Vancouver Island Small Lake Enrichment Program

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BRITISH COLUMBIA CONSERVATION FOUNDATION

Executive Summary

Over the past thirteen years, the British Columbia Conservation Foundation's Aquatic Research and Restoration Centre (BCCF ARRC) has implemented the Vancouver Island Small Lake Enrichment Program to enhance the growth of rainbow trout and kokanee salmon, and to create unique lake angling opportunities comparable to those found in interior British Columbia. This current five-year phase builds on eight previous years of funding from the Habitat Conservation Trust Foundation (HCTF), as well as a six-year pilot study conducted by the Vancouver Island Fisheries Sector and the University of British Columbia.

Between 2020 and 2026, four lakes were enriched over a total of 183 field days, with approximately 26,000 L of liquid nutrients applied. Water quality was monitored monthly throughout the April to September application period at both treatment and control lakes to ensure that target conditions were maintained. Fieldwork was carried out by BCCF staff and volunteers from several organizations, including the Campbell River Fish and Game Club and the Island Rangers. Fish monitoring, conducted via gillnetting at treatment lakes, was carried out each fall by the Ministry of Water, Land and Resource Stewardship (WLRS), while automated time-lapse cameras were used to estimate angler effort.

Fish monitoring and lake productivity metrics indicate that the program has been successful, with increased growth rates observed in three of the four treatment lakes. Rainbow trout reaching "trophy" size (> 500 mm in length and up to 1.5 kg in weight) have been caught in recent years. Primary productivity in treatment lakes remained stable, slightly increasing with continued nutrient applications, in contrast to the control lake. Growth rates were highest during the initial years of enrichment and appear to slow with continued nutrient inputs. A marked increase in angler effort has also been observed at treatment lakes over the course of the program, and BCCF has actively promoted the initiative through various media outlets and community outreach events across eastern Vancouver Island.

In the 2025/26 project year, primary funding was provided by the HCTF (~$56,000), with additional cash and in-kind contributions from key partners, including the Freshwater Fisheries Society of BC (FFSBC) and WLRS. When combined with the substantial contributions of volunteer support, the total annual project value exceeded $105,000.

Table of Contents

List of Figures

List of tables

1.0 Introduction

Vancouver Island small lakes are generally oligotrophic, receiving minimal nutrient inputs through natural processes due to regional geology and high precipitation (Damborg, 2021; Stockner et al., 1980). As a result, these systems typically support relatively small, slow-growing fish populations compared to mainland lakes. The *Vancouver Island Small Lake Enrichment Program* aims to create a regionally unique angling experience in selected lakes through the controlled application of liquid nutrients (nitrogen and phosphorus), combined with adaptive stocking strategies. The addition of nutrients enhances primary productivity of lower trophic levels, increasing energy availability throughout the food web, and ultimately supporting greater fish growth (Michalski, 2012).

2.0 Study Area and History

Lake fertilization on Vancouver Island has a well-established history, with early successes, such as the 1970s sockeye salmon (*Oncorhynchus nerka*) program at Great Central Lake, bringing recognition to this approach (Fisheries and Environment Canada, 1977). Since then, lake enrichment efforts in British Columbia have been undertaken for a range of objectives, including the recovery of at-risk species and stocks (e.g., kokanee salmon (*O. nerka*) and Gerrard rainbow trout (*O. mykiss*) in Kootenay Lake) and the enhancement of recreational fisheries.

In 1989, the Vancouver Island Fisheries Section, in collaboration with the University of British Columbia's Department of Fisheries, initiated a small lake fertilization program with the objectives of identifying lakes suitable for treatment, increasing sport fish production, and tripling baseline annual yield (Michalski et al., 2012). With Habitat Conservation Trust Foundation (HCTF) funding support, the program began with the selection of candidate lakes (four treatment and four control systems), followed by three years of pre-enrichment data collection (1990–1992) and three years of fertilization (1993–1995).

In 2012, the British Columbia Conservation Foundation (BCCF), with support from Dr. Ken Ashley, re-established the *Vancouver Island Small Lake Enrichment Program* with renewed funding from HCTF. Collectively, these programs generated extensive datasets, which had mixed overall outcomes. Results demonstrated that lakes with specific biophysical characteristics were more likely to achieve desired responses to enrichment. Overall, through the 13 years of study, several "candidate" lakes emerged, exhibiting consistent increases in fish size associated with nutrient addition.

2.1 Treatment and Control Lakes

In consultation with provincial biologists, treatment lakes were selected based on several criteria, including low natural nutrient loading, limited natural trout recruitment, small surface area (< 50 ha), road accessibility, proximity to urban centers, and inclusion in the Freshwater Society of British Columbia (FFSBC) stocking program.

Nimnim, Reginald, Rowbotham, and Shelton Lakes have been included in the program since 2017 and have remained the four treatment lakes throughout the most recent five-year cycle (2021–2026; Figure

1; Table 1). Shelton Lake has been in a trial phase since 2020, including the introduction of kokanee salmon in conjunction with nutrient enrichment.

Hawthorn Lake, located south of Port Alberni, was incorporated into the program in 2022 as a control system. While no nutrients are applied to Hawthorn Lake, it is subject to the same water quality monitoring and angler effort assessments as treatment lakes, providing a reference point to evaluate enrichment effectiveness and account for environmental variability.

All four treatment lakes are situated within the land base of Mosaic Forest Management ("Mosaic"). A collaborative partnership with Mosaic has been maintained throughout the project, including the provision of annual letters of support and access agreements to facilitate field operations and public angling access.

Table 1. General information for lakes involved in the Small Lakes Enrichment Program on Vancouver Island. Stocking information was obtained from the Freshwater Fisheries Society of British Columbia (FFSBC) Annual Stocking Report (FFSBC, 2026).

Lake	Years Involved	Location (by road)	Size and Depth	Stocked Species	Stocking Schedule
Nimnim	2018-2025	~49 km north of Port Alberni	~44 ha ~20 m deep	AF3N rainbow trout (Blackwater strain)	~1,000 yearlings, stocked every two years
Reginald	2013-2025	~26 km west of Cambell River	~32 ha ~27 m deep	AF3N rainbow trout (Mix of Fraser Valley, Horsefly, and Blackwater strains)	~500 yearlings, stocked annually
Rowbotham	2017-2025	~41 km southwest of Parksville	~22 ha ~12 m deep	AF3N rainbow trout (Blackwater strain)	~500 yearlings, stocked every two years
Shelton	2017-2025	~49 km west of Nanaimo	~36 ha ~18 m deep	AF3N kokanee salmon	~1,800 fry, stocked annually
Hawthorn (control)	2022-2025	~30 km south of Port Alberni	~10 ha ~22 m deep	AF3N coastal cutthroat trout	~300 yearlings, stocked every two years

*AF3N refers to all-female triploid

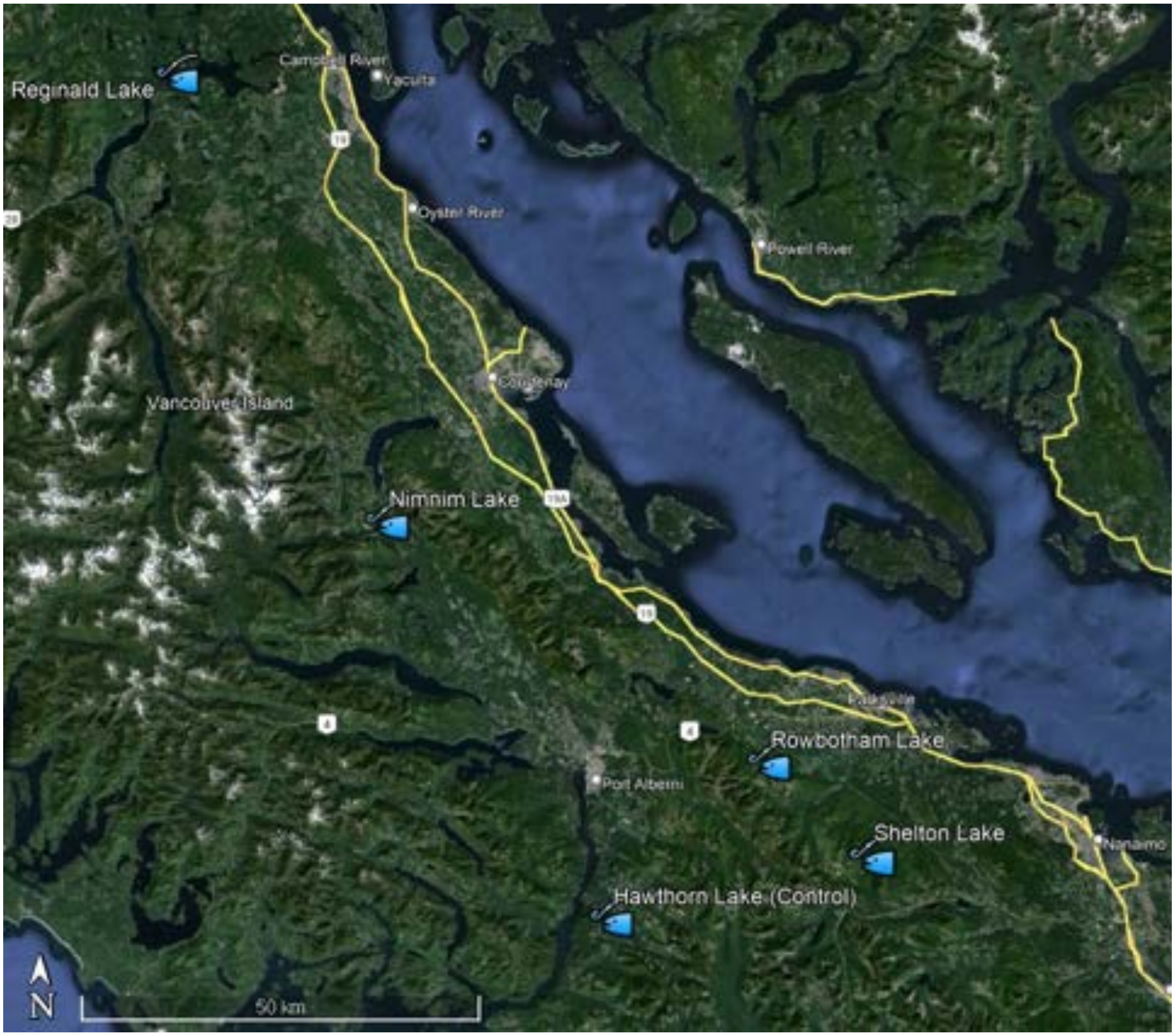

Figure 1. Map of treatment and control lakes involved in the Small Lakes Enrichment Program on Vancouver Island between 2020 and 2026.

3.0 Methods

3.1 Nutrient Applications

In April 2025, five 1,000 L containers of liquid fertilizer were procured from Nutrien Ag Solutions (Delta, BC) and delivered to the secured Ministry of Water, Land and Resource Stewardship (WLRS) compound in Nanaimo, BC. Nutrient application volumes were calculated based on the epilimnetic volume of each lake, following guidelines outlined in *The Practical Guide to Small Lake Fertilization on Vancouver Island* (Ashley, 2011). Fertilization involved the application of two nutrient formulations: a nitrogen (N) source, designated “28-00-00” (28% N, 0% phosphorus [P], 0% potassium), and an ammonium polyphosphate solution, designated “10-34-00” (10% N, 34% P), which served as the phosphorus source.

Between April and September 2025, the four treatment lakes were enriched over 35 application days, with a total of approximately 5,840 L of liquid nutrients applied (Table 2). Most of this volume (~5,590 L) consisted of the nitrogen formulation (28-00-00). The remaining ~250 L comprised a mixed solution of 28-00-00 and 10-34-00 at a 10:1 ratio (N:P). This mixed formulation was applied on three occasions, twice at Rowbotham Lake and once at Nimnim Lake, late in the application season (August – September 2025), when nitrogen concentrations remained relatively high and stable. All other applications consisted of nitrogen-only additions, with the intent of maintaining an overall N:P ratio consistent with the recommended 10:1 guideline (Ashley, 2011). Although cyanobacteria (blue-green algae) have not been observed in treatment lakes, this ratio was maintained as a precaution to minimize the risk of bloom formation (Stockner & Hyatt, 1984). Application methodology has remained consistent throughout the current five-year cycle (2021–2026), with a summary of total nutrient inputs provided in Table 3.

Table 2. Application schedule and total nutrients added for treatment lakes in Year 5 (2025/26).

Lake	Total N 28-00-00 (L)	Total Mixed (L)	Application Period	Number of Applications	Nutrients (L) per Application
Nimnim	1,480	30	May 20 – Sep 4	8	180 – 200
Reginald	1,520	0	May 1 – Sep 3	10	160 – 180
Shelton	1,840	0	Apr 25 – Sep 2	10	160 – 200
Rowbotham	750	220	May 29 – Aug 28	7	100 – 160
Total	**5,590**	**250**	-	**35**	-

*'mixed' refers to a 10:1 combination of 28-00-00 (nitrogen) and 10-34-00 (phosphorus mix)

Table 3. Total nutrients applied at all treatment lakes throughout the five-year cycle (2021 – 2026)

Project Year	Total N (L)	Total Mixed (L)
2021/22	*3,820	1,460
2022/23	*5,000	280
2023/24	4,000	260
2024/25	5,000	120
2025/26	5,590	250
Total	**23,410**	**2,370**

*N source used in 2021 and 2022 was 23-00-00 (23% nitrogen content and 0% phosphorus and potassium) as 28-00-00 was unavailable during these years.

Nutrient applications followed established methodologies described by Stockner and Ashley (2003). Fertilizers were transferred into portable containers ("jerry cans") and applied to each lake using a small pump and spray hose from a slow-moving boat (see Appendix B). During application, nutrients were mixed with lake water to prevent sinking below the photic zone by drawing lake water through a one-inch suction intake, while a secondary, smaller intake line equipped with dual control valves was used to introduce fertilizer at a regulated rate.

The resulting mixture was discharged through an adjustable fire hose nozzle onto the lake's surface, while the vessel maintained a consistent speed of approximately 8–10 km/h. Each application event typically required less than two hours per lake. Applications were conducted at approximately biweekly intervals from late April through September, depending on road access and prevailing environmental conditions.

This methodology has been consistently applied throughout the program and has proven effective in achieving target productivity levels and positive fish growth responses in several Vancouver Island lakes (Androsoff, 2024).

3.2 Water Quality Monitoring

Treatment and control lakes were monitored throughout the application period to evaluate the effectiveness of nutrient applications and ensure water quality remained within acceptable limits, consistent with previous protocols and those outlined in Ashley (2011). Water samples were collected monthly using a 1.2 L LaMotte 1087 horizontal water sampler at depths of 1 m and 10 m, capturing water above and below the thermocline. Deep samples were taken at least two meters above the lake bottom to avoid sediment contamination. When sampling coincided with nutrient application, samples were collected prior to nutrient additions to ensure measurements reflected standing nutrient concentrations rather than newly applied fertilizer.

Sampling crews followed strict contamination control procedures, including thorough rinsing of hands, samplers, and sample bottles. All samples were analyzed by Bureau Veritas Labs (Burnaby, BC) for total nitrate plus nitrite (TN), total phosphorus (TP), ammonia, and soluble reactive phosphorus (SRP). SRP, often referred to as orthophosphate, is a key nutrient readily available for algal uptake. Water samples allowed assessment of each lake's response over time, including nutrient uptake by organisms and the potential for nutrients to sink to the lake bottom.

Additional parameters assessed included Secchi depth, surface and air temperatures, water clarity, invertebrate and fish observations, plankton color, and presence of plankton blooms. Secchi depth serves as an indicator of primary productivity, with clearer water generally reflecting lower algal biomass. Throughout the most recent five-year cycle, target Secchi depths ranged from 4–6 m, with no more than two consecutive weeks of readings shallower than 2 m (Damborg, 2021). Observations of plankton blooms are particularly important, as the presence of blue-green algae may indicate nutrient imbalances or other water quality issues. Dissolved oxygen and temperature profiles were also collected at each lake during the start and end of the enrichment period (Appendix A).

3.3 Fish Monitoring

To evaluate population dynamics and fish growth, monitoring was conducted at the treatment lakes using standard multi-panel gillnets, following stock assessment protocols outlined in *Fish Collection Methods and Standards* (Resource Inventory Committee, 1997). Captured fish were sampled for species, fork length, sex, weight, and stomach contents. These data were used to determine size-at-age, condition factor, distribution, and relative abundance.

Due to the substantial effort and costs associated with netting and aging, lakes were sampled on a rotating schedule, with the objective of assessing each lake once every three to four years (Table 4). Fin clips were used to identify stocked fish to reduce laboratory aging time and costs, when available. Scale and/or otolith samples were collected from unmarked fish to determine age. In 2025, Shelton Lake was surveyed by WLRS fisheries staff on November 17–18, 2025.

Table 4. Summary of fish monitoring at treatment lakes between 2016 and 2025, including the total number of rainbow trout (RB) and kokanee salmon (KO) caught for each assessment year. Note that kokanee stocking began in Shelton Lake in 2020.

Lake	Assessment Year	RB	KO
Nimnim	2017	47	N/A
	2019	39	
	2024	32	
Reginald	2012	42	N/A
	2013	94	
	2014	34	
	2015	85	
	2016	80	
	2020	59	
	2023	30	
Rowbotham	2016	15	N/A
	2018	30	
	2022	73	
Shelton	2015	44	N/A
	2018	34	N/A
	2022	99	155
	2025	73	30

3.4 Angler Observations

Automated time-lapse cameras were deployed at all lakes to monitor angler effort during each project year. Cameras operated from April to November, capturing hourly images during daylight hours. Images were downloaded every one to two months. To validate camera data, visual angler counts were conducted during lake visits, when possible. Following the application period, all images were reviewed using the *Timelapse2©* image analyzer software (Greenberg Consulting Inc. & University of Calgary, 2011) to compile raw counts of boats and anglers observed at each lake.

4.0 Results

4.1 2025 Water Quality Monitoring

Throughout the sampling period in 2025, TN, TP, SRP, and ammonia concentrations remained relatively low across all lakes, with Rowbotham Lake exhibiting the highest levels of each parameter (Appendix A). In general, TN concentrations were higher at 1 m depths indicating the nutrient applications were effectively diluted and remained available for the target primary consumers residing in the sunlit epilimnion (i.e., phytoplankton: Figure 2).

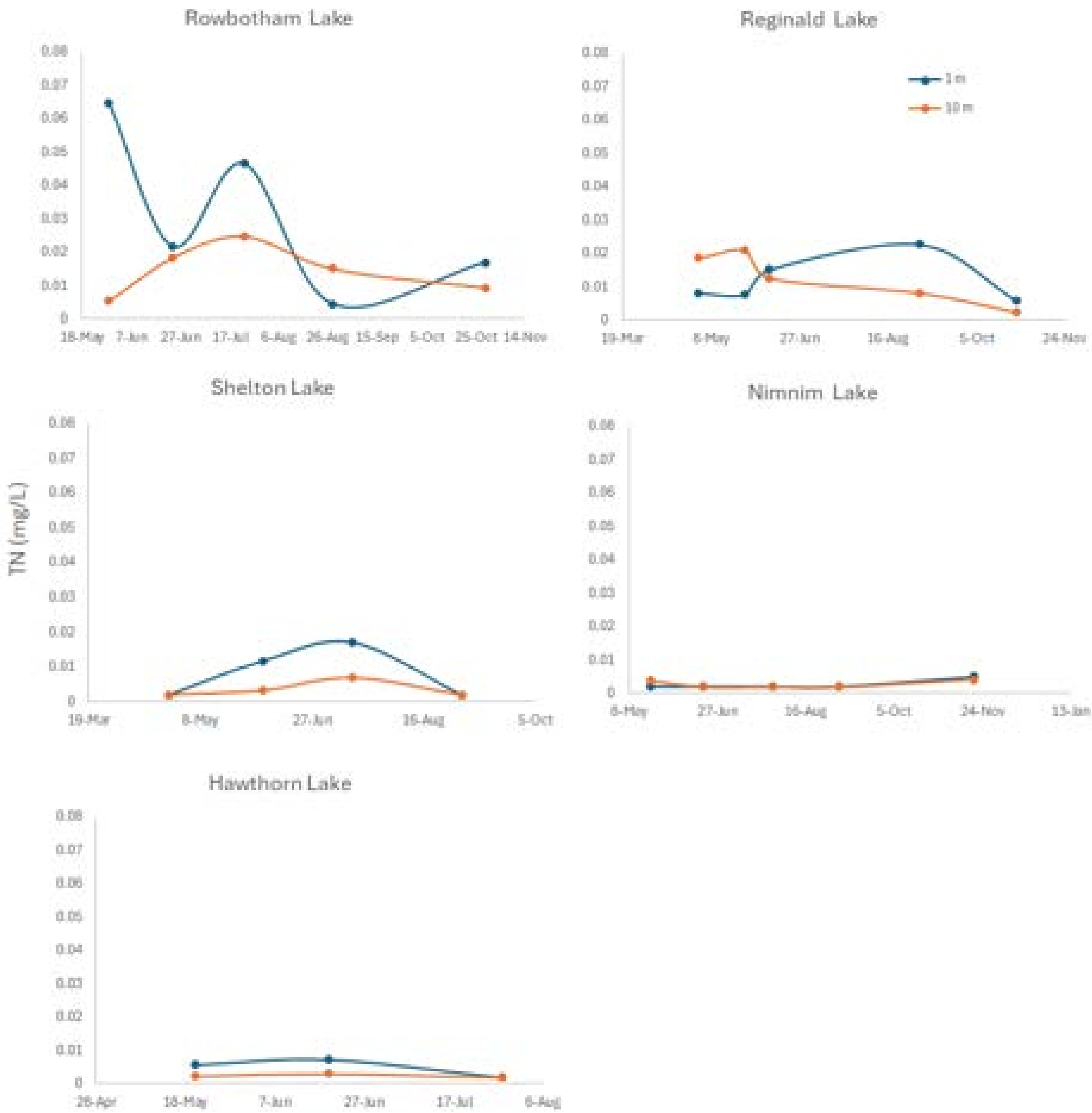

Figure 2. Total nitrogen (TN) observed in water samples taken at treatment and control (Hawthorn) lakes, 2025.

Secchi disc depth measurements for Reginald, Rowbotham, and Shelton Lakes indicate that primary productivity (algal growth) remained relatively stable throughout the 2025 application period, with a slight increase observed over time (Figure 2). Secchi depths at these lakes generally ranged between 3 and 7m. Nimnim Lake exhibited more variable Secchi readings, suggesting slightly lower algal growth compared to the other treatment lakes. In contrast, Hawthorn Lake, which received no nutrient applications, consistently displayed clearer water with deeper Secchi depths (9 – 12 m) that gradually decreased over the monitoring period, indicating substantially lower primary productivity. These observations have remained consistent since Hawthorn Lake was added as a control system in 2022.

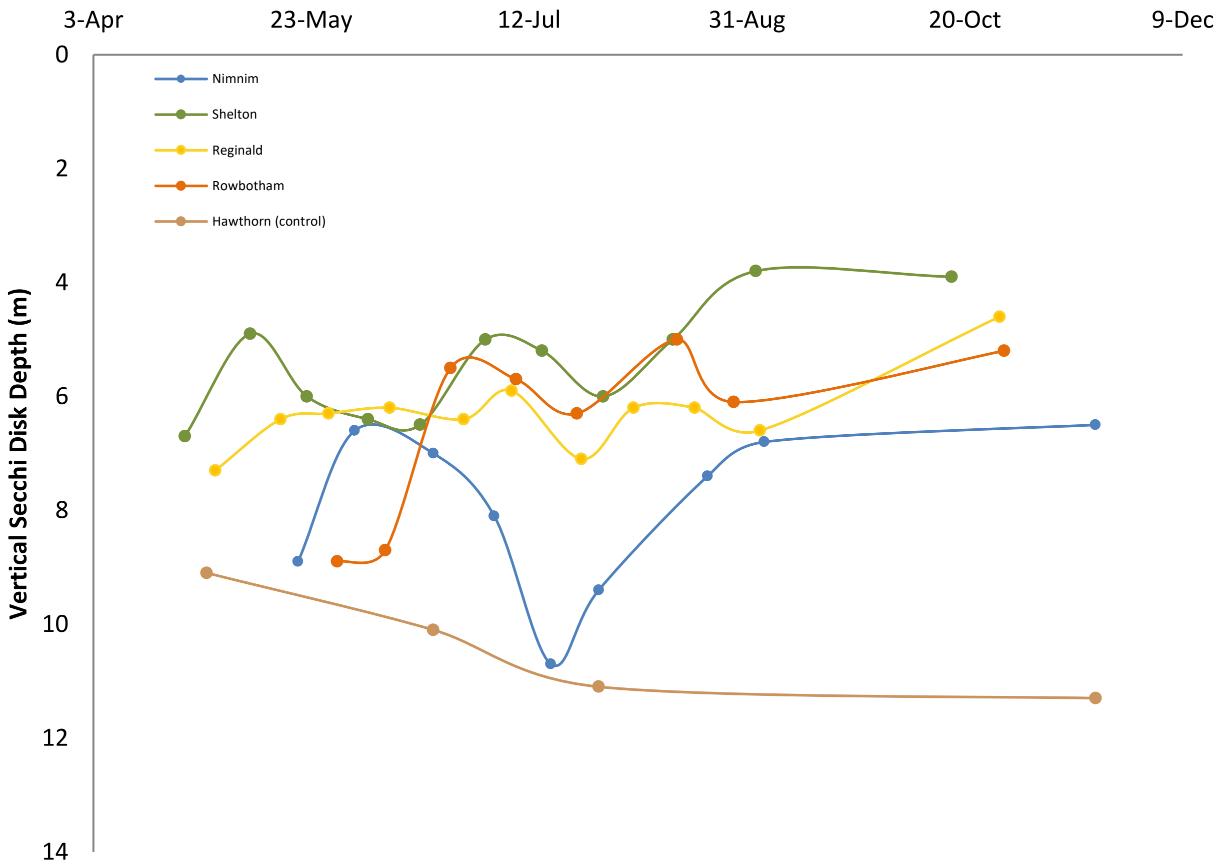

Figure 3. Observed Secchi disk depths for treatment and control lakes between April and November 2025.

4.2 Fish Monitoring

Gillnet assessments at Shelton Lake on November 17–18, 2025 captured 73 rainbow trout and 30 kokanee salmon. Pre- and post-fertilization fish monitoring data for Shelton Lake are summarized in Table 6. While Shelton Lake has shown to be suitable for kokanee salmon rearing, fish lengths for both kokanee salmon and rainbow trout have remained stunted, or in some cases decreased since the initiation of lake enrichment combined with kokanee stocking in 2020. No individuals of either species exceeded 400 mm in length. Age data for the sampled fish were not available at the time this report was prepared.

Table 5. Fish monitoring summary data for rainbow trout (RB) and kokanee salmon (KO) at Shelton Lake between 2015 and 2025. Kokanee stocking in conjunction with lake enrichment commenced in 2020, thus 2015 and 2018 represent pre-enrichment and 2022 and 2025 are post-enrichment.

Species	Total Count	Max Length (mm)	Mean Length (mm)	% of Catch				
				< 200 mm	200-300 mm	300-400 mm	400-500 mm	≥ 500 mm
2015 RB	44	409	282	7	48	43	2	0
2018 RB	34	378	277	18	26	56	0	0
2022 RB	99	372	219	37	54	9	0	0
2025 RB	73	343	235	25	70	5	0	0
2022 KO	155	267	232	10	90	0	0	0
2025 KO	30	271	183	57	43	0	0	0

Fish monitoring at the other three treatment lakes between 2017 and 2025 has shown an increase in rainbow trout size-at-age (mean length and weight) relative to pre-enrichment data (Figure 3). Notably, individuals exceeding 500 mm in length and 1.5 kg in weight were captured at Rowbotham Lake during the 2022 assessment. Nimnim Lake exhibited more modest gains in recent assessments; however, a steady increase in fish size has been observed since enrichment began in 2018.

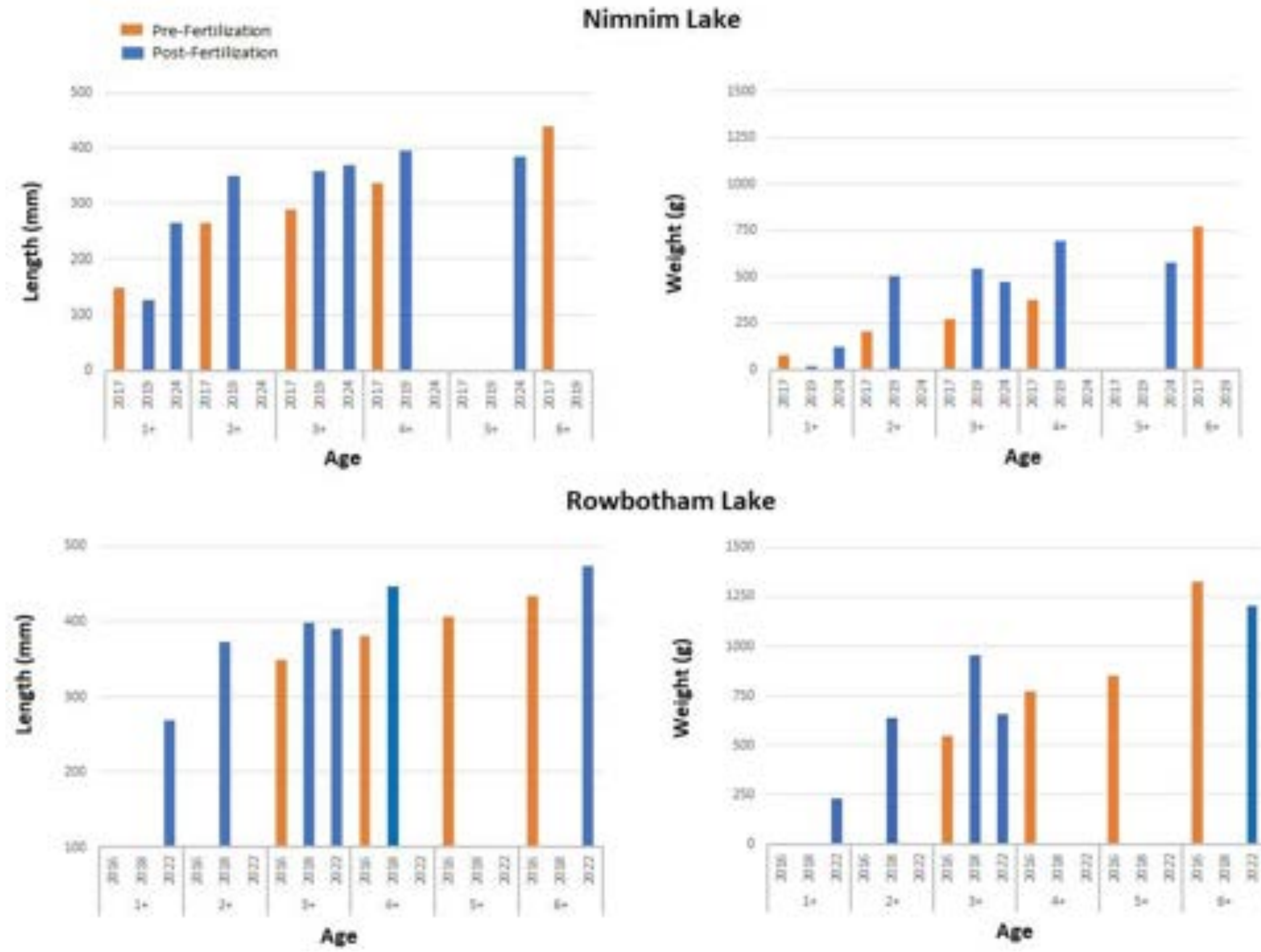

Figure 4. Pre- and post-enrichment size-at-age comparisons of gillnetted rainbow trout in Nimnim and Rowbotham lakes from 2017 - 2025. Mean length (left panel) and mean weight (right panel) are presented for each age class.

Reginald Lake has produced the largest fish observed since enrichment began, with individuals exceeding 540 mm in length and 2.1 kg in weight captured during monitoring. Significant increases in fish length and weight were documented between pre- and post-enrichment periods from 2012 to 2015, with more modest results observed in recent assessments (2020 and 2023; Figure 4). No individuals in the 4 – 5+ age classes were captured in 2012, limiting pre-enrichment comparisons for older fish. Overall, these results demonstrate the success of enrichment in Reginald Lake; however, the stocking of three distinct rainbow trout strains (Blackwater, Fraser Valley, and Horsefly) across different project years complicates precise attribution of growth outcomes in recent assessments.

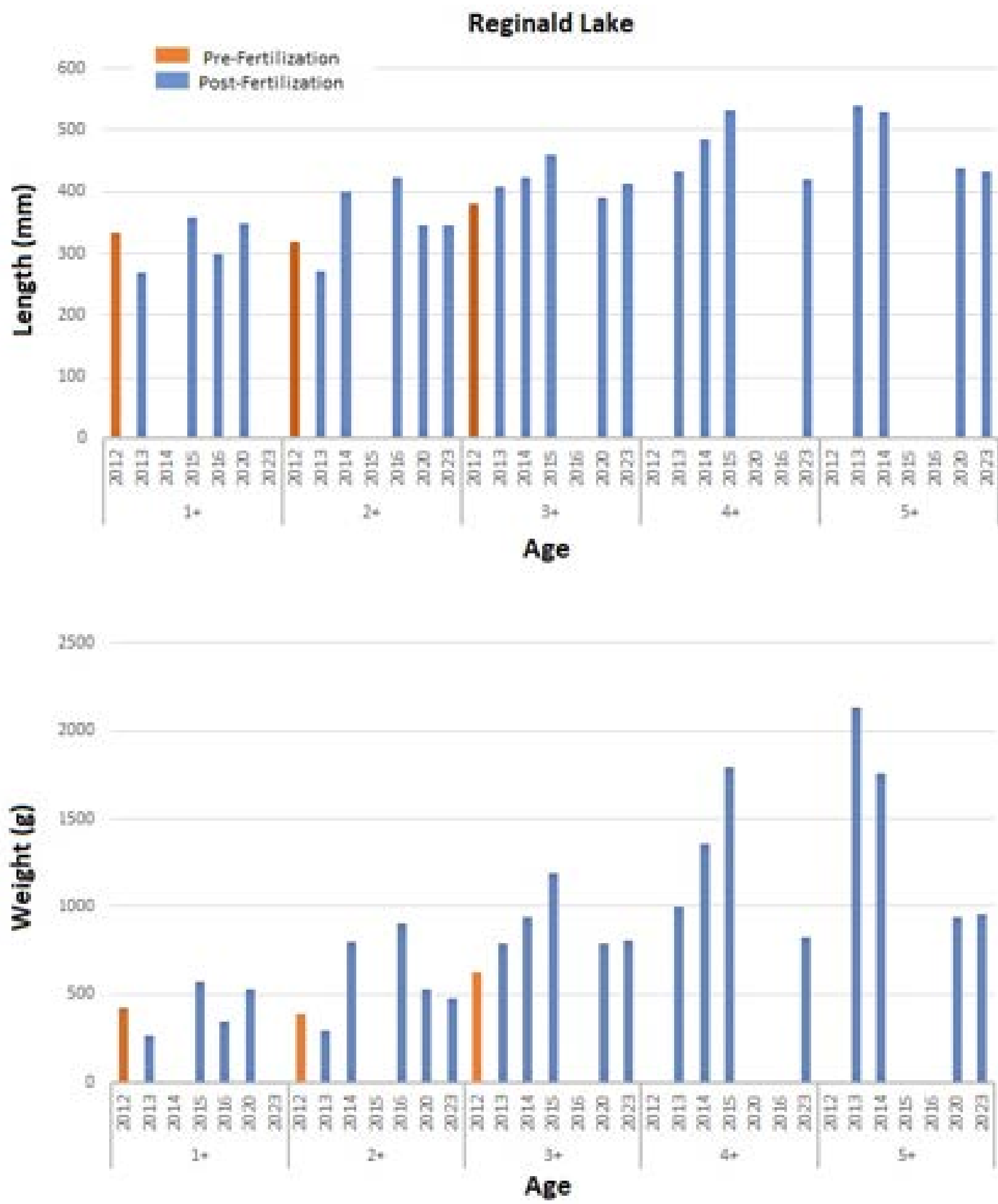

Figure 5. Pre- and post-enrichment size-at-age comparisons of gillnetted rainbow trout at Reginald Lake from 2012 to 2023. Due to adjusted stocking prescriptions, 2012 - 2016 only includes rainbow trout of the Fraser Valley strain, while 2020 is a mix of Fraser Valley, Horsefly and Blackwater strains, and 2023 includes the Blackwater-only strain.

4.3 Angler Observations

Year 5 of the program showed a marked increase in angler activity at Shelton Lake, more than doubling observations from previous years, with slight increases also noted at Nimnim and Rowbotham Lakes (Figure 5). The increase seen at Rowbotham Lake follows a significant spike observed in 2024, where roughly three times the number of anglers were observed compared to any previous year. On June 28, 2025, eight fishing boats were observed in a single image captured by the camera installed at Rowbotham Lake, the highest count recorded among all lakes in the last five years.

Reginald Lake consistently recorded the highest total angler presence, with 137 boats and 160 anglers observed across 1,847 daylight images between May 1 and October 28, 2025. Throughout the project, Reginald has maintained the highest annual angler counts, including 238 boats and 302 anglers in 2023, and a cumulative total of 825 anglers between 2022 and 2025. Camera malfunctions at Reginald Lake in 2021 prevented data collection for the first year.

Since 2023, angler observations have increased at Rowbotham and Shelton lakes, while Nimnim Lake has maintained a steady but low presence over the last five years. Hawthorn Lake, which was added as a control in 2022, consistently recorded the fewest angler observations. Due to camera tampering and theft in 2025, no data was available for the first and fifth years at Hawthorn Lake.

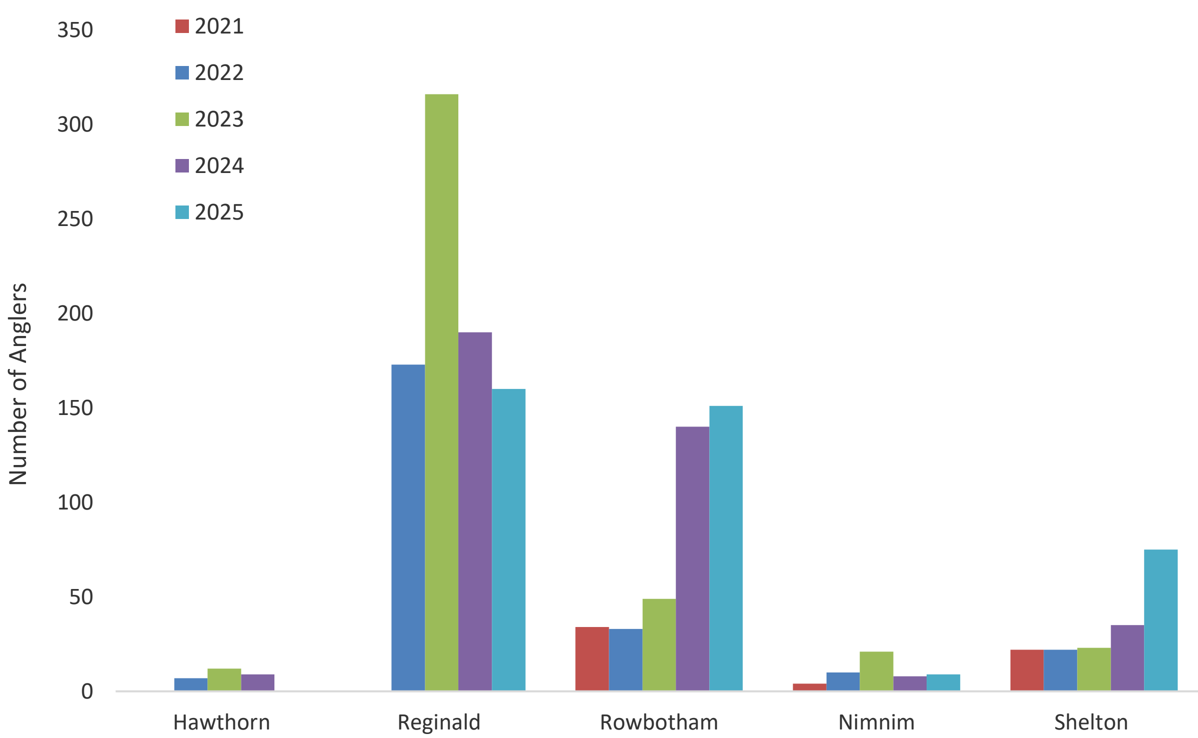

Figure 6. Total angler counts from trail cameras installed at treatment and control (Hawthorn) lakes between 2021 and 2025.

4.4 Communications and Engagement

The Snuneymuxw, Nanoose, and Tseshaht First Nations, as well as the A-Tlegay Fisheries Society (We Wai Kai, Wei Wai Kum, K'ómoks, Tlowitsis, and Kwiakah Nations) were contacted and provided information regarding activities conducted at the treatment lakes. Additional outreach efforts for the project included BCCF's quarterly newsletter, social media posts, and posters displayed in local tackle shops to promote awareness of the treatment lakes. Project information was also shared at numerous community outreach events across Eastern Vancouver Island. Fieldwork was conducted by BCCF Aquatic Research and Restoration Centre (ARRC) staff and supporting volunteers. The Campbell River Fish and Wildlife Association provided ongoing support, including the provision of a storage facility for project equipment.

5.0 Discussion

Although relatively low nutrient concentrations were observed throughout most of the application period each year, fish monitoring and lake productivity metrics indicate that the project has been successful over the past five years. Primary productivity, as inferred from Secchi disk readings, remained stable with slight increases in the treatment lakes as nutrient applications continued, in contrast to the control lake. Water samples showed elevated concentrations of applied nitrogen (N) within the epilimnion which indicates that sufficient dilution was achieved during application, a critical factor to ensure nutrients remain available to pelagic phytoplankton rather than settling to the lake bottom. With the exception of Shelton Lake, increased fish growth rates were observed in treatment lakes. Together with water quality data, these results demonstrate effective energy transfer through the trophic levels to reach fish populations and provide enhanced growth rates. The relatively low nutrient concentrations observed in water samples may reflect increased system-wide nutrient demand associated with enhanced overall productivity achieved at treatment lakes.

Fish monitoring at Nimnim, Reginald, and Rowbotham Lakes indicates increased fish growth following nutrient enrichment, with some individuals reaching "trophy" size (>500 mm in length). Growth rates were highest during the initial years of enrichment and appear to slow with continued years of nutrient applications. These results suggest that early enrichment may have acted as a "shock" to the system, stimulating primary productivity and fish growth; however, as nutrient inputs become consistent, they transition to a maintenance role within a newly established equilibrium. If enrichment is halted, a decline in fish size and/or abundance may occur, as these systems have adapted to elevated nutrient levels. Increasing nutrient loading or application frequency may further enhance fish growth rates, but such adjustments must be carefully calculated and administered to avoid undesirable and potentially harmful algal blooms.

The stocking of three distinct rainbow trout strains (Blackwater, Fraser Valley, and Horsefly) in Reginald Lake across multiple years complicates the interpretation of enrichment effects in this system. Specifically, it is difficult to distinguish the relative contributions of nutrient enrichment and inherent growth differences among strains. The Blackwater strain, stocked exclusively since 2020 replacing a 50:50 mix with Fraser Valley strain from 2016 to 2020 and Fraser Valley-only stocking prior to that, was expected to exhibit greater longevity and attain larger body sizes in older age classes. However, this trend was not observed in the 2020 and 2023 assessments. Interpretation is further limited by small sample sizes, which resulted in few individuals per age class, as well as inconsistencies in aging and strain identification data.

Shelton Lake appears to be a suitable system for kokanee salmon rearing; however, the mean sizes observed for both kokanee salmon and rainbow trout, and the absence of individuals exceeding 400 mm in length, indicate that current enrichment and stocking strategies have not achieved the objective of producing a trophy fishery. Enrichment appears to have increased the abundance of smaller fish rather than promoting growth to larger sizes, likely due to high rainbow trout densities within the lake (pers. comm., Scott Silvestri, January 27, 2026). Although stocking numbers of kokanee salmon were reduced from 2,900 to 1,800 fish beginning in 2023 (FFSBC Annual Stocking Report, 2025), density-related limitations may persist. Additionally, enrichment efforts targeting rainbow trout prior to kokanee stocking were also largely unsuccessful in promoting substantial growth. Based on these findings, it is recommended that Shelton Lake be removed from the program in favor of a more suitable candidate system.

The observed increase in angler activity at treatment lakes is likely attributable, at least in part, to the enrichment program, as these increases coincide with recent fish monitoring results and fishing reports provided to local angling groups. Reginald Lake has long been a popular destination and continues to receive the highest angling presence. The involvement of the Campbell River Fish and Game Club, combined with positive post-enrichment angling and fish monitoring reports, has contributed to the lake's reputation among anglers, as supported by informal surveys conducted during fieldwork. Nimnim Lake has experienced consistently low but stable angler use throughout the project period. The heavy logging in the area and limited road access during popular angling times of the year could be a contributing factor. Increased promotion through local tackle shops and outdoor recreation groups may help improve awareness and usage at treatment lakes. Additionally, the installation of angler survey sheets at boat launches could provide more reliable estimates of angler effort and valuable catch data in future years.

6.0 Acknowledgements

The project was primarily funded by the Habitat Conservation Trust Fund (HCTF), with additional cash and in-kind support provided by WLRS and the Freshwater Fisheries Society of BC (FFSBC). Volunteer assistance for field operations and gear storage was contributed by the Campbell River Fish and Game Club, the Island Rangers, and other supporting volunteers.

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Appendix A: Additional Water Quality Data

Table A1. Summary of water quality results from samples taken at treatment and control (Hawthorn) lakes in 2025, displaying total nitrogen (TN), Orthophosphate (SRP), and total phosphorous (TP). Numbers in red (Shelton Lake, Oct. 17 and Hawthorn Lake, Nov. 19) are suspected contaminated samples and were excluded from analysis.

2025 Shelton Lake 1M

Date	TN (mg/L)	SRP (mg/L)	TP (mg/L)
24-Apr	0.002	0.001	0.0036
5-Jun	0.0117	0.001	0.0027
15-Jul	0.017	0.001	0.0039
2-Sep	0.002	0.001	0.0043
17-Oct	0.14	0.001	0.0035

2025 Shelton Lake 10M

Date	TN (mg/L)	SRP (mg/L)	TP (mg/L)
24-Apr	0.002	0.001	0.0066
5-Jun	0.0033	0.001	0.0034
15-Jul	0.007	0.001	0.0063
2-Sep	0.002	0.001	0.0037
17-Oct	0.002	0.001	0.002

2025 Rowbotham Lake 1M

Date	TN (mg/L)	SRP (mg/L)	TP (mg/L)
29-May	0.0647	0.001	0.0035
24-Jun	0.0216	0.001	0.0046
23-Jul	0.0466	0.001	0.0035
28-Aug	0.0044	0.001	0.005
29-Oct	0.0169	0.001	0.004

2025 Rowbotham Lake 10M

Date	TN (mg/L)	SRP (mg/L)	TP (mg/L)
29-May	0.0053	0.001	0.0035
24-Jun	0.0184	0.0046	0.011
23-Jul	0.0249	0.001	0.0086
28-Aug	0.0151	0.001	0.0052
29-Oct	0.0094	0.001	0.0034

2025 Nimnim Lake 1M

Date	TN (mg/L)	SRP (mg/L)	TP (mg/L)
20-May	0.002	0.0013	0.0028
19-Jun	0.002	0.0014	0.0031
28-Jul	0.002	0.001	0.0031
4-Sep	0.002	0.001	0.0021
19-Nov	0.0049	0.001	0.0037

2025 Nimnim Lake 10M

Date	TN (mg/L)	SRP (mg/L)	TP (mg/L)
20-May	0.0038	0.0017	0.0018
19-Jun	0.002	0.001	0.0039
28-Jul	0.002	0.001	0.0025
4-Sep	0.002	0.001	0.0049
19-Nov	0.0041	0.001	0.0026

2025 Reginald Lake 1M

Date	TN (mg/L)	SRP (mg/L)	TP (mg/L)
1-May	0.0081	0.001	0.0041
27-May	0.0077	0.001	0.0039
10-Jun	0.0152	0.001	0.0035
3-Sep	0.0227	0.001	0.0037
28-Oct	0.0057	0.001	0.004

2025 Reginald Lake 10M

Date	TN (mg/L)	SRP (mg/L)	TP (mg/L)
1-May	0.0186	0.001	0.0045
27-May	0.021	0.001	0.006
10-Jun	0.0127	0.001	0.0044
3-Sep	0.0082	0.001	0.0057
28-Oct	0.0024	0.001	0.0034

2025 Hawthorn Lake 1M

Date	TN (mg/L)	SRP (mg/L)	TP (mg/L)
20-May	0.0058	0.001	0.0041
19-Jun	0.0073	0.004	0.001
28-Jul	0.002	0.001	0.0014
19-Nov	0.0075	0.001	0.0013

2025 Hawthorn Lake 10M

Date	TN (mg/L)	SRP (mg/L)	TP (mg/L)
20-May	0.0024	0.001	0.0033
19-Jun	0.003	0.001	0.0023
28-Jul	0.002	0.001	0.003
19-Nov	1.13	0.001	0.0019

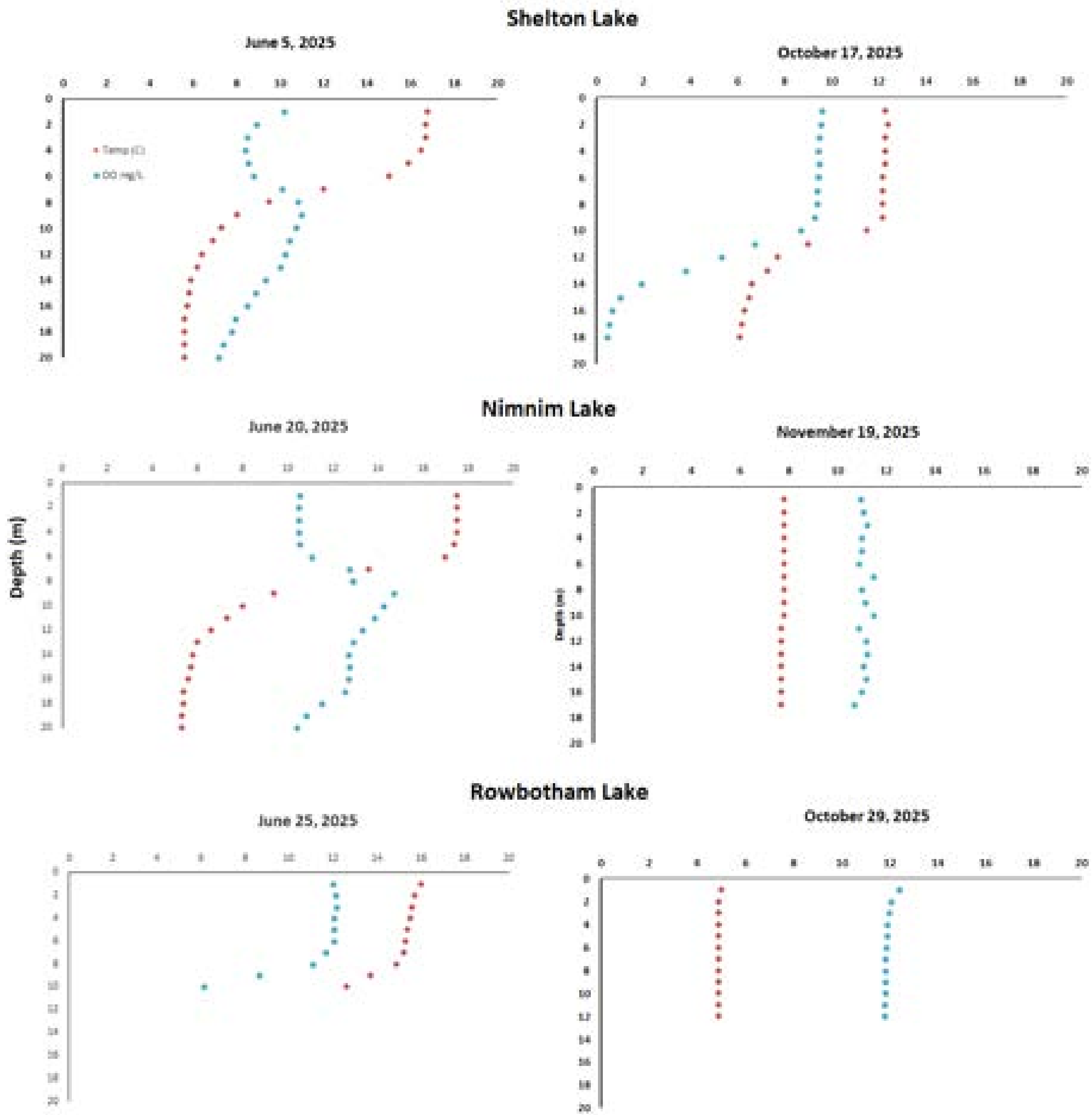

Figure A2. Dissolved Oxygen and temperature profiles for Shelton, Nimnim and Rowbotham Lakes, 2025.

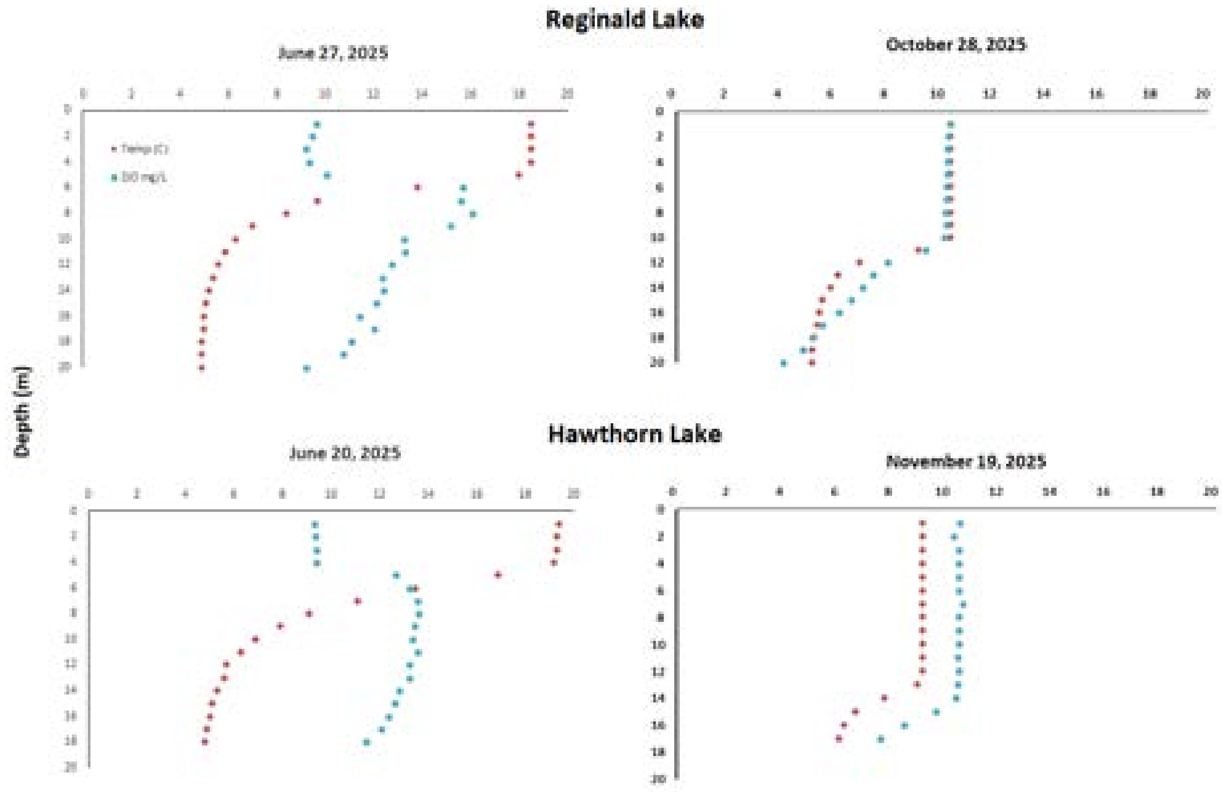

Figure A3. Dissolved Oxygen profiles for Reginald and Hawthorn (control) Lakes, 2025.

Appendix B: Photo Gallery

BCCF field staff spray liquid nutrients from a slow-moving boat into Rowbotham Lake, August 2025.

BCCF field staff apply liquid nutrients to Shelton Lake (top) and Nimnim Lake (bottom) using pump spraying system, 2024.

Project Lead, Aaron Androsoff collects Secchi disk readings and water column samples at Nimnim Lake, 2023.

Project Lead, Aaron Androsoff, setting up a trail camera to capture angler effort at Hawthorn Lake in the spring, 2025.

Photo captured from trail camera installed at Rowbotham Lake showing eight fishing boats, June 28, 2025.

BCCF field staff removing trail camera at Hawthorn Lake following field season, November 19, 2025.

Rainbow trout caught at Rowbotham lake in the spring, 2023.

Rainbow trout caught at Rowbotham lake in the spring, 2025.

Rainbow trout caught during fish monitoring at Rowbotham Lake, October 2022.


BCCF crews heading to Rowbotham Lake in the spring, 2024.


Gear and nutrients loaded into the boat ready for the first nutrient application of the season, Reginald Lake, 2024.

Controlled brush pile burning near Nimnim Lake during fall sampling, 2024.

Looking west towards Rowbotham Lake with Mount Arrowsmith behind, 2024.

Looking south towards Shelton Lake, 2025.

Angler fly fishing at Reginald Lake, 2023

Angler enjoying a sunny day at Rowbotham Lake, 2025.