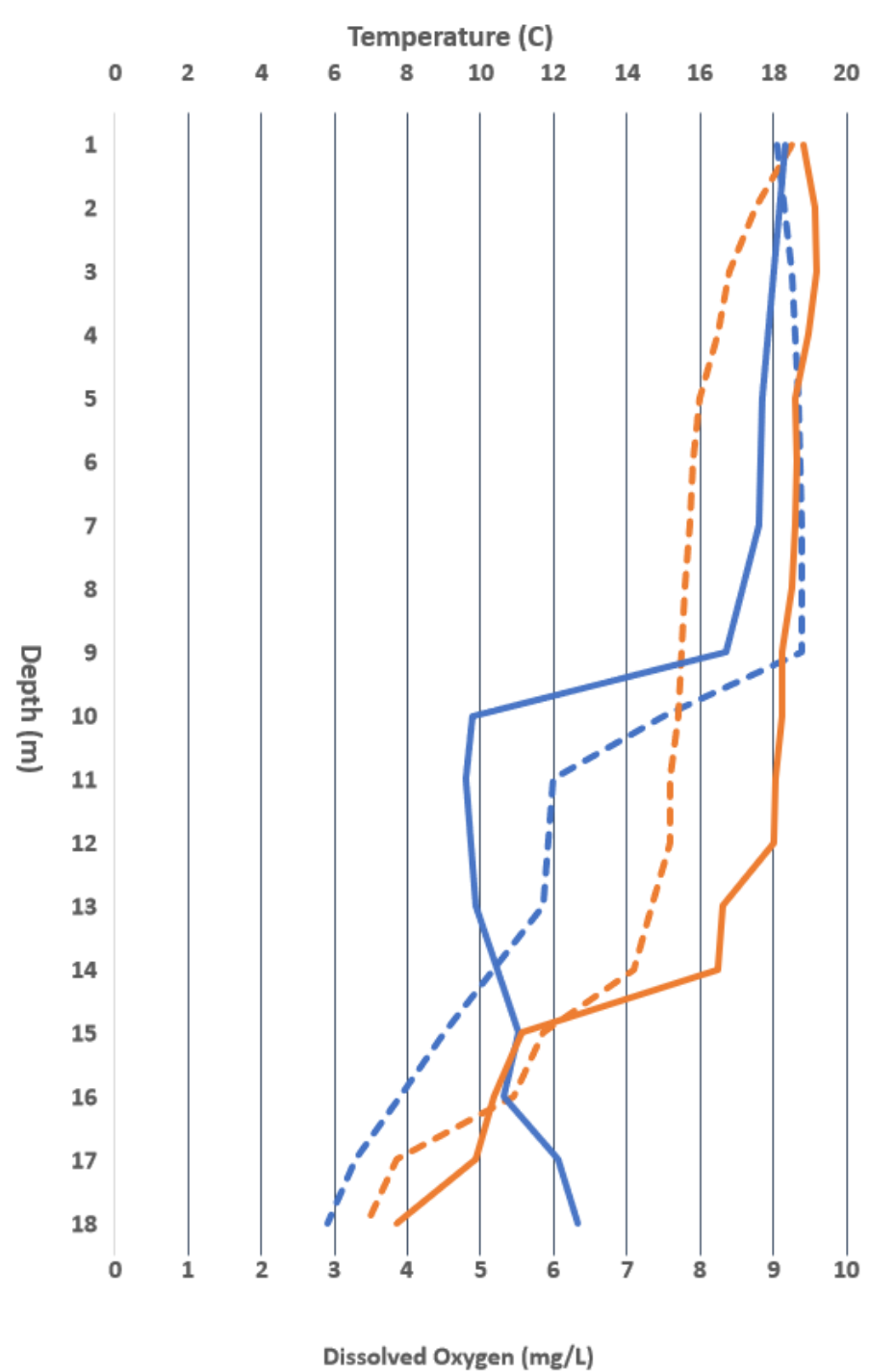
All data is stored on the accompanying Microsoft Excel files, and backups exist off site in case of loss or damage.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Richard Rowe', written in a cursive style.

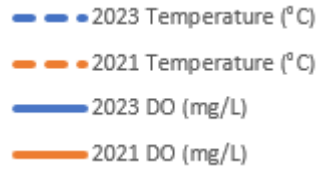
Richard Rowe, Senior Biologist
FRi Ecological Services

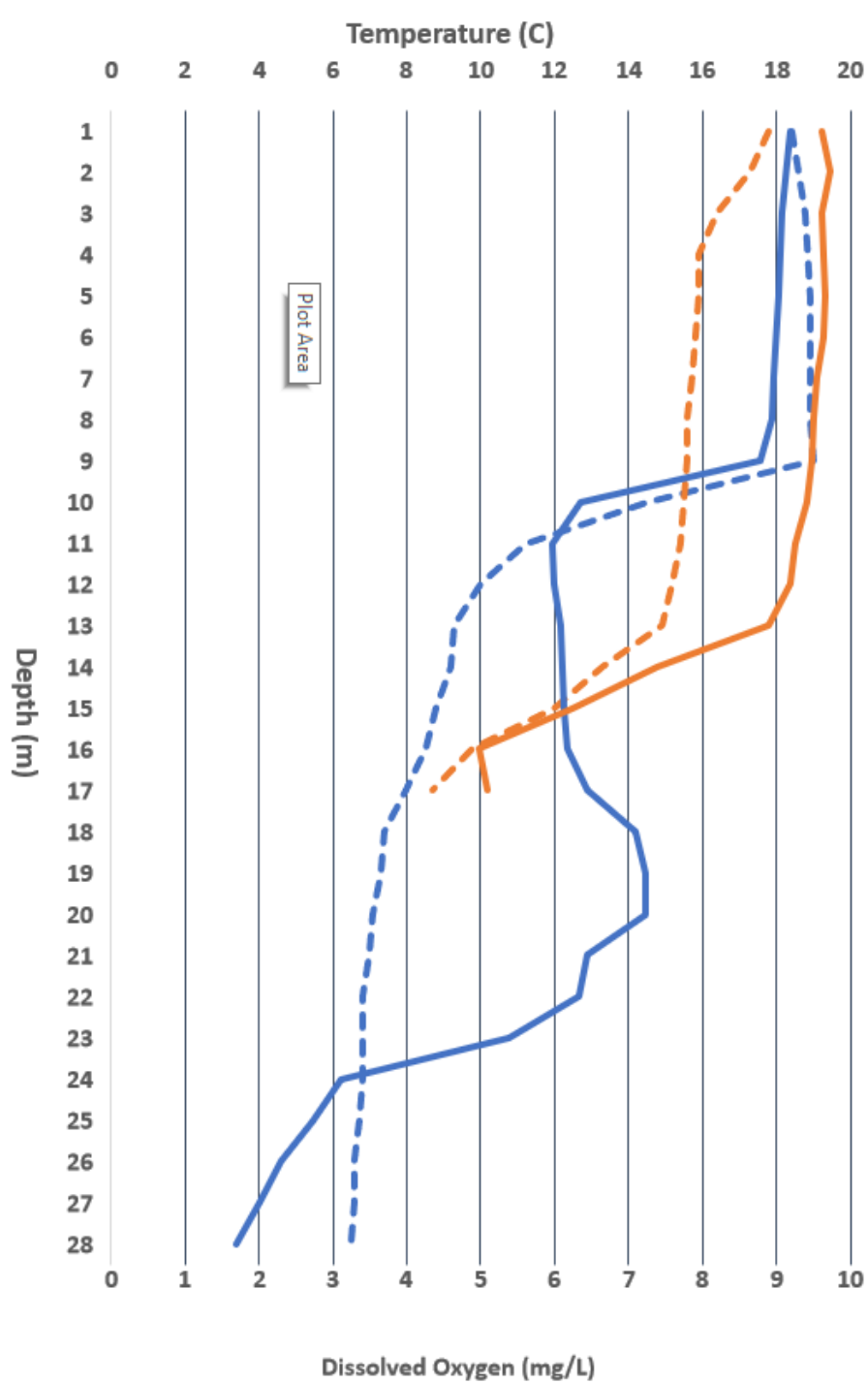
² Clark, B., Dillion, P. & Molot, L. (2004). Chapter 6 – Lake trout habitat volumes and boundaries in Canadian Shield Lakes: in Boreal Shield Watersheds: Lake trout ecosystems in a changing environment (J.M. Gunn, R.J. Steedman and R.A. Ryder) CRC Press LLC.



Straubs

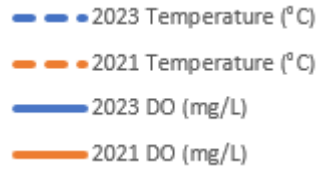
- Shallower thermocline in 2023
- Hypolimnetic oxygen slightly higher in 2023

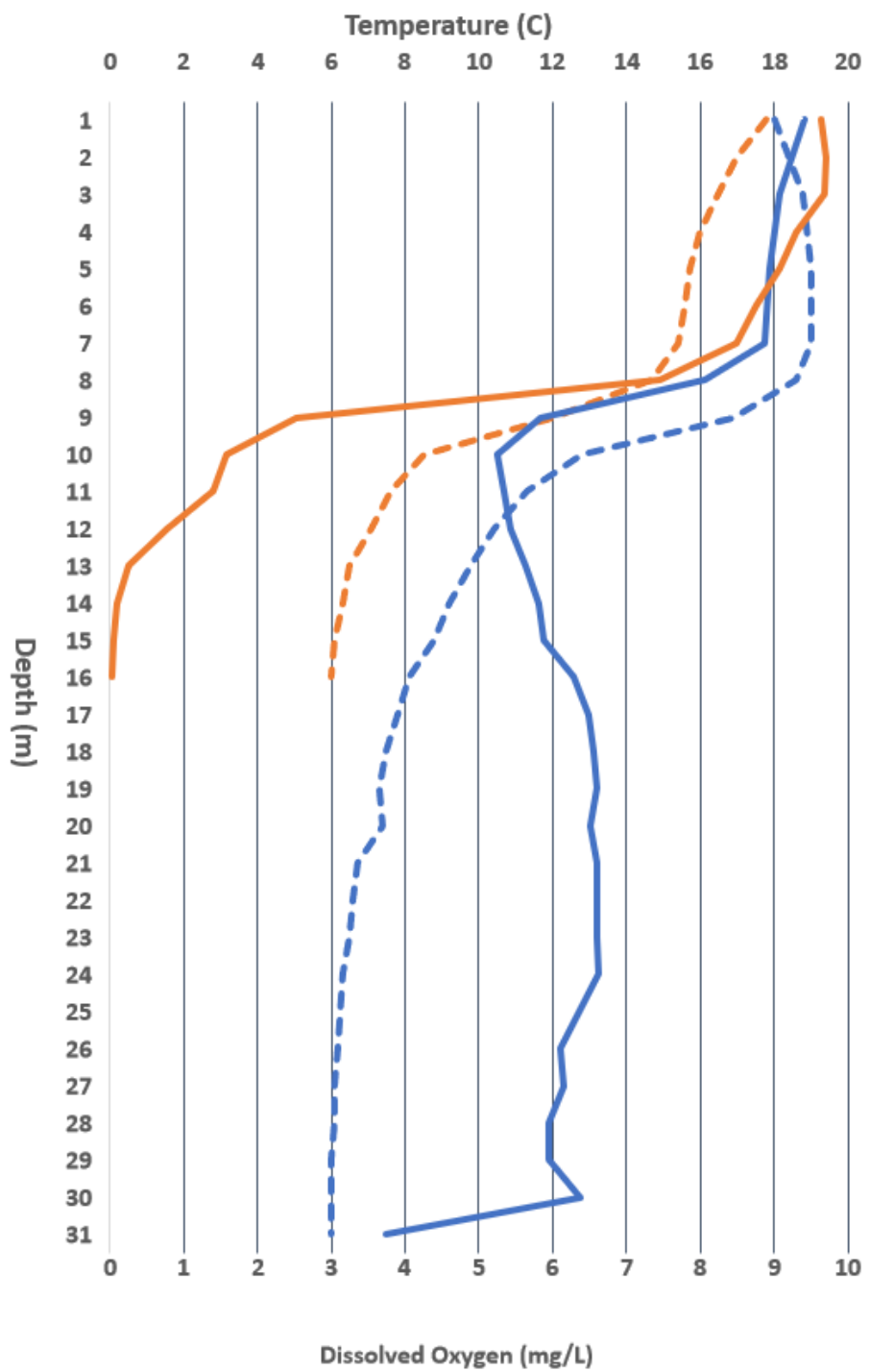




Wedding Cake

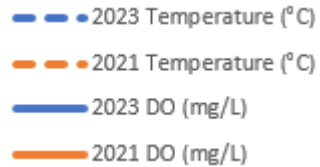
- Shallower thermocline in 2023
- Hypolimnetic oxygen slightly higher in 2023
- Deeper water found in 2023 (with guide)

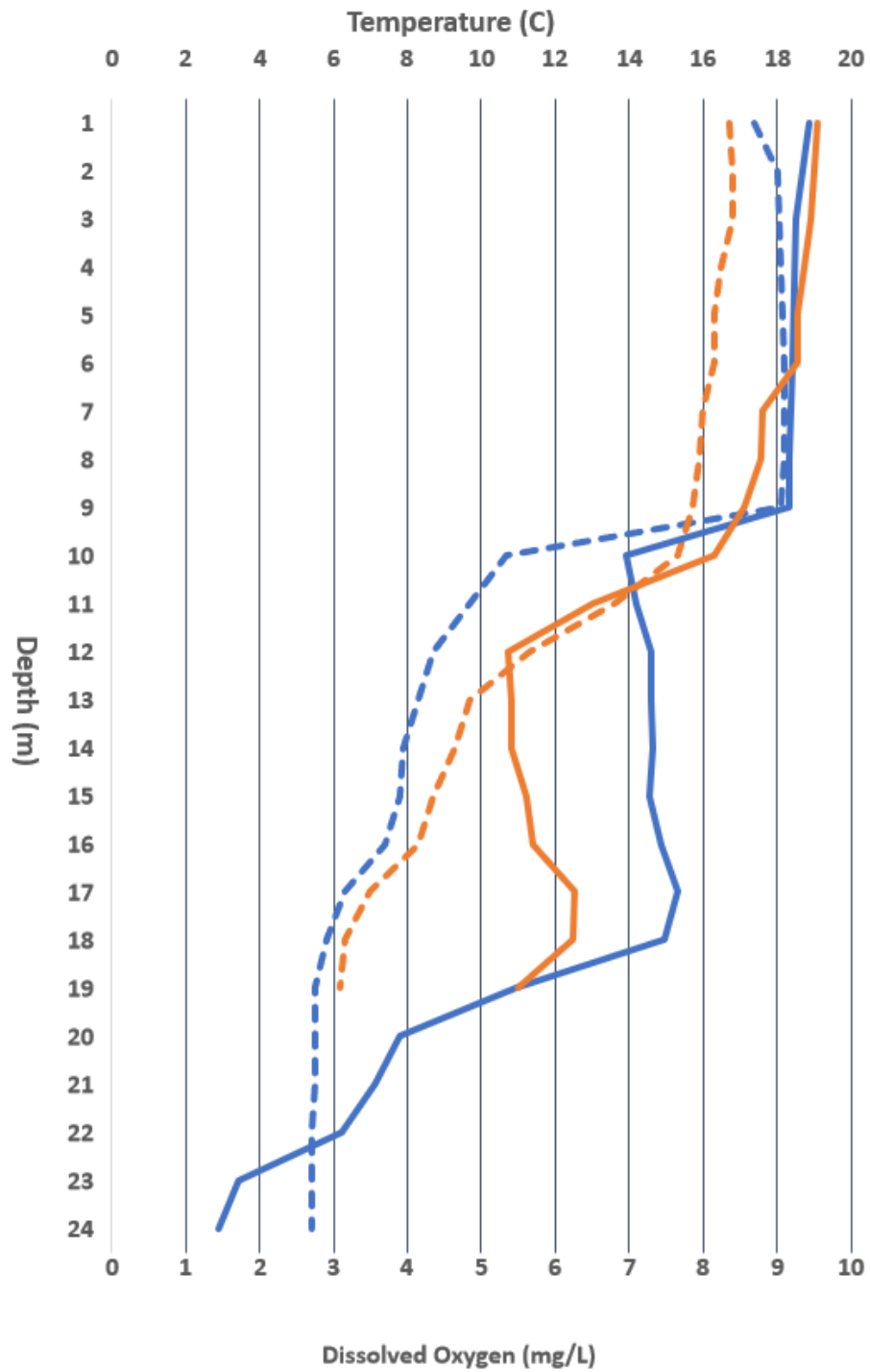




Shanty Bay

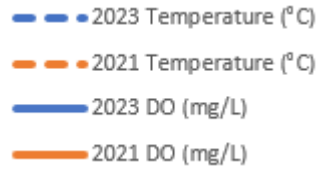
- Thermoclines similar 2023 and 2021
- Hypolimnetic oxygen higher in 2023
- Deeper water found in 2023 (with guide)

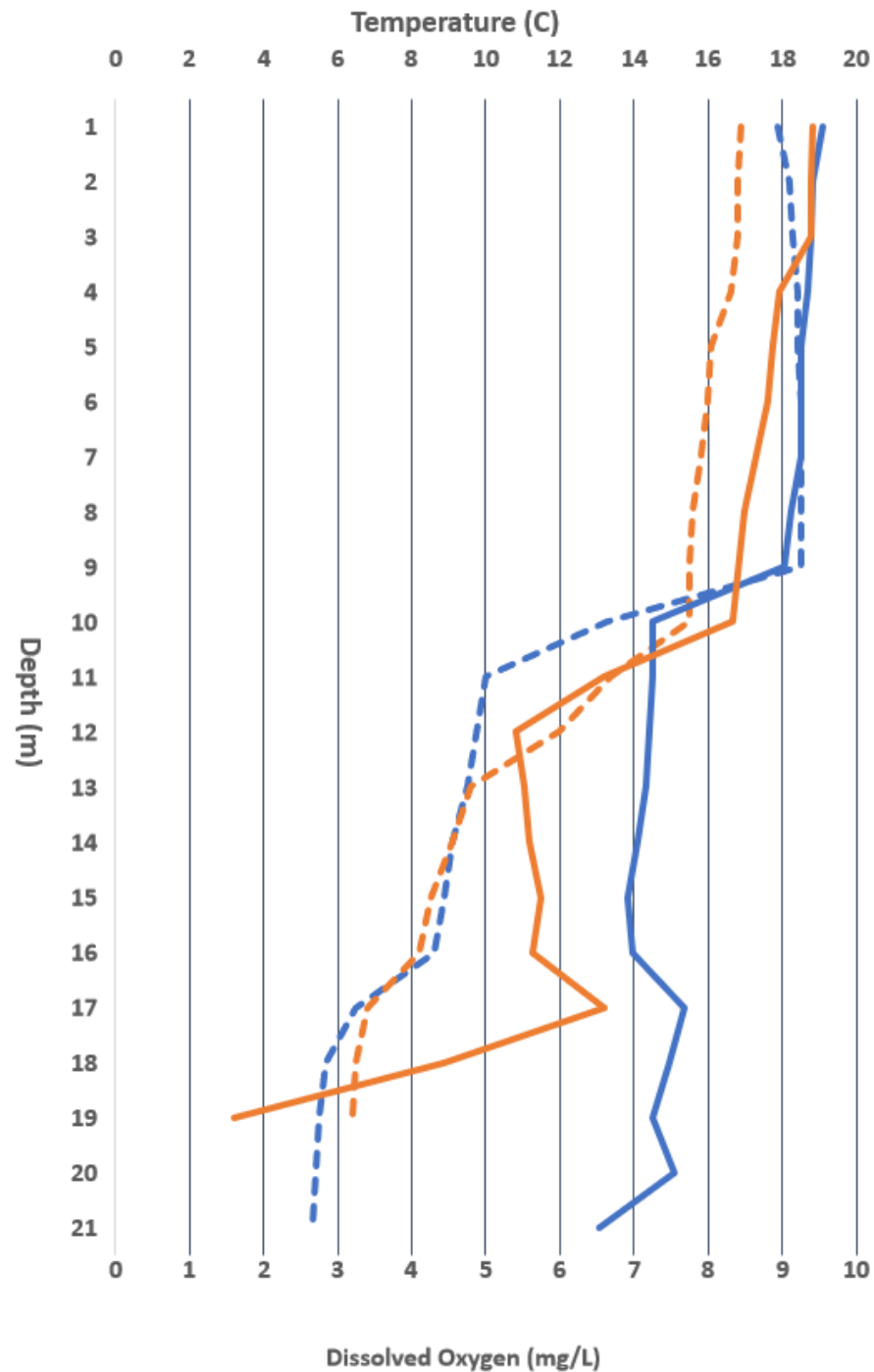




Birch Island

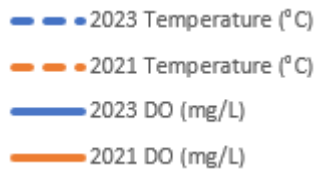
- Shallower thermocline in 2023
- Hypolimnetic oxygen slightly higher in 2023 (> 7 mg/L for 6 m)

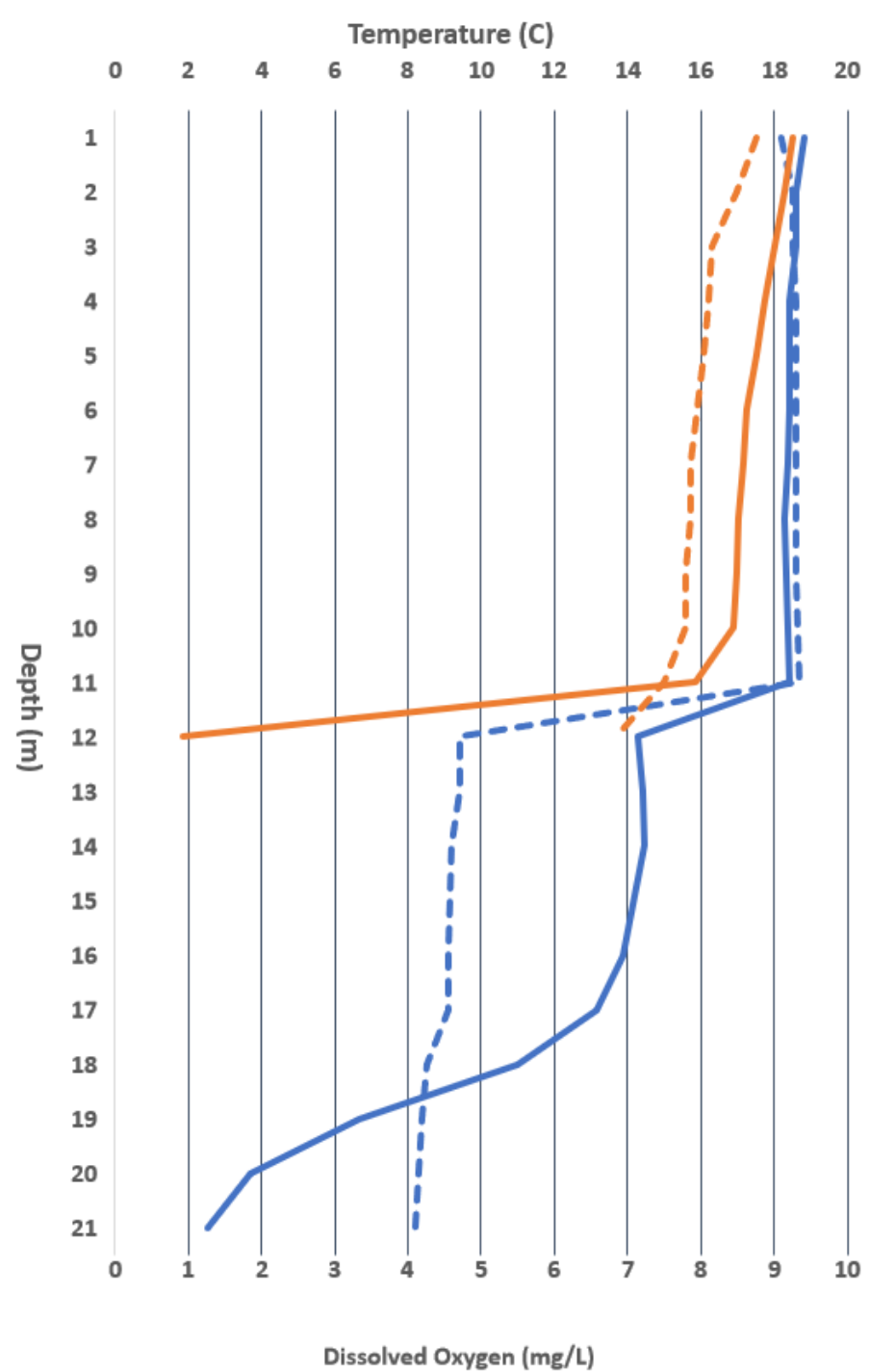




Centre Big Lake

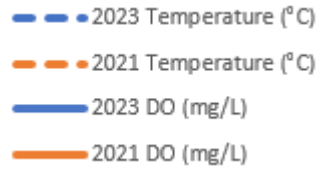
- Slightly shallower thermocline in 2023
- Hypolimnetic oxygen slightly higher in 2023, exceeding 7 mg/L





Slip Bay

- Thermoclines similar 2023 and 2021
- Hypolimnetic oxygen exceeded 7 mg/L for 4 m in 2023
- Deeper water found in 2023 (with guide)



Hypolimnion Average DO Concentration 0-4 m below Thermocline

