# Exploration of Sustainable Land Use at Little Pine First Nation, Saskatchewan

## Garden and Orchard: Plant varieties

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Course: RRM 421

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- The University of Saskatchewan RRM 421 class of 2023 and Little Pine First Nation (LPFN) embarked on a collective effort to address land use and water quality concerns.
- Through relationship-building and a visit to the community-held land, we identified soil sustainability, Battle River water quality, and the potential for a community-oriented garden and orchard as the overarching interests.
- This poster outlines the recommended orchard plant species that may be suitable for the community.

## Objective

- The poster will identify and evaluate the recommended plant varieties for a garden or orchard in the LPFN community. The suggested plant species can provide fresh produce to the community in an accessible manner while considering the community's input and knowledge.

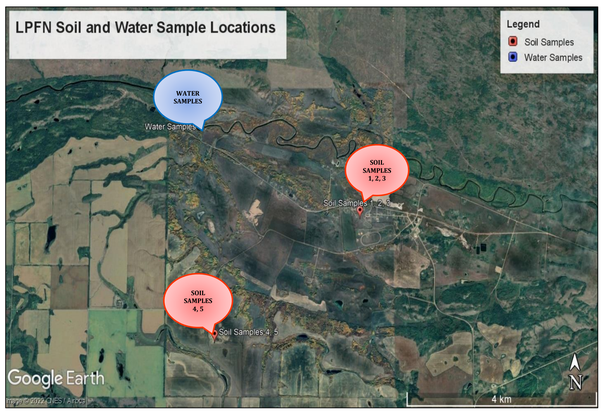


**Figure 1**: Location of the soil and water samples collected from LPFN. Soil samples 4 and 5, located in the Southwest corner (Google Earth 7.18, 2022b).

- Soil samples from LPFN indicated that its topography is moderately sloping inclined, hummocky, and undulating landscape. The soil is mainly fine, sandy loam and loam-textured, with an average pH range of 5.5 to 6.7. Water samples indicated no concerns about using it as a water source for the garden and orchard.

## Plant varieties

Ones to consider for the LPFN area include, but are not limited to:

1. Saskatoon Berry *(Amelanchier alnifolia)*
2. Cranberries *(Vaccinium spp.)*
3. Raspberries *(Rubus spp.)*
4. Haskap Berry 'Blue honeysuckle' *(Lonicera caerulea)*
5. Blueberries *(Vaccinium corymbosum)*

**Figure 2**: Ripened Saskatoon Berry (Government of Manitoba, n.d.a).

- Saskatoon shrubs do best in loam to sandy loam soils.
- Full sun is ideal for the best fruit production. It does well in part-shade home gardens, although yields are lower than in full-sun locations.

**Figure 3**: Highbush Cranberries (Canadian Food Focus, n.d.a).

- Cranberry shrubs were chosen as they enjoy well-drained soils and only need occasional watering.
- Growers must be aware of the temperature tolerance of their crops and be prepared when frost is forecasted.

## Plant varieties

**Figure 4**: Seasoned Raspberries (Canadian Food Focus, n.d.b).

- Raspberries prefer being planted in a sunny area. The sandy soil in LPFN provides a suitable habitat since it allows the soils to be well-drained.
- Avoid planting in windy locations, as raspberry vines are sensitive to drying out.
- If conditions are right, raspberries will start blooming in late May or early June.

**Figure 5**: Prairie Gardens Haskap Berries (Prairie Gardens, n.d.).

- Haskap shrubs do not require a lot of water and prefer irrigated soil, but it is still recommended to keep their soil moist to achieve maximum yield.
- Fertilize with an all-purpose rose or fruit granular fertilizer monthly during May, June, July, and at the start of August.

## Plant varieties

**Figure 6**: Cultivated and Wild Canadian-grown Blueberries (CTV News, 2015).

- Blueberry plants are tolerant to pH around 4.5 to 7
- The berries are highly resistant to colder temperatures reaching a low of -35C, and freeze injury rarely begins.

## Conclusion

- Strategies to increase food production and security in gardens and orchards include establishing community-based agriculture projects to provide access to land and resources for local farmers.
- Assistance through land trusts, cooperative farms, or other forms of collective ownership. Community-supported agriculture (CSA) programs can also provide access to fresh, local produce.
- Urban agriculture initiatives can help increase food production. Examples include rooftop gardens, vertical farming, and other innovative approaches.

## Acknowledgements

We want to thank Little Pine First Nation for welcoming us into the community and providing our group with a valuable opportunity to explore ongoing land use and water quality concerns.

# RRM 421: EXPLORING WATER QUALITY CONCERNS AT LITTLE PINE FIRST NATION

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## INTRODUCTION

The RRM 421 class of 2023 was provided the opportunity to collaborate with Little Pine First Nation (LPFN) to address land use and water quality concerns of council and community.

Community members have observed **a decline in the water quality** and **the number of fish** within the Battle River, along with concerns about fish **consumption**. As well, it is a goal of the community to re-integrate the use of a **traditional fish basket**.

To address these concerns, we identified activities upstream of LPFN examined the reasons for the decrease in fish numbers. We also acknowledged involvement in **watershed planning** as an important method of voicing concerns and influencing decisions regarding the Battle River.

Along with **macroinvertebrate counting**, **riparian assessments** are effective ways to monitor the health of the river. The re-integration of the fish basket is dependent upon these factors, and it must be evaluated accordingly.

## OBJECTIVES

- ❑ Assess the integration of citizen science and watershed planning as a means to evaluate and maintain or improve the health of the Battle River within LPFN.
- ❑ Provide comprehensive information and resources about the Battle River's current state to LPFN.

## MATERIALS & METHODS

To understand water data, generic samples of the Battle River were taken in the Fall of 2022.

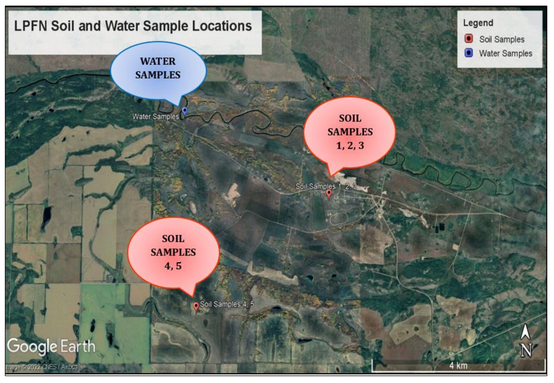


**Figure 1**: General locations of the water and soil samples collected from LPFN [4].

As well, these databases provided quantitative data on pesticides, minerals, and trace elements. We were able to restrict the data to relevant timeframes along with locations relevant to the LPFN area:

1. DataStream (2023)
2. Government of Alberta, Water Quality Portal (2023)
3. Water Security Agency (2023)
   - Government of Saskatchewan, Surface Water Quality Data

A literature review of 20-30 scientific articles was also performed to sustain the recommendations made.

## MAIN FINDINGS

- Fish population may decrease due to many factors such as water temperature, flow levels, pollution, overfishing, and adjacent land uses.
- The Battle River makes its way from Central Alberta eastward to Saskatchewan where it meets the North Saskatchewan River southeast of North Battleford (Figure 2). It is approximately 30,000 square kilometers with 83% of this area residing in Alberta [1].

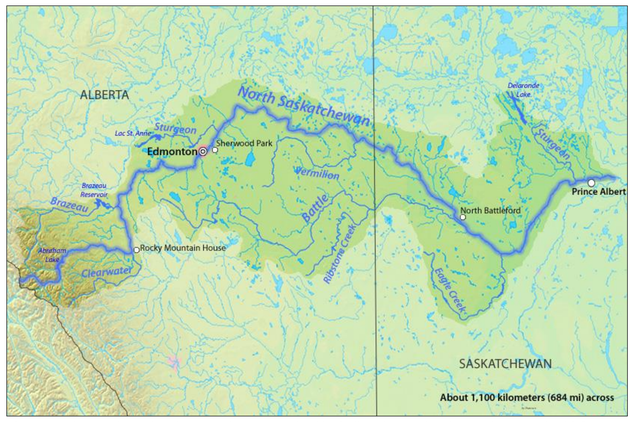


**Figure 2**: The North Saskatchewan River Watershed including the Battle River Sub-Watershed [1].

- Water quality monitoring results for the Battle River from the Battle River Watershed Alliance indicate that high levels of phosphorus and nitrogen in the mainstem of the Battle River is a pressing issue [2].
- An overview of both phosphorus and nitrogen with nitrogen fluctuating significantly throughout the year (likely at times of high run-off accumulation) can be seen in Figure 3.

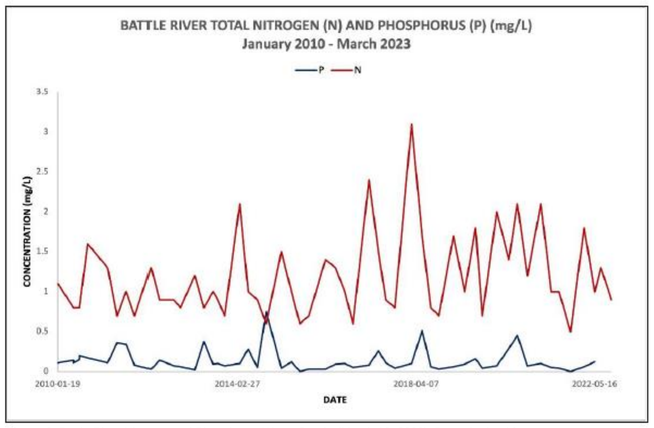


**Figure 3**: Battle River Nitrogen and Phosphorus Water Graph. (March 12, 2023). Data obtained from https://waterquality.saskatchewan.ca/RiverBasin.

- Based on the location of a coal mine and the Battle River Generating Station, thallium levels may be of interest to the community. It is highly correlated with disruptive growth and reproductive harm of aquatic organisms [6].
- Due to the extent of the 2016 Husky Oil Spill, Polycyclic Aromatic Hydrocarbon (PAH) levels in the fish tissue is of concern regarding consumption (Figure 4). Though not formally recorded, the spill would have contributed to the presence of petroleum hydrocarbons near the community.

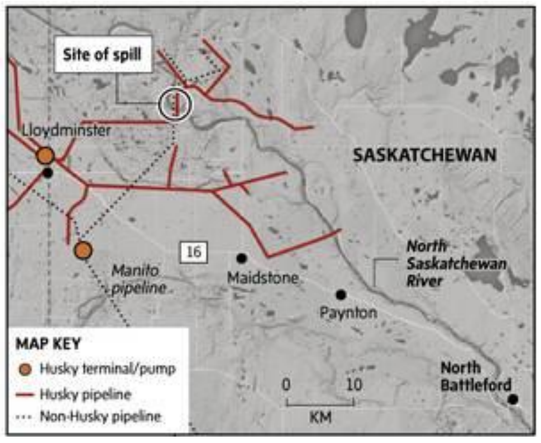


**Figure 4**: Snippet of a detailed pathway of the 2016 Husky Oil Spill [7].

- As well, mercury testing (depending on the fish species recorded) may be of interest due to the occurrence of mercury bioaccumulation. However, species found in the Battle River near LPFN have historically been naturally low on the trophic level of the local ecosystem [5].

## CONCLUSIONS & FUTURE DIRECTIONS

LPFN has been connected with the North Saskatchewan Watershed Alliance to be involved with watershed planning.

In the future, it would be optimal to conduct hands-on activities that may engage students from the Chief Little Pine School through:

1. BioBlitzes (riparian assessment)
2. Regular sampling/testing of the Battle River

As well, it may be within the community's interest to send in fish tissue samples to:

- Have a fish tissue sample analyzed for mercury levels & PAH content

It is also important to address the re-integration of a fish basket based on costs and benefits. As Floyd Flavel mentions, it requires physical labour to maintain (personal communication, 2023). With climatic conditions becoming more unpredictable due to climate change, a fish basket may not be worth it.

**Figure 5**: Traditional fish basket installation near Poundmaker Cree Nation in the Battle River [3].

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