# Winipakw Climate Change, Contaminants and Blue Carbon Ecosystems Community-based Monitoring Project: Progress Report

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# 1 Background

This project aims to build scientific capacity in Chisasibi by monitoring blue carbon ecosystems using environmental indicators stemming from Cree Traditional Ecological Knowledge (TEK) and environmental sciences. This project is one element of a longer-term initiative to develop an integrated, Indigenous-led, landscape-level conservation strategy across James Bay. In James Bay, blue carbon habitats are essential for their global contribution to climate change mitigation and their close link to sustaining the indigenous Cree way of life as crucial habitats for fish and migratory waterfowl. We focus on monitoring key blue carbon ecosystem indicators and assessing current and emerging threats to these systems and their potential impacts on Cree's traditional livelihoods. Through this project, we wish to build a framework for participatory environmental monitoring in Chisasibi that can be scaled up in other communities and contribute to conserving the blue carbon ecosystems in eastern James Bay.

# 2 Objective

This project aims to initiate a long-term monitoring program to support community-driven decision-making on environmental conservation locally and across James Bay. Our approach is to monitor a suite of biophysical and climate change indicators in strategic blue carbon ecosystems using Cree TEK and scientific methods. Assessments will understand the cumulative impacts and emerging threats to these ecosystems. Monitoring activities will concentrate on the north of La Grande river. Using monitoring data, we hope to gain the necessary depth and breadth of knowledge to understand blue carbon ecosystems' current and future state, ecosystem services, and impacts on traditional practices through this strategy.

# 3 Methods

We visited several sites during the summer of 2021 and 2022. Using a suite of environmental monitoring methods, we collected the following baseline data on eelgrass, saltmarsh, and fens. * Sediment cores * Historical (for eelgrass) and current distribution * Collection and measurement of plant samples * Water quality indicators * Presence or absence of potentially harmful algal blooms

This data will be integral to assessing the target ecosystems' role as greenhouse gas sinks or sources. The information also contributes to answering guide questions about the state of the target ecosystem:

1. How much organic carbon (C) is James Bay blue carbon ecosystems accumulating per unit area per year?
2. What are the threats to blue carbon ecosystems, and how do these threats affect the sequestration rate of blue carbon in James Bay and their traditional ecosystem services?
3. What is the state of James Bay eelgrass and other coastal ecosystems as blue carbon sinks/sources?
4. How does climate change impact blue carbon accumulation in James Bay?
5. What management actions best maintain and promote carbon sequestration and traditional use of blue carbon ecosystems in James Bay?

# 4 Accomplishment to Date

- Collection of sediment cores
- Ten days of fieldwork on eelgrass sites of potential coring for organic carbon estimation (Figure 1)
- Collected environmental and other water quality parameters
- Collected and measured eelgrass samples
- Collected traditional knowledge on the historical distribution of eelgrass
- Collection and identification of harmful algal or cyanobacterial blooms and diatoms

## 4.1 Procurement of laboratory equipment

**Percent accomplishment: 100**

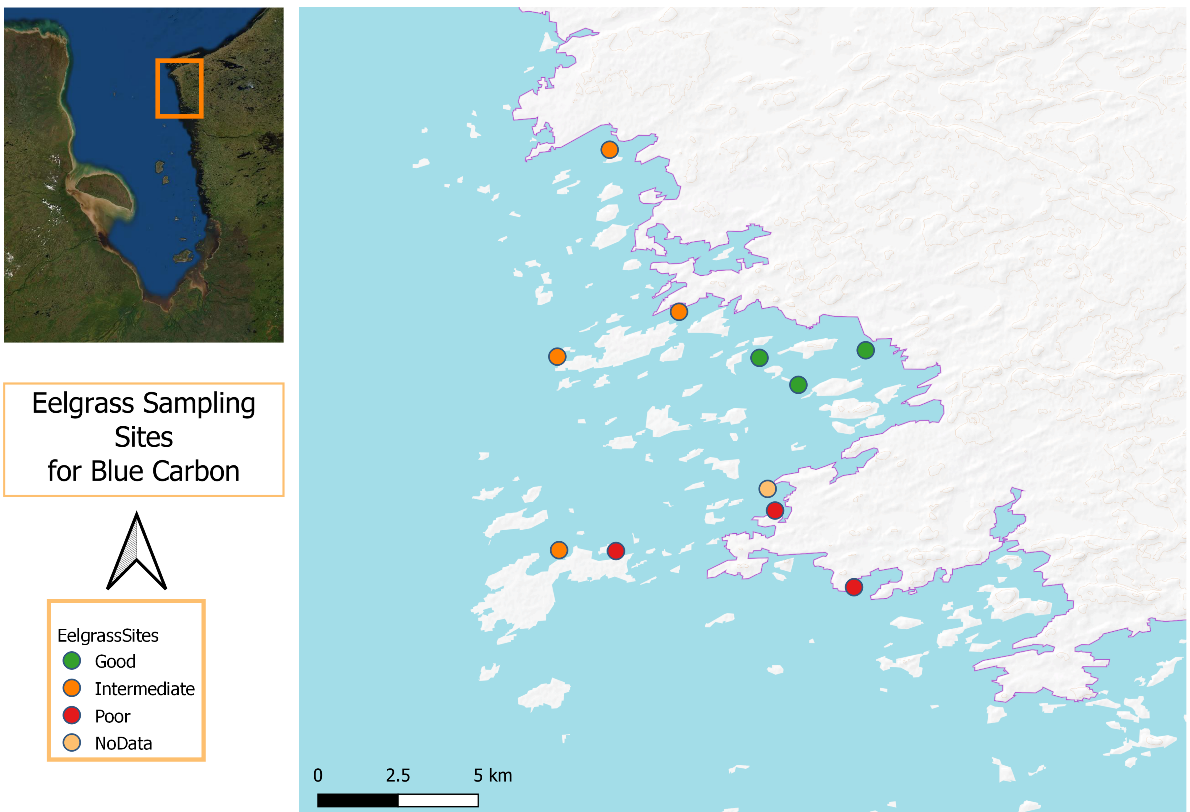


Figure 1: Eelgrass ecosystem sampling locations

Despite delays in procurement and delivery, the project acquired needed scientific and field equipment and successfully carried out fieldwork. All the equipment and consumables needed for water quality monitoring have been delivered. Purchase of additional equipment is ongoing.

## 4.2 Sampling program

**Percent accomplishment: 20**

The trapline tallymen provided the knowledge that guided site selection. These sites are precise and have a long history of resource use and they also represent areas where land users have observed environmental changes throughout the years. Last fall, we finally collected sediment cores from 3 out of 4 target sites. However, we could not have them analyzed sooner because of the lack of a laboratory to do analyses immediately. Lately, we all lost the samples to fire when our storage building burnt down while waiting for the cores to be analyzed .

## 4.3 Highlights

**Hiring and training of youth co-researchers**

The funding contributes to the partial salaries of 2 co-researcher. This co-researcher was involved in the last fieldwork and will be assisting again in this year's field campaign. Also, these co-researcher received training in environmental and water quality monitoring.

**Training and consultation workshops with land-users and participatory mapping**

We consulted three tallymen from 3 different traplines and obtained the historical distribution of eelgrass. We could have involved more land users, but COVID restrictions prevented meeting more people. This year we will be consulting the remaining seven coastal tallymen.

**Community consultations/interviews to define environmental monitoring priorities, research strategies and relevant traditional ecological indicators**

We only consulted three tallymen as interactions within the community were very limited. We are planning to do more consultations this year.

**Meeting with or presenting to local leadership and/or community**

We made two presentations to the CERRI board about the project and one presentation to the general community assembly. Community members were learning blue carbon and climate change concepts. Still, they were interested in exploring the synergy between enhancing the blue carbon ecosystem to make them more productive as a carbon sink and productive waterfowl habitats. They also wanted to know more about algae and cyanobacteria and how it affects traditional resources like fisheries.

## 4.4 Key Findings

### 4.4.1 Eelgrass

The most striking morphometric differences among eelgrass sites were the plants' length, number of leaves, internode length, and leaf necrosis (black leaves). Because of this, it it is likely that eelgrass with necrotic black leaves could negatively influence goose feeding activity and their capacity to store carbon.

### 4.4.2 Cyanobacteria

Most of the eelgrass beds we surveyed are in poor states and are colonized by a potentially toxic species of cyanobacteria (Figure 2). We are consulting with other researchers who can provide more information about the identity of the species, its toxicity, impacts, and prospects of preventing its overgrowth.

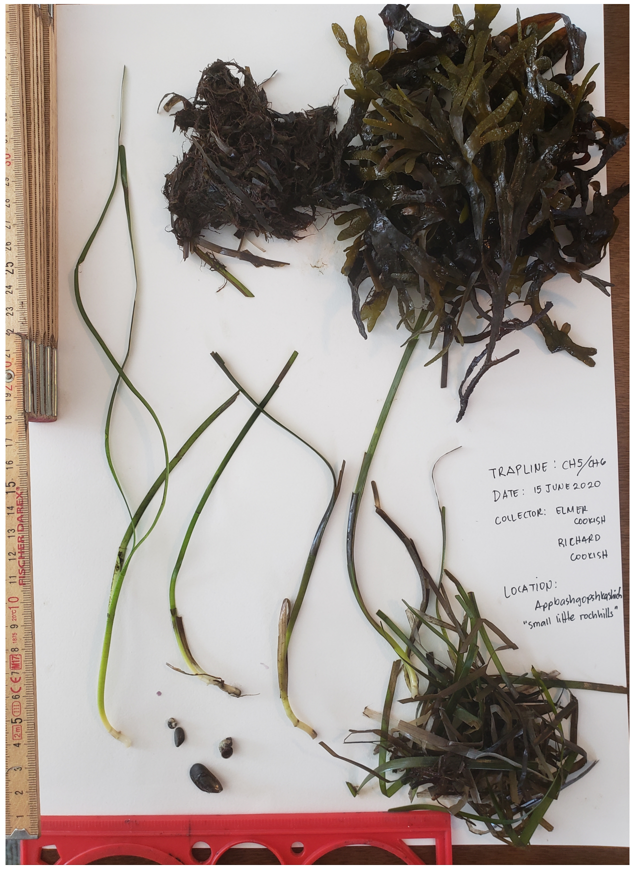


Figure 2: Typical eelgrass characteristics of the surveyed sites)

Figure 3: Mats and microscopic images of filamentous cyanobacteria

### 4.4.3 Sediment cores

Despite the cores being burnt down we were able to measure the thickness of the sediments we had collected in the sampling sites. The three sites we sampled have varying sediments depths from 25 cm to 39.25cm with an average core depth of 32.00cm.

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Table 1: Core Depths

| SITE NAME | LATITUDE | LONGITUDE | CORE DEPTH (cm) |
|---|---|---|---|
| Mishtukahjimdach | 54.23856 | -79.46393 | 24.75 |
| Ahbawhmayach | 54.24842 | -79.42276 | 39.25 |
| Seedaychikinminshtuk | 54.29154 | -79.43729 | 32.00 |

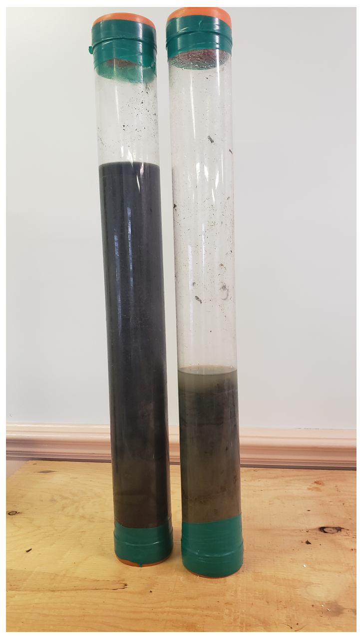

Figure 4: Eelgrass sediment cores

# 5 Challenges

The following challenges have delayed the implementation of some project activities

- COVID restrictions impacted travel plans and community engagements
- Resignation of the anthropologist has delayed gathering of traditional ecological knowledge
- Windy and rough seas made it challenging to conduct more field surveys

- Limited access – only two eelgrass beds are at the intertidal zone
- Delays from scientific instrument suppliers
- Fire has destroyed our core samples when our storage building burnt down

Figure 5: Laboratory Fire

## 6 Key updates to the workplan

- Re-sampling eelgrass and marsh sites (2 cores each as funding allows)
- Send cores to a laboratory (McGill University or UQAM)
- Analyze and write a report/publication

## 7 Current Expenditures

Table 1 provides detail on the current expenditures.

Table 2: Summary of Expenditures

| CATEGORY | DETAILS | AMOUNT ($) |
|---|---|---:|
| Laboratory/Field Equipment | Filtration syringe | 500.00 |
| Laboratory/Field Equipment | Extra sample bottles | 200.00 |
| Laboratory/Field Equipment | Sampling kits | 2798.03 |
| Laboratory/Field Equipment | Sediment Corer | 3199.39 |
| Laboratory/Field Equipment | Niskin sampler bottle | 2220.00 |
| Fieldwork and Monitoring | Salaries and wages | 6350.00 |
| Fieldwork and Monitoring | Rentals, food, gas | 2000.00 |
| Salaries and wages | Partial salaries of 2 co-researchers | 26500.00 |
| NA | Total Expenditutes | 43767.42 |
| NA | Total Funding | 50065.00 |
| NA | Variance | 6297.58 |

The remaining funds allocated for processing of the samples were not spent. As such we hope to re-sample limited areas and use the funds to pay for the costs related to core sample analyses.