



Natural Resources
Canada

Ressources naturelles
Canada



FORESTRY
FUTURES
TRUST
ONTARIO

DIGITAL SOIL MAPPING in Support of Forest Management



NEWSLETTER
Vol. 1 October 2022

IN THIS ISSUE

- ⇒ Meet the Team (Pg. 1&2)
- ⇒ Compiling Legacy Soil Data (Pg. 2)
- ⇒ Identifying Key Soil Indicators (Pg. 3)
- ⇒ Map Products (Pg. 3)
- ⇒ In the Field (Pg. 3)
- ⇒ Next Steps (Pg. 4)

Pedon to Region: Digital Soil Mapping (DSM) as an emerging tool in sustainable forest management.

- ⇒ The aim of this project is to continue to advance tools and create products to map soils at high spatial resolutions that will provide a foundational layer to enhance Ontario's forest resource inventory, assist in forest management planning, and improve operational decision making.
- ⇒ Digital soil mapping (DSM) has emerged as a powerful tool to help understand and predict the distribution of soils on Ontario's complex forest landscapes. DSM is done by combining plot level, soils information with geospatial layers that represent the key soil forming factors such as climate, vegetation, topography, and geology using statistical models such as machine learning to predict soil properties across the landscape.
- ⇒ The key components of this project are: 1. compiling legacy data and facilitating soil data acquisition; 2. summarizing key indicators or metrics of soil properties, and; 3. expanding soil property map products and their applications.

MEET

- ¹ Natural Resources Canada, Great Lakes Forestry Centre
- ² Ontario Ministry of Natural Resources and Forestry
- ³ Dalhousie University
- ⁴ Simon Fraser University
- ⁵ Forsite Consultants Ltd



THE TEAM

Canada

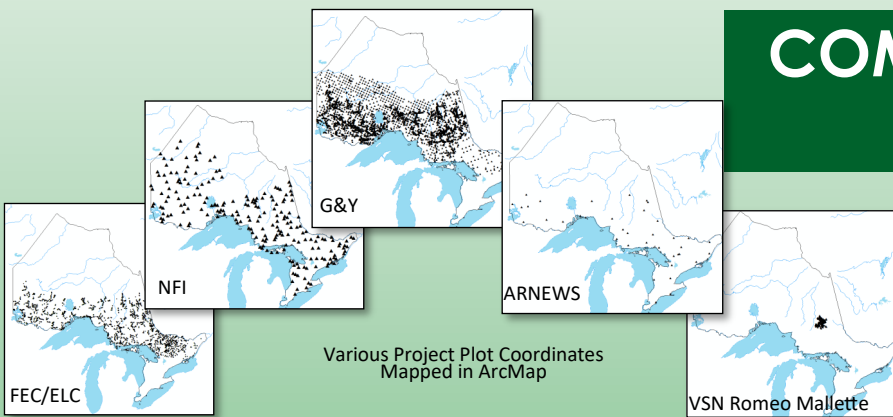


MEET THE TEAM CONT'D

From L to R: **Dr. Kara Webster**, Forest Soil Ecology Research Scientist, Project Lead; **Dr. Dave Morris**, Forest Stand Ecology Research Scientist— “Excited to work with our team to develop a foundational soil layer that will span Ontario’s managed forest area, and will support a wide variety of strategic and tactical

forest management activities/decisions for decades to come.”; **Dr. Brandon Heung**, Assistant Professor in Geospatial Informatics, Department of Plant, Food, and Environmental Sciences; **Jin Zhang**, Research Associate, Data Management Developer— “This project allows me to apply skills that I have acquired in my previous jobs, as well as to gain a deeper understanding of soil and geospatial data management.”; **Dr. Rob Fleming**, Forest Ecologist Research Scientist; **Ian Sinclair**, Remote Sensing Analyst; **Kim Chapman**, Forest Ecologist; **Shelagh Yanni**, Forest Soil Analyst— “Having worked with Ontario’s legacy soil data from a wide variety of sources for several years, it’s great to see it all coming together in a project to support forest management efforts in the future.”; **Kat Gunion**, Forest Analyst and **Grant McCartney**, Senior GIS Analyst— “Kat and Grant are excited to support the technical development and modelling for this project. Collaboration and information sharing on multiple Forestry Futures projects enrich results and help foster forest inventory innovation for Ontario.”

COMPILING LEGACY SOIL DATA



A summary of 23 different datasets/projects with legacy soil data in Ontario have been identified. Greater than 90,000 research plots are included and have a variety of detailed soil information from project to project. Data Sharing Agreements have been completed to acquire the data when necessary. The data has been acquired from most of the projects in a variety of formats and is being reviewed and restructured where necessary. Some data is still to be collected.

PROJECTS		
FEC/	G&Y	NFI
VSN	ARNEWS	
eFRI	NEBIE plots	
Island Lake	Rinker Lake	
Turkey Lakes Watershed		
WOSIS/Shaw Plots	Jack Pine LTSP	
Black Spruce LTSP		
Turkey Lakes Watershed		
Petawawa Research Forest		
Enhanced Forest Productivity Project		

BY PROJECT BY PLOT
BY HORIZON OR LAYER

- ◇ SITE INFO
- ◇ SOIL PHYSICAL CHARACTERISTICS
- ◇ SOIL CHEMISTRY CHARACTERISTICS
- ◇ FOREST/VEG CHARACTERISTICS

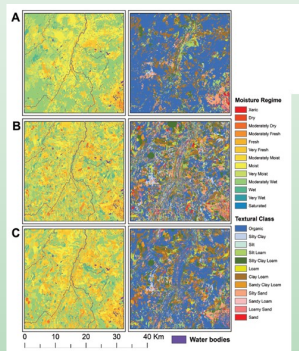


Natural Resources
Canada

Ressources naturelles
Canada

IDENTIFYING KEY SOIL INDICATORS

Jin Zhang has been working with the ELC/FEC spatial data with horizon information to develop pedotransfer functions for soil moisture regime and soil nutrient regime site level information and analytical information.



MAP PRODUCTS

To expand mapped soil properties, new mapped products are being developed by Kat Gunion and Grant McCartney from For-site Ltd, using covariates (T2 LIDAR derived water lines, polygons) and additional and improved soil field data from VSN plots. Aggregate DEM raster, Smoothing DEM, Creating hydrology files, biota metrics, geology metrics, hydrology metrics and topography metrics has been completed. Data processing continues.

IN THE FIELD



A field tour based at the Island Lake Biomass Harvest Research Trial (Chapleau, ON), highlighted the need to maintain soil quality to support stand productivity over the long-term.



MNRF staff (Dave Morris – CNFER, Gordon Kayahara – NE Regional Operations Division, Gord King – Forest Industry Division) help lead a field tour, in collaboration with Green First Forest Products, with Wahkohtowin’s Forest Guardians and crew leader (Amberly Quakege-sic) in July, 2022. The group toured a number of operational sites and discussed forest soil development and fine-scale ecosite management.



Natural Resources
Canada

Ressources naturelles
Canada

NEXT STEPS


Note from the Lead PI:

I am extremely happy to have the pleasure of working with this amazing group of people to advance tools and applications of DSM. All of the individuals bring critical skill sets to advance our project. We have highlighted some of the key advances in each of the components of the project in this newsletter and continue to stay tuned for more updates and outputs in the coming months! Coming up next year we will be hosting a soil sampling workshop and also plan a DSM tools workshop for practitioners. If you or any others you know might be interested in either of these events please feel free to contact me.

Kara kara.webster@nrcan-rncan.gc.ca

THANK YOU TO ALL OUR PARTNERS



 Natural Resources
Canada Ressources naturelles
Canada

Canada

Canadian Forest Service / Service canadien des forêts



Canada