Forest Soil Datasets In Ontario
FACT SHEETS

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Canada

The Great Lakes Forestry Centre, Sault Ste. Marie, Ontario

The Great Lakes Forestry Centre is one of five research centres within the Canadian Forest Service, which is the national and international voice for Canada's forest sector. One of the core mandates of the Service is to conduct scientific research on Canada's forests. This research can be used to inform forest management planning and policy decisions and to assist the forest industry, the public and other scientists. The research projects cover diverse forestry related issues including climate change, forest fires, pests, and remote sensing. The results of this research are distributed in the form of scientific and technical reports and other publications.

Additional information on Natural Resources Canada, the Canadian Forest Service, and the Great Lakes Forestry Centre research and publications is also available online at https://natural-resources.canada.ca/science-data/science-research/research-centres/great-lakes-forestry-centre.

To download this publication, see the online bookstore at: Canadian Forest Service Publications website

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ACKNOWLEDGEMENTS

DISCLAIMER

These datasets may evolve over time. If you are interested in a particular study, please reach out to the specific data steward for that project to see if new data is available. If the data steward is no longer active, please contact Kara Webster (kara.webster@nrcan-rncan.gc.ca).

INTRODUCTION

This report presents a compilation of forest soil datasets across Ontario. Curating legacy forest soil data in Ontario is critical to support initiatives and applications that require soil information, such as Digital Soil Mapping (DSM). DSM, or predictive soil mapping is the computer-assisted production of digital maps of soil properties by developing quantitative relationships between spatial predictor layers (e.g., geology, topography) with field observation data. DSM within forested landscapes has been challenged because there is no central repository for forest soil data, which were collected and analyzed by many different agencies and for many purposes. Curating forest soil data is a key first step to advancing DSM tools and creating products to map soils at higher resolution for use in forest resource inventory, operational forest management planning, and decision making.

This document summarizes 22 forest soil data sources and 94 650 data points collected over the past 50 years and analyzed for research projects conducted by various agencies, industry, and universities. Many projects were collaborations, and we thank all those who helped to retrieve and explain the datasets. Since the focus is on forest soils, most studies/projects were conducted primarily within the province's managed forest region (i.e., Area of the Undertaking).

Accurate site and soil information is critical for practical site- and stand-level management planning and operations. A summary of the limitations of these data sets is discussed, including the precision of geolocation information and varied methods for recording, collecting, and analyzing soil samples. As a result of reviewing these forest soil datasets, the next steps include data cleaning (quality checking) and standardization. Currently, these datasets are housed in different repositories. As data-sharing agreements allow, these datasets will be housed on a national soil data portal currently under development.

Forest Soil Datasets in Ontario

ACIDIC PRECIPITATION IN ONTARIO STUDY (APIOS)

Project Details

Acidic Precipitation in Ontario Study (APIOS) was established in 1979 by the Ontario Ministry of the Environment (MOE) to determine the effects of acidic deposition on terrestrial ecosystems. The database is a digital compilation of the data presented in the APIOS - Ontario Soil Baseline Survey. The principal objective of the baseline program was to establish a uniform database for soils across the province. The database 1) provided data to identify future trends, 2) enabled the development of laboratory experiments which define soil sensitivity criteria to acidic precipitation, and 3) provided information required for sensitivity mapping of soils throughout Ontario. Reports and data available through Ontario GeoHub at: https://geohub.lio.gov.on.ca/datasets/a9d3c2f21f824e9eba071124ec053875/ about. Note that not all of the soil data in the database are forest soils.

Plot Map

Dataset Information

Project Year(s): 1979-83

 # Plots: 315

Data Format: Excel spreadsheet

Data Steward: Daniel Saurette, Land Resource Specialist, Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA)
email: omafra.gis@ontario.ca

Partners: OMAFRA; OMOE

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓
Plot or Polygon ID	✓*
Year	✓*
Elevation	
Site Treatment / Disturbance	

SOIL SAMPLING	
Soil Sampling Method	
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition	✓	Drainage Class	
Topographic details	✓	Pore pattern	
Landform	✓	Humus form	
Stone/Rock outcrop		Structure	
Ecosite		Boundary	
Texture		Rooting depth	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	
Moisture Regime		Colour	✓*
Seepage		Presence of carbonates	

SOIL PROPERTIES	
Bulk Density	
Sand Silt Clay	✓*
pH	✓*
C, organicC	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	✓*
Phosphorus	✓*
Other elements	✓*
Bulk Density	

Publications

Forest Soil Datasets in Ontario

ACID RAIN NATIONAL EARLY WARNING SYSTEM (ARNEWS)

Project Details

This dataset contains information collected from The Acid Rain National Early Warning System (ARNEWS) network of plots that was deployed in 1984, when the Canadian Forest Service looked for signs of damage across the country inflicted on Canada's forests by air pollution. As Canada's national forest health monitoring plot network, more than 150 such plots were established across the country to monitor changes to vegetation and forest soils caused by air pollution and environmental change. This dataset includes soil plot information from 39 ARNEWS stations in Ontario.

Plot Map

Dataset Information

Project Year(s): 1984-1995

 # Plots: 195 soil plots (39 stations in Ontario)

Data Format: Excel spreadsheet

Data Steward: Dr. Kara Webster, Research Scientist, Forest Soil Ecology Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC) email: kara.webster@nrcan-rncan.gc.ca

Partners: NRCan

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	
Site Treatment / Disturbance	

SOIL SAMPLING	
Soil Sampling Method	
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition		Drainage Class	
Topographic details		Pore pattern	
Landform		Humus form	
Stone/Rock outcrop		Structure	✓*
Ecosite		Boundary	✓*
Texture	✓*	Rooting depth	✓*
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	
Moisture Regime		Colour	✓*
Seepage		Presence of carbonates	

SOIL PROPERTIES	
Bulk Density	
Sand Silt Clay	
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	✓*
Phosphorus	✓*
Other elements	✓*
Soil Biology	

Publications

ENHANCED FOREST PRODUCTIVITY PROJECT (EFP)

Project Details

This data was collected as part of the Implementation of Enhanced Forest Productivity: A Pilot Project on the Romeo Malette Forest. The Forestry Research Partnership (FRP) had initiated a series of demonstration areas as part of their strategy to increase wood supply in an ecologically sustainable context. FRP products are being incorporated and implemented with existing state-of-the-art knowledge and tools as harvest-to-harvest sequences of silvicultural best-practices to maximize productivity. This project aimed to act as a catalyst for enhanced productivity on the Romeo Malette Forest and other forests across Ontario.

Plot Map

Dataset Information

Project Year(s): 2005-2008

 # Plots: 240

Data Format: Excel spreadsheet

Data Steward: Michael Hoepting, Silviculture Research Forester, Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC)
email: michael.hoepting@nrcan-rncan.gc.ca

Partners: NRCan, GLFC; Ontario Ministry of Natural Resources (OMNR); Tembec Industries; Forest Research Partnership (FRP)

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	
Site Treatment / Disturbance	✓*

SOIL SAMPLING	
Soil Sampling Method	
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition		Drainage Class	
Topographic details	✓*	Pore pattern	
Landform	✓*	Humus form	
Stone/Rock outcrop	✓*	Structure	
Ecosite	✓*	Boundary	
Texture	✓*	Rooting depth	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	
Moisture Regime	✓*	Colour	
Seepage		Presence of carbonates	

SOIL PROPERTIES	
Bulk Density	
Sand Silt Clay	
pH	
C, organic C	
Total N	
C/N ratio	
CEC	
Exchangeable cations	
SO4	
Phosphorus	
Other elements	
Soil Biology	

Publications

Forest Soil Datasets in Ontario

ENHANCED FOREST RESOURCES INVENTORY (EFRI)

Project Details

This dataset contains the information collected for the enhanced Forest Resources Inventory (eFRI) program run by the Ontario Ministry of Natural Resources (OMNR). The merchantable forest in Ontario, or Area of Undertaking (AOU) has 42 Forest Management Units (FMU). Soils were surveyed to determine the ecosite (Forest Ecosystem Classification or Ecosystem Land Classification) in locations along the plot transects.

Plot Map

Dataset Information

Project Year(s): 2007-ongoing

 # Plots: 83076

Data Format: Excel spreadsheet

Data Steward: Ken Smith, GIS Officer, Science and Research Branch, OMNR
email: ken.smith@ontario.ca

Partners: OMNR

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	✓
Site Treatment / Disturbance	

SOIL SAMPLING	
Soil Sampling Method	✓*
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition		Drainage Class	
Topographic details		Pore pattern	
Landform		Humus form	
Stone/Rock outcrop	✓	Structure	
Ecosite	✓*	Boundary	
Texture	✓*	Rooting depth	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	
Moisture Regime	✓*	Colour	
Seepage		Presence of carbonates	✓*

SOIL PROPERTIES	
Bulk Density	
Sand Silt Clay	
pH	
C, organic C	
Total N	
C/N ratio	
CEC	
Exchangeable cations	
SO4	
Phosphorus	
Other elements	
Soil Biology	

Publications

FOREST ECOSYSTEM CLASSIFICATION/ECOSYSTEM LAND CLASSIFICATION (FEC/ELC)

Project Details

Ontario's ecological land classification system is founded on Angus Hills' Site Regions and Districts, first adopted in the 1950's. The Ontario Ministry of Natural Resources (OMNR) has continued to develop and refine the province's ecological divisions, enhancing their compatibility with national and continental classification systems (Ecological Land Classification Primer, 2007). The data includes 6644 ecological plots from eleven different projects across Ontario conducted between 1980 and 2005.

Plot Map

Dataset Information

Project Year(s): 1980-2005

 # Plots: 6644

Data Format: Electronic Data Repository (EDR) database in Microsoft Access

Data Steward: Natural Heritage Information Centre (NHIC)
email: NHICrequests@ontario.ca

Partners: OMNR

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	✓*
Site Treatment / Disturbance	

SOIL SAMPLING	
Soil Sampling Method	✓*
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition	✓*	Drainage Class	✓*
Topographic details	✓*	Pore pattern	✓*
Landform	✓*	Humus form	✓*
Stone/Rock outcrop	✓*	Structure	✓*
Ecosite	✓*	Boundary	
Texture	✓*	Rooting depth	✓*
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	✓*
Moisture Regime	✓*	Colour	
Seepage	✓*	Presence of carbonates	✓*

SOIL PROPERTIES	
Bulk Density	✓*
Sand Silt Clay	✓*
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	✓*
Phosphorus	✓*
Other elements	✓*
Soil Biology	

Publications

GREAT LAKES - ST. LAWRENCE (GLSL) - BIOMASS HARVESTING STUDY

Project Details

The objective of the Great Lakes - St. Lawrence (GLSL) Biomass Harvesting Study is to evaluate the effects of biomass harvesting in partial harvest systems on stand-level productivity and biodiversity. This includes, in part, effects on forest soil chemistry. Soil samples were taken by depth – FH layer, 0-15cm depth and 30-50cm depths. Plots are located across 4 sites including Petawawa Research Forest (PRF), Algoma (AL) north of Sault Ste. Marie, Haliburton Forest (HF) in Algonquin Park, and Nipissing Forest (NIP) outside of North Bay.

Plot Map

Dataset Information

Project Year(s): 2012-ongoing

 # Plots: 36 (PRF), 15 each in NIP, HF, AL sites

Data Format: ArcMap shapefile, Excel spreadsheet

Data Steward: Dr. Trevor Jones, Research Scientist, Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC)
email: trevor.jones@nrcan-rncan.gc.ca

Partners: NRCan, GLFC; Ontario Ministry of Natural Resources (OMNR)

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	✓*
Site Treatment / Disturbance	✓*

SOIL SAMPLING	
Soil Sampling Method	
Sampled by Horizon	✓*
Sampled by Depth	✓*
Archived Samples	✓*

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition		Drainage Class	
Topographic details	✓*	Pore pattern	
Landform		Humus form	
Stone/Rock outcrop		Structure	
Ecosite	✓*	Boundary	
Texture	✓*	Rooting depth	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	
Moisture Regime	✓*	Colour	
Seepage	✓*	Presence of carbonates	

SOIL PROPERTIES	
Bulk Density	
Sand Silt Clay	✓*
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	✓*
Phosphorus	✓*
Other elements	✓*
Soil Biology	

GROWTH AND YIELD (G & Y)

Project Details

The Growth and Yield program in Ontario maintains a network of thousands of permanent plots. The plots are used for recurring data collection on forest growth, productivity, and dynamics. Data is collected from plots in targeted forest conditions in managed forests both on and off Crown land. Data is used to develop prediction tools and models needed for forest management planning and operations.

Plot Map

Dataset Information

Project Year(s): 1977-ongoing

 # Plots: >5600

Data Format: SQL database

Data Steward: Waseem Ashiq, Growth and Yield program lead, Ontario Ministry of Natural Resources (OMNR)
email: muhammadwaseem.ashiq@ontario.ca

Partners: OMNR

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	
Site Treatment / Disturbance	

SOIL SAMPLING	
Soil Sampling Method	✓*
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition	✓*	Drainage Class	✓*
Topographic details	✓*	Pore pattern	✓*
Landform	✓*	Humus form	✓*
Stone/Rock outcrop		Structure	✓*
Ecosite	✓*	Boundary	✓*
Texture	✓*	Rooting depth	✓*
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	✓*
Moisture Regime	✓*	Colour	✓*
Seepage	✓*	Presence of carbonates	✓*

SOIL PROPERTIES	
Bulk Density	
Sand Silt Clay	
pH	
C, organic C	
Total N	
C/N ratio	
CEC	
Exchangeable cations	
SO4	
Phosphorus	
Other elements	
Soil Biology	

Publications

ISLAND LAKE BIOMASS HARVEST RESEARCH AND DEMONSTRATION AREA

Project Details

The Island Lake Biomass Harvest Research and Demonstration Area near Chapleau, ON, was developed to study the impact of intensified biomass harvesting on forest sustainability, specifically stand growth, soil productivity and forest biodiversity. It builds on the success of the multi-agency North American Long-Term Soil Productivity (LTSP) experiment. This dataset is a summary of the pre-harvest soil physical and chemical properties on 51 plots: 10 deep soil pits dug across the site plus 41 shallow soil pits.

Plot Map
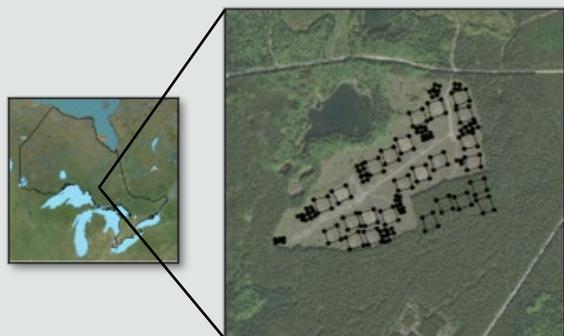
Dataset Information

Project Year(s): 2011-ongoing

 # Plots: 51

Data Format: Microsoft Access database

Data Steward: Dr. Kara Webster, Research Scientist, Forest Soil Ecology, Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC)
email: kara.webster@nrcan-rncan.gc.ca

Partners: NRCan, GLFC; Ontario Ministry of Natural Resources (OMNR)

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	✓
Site Treatment / Disturbance	

SOIL SAMPLING	
Soil Sampling Method	✓*
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	✓*

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition		Drainage Class	
Topographic details		Pore pattern	
Landform		Humus form	
Stone/Rock outcrop		Structure	
Ecosite		Boundary	
Texture	✓*	Rooting depth	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)		Coarse Fragment Content	✓*
Moisture Regime		Colour	
Seepage		Presence of carbonates	

SOIL PROPERTIES	
Bulk Density	✓*
Sand Silt Clay	✓*
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	
Exchangeable cations	✓*
SO4	✓*
Phosphorus	✓*
Other elements	
Soil Biology	✓*

Publications

ISLAND LAKE FIRE SITE AT RIPPLE LAKE

Project Details

Ripple Lake area was a young jack pine plantation that burned in the spring of 2012, just after the 2011/2012 establishment of the Island Lake Biomass Harvest Research and Demonstration Area near Chapleau, ON. Plots were set up as a "wildfire comparison" to complement the Island Lake Experiment. Three large soil pits and 18 mini pits were dug in 2013 and samples were collected for chemical analysis. The 3 large pits were dug between the main plot centers (black dots on map), and no coordinates noted. The 18 mini pits were geolocated and are shown on the map.

Plot Map
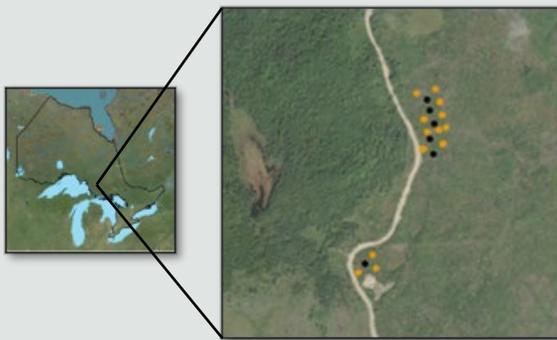
Dataset Information

Project Year(s): 2013-ongoing

 # Plots: 21

Data Format: Excel spreadsheet

Data Steward: Stephanie Nelson, Ecosystem Biologist, Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC)
email: stephanie.nelson@nrcan-rncan.gc.ca

Partners: NRCan, GLFC; Ontario Ministry of Natural Resources (OMNR)

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	
Site Treatment / Disturbance	✓*

SOIL SAMPLING	
Soil Sampling Method	✓*
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	✓*

SOIL PHYSICAL FIELD CHARACTERISTICS				
Mode of Deposition		Drainage Class		
Topographic details		Pore pattern		
Landform		Humus form		
Stone/Rock outcrop		Structure		
Ecosite		Boundary	✓*	
Texture		Rooting depth	✓*	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	✓*	
Moisture Regime		Colour	✓*	
Seepage		Presence of carbonates		

SOIL PROPERTIES	
Bulk Density	✓*
Sand Silt Clay	✓*
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	✓*
Phosphorus	✓*
Other elements	✓*
Soil Biology	✓*

Publications

LONG TERM SOIL PRODUCTIVITY: BLACK SPRUCE (SB LTSP)

Project Details

These study sites are part of the North American LTSP network. The national program of Long-Term Soil Productivity (LTSP) research was established to address both short- and long-term consequences of site and soil disturbance on fundamental forest productivity. These sites represent a productivity gradient and toposequence (i.e., upland sandy to lowland, peaty phase soils) of black spruce stands in northwestern Ontario. Stands were undisturbed, fire-origin stands ranging in age from 57 to 125 years. Nine sites were included in the study design, with 15 (30 m x 30 m) plots established in each stand, 3 of which were unharvested reference (control) plots. The remaining 12 plots had replicated biomass removal treatments applied to them in 1993/94. Three quantitative soil pits were dug/assessed prior to harvest at random locations across the planned harvest and control areas. Routine sampling has been completed on all plots from the 5th year up to and including the 30th year resampling.

Plot Map
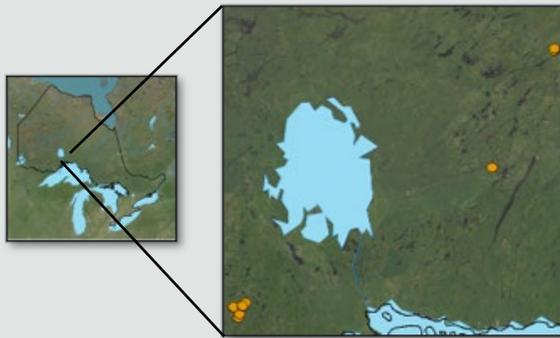
Dataset Information

Project Year(s): 1993-ongoing

 # Plots: 9 Sites (135 plots)

Data Format: Excel spreadsheet

Data Steward: Dr. Dave Morris, Research Scientist, Forest Stand Ecology, Centre for Northern Forest Ecosystem Research, Ontario Ministry of Natural Resources (OMNR) email: dave.m.morris@ontario.ca

Partners: OMNR; Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC)

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	
Site Treatment / Disturbance	✓*

SOIL SAMPLING	
Soil Sampling Method	✓*
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	✓*

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition	✓*	Drainage Class	✓*
Topographic details		Pore pattern	✓*
Landform		Humus form	✓*
Stone/Rock outcrop		Structure	
Ecosite		Boundary	
Texture	✓*	Rooting depth	✓*
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	✓*
Moisture Regime	✓*	Colour	✓*
Seepage	✓*	Presence of carbonates	

| SOIL PROPERTIES	
Bulk Density	✓*
Sand Silt Clay	✓*
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	
Phosphorus	✓*
Other elements	
Soil Biology	

Publications

LONG TERM SOIL PRODUCTIVITY: JACK PINE STUDY (PJ LTSP)

Project Details

These study sites are part of the North American LTSP network. The national program of Long-Term Soil Productivity (LTSP) research was established to address both short- and long-term consequences of site and soil disturbance on fundamental forest productivity. A series of experimental sites were established in a range of Plonski's site classes, in north central Ontario jack pine stands. Baseline data collection methods included preharvest soil sampling, seedbed, and natural regeneration assessments (Tenhagen et al. 1996). Nine mature sites were studied with 15 (30 m x 30 m) plots at each site, 3 of which were control plots and 12 were biomass removal treatment plots. Two soil pits were dug pre-harvest in buffer zones in each site, totaling 18 pits. Further soil collection (auger or pits) and analyses available for control plots over 20 years.

Plot Map
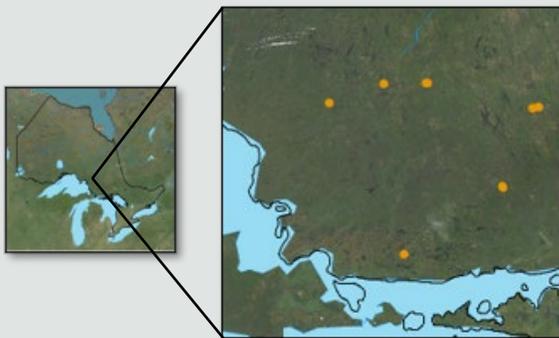
Dataset Information

Project Year(s): 1993-95, 2006, ongoing

 # Plots: 9 sites (135 plots)

Data Format: Excel spreadsheet

Data Steward: Dr. Rob Fleming, Research Scientist, Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC)
email: rob.fleming@nrcan-rncan.gc.ca

Partners: NRCan; Ontario Ministry of Natural Resources (OMNR)

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓
Plot or Polygon ID	✓*
Year	✓*
Elevation	✓
Site Treatment / Disturbance	✓*

SOIL SAMPLING	
Soil Sampling Method	
Sampled by Horizon	
Sampled by Depth	✓*
Archived Samples	✓*

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition		Drainage Class	
Topographic details		Pore pattern	
Landform		Humus form	✓*
Stone/Rock outcrop		Structure	
Ecosite	✓*	Boundary	
Texture	✓*	Rooting depth	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	✓*
Moisture Regime	✓*	Colour	
Seepage		Presence of carbonates	

SOIL PROPERTIES	
Bulk Density	
Sand Silt Clay	
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	
Phosphorus	✓*
Other elements	✓*
Soil Biology	

Publications

Forest Soil Datasets in Ontario

NATIONAL FOREST INVENTORY (NFI)

Project Details

This dataset includes the Ontario ground plots that are assessed for the ongoing National Forest Inventory (NFI) sampling program that was originally established between 2003 and 2006. The NFI program is a joint effort between federal, provincial, and territorial governments, and plot remeasurements are spread over a 10-year cycle. The 215 Ontario plots were assessed for 25 key attributes as well as for additional variables that met provincial growth and yield requirements. The NFI program in Ontario is a component of the Ontario Growth and Yield program led by the Ontario Ministry of Natural Resources (OMNR).

Plot Map

Dataset Information

Project Year(s): 2003-ongoing

 # Plots: 215

Data Format: SQL database

Data Steward: Waseem Ashiq, Growth and Yield program lead, OMNR
email: muhammadwaseem.ashiq@ontario.ca

Partners: OMNR; Natural Resources Canada

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	✓*
Site Treatment / Disturbance	

SOIL SAMPLING	
Soil Sampling Method	
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition		Drainage Class	✓*
Topographic details	✓	Pore pattern	✓*
Landform	✓*	Humus form	
Stone/Rock outcrop	✓	Structure	
Ecosite	✓*	Boundary	
Texture	✓*	Rooting depth	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	✓*
Moisture Regime	✓*	Colour	✓*
Seepage	✓*	Presence of carbonates	✓*

SOIL PROPERTIES	
Bulk Density	✓*
Sand Silt Clay	✓*
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	
Exchangeable cations	
SO4	
Phosphorus	
Other elements	
Soil Biology	

Publications

NATURAL DISTURBANCE, AND EXTENSIVE, BASIC, INTENSIVE, AND ELITE SILVICULTURE (NEBIE) PLOT NETWORK

Project Details

The Intensive Management Science Partnership: NEBIE (Natural disturbance, and Extensive, Basic, Intensive, and Elite silviculture) plot network is a stand-scale, multi-agency research project designed to compare the ecological effects of a range of silvicultural treatments in northern temperate and boreal forest regions of Ontario. It was established in 2001 with randomized complete block experiments installed at eight sites. Each NEBIE treatment was replicated at least three times at each site, using large experimental units (2-ha plots).

Plot Map

Dataset Information

Project Year(s): 2001-ongoing

 # Plots: 160

Data Format: SQL database

Data Steward: Dr. F. Wayne Bell, Forest Monitoring and Research Section, Ontario Ministry of Natural Resources (OMNR)
email: wayne.bell@ontario.ca

Partners: OMNR; Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC); University of Guelph; University of Western; industry partners

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	
Site Treatment / Disturbance	✓*

SOIL SAMPLING	
Soil Sampling Method	✓*
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition		Drainage Class	✓*
Topographic details	✓	Pore pattern	✓*
Landform		Humus form	✓*
Stone/Rock outcrop		Structure	
Ecosite	✓*	Boundary	
Texture	✓*	Rooting depth	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	✓*
Moisture Regime	✓*	Colour	
Seepage	✓*	Presence of carbonates	✓*

SOIL PROPERTIES	
Bulk Density	
Sand Silt Clay	✓*
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	
Exchangeable cations	✓*
SO4	
Phosphorus	✓*
Other elements	
Soil Biology	

Publications

NIPIGON STRIP CUTS

Project Details

This study looked at factors affecting regeneration in alternate strip clearcutting in shallow-soil upland black spruce near Nipigon, ON. Soils and soil chemistry were assessed prior to harvesting. Locations are general with no specific coordinate information as soils were sampled in quadrants along the strip cuts. Ecosystem Land Classification information was added years after research based on soil data that was collected.

Plot Map

Dataset Information

Project Year(s): 1974-1980

 # Plots: 24

Data Format: Excel spreadsheet

Data Steward: Dr. Rob Fleming, Research Scientist, Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC)
email: rob.fleming@nrcan-rncan.gc.ca

Partners: NRCan; Ontario Ministry of Natural Resources (OMNR)

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓
Plot or Polygon ID	✓*
Year	✓*
Elevation	
Site Treatment / Disturbance	✓

SOIL SAMPLING	
Soil Sampling Method	✓*
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	✓*

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition		Drainage Class	✓*
Topographic details		Pore pattern	
Landform	✓	Humus form	
Stone/Rock outcrop	✓	Structure	
Ecosite	✓*	Boundary	
Texture	✓*	Rooting depth	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	✓*
Moisture Regime	✓*	Colour	✓*
Seepage		Presence of carbonates	

SOIL PROPERTIES	
Bulk Density	✓*
Sand Silt Clay	✓*
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	
Phosphorus	✓*
Other elements	
Soil Biology	

Publications

PETAWAWA RESEARCH FOREST (PRF) - CARTIER LAKE SILVICULTURAL AREA (CLSA)

Project Details

The Cartier Lake White Pine Stand Improvement Harvesting study was initiated in 1971 primarily to explore the potential of accelerating merchantable white pine volume production through thee harvest of mature tolerant hardwoods overtopping mid-rotation white pine. The study included harvest and no-harvest treatments across several stands with three levels of residual pine basal area. Soil pits were established adjacent to a subset of plots in 2001 to quantify effects on soil carbon and nutrients.

Plot Map

Dataset Information

Project Year(s): 1971-2001, ongoing

 # Plots: 20

Data Format: ArcMap shapefile, Excel spreadsheet

Data Steward: Michael Hoepting, Silviculture Research Forester, Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC)
email: michael.hoepting@nrcan-rncan.gc.ca

Partners: NRCan, GLFC; Ontario Ministry of Natural Resources (OMNR); Forest Research Partnership (FRP); University of Toronto

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	
Site Treatment / Disturbance	✓*

SOIL SAMPLING	
Soil Sampling Method	
Sampled by Horizon	✓*
Sampled by Depth	✓*
Archived Samples	

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition		Drainage Class	
Topographic details		Pore pattern	
Landform		Humus form	
Stone/Rock outcrop		Structure	
Ecosite		Boundary	
Texture	✓*	Rooting depth	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	
Moisture Regime	✓*	Colour	✓*
Seepage		Presence of carbonates	

| SOIL PROPERTIES	
Bulk Density	✓*
Sand Silt Clay	✓*
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	
Phosphorus	✓*
Other elements	✓*
Soil Biology	

Publications

PETAWAWA RESEARCH FOREST (PRF) - MERIDIAN ROAD SILVICULTURAL AREA (MRSA)

Project Details

Studies in the Meridian Road Silviculture Area (27 ha) in the PRF focused on a white pine shelterwood study. A soil survey was completed in 1993, but coordinates were not recorded for plot locations. In 1999, sampling was carried out and the polygons and plots are now mapped, with estimation of plot location within 5 metres accuracy.

Plot Map
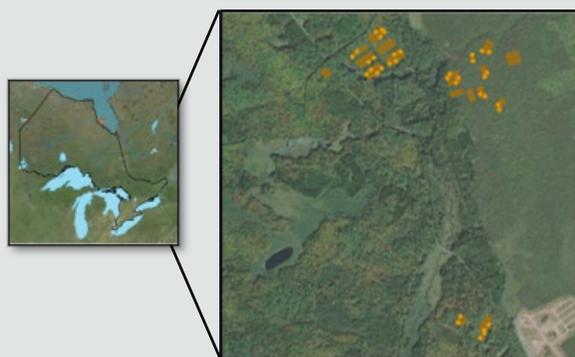
Dataset Information

Project Year(s): 1993, 1999, ongoing

 # Plots: 36

Data Format: ArcMap shapefile, Excel spreadsheet

Data Steward: Michael Hoepting, Silviculture Research Forester, Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC)
email: michael.hoepting@nrcan-rncan.gc.ca

Partners: NRCan, GLFC; Ontario Ministry of Natural Resources (OMNR); universities

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	
Site Treatment / Disturbance	✓

SOIL SAMPLING	
Soil Sampling Method	✓*
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition		Drainage Class	✓*
Topographic details	✓*	Pore pattern	
Landform		Humus form	✓*
Stone/Rock outcrop		Structure	
Ecosite		Boundary	
Texture	✓*	Rooting depth	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	
Moisture Regime		Colour	
Seepage		Presence of carbonates	

| SOIL PROPERTIES	
Bulk Density	✓*
Sand Silt Clay	✓*
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	✓*
Phosphorus	✓*
Other elements	✓*
Soil Biology	

Publications

PETAWAWA RESEARCH FOREST (PRF) - SOIL SAMPLING FOR DIGITAL SOIL MAPPING PROJECT (DSM)

Project Details

To support the Digital Soil Mapping (DSM) project, soil sampling on 82 sites representing a variety of ecosites was carried out in the PRF. Locations were already established through the Advanced Forest Resource Inventory Technologies (AFRIT) project lead by Murray Woods, Ontario Ministry of Natural Resources (OMNR). In 2018, soil core and soil auger samples were collected for chemical analysis at 246 subplots (82 plots; 3 subplots within each plot). In 2019, 6 deep (1 m x 1 m) soil pits, representing the most common ecosite types within the study were dug in buffer areas outside of sampling plots and assessed (physical soil descriptions and soil chemistry analysis completed).

Plot Map
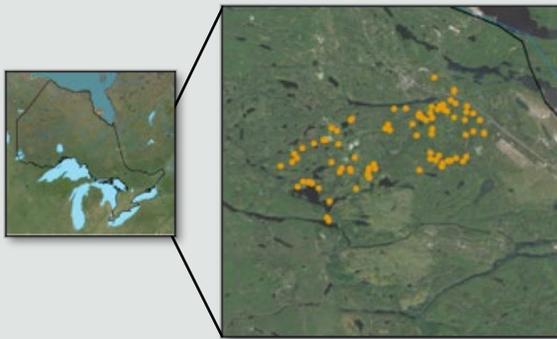
Dataset Information

Project Year(s): 2018-2019

 # Plots: 82 (246 subplots) + 6 large soil pits outside of plots

Data Format Excel spreadsheet

Data Steward: Stephanie Nelson, Ecosystem Biologist, Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC)
email: stephanie.nelson@nrcan-rncan.gc.ca

Partners: NRCan; OMNR

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	
Site Treatment / Disturbance	

SOIL SAMPLING	
Soil Sampling Method	✓*
Sampled by Horizon	✓*
Sampled by Depth	✓*
Archived Samples	✓*

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition		Drainage Class	
Topographic details		Pore pattern	
Landform		Humus form	
Stone/Rock outcrop		Structure	
Ecosite	✓*	Boundary	
Texture	✓*	Rooting depth	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	✓*
Moisture Regime	✓*	Colour	
Seepage	✓*	Presence of carbonates	

| SOIL PROPERTIES	
Bulk Density	✓*
Sand Silt Clay	✓*
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	✓*
Phosphorus	✓*
Other elements	✓*
Soil Biology	

PORRIDGE LAKE WOOD ASH TRIAL

Project Details

This project is a component within the larger Natural Resources Canada-Canadian Forest Service led AshNet project, a network of scientists, foresters, industry and government (federal and provincial) representatives who are actively investigating the potential for moving forward Canada's bioeconomy objectives, reducing waste and improving forest health by applying wood ash from bioenergy production to forest soils. The Porridge Lake Trial is a pilot project with long-term monitoring of the ecological effects of a one-time wood ash application to the soil at a hardwood forest site. The pre-ash application sampling of the soil was completed in 2018.

Plot Map
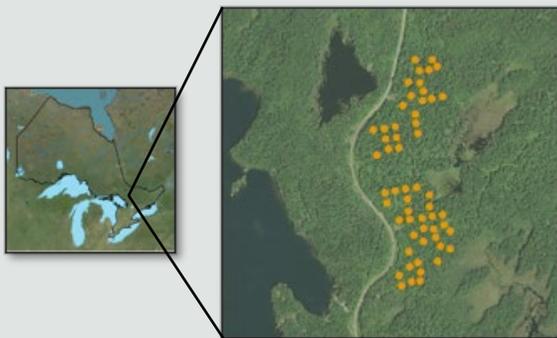
Dataset Information

Project Year(s): 2017-ongoing

 # Plots: 56

Data Format: Excel spreadsheet

Data Steward: Eric Searle, Research Scientist, Ontario Ministry of Natural Resources (OMNR), Ontario Forest Research Institute (OFRI)
email: Eric.Searle@ontario.ca

Partners: NRCan (GLFC); Ontario Ministry of Natural Resources (OMNR); Laurentian University; Trent University; Westwind Forest Stewardship Inc.; Murray Brothers Lumber Company; Brinkman Reforestation

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	
Site Treatment / Disturbance	✓*

SOIL SAMPLING	
Soil Sampling Method	✓*
Sampled by Horizon	✓*
Sampled by Depth	✓*
Archived Samples	✓*

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition		Drainage Class	✓*
Topographic details		Pore pattern	
Landform		Humus form	
Stone/Rock outcrop		Structure	
Ecosite		Boundary	
Texture		Rooting depth	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	✓*
Moisture Regime	✓*	Colour	
Seepage		Presence of carbonates	

| SOIL PROPERTIES	
Bulk Density	✓*
Sand Silt Clay	✓*
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	
Phosphorus	✓*
Other elements	✓*
Soil Biology	

Publications

RINKER LAKE BOREAL MIXEDWOOD MAPPING PILOT PROJECT

Project Details

This dataset contains a summary of information collected from the North Central Ontario Forest Ecosystem Classification (NCO FEC, merged with Northwestern Ontario FEC, NWO FEC) plots installed in 1983. In early 1990s, Great Lakes Forestry Centre (GLFC) researchers used those plots from 1983, and added more in 1993 for use as a test case for developing spatial analysis tools and approaches. Canadian Wildlife Service (CWS) added plots in 1992; University of Waterloo added plots in 1993; Ontario Geological Survey (OGS) added many geomorphology/bedrock geology plots in 1993; GLFC added plots in 1994 and 1995 to study forest succession on areas that were harvested previously, including some from the 1983 NCO FEC plots.

Plot Map
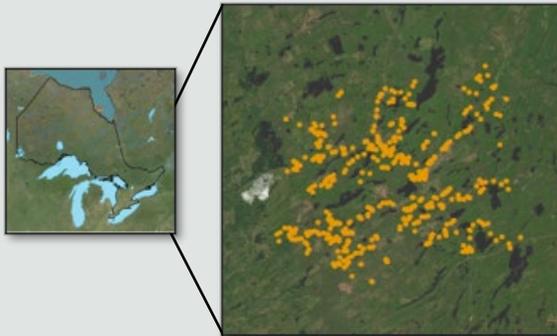
Dataset Information

Project Year(s): 1983, 1992-95

 # Plots: 655

Data Format: Excel spreadsheet

Data Steward: Dr. Kara Webster, Research Scientist, Forest Soil Ecology, Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC)
email: kara.webster@nrcan-rncan.gc.ca

Partners: NRCan, GLFC; Ontario Ministry of Natural Resources (OMNR); CWS; University. of Waterloo; OGS

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	✓
Site Treatment / Disturbance	✓

SOIL SAMPLING	
Soil Sampling Method	
Sampled by Horizon	✓*
Sampled by Depth	✓*
Archived Samples	✓*

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition	✓*	Drainage Class	
Topographic details	✓*	Pore pattern	
Landform	✓*	Humus form	✓*
Stone/Rock outcrop		Structure	
Ecosite		Boundary	
Texture	✓*	Rooting depth	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	
Moisture Regime	✓*	Colour	
Seepage	✓*	Presence of carbonates	

SOIL PROPERTIES	
Bulk Density	
Sand Silt Clay	✓*
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	✓*
Phosphorus	✓*
Other elements	✓*
Soil Biology	

Publications

TURKEY LAKES WATERSHED STUDY (TLW)

Project Details

Soil data were collected as part of the Turkey Lakes Watershed Study. The TLW is located in the Eastern Temperate Mixed Forest on the Canadian Shield, approximately 60 km north of Sault Ste. Marie, Ontario. This 10.5 km² watershed has been the site of one of the longest running watershed studies in Canada. A whole-ecosystem investigative approach was adopted from the outset by federal scientists and has allowed research to evolve from its original (and continuing) acidification focus to include investigations on the effects of climate change, forest harvesting and other forest ecosystem perturbations. Soil data collected includes soil surveys, soil water, and detailed soil pit excavations for a variety of studies throughout the TLW.

Plot Map

Dataset Information

Project Year(s): 1980-2016, ongoing

 # Plots: 457

Data Format: Excel spreadsheet

Data Steward: Stephanie Nelson, Ecosystem Biologist, Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC)
email: stephanie.nelson@nrcan-rncan.gc.ca

Partners: NRCan, GLFC; Ontario Ministry of Natural Resources (OMNR); Canadian Wildlife Service (CWS); Environment and Climate Change Canada (ECCC); universities

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	
Site Treatment / Disturbance	✓*

SOIL SAMPLING	
Soil Sampling Method	
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	✓*

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition	✓*	Drainage Class	✓*
Topographic details	✓	Pore pattern	
Landform		Humus form	
Stone/Rock outcrop		Structure	
Ecosite		Boundary	
Texture	✓*	Rooting depth	
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	✓*
Moisture Regime	✓*	Colour	
Seepage		Presence of carbonates	✓*

SOIL PROPERTIES	
Bulk Density	✓*
Sand Silt Clay	✓*
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	✓*
Phosphorus	✓*
Other elements	✓*
Soil Biology	

Publications

TYROL LAKE BLACK SPRUCE PRE-COMMERCIAL THINNING PROJECT

Project Details

These plots were part of a project near Beardmore, Ontario, that studied the effects of cleaning (hardwood removal) and different levels of precommercial thinning on stand development in a dense upland black spruce plantation. Soil descriptions and soil chemistry data were obtained in 1994.

Plot Map

Dataset Information

Project Year(s): 1994, 2007

 # Plots: 62

Data Format: Excel spreadsheet

Data Steward: Dr. Rob Fleming, Research Scientist, Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC)
email: rob.fleming@nrcan-rncan.gc.ca

Partners: NRCan, GLFC

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	
Site Treatment / Disturbance	✓*

SOIL SAMPLING	
Soil Sampling Method	
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition		Drainage Class	
Topographic details	✓*	Pore pattern	
Landform		Humus form	
Stone/Rock outcrop		Structure	
Ecosite	✓*	Boundary	
Texture	✓*	Rooting depth	✓*
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	✓*
Moisture Regime		Colour	
Seepage		Presence of carbonates	

SOIL PROPERTIES	
Bulk Density	
Sand Silt Clay	
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	✓*
Phosphorus	✓*
Other elements	✓*
Soil Biology	

Publications

VEGETATION SAMPLING NETWORK (VSN)

Project Details

This dataset is a summary of Ontario's Vegetation Sampling Network (VSN). The development of this terrestrial ground plot network (2019 – ongoing) was in support of the wall – to – wall single photon LiDAR (SPL) acquisition and the update of Ontario's eFRI across the managed forest area of Ontario (35.6 million ha). All established plots (temporary or permanent sample plots – 400 m^2) include a georeferenced soil profile pedon description (auger or soil pit) and ecosite classification, with a subset selected (i.e., range of forest humus forms, effective textures, and moisture regimes) for the analysis of chemical properties. By 2028, there will be approximately 6000 VSN plots established across 9 ecoregions and 41 Forest Management Units (FMUs).

Plot Map

Dataset Information

Project Year(s): 2019-ongoing

 # Plots: 3666 plots (6000 by 2028)

Data Format: Excel spreadsheet

Data Steward: Dr. Dave Morris, Research Scientist, Forest Stand Ecology, Centre for Northern Forest Ecosystem Research, Ontario Ministry of Natural Resources (OMNR) email: dave.m.morris@ontario.ca

Partners: OMNR; Natural Resources Canada (NRCan), Great Lakes Forestry Centre (GLFC)

Soil Data Attributes

✓ - Site specific details
✓* - Plot specific details

SITE INFORMATION	
Location (coordinates, ecodistrict, township, etc.)	✓*
Plot or Polygon ID	✓*
Year	✓*
Elevation	
Site Treatment / Disturbance	✓*

SOIL SAMPLING	
Soil Sampling Method	✓*
Sampled by Horizon	✓*
Sampled by Depth	
Archived Samples	

SOIL PHYSICAL FIELD CHARACTERISTICS			
Mode of Deposition	✓*	Drainage Class	✓*
Topographic details	✓*	Pore pattern	✓*
Landform		Humus form	✓*
Stone/Rock outcrop		Structure	✓*
Ecosite	✓*	Boundary	✓*
Texture	✓*	Rooting depth	✓*
Soil Profile Depth (depth to bedrock, water table, mottles, etc.)	✓*	Coarse Fragment Content	✓*
Moisture Regime	✓*	Colour	✓*
Seepage	✓*	Presence of carbonates	✓*

SOIL PROPERTIES	
Bulk Density	✓*
Sand Silt Clay	✓*
pH	✓*
C, organic C	✓*
Total N	✓*
C/N ratio	✓*
CEC	✓*
Exchangeable cations	✓*
SO4	✓*
Phosphorus	✓*
Other elements	✓*
Soil Biology	

Publications

DATASET SUMMARY

Project Timelines
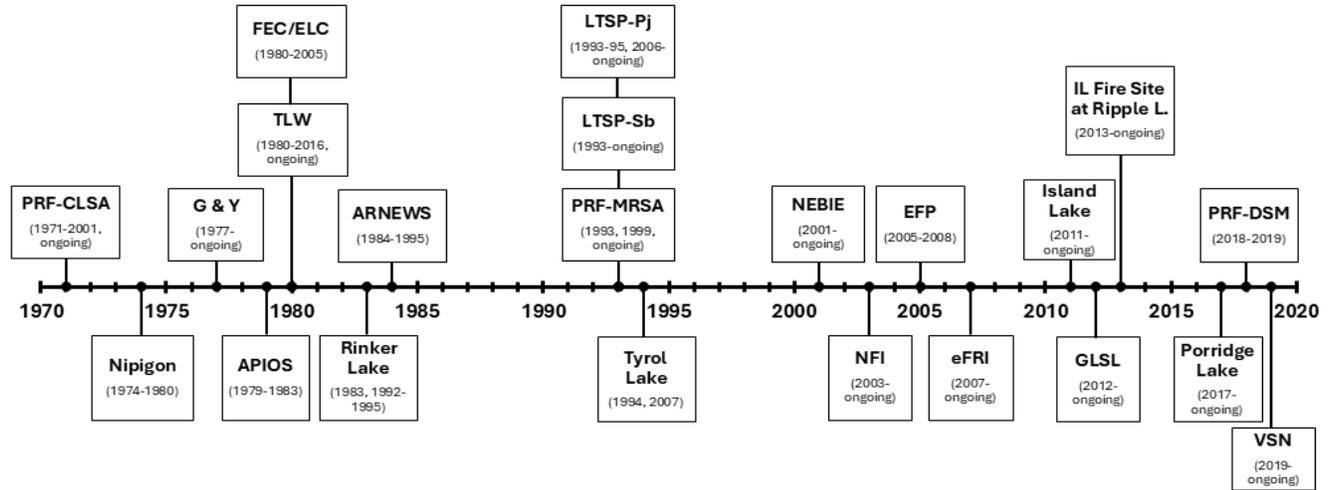
Datasets Plot Map
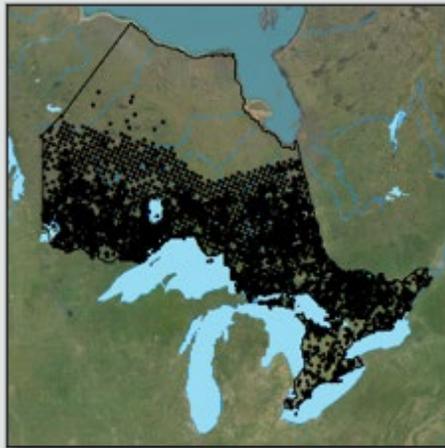
Soil Data Attributes

■ All or most of the plots		▦ Some plots	░ Site level only	☐ No data

Legend: ■ = All or most of the plots; ▦ = Some plots; ░ = Site level only; ☐ = No data

Soil Data Attributes	APIOS	ARNEWS	EFP	eFRI	FEC/ELC	GLSL	G & Y	Island Lake	IL Fire Site	LTSP-Pj	LTSP-Sb	NFI	NEBIE	Nipigon	PRF-CLSA	PRF-MRSA	PRF-DSM	Porridge Lake	Rinker Lake	TLW	Tyrol Lake	VSN

Site information
- Location
- Plot ID
- Polygon ID
- Year
- Elevation
- Site Treatment/ Disturbance

Soil Sampling
- Soil Sampling Method
- Sampled by Horizon
- Sampled by Depth
- Archived Samples

Soil Physical Characteristics
- Mode of Deposition
- Topographic Details
- Landform
- Stone/Rock Outcrop
- Ecosite
- Texture
- Soil Profile Depth details
- Moisture Regime
- Seepage
- Drainage Class
- Pore Pattern
- Humus Form
- Structure
- Boundary
- Rooting depth
- Coarse Fragment Content
- Colour
- Presence of Carbonates

Soil Properties
- Bulk Density
- Sand, Silt, Clay
- pH
- C, Organic C
- Total N
- C/N ratio
- CEC
- Exchangeable cations
- SO₄
- Phosphorus
- Other elements
- Soil Biology

SUMMARY

This report summarizes forest soil databases from 22 different studies totaling 94 650 soil data points over 50 years. The majority of these data points (88%) are from the enhanced Forest Resource Inventory (eFRI) inventory that while extensive, contain only field-assessed values. For some of these studies, forest soil collection and data may not have been the primary focus, and therefore the data may have some limitations for its use. Methods and protocols for forest soil field description and sampling techniques varied and may not be comparable or compatible.

In terms of site information, location accuracy is highlighted as a key limitation to the use of the data for applications, such as digital soil mapping (DSM), which require precision. Particularly for older studies, there is uncertainty around location information. Some data sets have inaccurate, general, or missing plot location coordinates. Even with more recent studies, the GPS points may record the plot or site location, but not the soil sampling location (e.g., Growth and Yield).

In terms of the soil sampling approach, there were different methods for sampling (by horizon or depth), and sometimes single samples were taken; other times multiple samples were collected and either analyzed individually or bulked together. There were some instances in which the unit of measurement was not recorded. Archived soil samples have been noted for nine of the studies, thus there is an opportunity for additional analyses on these dried samples or comparison with remeasured soils to be done.

In terms of soil physical characteristics of the 22 studies, 21 had soil depth profile details, 18 studies had texture (16 had lab estimates of % sand, silt, clay), 15 studies had field-assessed moisture regime, 14 had coarse fragment content. In terms of lab-assessed soil chemical properties, 19 studies had both organic C and total N, 18 had exchangeable cations and phosphorus, and only 11 had bulk density. Having horizon and depth information allows for greater flexibility in the use of data for other applications. However, the lack of bulk density and coarse fragment information provides challenges for converting chemical concentrations to nutrient pools.

RECOMMENDATIONS

This collection of forest soil datasets is a valuable asset to those requiring information on soils for research, operations, planning and policy development. Using and combining datasets will require careful consideration of the limitations of each dataset and the purpose for which the data will be used. Work on data quality assurance and clarification continues, including contacting project researchers where possible. Many efforts are being made to create centralized databases to house both legacy and ongoing soil research data at the provincial and national levels. This Ontario forest soil dataset collection will be a valuable contribution to these efforts.

New avenues of research are helping to expand the usefulness of these soil datasets. For example, effective texture and moisture regimes are being derived using the horizon information in the Growth and Yield data. Other approaches, such as the creation of functions that use more commonly measured soil properties to predict less commonly measured soil properties (e.g., soil chemistry), will extend the applications of these datasets. Furthermore, new technologies, such as spectroscopic characteristics are emerging in soil science and can take advantage of the archived soil samples and associated data.

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