MGI Grassland Sampling Protocol

Deliverable 11 (Grassland sampling protocol). Field work Guide for 2021 to update MGI mapping in agriculture Manitoba.

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Land cover identification

As shown in Table 1, this project will monitor and detect seven (7) land cover classes using remote sensing big data, and these classes have been defined based on previous research for mapping grassland in the Canadian Prairie.

Table 1. Manitoba Grassland Inventory (MGI) land cover classes and definitions.

Class	Definition
Native grassland	This class represents the native grassland, composed primarily of native grass species, such as: • Needle grasses (needle and thread, porcupine grass, and green needlegrass); • Wheat grasses (slender, western, northern and awned); • June grass, blue grama grass, side oats grama. • Little & big bluestem, switchgrass. • Sedge species. • Pasture sage; and • Non-vascular species (selaginella or lichens)
Mixed/modified grassland	This class represents one or more of the followings cases: • A higher heterogenic grassland terrain with a mix of less than 75% native or/and less than 75% tame. • Native or/and tame grassland affected by high abiotic stresses such as soil salinity and drought. • Native or/and tame grassland affected by soil erosion such as water and wind erosions. • A high disturbed area by livestock and human activities; and • A bare terrain with low vegetation covers < 50% coverage in a 100 m^2 area.
Tame	This class represents the tame grassland areas that have, in most cases, been intentionally modified and seeded or planted with an introduced grass species such as: • Crested wheatgrass, meadow & smooth brome; Orchard. • Kentucky bluegrass, Russian wildrye, tall & meadow fescue; and • Alfalfa, red/white/alsike clover and sweet clover.
Cropland	This class represents all cultivated areas with crops such as corn, pulses, oilseeds, small grains, and summer-fallow.
Shrub	This class represents the predominantly woody vegetation of relatively low height (generally ±2 m).
Forest	This class represents the predominantly forest areas such as: • Coniferous trees. • Deciduous trees; and • Mixedwood area.
Water	This class represents deep water bodies such as lakes and rivers. Also, it represents shallow water bodies, such as: • Fen. • Bog; • Marsh; and • Swamp.

1. Grassland land cover assessment (not for crop, shrub, forest, water)

In this section, the mechanisms of assessing different grassland classes have been illustrated. As shown in Figure 1, the grassland assessment will be based on a plot that has the following criteria:

- The PLOT size is 30 x 30 meters, divided into four (4) QUARTERS (sections)
- Each quarter will be assigned a land cover class averaged from three (3) 1x1 meter quadrats.
- The plot's land cover class and GPS coordinate should be assigned at the center of the plot (red dot in Figure 1).

The assessment will be conducted as follows:

- Familiarize yourself with the land cover class definitions in on Table 1.
- Print out a copy of the assessment sheet in the appendix for each plot you visit.
- Review Figures 1, 2 and 3 for a step-by-step calculation of the steps below.
    - Assign a land cover class for each of the three (3) quadrats in each of the four (4) quarters.
    - Assign each quarter a land cover class based on the results from their three (3) quadrat assessments.
    - Assign the plot a land cover class using the results from the four (4) quarters.
    - Input the plot's land cover assessment result into the Survey 123 app.

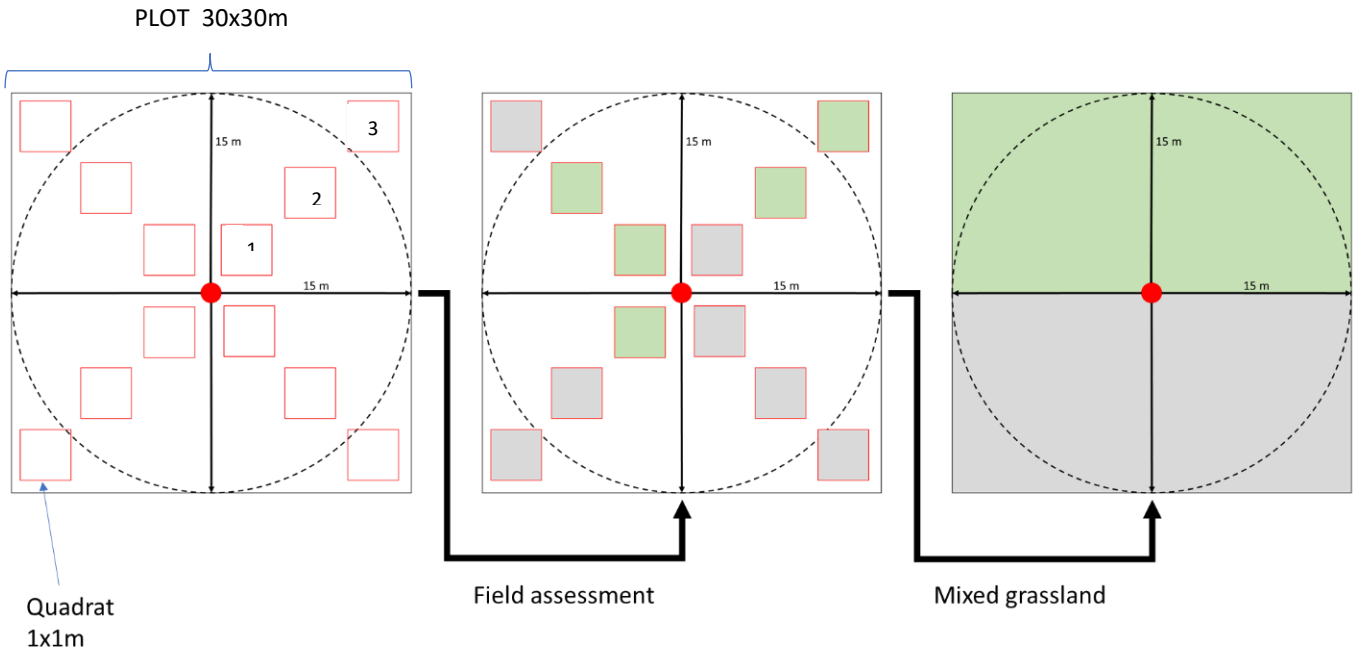


Figure 1. Examples of how to assess Native, Tame, and Mixed grasslands within the grassland assessment plot.

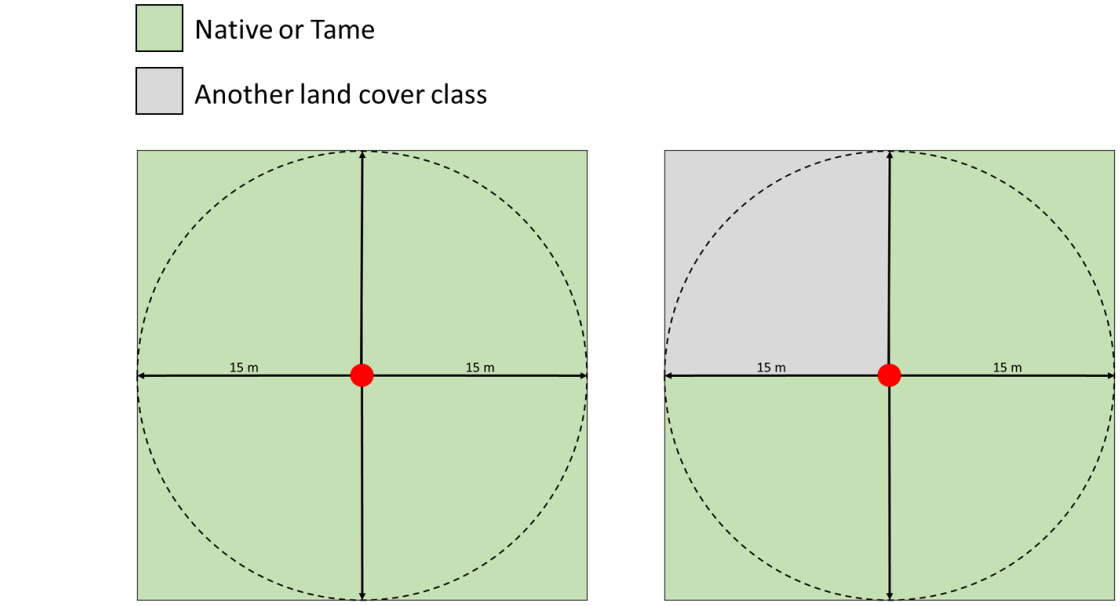


Figure 2. Native grassland or Tame grassland should be dominant in the plot with >= 75 % cover

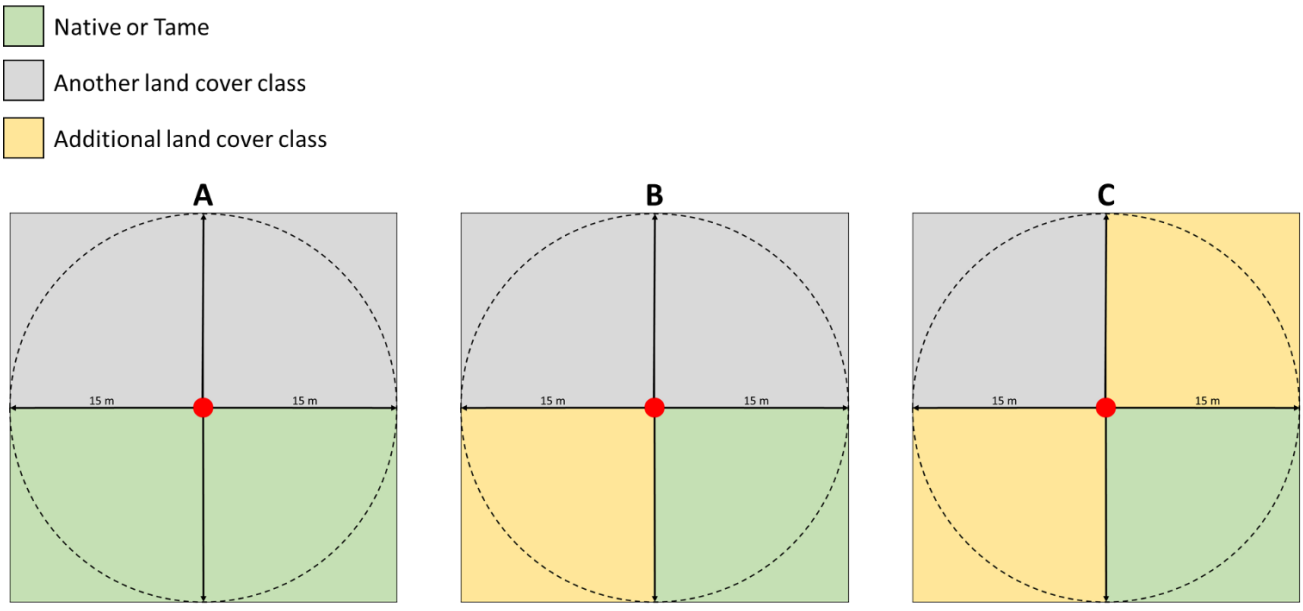


Figure 3. Mixed grassland should be 50/50 Native and Tame (Figure 3A), or 25-50% Tame or Native with 25-50% other classes (Figure 3B & 3C).

2. Biomass assessment

The main goal is to measure aboveground biomass of grassland sites using a simple technique used in many research studies. The basic steps on how to measure the aboveground biomass are stated as follow:

- Remove aboveground plant biomass within the 1m x 1m quadrat;
    - Place your 1m x 1m quadrat at the center of the grassland assessment plot, see Figure 4.
    - Harvest all plant (grass) material inside the boundaries of the used quadrat.
    - Measure all plant biomass above the soil, even if it is plant litter.
    - Cut as close as possible to the soil surface.
    - Never harvest plant parts outside the quadrats, even if these plants are rooted within the quadrat.
- Input the biomass wet weight on the assessment sheet, and into the Survey 123 app (indicating it as wet weight);
- Dry the plant samples in an oven at 105°C for 24-72 hours to remove all the water;
- Record the dry weight on the assessment sheet and email a copy of the assessment sheet to the MGI coordinator (glenn.friesen@gov.mb.ca);
- Retain hard copies as backup. Consider mailing to Glenn Friesen, 545 University Cres. Winnipeg, MB R3T 5S6.

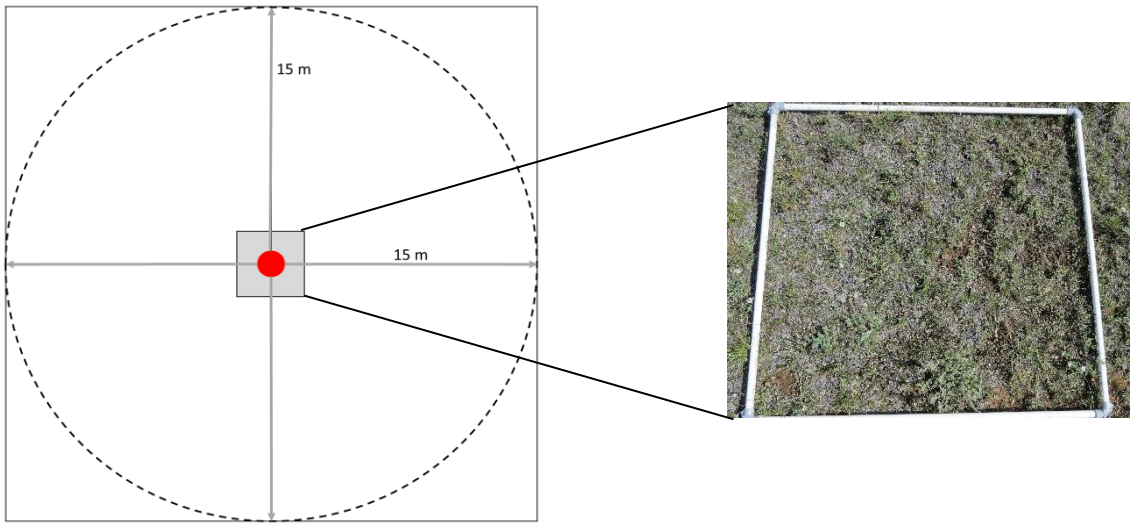


Figure 4. The location of the aboveground biomass sampling within the grassland assessment plot.

3. Areas of interest (AOI)

Grassland Analytica successfully mapped the grasslands (native, tamed, and modified "mixed") in agriculture Manitoba (AM) with about 90% overall accuracy, a total area of 12.2 million ha. The inventory determined that Grasslands occupy about 17.7% (2.15 million ha), see Figure 5. This fieldwork guide will support our team in gathering classification information on 3,000 points in Manitoba, of which 50% are to be from grasslands.

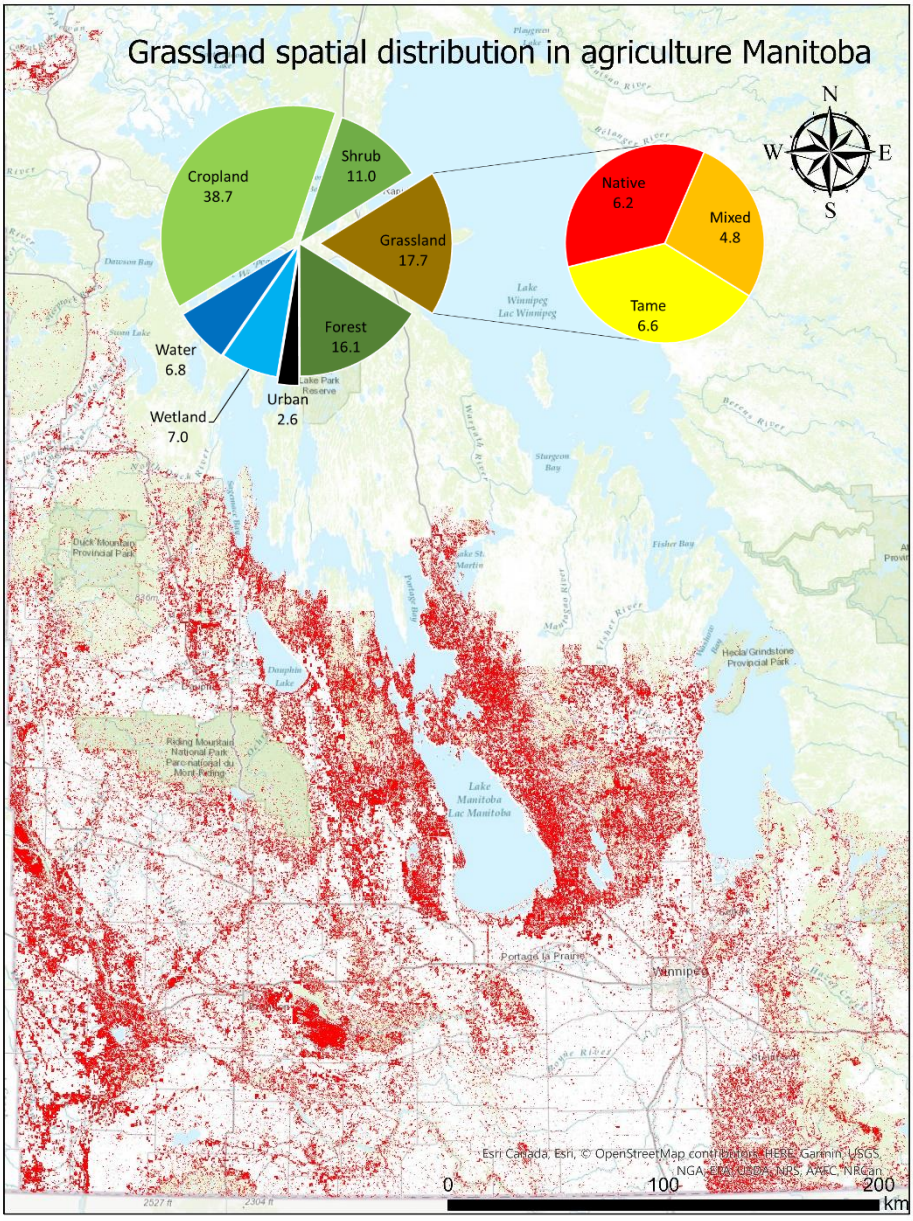


Figure 5. The spatial distribution of grassland classes (native, tame, and mixed) in the agriculture Manitoba for the year 2020.

4. Survey 123 app

Manitoba Agriculture and Resource Development has developed and recently launched the Land Identification Project that will be the single source platform for field data collection within the Province of Manitoba. This platform will be the centralized location where updates will be streamlined using the ArcGIS online platform. For more information, please visit URL: https://www.gov.mb.ca/agriculture/land-management/land-id-tool.html

For more information, please watch this demonstration video: https://youtu.be/QSiVwGpRhMs

Please follow these steps:

- Download the Survey 123 App from App Store on iPhone or tablet or Google Play on android.
- Scan this QR code using your device (mobile/tablet) to open the survey
- Click on **Continue without Signing in**, as shown below

5. Appendix: *Print multiple pages of this page for field data collection.*

Date: DD / MM / YYYY

Your Name: _____

Lat: _____

Overall land cover type: _____

Long: _____

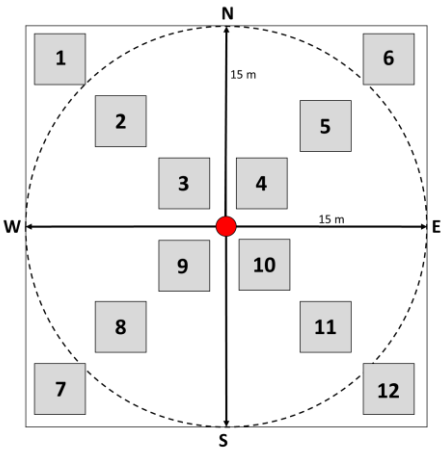
Wet above-ground biomass: _____ g/m^2

Dry above-ground biomass: _____ g/m^2

Quadrat #	% Native Grasses	% Native Forbs	% Tame Grasses	% Tame Forbs	% Bare Ground	% Shrubs	**Land cover type**
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Note: Please use the following:

< 1 %
1 – 5 %
5 – 25 %
25 – 50 %
50 – 75 %
75 – 100 %



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