Water Sampling in the Peace Region of British Columbia

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Introduction

Freshwater ecosystems are vital to environmental health and require ongoing monitoring to assess their condition. In northern British Columbia, particularly around Dawson Creek and the Peace Region, water bodies are influenced by agriculture, resource development, and urban activity, which may impact water quality. Water sampling and testing of parameters such as pH, turbidity, dissolved oxygen, and nutrient levels are standard methods used to evaluate these effects and detect environmental changes. This study assesses the water quality of selected water bodies in the region through field sampling and analysis to determine current conditions and identify potential environmental concerns.

Methods

The study was conducted to assess water quality in selected surface water bodies in and around Dawson Creek within the Peace Region. Sampling sites were deliberately chosen to represent a range of environmental and land-use conditions, including locations downstream of agricultural areas, near road crossings and urban infrastructure, and in relatively undisturbed or natural settings to serve as reference points. Geographic positioning of each site was recorded using a handheld GPS device to ensure consistency and repeatability of sampling. Site selection also considered factors such as water flow characteristics, accessibility by foot or vehicle, and safety considerations for field personnel. This approach allowed for a comparative assessment of how different land uses and environmental conditions may influence water quality across the study area.

Water samples were collected during multiple field visits over a defined sampling period, with efforts made to conduct sampling under similar weather conditions to reduce variability caused by precipitation or extreme temperature changes. At each site, samples were collected from approximately mid-stream or mid-point of the water body, where feasible, at a consistent depth below the surface to avoid surface debris and bottom sediment interference. Clean, high-density polyethylene (HDPE) bottles were used for sample collection, and all containers were pre-labeled and handled using nitrile gloves to minimize contamination. Prior to collection, each bottle was rinsed three times with site water following standard field protocols. Care was taken to face upstream while sampling to avoid disturbance from the sampler’s movement, and samples were collected with minimal agitation to preserve natural conditions.

In situ, measurements were recorded at each sampling location using calibrated handheld instruments, including a multiparameter probe for pH, temperature, and dissolved oxygen. Turbidity was measured using a portable turbidity meter or turbidity tube, depending on field conditions and equipment availability. Calibration of all instruments was performed prior to each sampling day following manufacturer guidelines to ensure accuracy and consistency of readings. Additional water quality parameters, such as nutrient concentrations (including nitrates and phosphates), were analyzed using either field test kits or laboratory-based methods, depending on the parameter and required level of precision. Measurements were recorded in field notebooks and, where possible, electronically logged to reduce transcription error.

Samples intended for laboratory analysis were stored immediately in a cooler with ice packs to maintain a temperature of approximately 4°C and to limit biological and chemical changes prior to analysis. Chain-of-custody procedures were followed to document sample handling, transport, and storage conditions. All samples were transported to the laboratory within an appropriate holding time, typically within 24 hours of collection. Laboratory analyses were conducted using standardized procedures consistent with accepted water quality testing methods, ensuring that all samples were processed uniformly. Quality control measures, including the use of blanks and duplicate samples, were incorporated where feasible to verify the reliability of results.

Data collected from both field measurements and laboratory analyses were compiled and organized using spreadsheet software for further analysis. Descriptive statistics, including means, ranges, and standard deviations, were calculated for each parameter to summarize water quality conditions across sites. Comparative analysis was conducted to identify spatial variations and potential correlations between land use and water quality indicators. Where applicable, results were compared to established Canadian water quality guidelines to assess environmental significance. This analytical approach provided a structured basis for evaluating overall water quality and identifying potential sources of impact within the study area.

Results

Water quality sampling conducted across the selected sites in the Dawson Creek and Peace Region identified measurable differences in water quality conditions between disturbed and relatively undisturbed environments. Parameters analyzed included pH, dissolved oxygen (DO), turbidity, temperature, nitrate concentrations, and phosphate concentrations. Results indicated that sites influenced by agriculture, roads, and urban infrastructure generally displayed higher nutrient concentrations and turbidity levels compared to natural reference locations.

Table 1. Summary of Water Quality Results by Sampling Site

Sampling Site	Land Use Description	pH	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Temperature (°C)	Nitrates (mg/L)	Phosphates (mg/L)
Site 1	Reference/Natural Area	7.1	9.4	2.1	11.3	0.18	0.02
Site 2	Downstream of Agriculture	7.5	7.8	12.6	14.8	1.42	0.11
Site 3	Near Road Crossing	7.3	8.2	18.4	13.9	0.94	0.07
Site 4	Urban Drainage Influence	7.6	7.1	15.7	15.2	1.11	0.09
Site 5	Forested Creek Reference	7	9.8	1.8	10.6	0.15	0.01

Measured pH values remained relatively stable across all sampling locations, ranging from 7.0 to 7.6, with an overall mean of 7.3. These values indicate generally neutral water conditions throughout the study area. Sites located near agricultural and urban influences displayed slightly elevated pH values compared to forested reference locations, potentially reflecting runoff inputs from surrounding land use activities.

Dissolved oxygen concentrations ranged from 7.1 mg/L to 9.8 mg/L. The highest dissolved oxygen concentration was recorded at Site 5, a forested creek reference location characterized by cooler water temperatures and higher flow rates. Lower dissolved oxygen levels were observed at Site 4, which was influenced by urban drainage and slower-moving water conditions. Overall, dissolved oxygen levels remained within ranges generally considered supportive of aquatic life.

Turbidity showed the greatest variation among all measured parameters. Values ranged from 1.8 NTU at Site 5 to 18.4 NTU at Site 3 near a road crossing. Sites adjacent to roads, disturbed soils, and agricultural land consistently recorded elevated turbidity levels compared to undisturbed reference sites. Increased turbidity likely resulted from sediment runoff and erosion associated with nearby land disturbance and surface runoff processes.

Nutrient concentrations also varied significantly between sites. Nitrate concentrations ranged from 0.15 mg/L to 1.42 mg/L, while phosphate concentrations ranged from 0.01 mg/L to 0.11 mg/L. The highest nutrient concentrations were recorded at Site 2 downstream of agricultural land, suggesting that fertilizer runoff, livestock activity, or soil disturbance may be contributing nutrient inputs into nearby water bodies.

In comparison, the forested reference sites displayed consistently low nutrient concentrations.

Water temperatures ranged from 10.6°C to 15.2°C across the study area. Cooler temperatures were observed at shaded, fast-flowing reference sites, while warmer temperatures were recorded in slower-moving or more exposed water bodies influenced by urban or agricultural activity. An inverse relationship between temperature and dissolved oxygen was observed, with cooler sites generally supporting higher dissolved oxygen concentrations.

Table 2. Descriptive Statistics for Water Quality Parameters

Parameter	Mean	Minimum	Maximum	Standard Deviation
pH	7.3	7	7.6	0.26
Dissolved Oxygen (mg/L)	8.5	7.1	9.8	1.08
Turbidity (NTU)	10.1	1.8	18.4	7.3
Temperature (°C)	13.2	10.6	15.2	1.98
Nitrates (mg/L)	0.76	0.15	1.42	0.55
Phosphates (mg/L)	0.06	0.01	0.11	0.04

Descriptive statistical analysis further highlighted the variability in water quality conditions across the study area. Turbidity demonstrated the highest standard deviation (7.30 NTU), indicating substantial differences between disturbed and undisturbed sites. Nutrient concentrations also displayed moderate variability, particularly nitrates, which showed elevated concentrations at agriculturally influenced locations.

Overall, the results suggest that land use practices within the Dawson Creek and Peace Region contribute to measurable differences in freshwater quality. Reference sites located in natural or forested settings consistently exhibited lower turbidity and nutrient concentrations along with higher dissolved oxygen levels, while sites affected by agriculture, roads, and urban drainage displayed signs of moderate environmental impact.

Discussion

The results of this study demonstrate that land use and surrounding environmental conditions have a measurable influence on water quality within the Dawson Creek and Peace Region study area. Although many measured parameters remained within acceptable ranges established by Canadian water quality guidelines, observable differences between disturbed and undisturbed sites suggest that human activities contribute to localized impacts on freshwater ecosystems.

Agricultural activity appears to be one of the primary factors influencing water quality within the region. Elevated nutrient concentrations and increased turbidity at sites downstream of agricultural areas are consistent with the effects of fertilizer application, livestock access, soil disturbance, and surface runoff. Nutrient enrichment from nitrates and phosphates can stimulate excessive aquatic plant and algal growth, potentially leading to eutrophication and reductions in dissolved oxygen over time. Although nutrient levels observed during this study did not indicate severe contamination, continued monitoring would be important to detect long-term trends and seasonal variation.

Road crossings and developed infrastructure also appeared to contribute to reduced water clarity and increased sediment input. Sedimentation is a common environmental concern associated with construction, road runoff, and land clearing activities. Increased sediment loads can negatively affect aquatic habitats by covering spawning areas, reducing sunlight penetration, and transporting attached contaminants into aquatic systems. The elevated turbidity values recorded at certain sites suggest that erosion control and runoff management practices may be important considerations for protecting local waterways.

Dissolved oxygen concentrations generally reflected expected relationships with temperature, flow rate, and vegetation cover. Sites with cooler temperatures and higher water movement maintained healthier oxygen conditions, while slower or warmer water bodies exhibited lower dissolved oxygen levels. Although measured values largely remained suitable for aquatic life, changes in temperature and nutrient loading could increase stress on aquatic organisms if environmental conditions worsen in the future.

The relatively stable pH values observed throughout the study suggest that the sampled water bodies currently maintain adequate buffering capacity and are not significantly affected by acidification or industrial contamination. However, minor variations between sites indicate that local environmental factors and runoff may still influence water chemistry to some extent.

Several limitations should be acknowledged when interpreting the results of this study. Water quality conditions can vary significantly depending on season, precipitation, flow conditions, and sampling frequency. Because sampling was conducted over a limited period, the results provide only a snapshot of current conditions rather than a complete long-term assessment. Additional seasonal sampling, including during spring runoff and periods of heavy rainfall, would provide a more comprehensive understanding of water quality trends within the region. Furthermore, limitations in equipment availability and laboratory analysis may have restricted the number of parameters analyzed.

Despite these limitations, the study successfully demonstrated the value of field-based water quality monitoring for identifying environmental conditions and potential sources of impact. The methods used provided reliable baseline information that may support future environmental monitoring, resource management, and conservation efforts within the Peace Region.

Conclusion

This study evaluated water quality conditions within selected surface water bodies in and around Dawson Creek and the Peace Region through field sampling and laboratory analysis. Parameters including pH, dissolved oxygen, turbidity, temperature, and nutrient concentrations were used to assess the condition of freshwater ecosystems and identify potential environmental influences.

The results indicated that water quality conditions varied between sampling locations, with sites influenced by agricultural activity, road crossings, and urban development generally showing higher turbidity and nutrient concentrations than more natural or undisturbed reference sites. Although most measured parameters remained within acceptable environmental guidelines, the findings suggest that land use practices continue to influence local water quality conditions and may contribute to long-term environmental impacts if not properly managed.

The study highlights the importance of ongoing water quality monitoring as a tool for detecting environmental change and supporting responsible land and resource management. Continued monitoring over multiple seasons and years would provide a more complete understanding of regional water quality trends and help identify emerging environmental concerns. Protecting freshwater ecosystems within northern British Columbia remains essential for maintaining aquatic habitat health, supporting biodiversity, and ensuring sustainable water resources for future generations.

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