Plan – Carbon forecasting 2023

**Statement of Purpose**

The work completed to date was to increase the amount of data on carbon stocks in undisturbed boreal forests and boreal forests impacted by insect defoliation and forest fires followed by moose browsing. The additional sampling completed in the summer of 2023 is to be combined with remote sensed environmental data to forecast carbon across the national parks of Newfoundland.

**Technicians**

Hire one technician for May - August 2023? Through a program or put up add postings?

**Sites**

Twenty-three sites are to be sampled in both Terra Nova National Park (TNNP) and Gros Morne National Park (GMNP) between June and July 2023 (Table 1).

These sites will be selected to fill gaps in environmental variables of sites sampled thus far (Table 2; 1. Determine new sample sites). The new sites will also be distributed across disturbance regimes of insect defoliation, forest fires or mature forest, with or without moose browsing.

**Table 1**

*List of sites sampled in TNNP during the 2023 field season.*

|  |  |  |
| --- | --- | --- |
| **Site** | **Type** | **Moose Exclosure Name** |
|  |  |  |

**Table 2**

*Steps for preparation of field work 2023 .*

|  |  |  |  |
| --- | --- | --- | --- |
| Milestone | | | Expected timeframe |
| 1. |  | Determine new sample sites | February, 2023 |
|  | a) | Download environmental variable |  |
|  | b) | Map environmental variables |  |
|  | c) | Extract environmental variables at Rachael’s sample locations |  |
|  | d) | Extract random sample of environmental variables from across AOI |  |
|  | e) | Compare distribution of Rachael’s values vs AOI and determine locations of interest |  |
| 2. |  | Finalize logistics for summer – when going where and housing/resources available | March, 2023 |
|  | a) | Housing | Before March! |
|  | b) | Determine if some places are time sensitive to sample missing environmental coverage |  |
|  | c) | Other resources available |  |
| 3. |  | Hire technician | April, 2023 |
|  | a) | Put out call personally or through MUN program? |  |
|  | b) | Interview and hire? |  |
| 4. |  | Access equipment for field work | May, 2023 |
|  | a) | Determine tools required |  |
|  | b) | Obtain from school and order what is necessary |  |
|  | c) | Create inventory |  |

**Data Collection**

To estimate carbon stocks at a sample site various carbon pools will be measured (Table 3).

In the field, trees, shrubs, ground vegetation, and deadwood will be measured; these measurements will be used to calculate the biomass within each pool, which will then be converted to carbon content. These field measurements will also be used to calculate the carbon content stored in tree and root biomass. Eight litter samples and eight soil cores were collected at each site; these samples are being processed at MUN and will be sent away for carbon analysis. We also deployed 16 Plant Root Simulator (PRS) probes and one temperature logger at each site; these were retrieved several weeks following sampling. PRS probes were returned to Western Ag Innovations Inc. to be analyzed and the results have been received.

**Table 3**

*Types of data collected during the 2022 field season.*

|  |  |  |
| --- | --- | --- |
| **Carbon Pool** | **Type of Measurement** | **Method** |
| Tree Biomass | In-field measurements | Record the height, diameter at breast height (DBH), and species of live trees greater than or equal to 3 meters tall |
| Shrub Biomass | In-field measurements | Record species, height, and orthogonal diameters  \* will I need to create own species-specific shrub densities |
| Deadwood Biomass | In-field measurements | Record length and orthogonal diameters at each end of fallen deadwood, and if hollow sounding or not |
| Ground Vegetation Biomass | In-field measurements | ? |
| Litter | Samples collected | 20 x 20 centimetre cut-outs |
| Root Biomass | Calculated from field measurements | calculations of tree and shrub root biomass and carbon in the soil or loggers\* |
| Soil | Samples collected | 20 x 20 centimetre cut-outs |
| Soil Temperature \* | Loggers deployed and collected |  |

\* Unlikely to use loggers that I will have to return to - but will root simulators be needed? See if above ground biomass works to calculate

**Lab Work**

Lab work is ongoing. As mentioned, eight litter samples and eight soil cores were collected from each site. These samples are being combined according to the subplot from which they were collected within; there will therefore be four litter samples and four soil samples per site. During processing, samples are dried at 60 degrees Celsius until a constant weight is reached; samples are then ground to a fine powder. Ten grams of each sample will be sent to the Agriculture & Food Laboratory at the University of Guelph for carbon analysis, with a backup sample being stored at MUN.

Litter samples are currently being processed in the lab. Processing of soil samples will begin immediately following this.