Recreational Swimming Area Environmental Health and Safety Survey

Prospect Lake - Power To Be

Prepared by:
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Identification

Site: Prospect Lake - Power To Be

Address: 4633 Prospect Lake Rd, Victoria, BC V9E 1J5 (Power To Be basecamp)

Site Coordinates: 48.5071885633924, -123.44301853696085 (dock coordinates)

Year of Identification: 2023

Responsible Authority: Swim Drink Fish

Contact: Katie Wilson, Victoria Community Based Water Monitoring Coordinator

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Person(s) conducting assessment: Katie Wilson

Background Information

Waterbody type: Freshwater Lake

Dimensions of site: 80m length; 40m width

Perimeter: 216m

Area: 2839m^2

Number of sample locations: 5

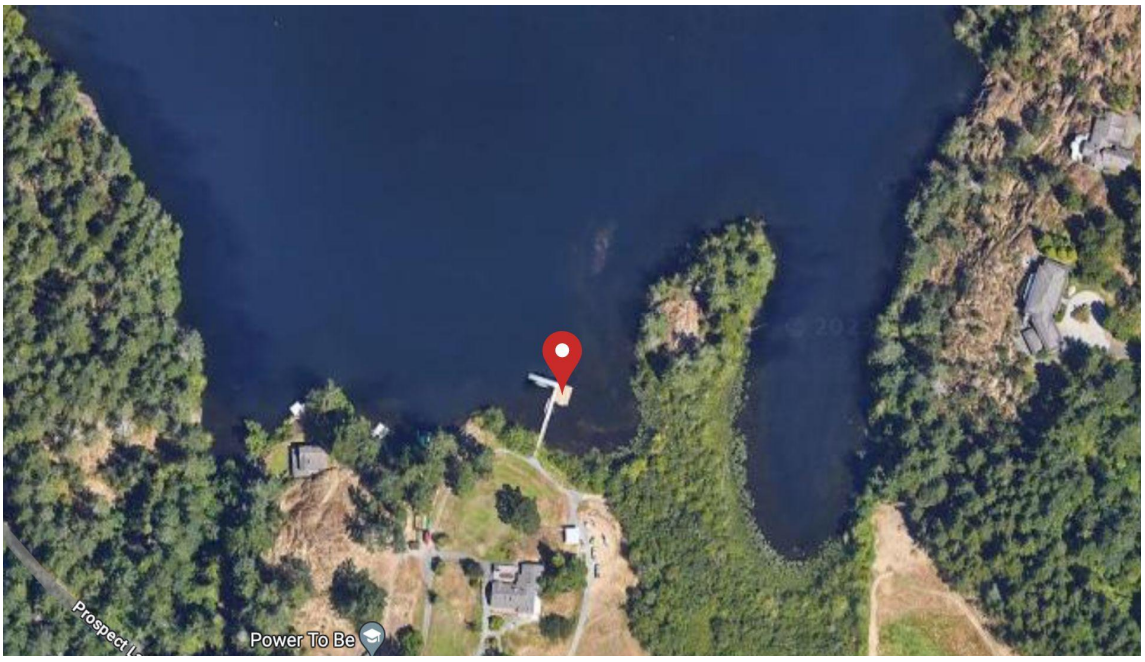

Figure 1. Zone of Local Influence. Pin indicates Power To Be dock sampling location.

Figure 2. Power To Be water monitoring site outlined in blue with sample locations designated by red pins. * Indicates Water Rangers testing site.

Figure 3. Standing on the west end of the dock looking east where the kayaks are stored. **Figure 4.** When glancing to the right, the dock access is visible above where two canoes are moored.

Annual Precipitation for Watershed (mm): 880

Drainage Area (km2): The entire drainage area of Tod Creek Watershed including lakes is ~23km^2. The portion that feeds into Prospect Lake is ~10km^2.

History: Surrounding Land Use

- Residential
- Rural
- Agriculture
- Forest
- Field
- Hills/Uplands
- Stream
- Parkland
- Recreational

Land use notes: There is a sensitive wetland located near the site (within 40m).

Prospect Lake is located within the unceded traditional territories of the Songhees, Esquimalt, Malahat and W̱SÁNEĆ peoples who are the first known inhabitants of southern Vancouver Island.

European colonization and settlement of the Prospect Lake area began in the mid 1800s with pioneer farmers. Soon thereafter, Prospect Lake became a popular fishing and hunting spot for local residents. By the end of the 19th century, the railway provided a means of transportation to the lake which involved a 2 mile trek through the forest. Summer houses and farmland soon began popping up around the perimeter of the lake, bringing in a number of permanent residents (District of Saanich, 2014).

Today, the entire perimeter of the lake has been developed into residential housing, with the exception of 3 lakeside parks: Whitehead Park, South Prospect Lake Park, and Estelline Park. These parks see a number of swimmers, paddle boarders, fishermen, boaters, and other recreators enjoying the shoreline and lake throughout the year.

While the historical use of fertilizers was likely given the high agricultural use surrounding the lake, there is currently minimal to no agriculture activity near the lake. Land use changes and the construction of impervious surfaces including roads, driveways, and rooftops likely contribute to increased stormwater runoff into the lake. The larger surrounding area makes up rural Saanich, comprising forest, fields, streams, lakes, parks, and light agriculture. The wetland and riparian areas within the lake are habitat for migratory native and non-native species such as Canada Geese and seagulls, which may contribute to a higher concentration of fecal bacteria in the lake. Prospect Lake is subject to periodic increases in nutrient levels, especially phosphorus, leading to annual algal blooms, heavy weed growth, and lowered oxygen levels. The District of Saanich indicates that roughly 1/3 of these nutrients come from watershed-streams, 1/3 from septic fields, and 1/3 from decomposing vegetation (District of Saanich, 2023).

The Power To Be basecamp is located uphill from the dock. There are stormwater collection points and a rain garden, which contribute to minimizing any potential runoff. Although there is barn construction currently underway, the impact on water quality can be considered low.

Figure 5. Looking south towards the entrance to the dock.

Figure 6. The view from the dock when looking northwest. Residential buildings can be seen along the perimeter of the lake.

Upstream Pollution Notes: The Hartland landfill is located within the Tod Creek watershed. It is located approximately 3.7 km NW of the site (as the crow flies). It is important to note that Killarney Lake, which feeds water into Prospect Lake via Killarney Creek, is located ~1 km away from the landfill.

"Surface water flowing south from the landfill is directed to Killarney Lake and Prospect Lake, and ultimately discharges to Tod Creek."

"Water that is diverted and existing drainage courses on the landfill property and downstream of the landfill are monitored to ensure that water quality is not affected by landfill operation."

-Capital Regional District, 2023.

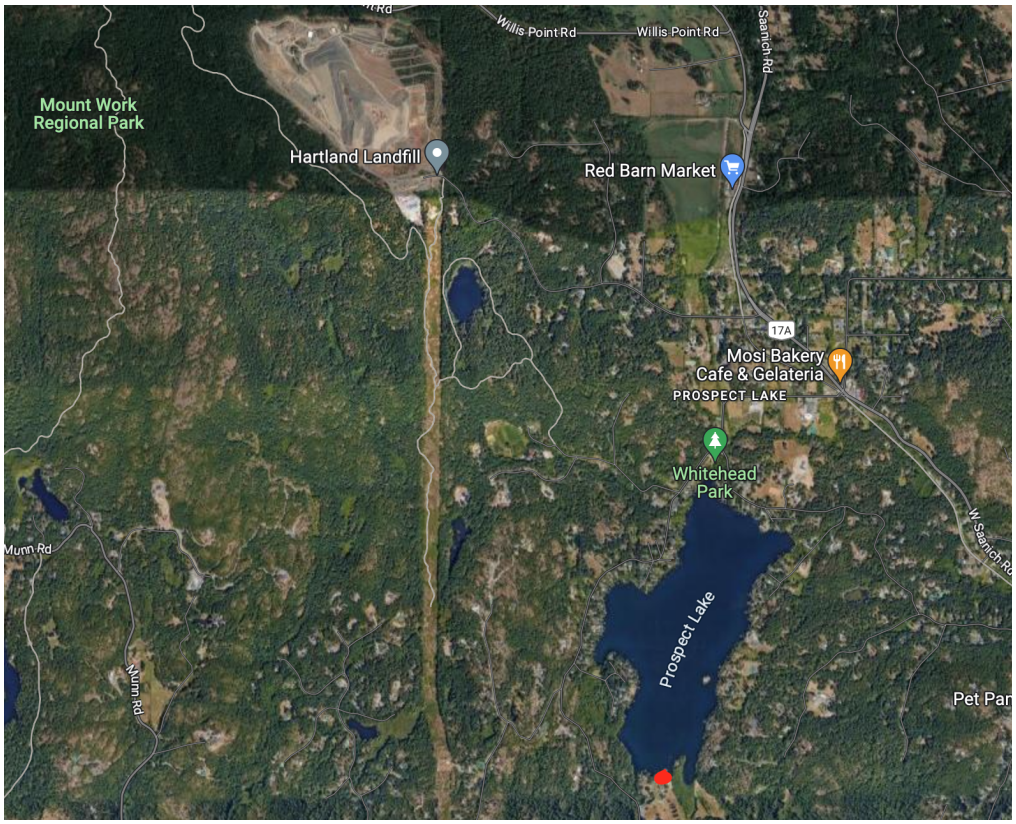

Figure 7. The Hartland landfill in relation to the monitoring site (red point).

Microbiological Hazard Assessment

Potential Sources of Fecal Contamination: (select from None, Low, Med, High)

- Municipal Sewage Discharges - **NONE**

Prospect Lake is located outside the urban sewer containment boundary, therefore residents in the area do not receive municipal sewage services from Saanich. Properties in rural Saanich use septic systems. Saanich does not regulate septic tanks and fields, however the Capital Regional District's Septic Maintenance Bylaw does (CRD, 2023).

- Stormwater Drains / Discharges - **MEDIUM**

Although the surrounding area near the sampling site is rural, there are a number of impervious surfaces including roads, driveways, and rooftops that result in runoff entering streams and eventually the lake, creating the possibility for contamination.

- Septic Waste Systems - **UNKNOWN**

The residents living around Prospect Lake and the surrounding area use septic fields and tanks. There is a potential risk that septic systems will back up or leak following a rain event, improper care, or malfunction. Since there have been no reports and it is difficult to predict, the risk is classified as unknown.

- Combined Sewer Overflows (CSOs) - **UNKNOWN**

Given that Prospect Lake lies outside the sewer containment boundary regulated by Saanich and there is no sign or online maps indicating the existence of any outfalls draining into the lake, it can be assumed that none exist. It cannot however be confirmed.

Other Environmental Sources: (Select from None Low Med High)

- Birds (gulls, canada geese, ducks, etc) - **MEDIUM**

Bird species including seagulls, eagles, barn swallows, and Canada geese were spotted on and around the lake, however few were within the sampling site area. There is evidence of bird fecal waste on the dock (see Figure 8) which indicates a recurring presence. Additionally, there is a section of wetland (classified by Saanich as sensitive ecosystem inventory) located ~40m from the dock which could increase the presence of bird activity.

Figure 8. Waterfowl fecal matter is commonly found on the dock. Canada Geese are pictured both near and within the monitoring area.

- Discharging Rivers/Streams/Creeks - **LOW**

There are many creeks (Killarney, Bleathman, Gibson) that flow into Prospect Lake from within the Todd Creek Watershed and they can carry excess nutrients and pollutants from the lands around them. The risk is classified as low because there are no significant land pollution sources besides road and stormwater runoff owing to the rural topography of the surrounding area.

- Pets - **LOW**

There are three parks situated on the lakeside: South Prospect Lake Park, Estelline Park (Southwest), and Whitehead Park (North), the first being located closest to the site and within the zone of influence. All three allow dogs, with leash restrictions. This is a potential source for fecal contamination if dogs defecate near the shoreline or in the water, however the risk has been classified as low since the presence of dogs is minimal.

- Swimmers - **LOW**

Although not publicly accessible for swimming due to safety and regulatory concerns, the Power To Be staff often swim from the dock site. Swimmers can access the lake via South Prospect Lake which is nearby the site. The risk for fecal shedding from swimmers is classified as low given the limited number of people observed swimming.

Figure 9. Paddle boarders and swimmers participating in both primary and secondary water use west of the site.

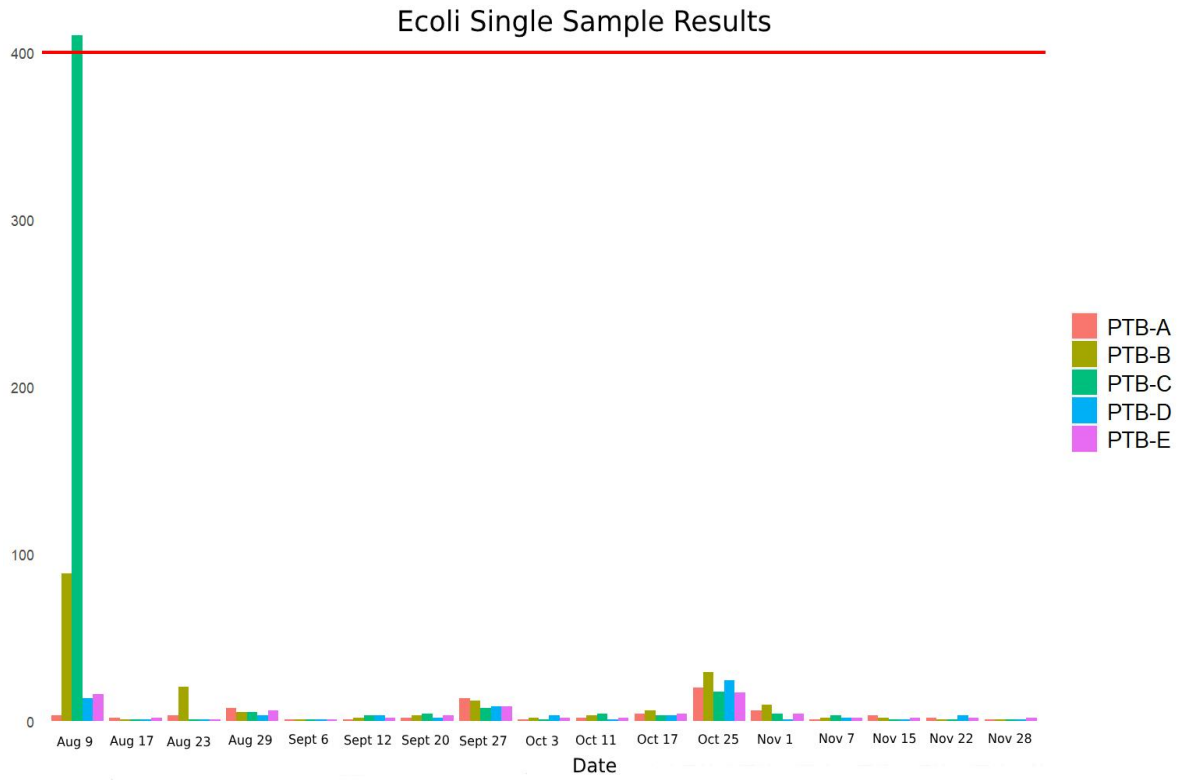

Figure 10. Graph displaying the E. coli single sample results for Power To Be for the 2023 sampling season. The y-axis represents E.coli MPN/100 mL with 400 being the single sample

maximum threshold as outlined in the Canadian Recreational Water Quality Guidelines. This was the inaugural year of monitoring at Power To Be. Power To Be was sampled 17 times between August 9, 2023 and October 11, 2023. The site met the 2019 provincial standard 100% of the time. The highest recorded geomean of the season was on August 9, 2023 with a value of 29.8 E. coli/100 ml MPN. **Disclaimer:** August 9th was the first official sample collection day at the site and based on consecutive samples, it is a high outlier. A large amount of goose fecal waste was on the dock and it is likely this resulted in higher levels of E.coli entering the water. Furthermore, it is plausible that there was a human error during sample collection.

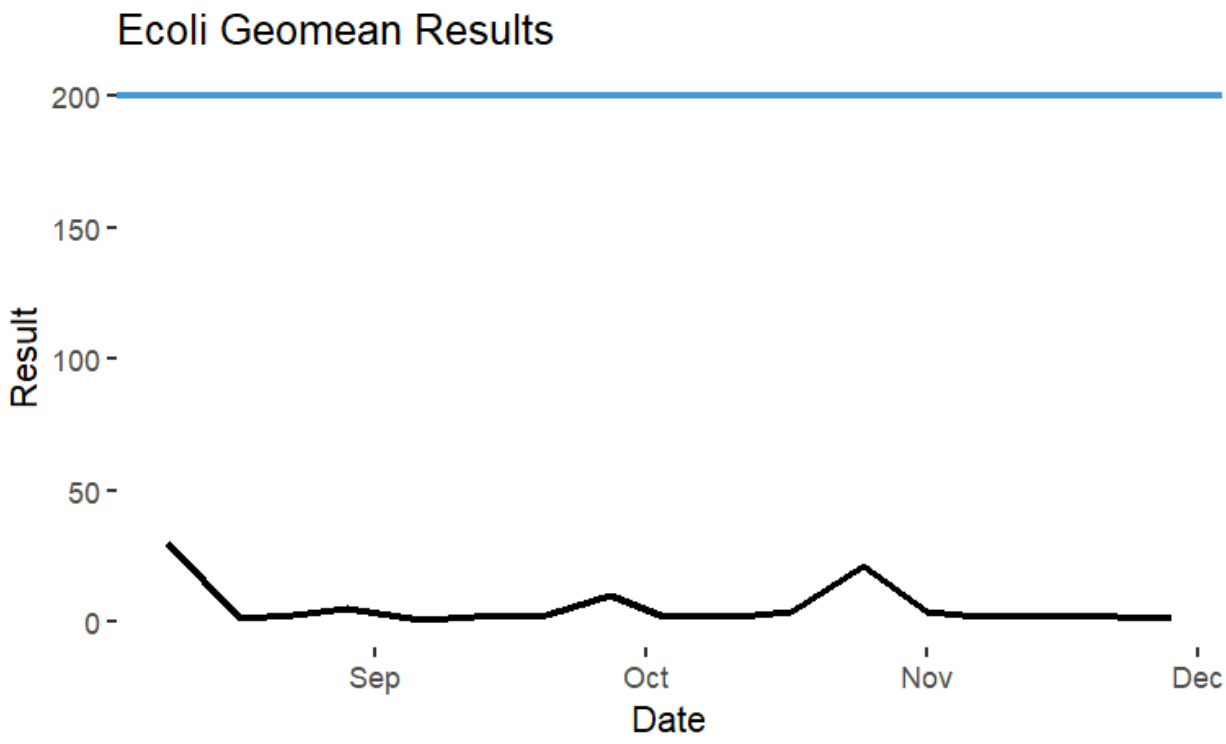

Figure 11. Graph representing the E.coli geomean results for the 2023 sampling season.

Chemical Hazard Assessment

- Commercial / Industrial Discharges - **UNKNOWN**

Given the absence of both commercial or industrial activity, the likelihood of discharge entering the lake is extremely low. However, it cannot be confirmed whether there are any discharges from surrounding urban areas entering streams that later deposit into the lake.

- Motorized watercraft - **MEDIUM**

There is a boat launch from Echo drive on the east side of the lake. Boats are permitted to operate on the lake within enforced time restrictions and designated operation areas. Most of the lakeside residents have a dock and a motorized boat which increases the risk for point source pollution. Potential pollution sources are gas and/or diesel contamination from spillage.

- Pesticides/Fertilizers - **LOW**

There is light agricultural activity (small scale) beyond the immediate border of the lake. There is a cidery and a few veggie / fruit production farms located NW and NE of the lake. There are many creeks and streams that flow into Prospect Lake and they can potentially harbor excess fertilizers and pesticides from the lands around them.

Other Biological Hazards

Biological hazards known to affect the recreational water area (presence may be continuous, seasonal, or sporadic):

- Cyanobacterial Blooms **-** **MEDIUM**

The Prospect Lake Preservation Society noted that there is at least one blue-green algae bloom each year in varying sizes. The last reported sighting was November 2019 and an advisory was published on the news (Black Press Media, 2019). Algae blooms were observed every week while sampling took place, from the end of September to the beginning of December. These blooms were reported to the CRD infoline with new signage being posted at South Prospect Lake Park near the monitoring site. The risk is classified as medium given the lack of data confirming the toxicity of the algae, although it is advised to remain diligent when a bloom is observed.

- Swimmer's Itch - **UNKNOWN**

There have been no documented cases of swimmer's itch as a result of recreating in the lake. The risk is therefore classified as unknown since it is more common to suffer from swimmer’s itch after wading or swimming in a freshwater lake environment (Mayo Clinic, 2023).

- Large numbers of aquatic plants - **LOW**

Aquatic vegetation and plants make up the majority of the lake shoreline. There is also full bottom coverage of lake weed and other plants that can be observed when standing on the dock, although the risk for injury can be considered low. The amount of growth can be spurred by sporadic levels of phosphorus which can lead to higher volumes of plant material and lower oxygen levels as a result, impacting the lake health.

Figure 12. Lakeweed is often seen floating on the water's surface.

Recreational water users: impact on water quality

Recreational water and site users were observed within the Power To Be monitoring area throughout the season. During August and September, the most frequently observed form of recreational water use was swimming, fishing, and boating. South Prospect Lake Park is adjacent to the site and was typically visited by water users that were swimming and fishing. Rarely were there water's edge users and dogs observed in the monitoring area, which can be explained by the absence of public access to the Power To Be property and dock. On occasion, motorized boats were observed pulling recreators who were tubing, water-skiing, and wakeboarding. Additionally, some users were fishing from their boats near the monitoring site.

It is expected that the average number of water users is slightly higher than our in-field observations, due to the time of day sampling occurs (early to mid mornings) and days of the week it occurs (weekdays). Recreation tends to increase on weekends and afternoons when it is hottest. Furthermore, the majority of residents living around the lake have a private dock and boat, suggesting high recreational use of the lake, particularly in the summer months. The few recreational users observed throughout the monitoring season likely have minimal effect on the water quality.

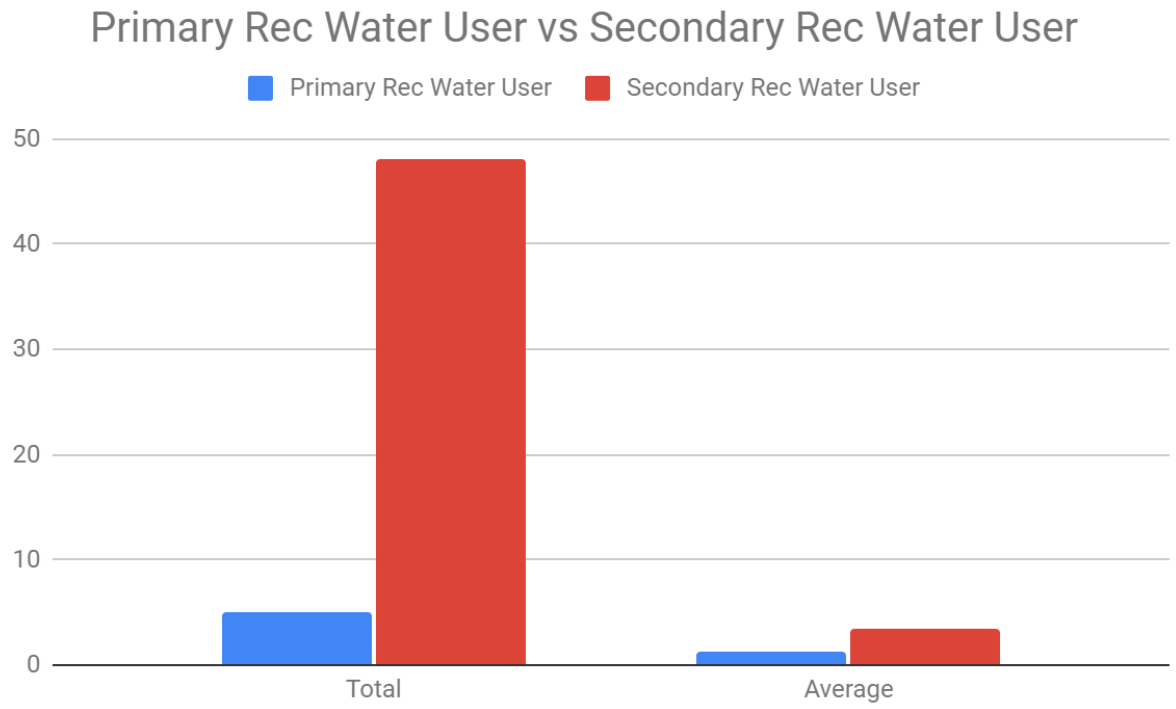

Figure 13. Graph comparing the total and average number of primary and secondary recreational water users observed over 17 days of sampling.

Physical Hazards and Aesthetic Considerations

Subsurface Hazards: (Select from None Low Med High)

- Steep slopes or drop offs - **LOW**

The dock itself can be considered a slight dropoff, although the height is minimal. Near the site, there is a collection of rocky bluffs where people can access the water. The slope can be considered a bit steep, so caution should be taken when descending into the water.

- Depths greater than 4.5 m - **MEDIUM**

At the end of the dock to the left, the depth is >4.5 m. The bottom material is likely sandy substrate, lake weed, and debris. Participants of Power To Be's programs require the use of a PFD while near or on the water, minimizing safety risks.

Figure 14. There is a swim ladder providing a safe method to exit the water should there be an accident or hazard.

Applicable physical and aesthetic parameters (pH, temperature, turbidity, colour, clarity, litter) in agreement with recommendations given in the Guidelines for Canadian Recreational Water Quality.

Water temperature and clarity were recorded consistently using a thermometer and Secchi disk, however the other aesthetic parameters are based on subjective observations. Physical parameters were measured using a Water Rangers Kit.

Parameter	**Average observed condition**
Turbidity	Average: cloudy
Surface appearance	Average: natural
Colour	Average: clear
Wave frequency and condition	Average: calm
Clarity (m)	Average visibility observed with the Secchi disk: 1.74m, Min: 0.76m, Max: 3.9m

Odour	Average: None
Litter	Minimal litter

Table 1. Aesthetic parameters for Power To Be 2023 sampling season.

Parameter	**Average Measure**
Water Temperature (°C)	Average: 15.9
Barometric Pressure (hPa)	Average: 1016.4
Dissolved Oxygen mg/L	Average: 7.5
Conductivity (µmhos/cm)	Average: 126.9
pH	Average: 7.5

Table 2. Physical parameters for Power To Be 2023 sampling season.

Water Conditions: (Select from None Low Med High)

- Strong Currents or Riptides — **NONE**
- Undertows — **NONE**

Other: (Select from None Low Med High)

- Floating debris — **LOW**
- Sewage waste — **NONE**
- Microplastics — **NONE**

Facilities and Safety Provisions

Important Note: It is important to note that while some provisions and facilities are located at the Power To Be basecamp, the dock site itself is not accessible to unscheduled public walk-ins.

Facilities:

Toilets: 6, accessible, gender neutral

Showers: 1, accessible

Drinking Water Fountains: 2 water bottle refill stations.

Litter Bins: ~10

Recycling Bins: ~7

Access for Persons with Disabilities: There is accessibility to the water via canoes and kayaks.

Safety Provisions:

Lifeguard Station: 0

Life Saving Equipment: PFDs, ~100

Emergency Telephone: Yes

First Aid Station: Yes

Beach Postings/Suitability for Swimming: No

Emergency Contact Information: Yes - Power To Be basecamp

Reporting Information

District of Saanich: Any type of spills or polluting substances to land or water, on road surfaces or into storm drains, call:

- Saanich Public Works: 250-475-5599
- After-hours Emergency: 250-475-5599

To report a waterborne disease outbreak:

- Island Health: 250-370-8699

Where to find the water quality results:

- Swim Guide: Prospect Lake - Power To Be

Appendix

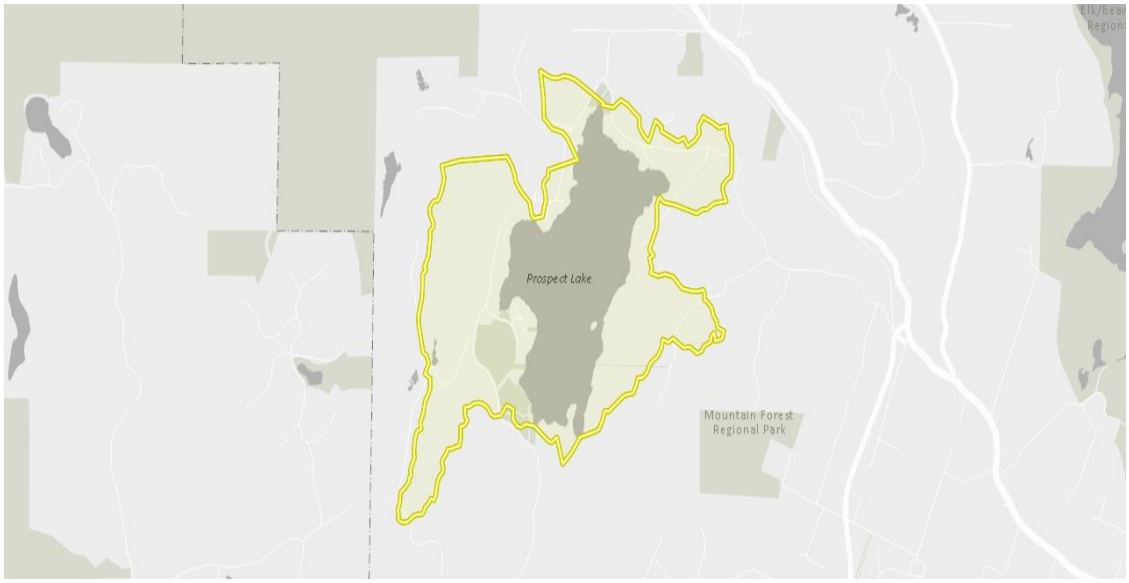

Figure A. Map of Prospect Lake Watershed (sub watershed)

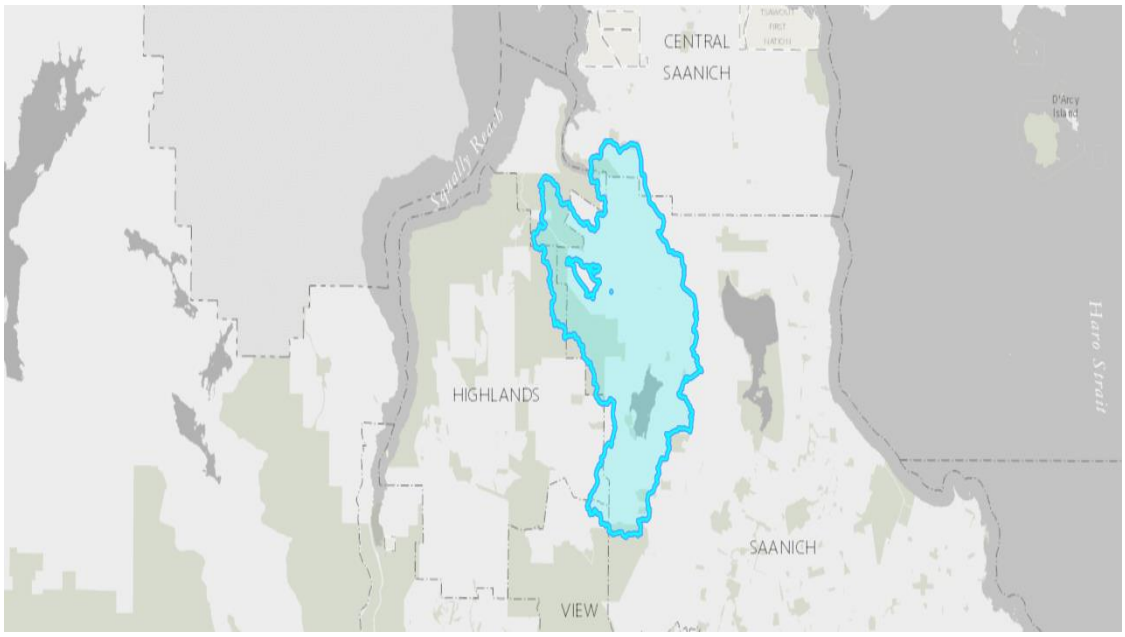

Figure B. Map of Tod Creek Watershed (full watershed)

References

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3. Capital Regional District (2023). Protecting your septic system. crd.bc.ca. https://www.crd.bc.ca/education/stormwater-wastewater-septic/at-home/protecting-septic-system

4. Black Press Media (2019). Saanich man spots blue-green algae at Prospect Lake Park. vicnews.com. https://www.vicnews.com/news/saanich-man-spots-blue-green-algae-at-prospect-lake-park-63429

5. Mayo Clinic (2023). Swimmer's Itch. mayoclinic.org. https://www.mayoclinic.org/diseases-conditions/swimmers-itch/symptoms-causes/syc-20355043#:~:text=It's%20most%20common%20after%20being,people%2C%20so%20they%20soon%20die.