Monitoring update and options for mitigating blue-green algae blooms in Quamichan Lake

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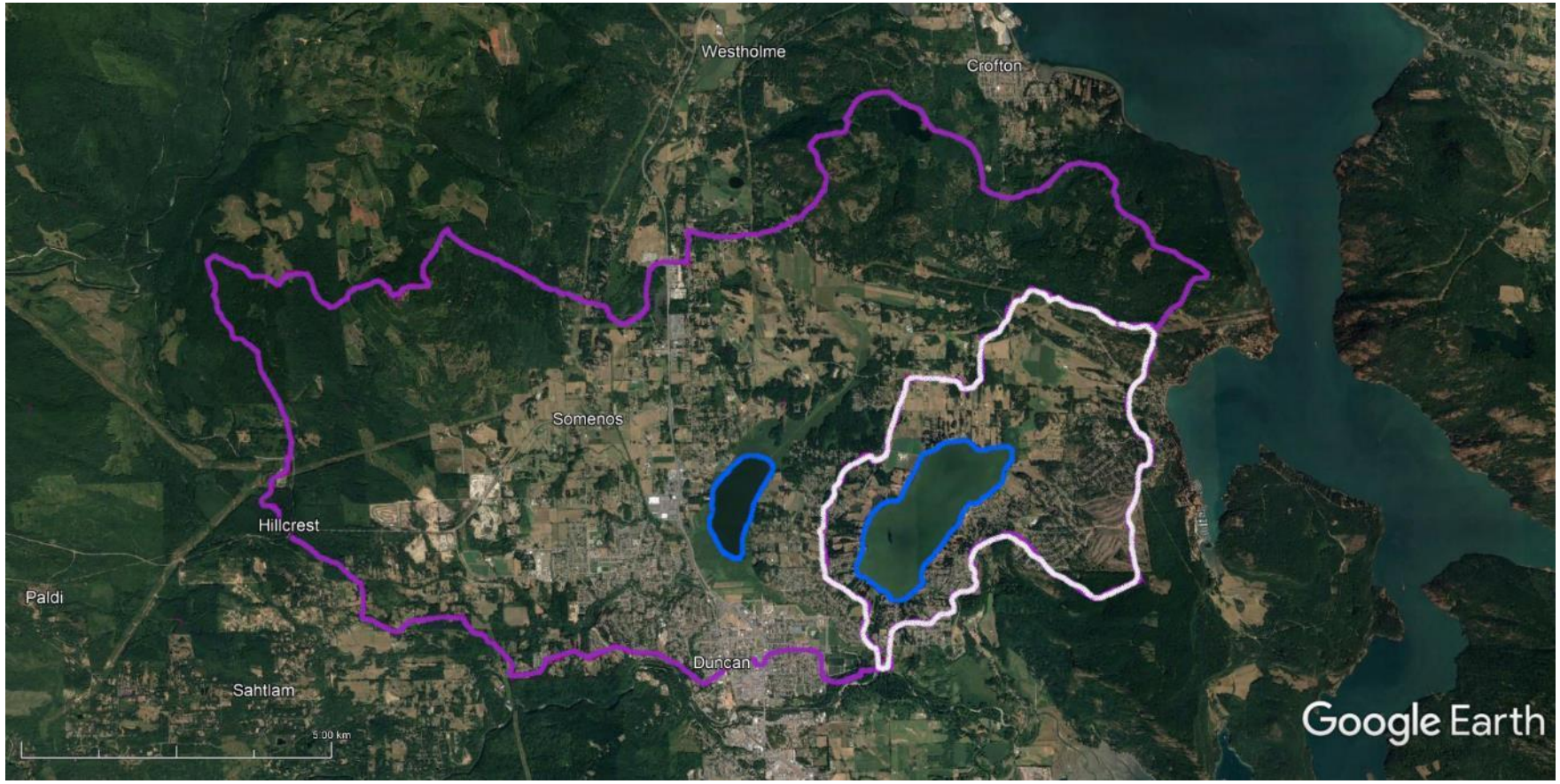
Setting / Monitoring



Lake area: 310 ha
Watershed: 1,400 ha

Monitoring :

- Nutrients (monthly in winter, bimonthly in summer)
- Phytoplankton (same as Nutrients)
- Temperature (hourly)
- Oxygen (hourly)

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Quamichan Lake and Blue Green Algae (Cyanobacteria)

- Quamichan Lake is significant to Cowichan's society, ecology, history and economy
- historic occurrences of Blue-Green Algae blooms as early as 1930
- frequency and duration of these blooms appears to be increasing
- data and information from monitoring and sampling to inform management on actions to improve water quality

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Not all Quamichan algae blooms are blue-green algae

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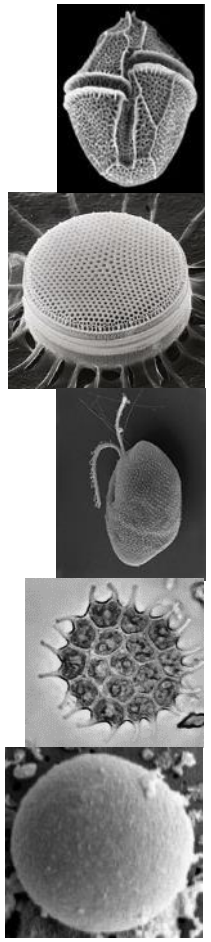
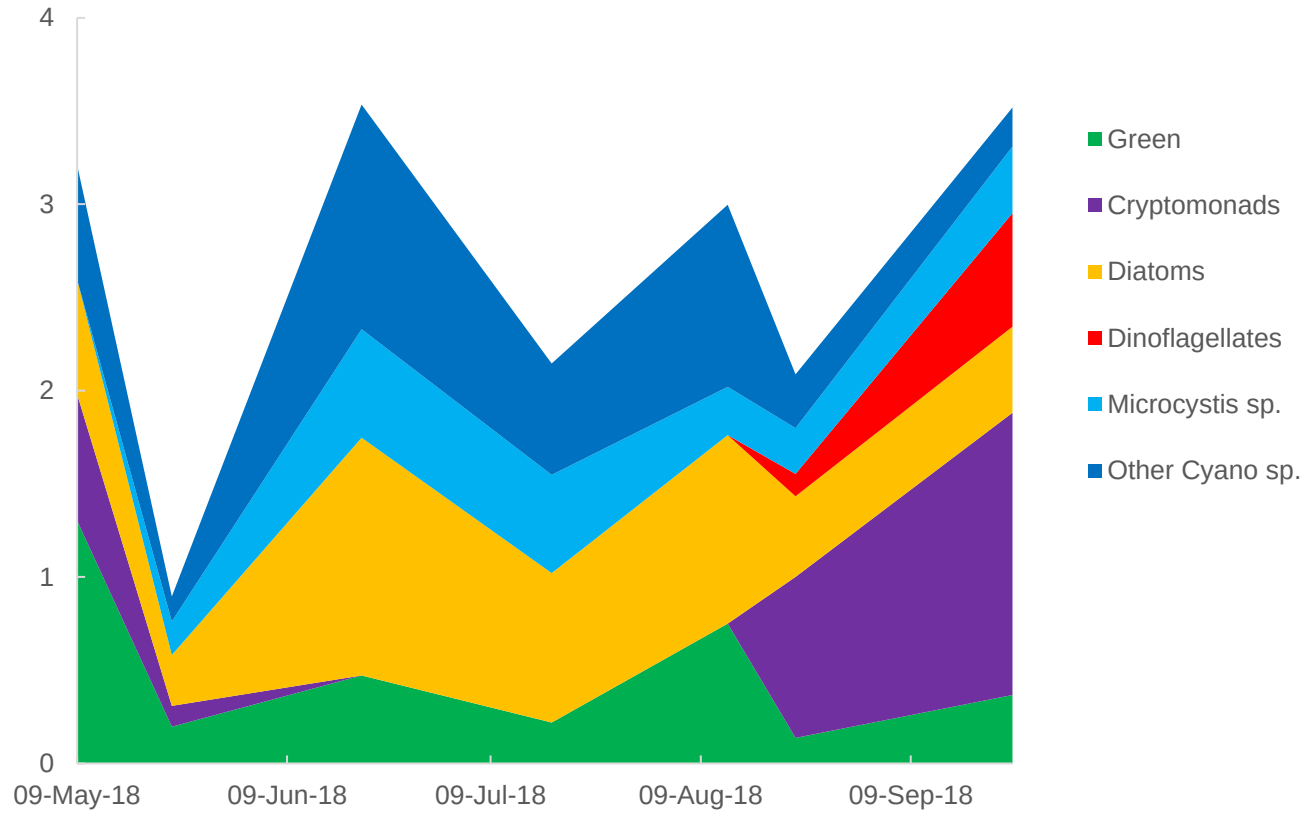
Meet the neighbours

- Dinoflagellate
- Diatom
- Cryptomonad
- Green
- Blue-Green





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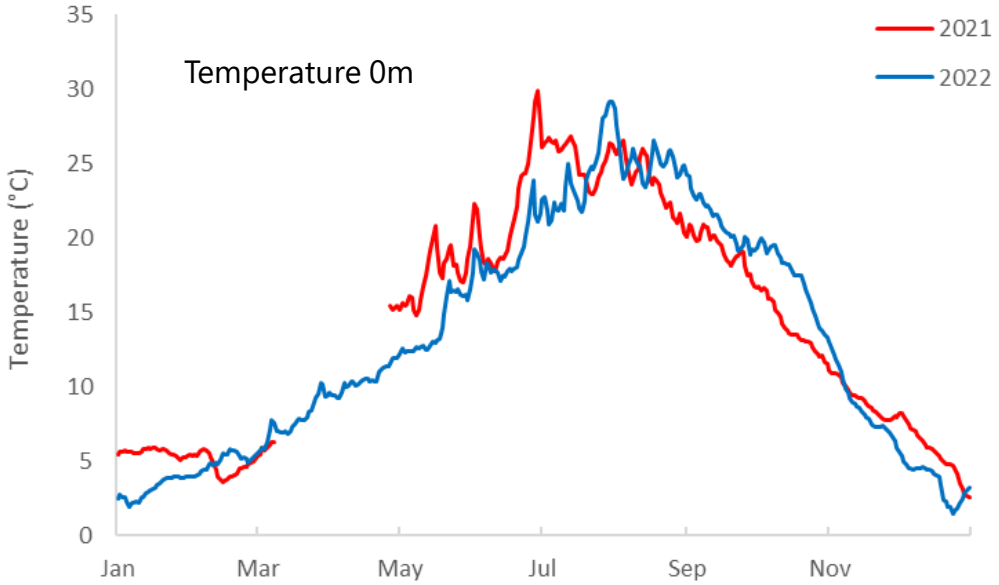

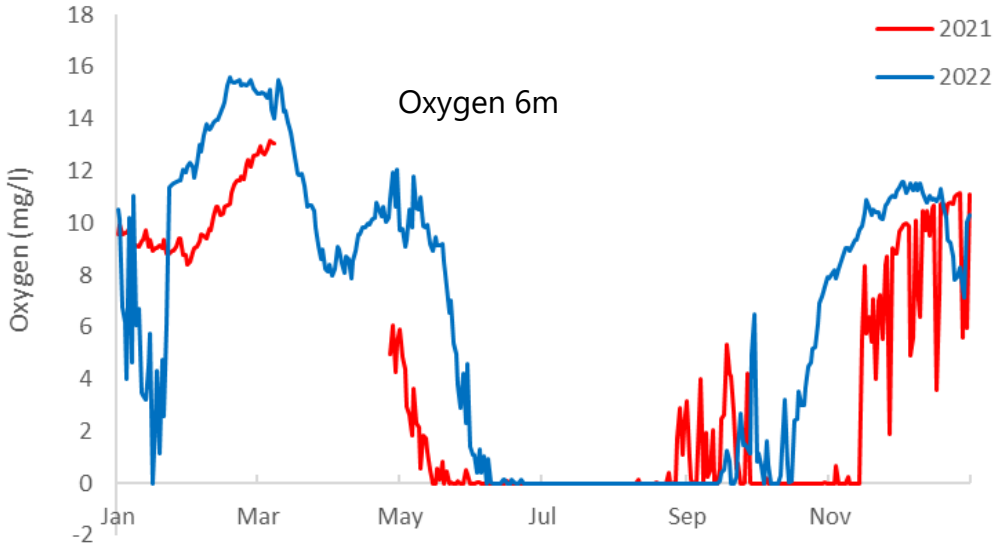

What have we learned?

- High temperature lowers oxygen
- Years with more oxygen at depth associated with smaller Blue-Green Algae blooms
- Phosphorus in lake sediment fuels Blue-Green Algae
- Phosphorus freed during anoxia
- ~90-95% of lake phosphorus from lake sediment which is a legacy of historic land management

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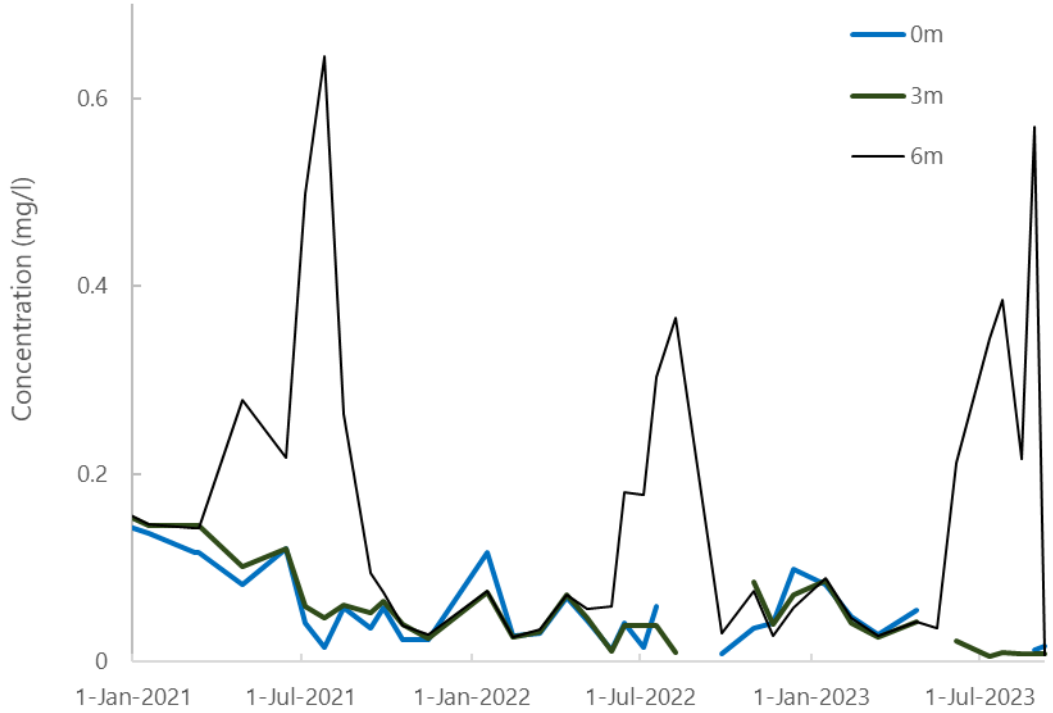
What have we learned?



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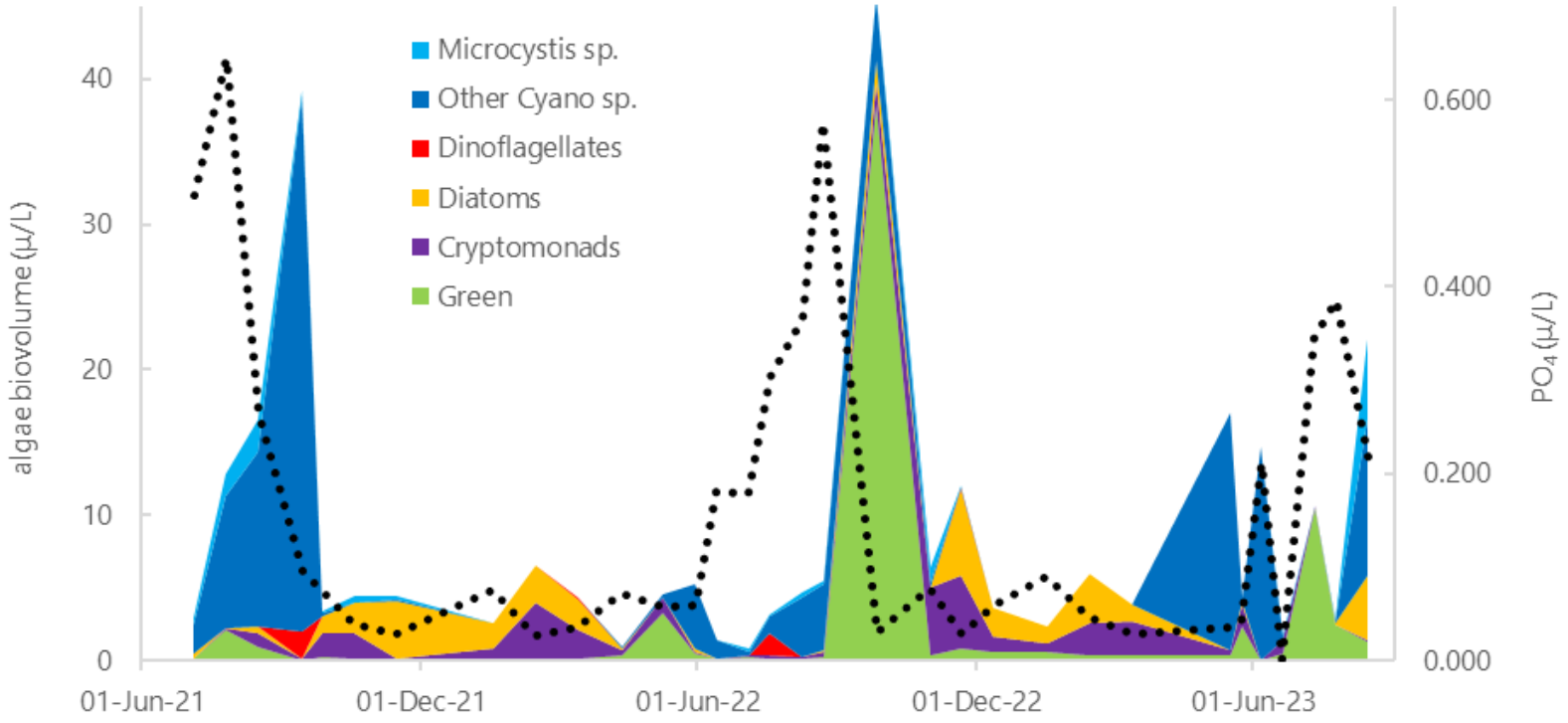
2021

- Early onset of anoxia
- Peak summer temperature earlier
- Peak Summer temperature higher

2022

- Less phosphate in water column
- Blue-Green Algae bloom smaller
- Microcystis much less abundant



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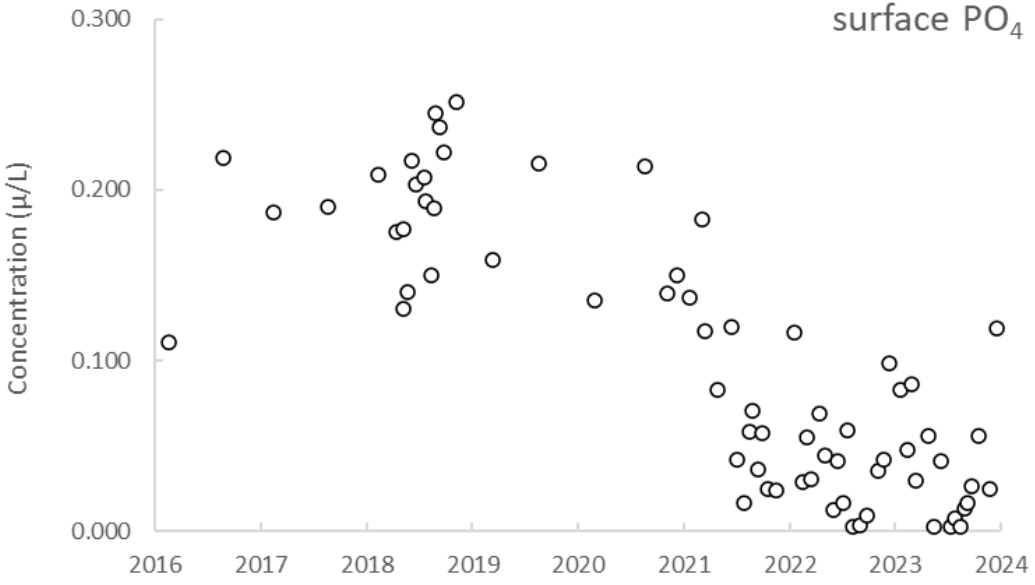
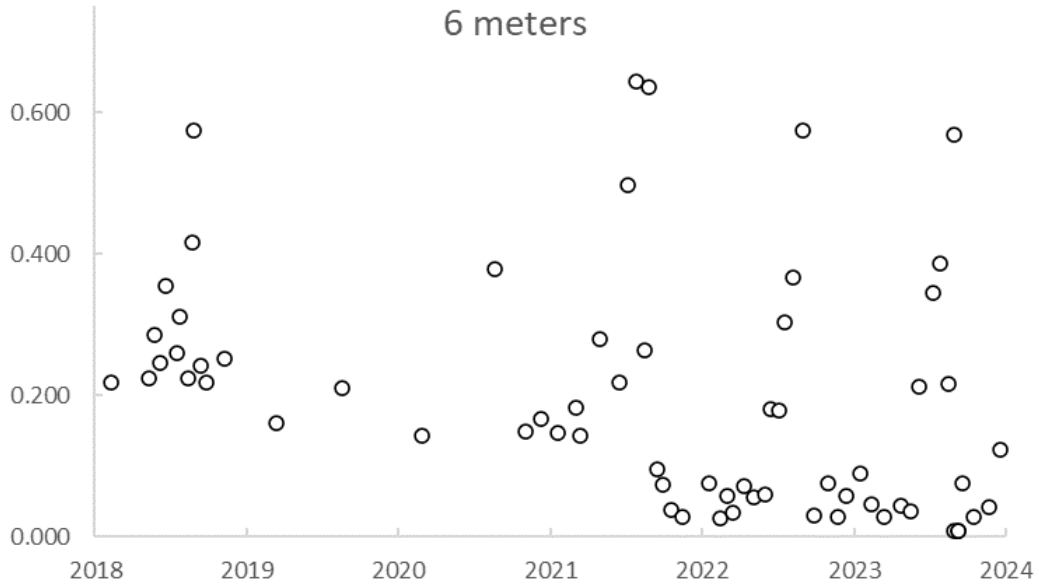
Long-term Phosphate Changes





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Initial Options Assessment

- **dredging** not suitable for Quamichan Lake; large quantity of sediment to be removed, high costs, and uncertain efficiency
- **deep water withdrawal /flushing** may not work in the short term, need a water source
- **artificial mixing** may cause sediment resuspension and stimulate cyanobacteria, will increase lake temperature
- **Phoslock®** high cost and may need reapplication
- **aeration** several options available, can lower blue green algae but will not eliminate all types of algae, helps fish

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Next steps

- Continue monitoring
- Continue work to
  - reduce external phosphorus
  - improve riparian habitat
  - Restore streams and wetlands
  - Augment stormwater features
  - Engage residents, and farmers

- Continue consultation with provincial agencies and other local governments
- Assess aeration options and then report to Council with management plan
- More Excitement since March 2024…..

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Floating Vegetation Island!

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Elk Lake Aerator Visit!

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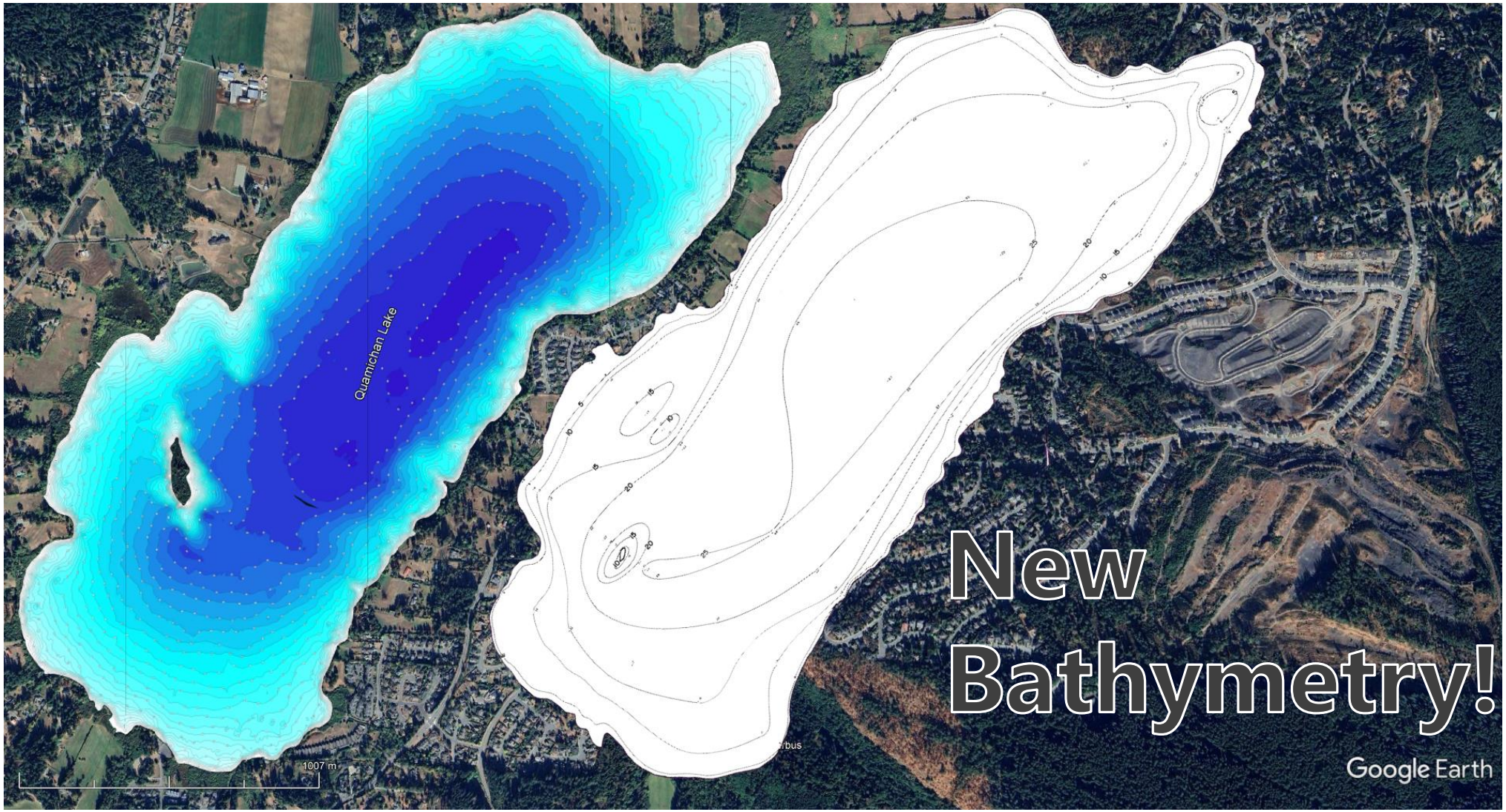

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