ISO 19131 Biomass Inventory Mapping and Analysis Tool Business Data – Data Product Specification

Revision: A

Data Product Specification: *Biomass Inventory Mapping and Analysis Tool Business Data*

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1 Overview

1.1. Informal description

The “Biomass Inventory Mapping and Analysis Tool Business Data” series is a collection of datasets that are related to the supply and location of biomass in Canada. It includes data about leftover material from agricultural and forestry industries (residues), agricultural crops, and municipal solid waste that can be used as feedstock for bioindustries.

The data is used by a web-based application, the Biomass Inventory Mapping and Analysis Tool or BIMAT, to allow users to view and analyze detailed information about biomass availability using digital maps and database searches. Users can search by type of biomass, by required quantity and by location. Users also have the option to include in their reports estimates of harvest and transportation costs and information about 1-in-10 year low and 1-in-20 year low biomass production.

1.2. Data product specification metadata

This section provides metadata about the creation of this data product specification.

Data product specification – title:	BIMAT – Business Data
Data product specification – reference date:	2019-10-04
Data product specification – responsible party:	Agri-Geomatics
Data product specification – language:	English, French
Data product specification – topic category:	Farming, Economy, Transportation

1.3. Terms and definitions

- **Biomass**

  Living and recently living biological material that can be used for industrial production.

- **Crop residue**

  The non-grain above-ground portion of a crop plant is left behind after harvest. It is composed of three parts:

- **Chaff**

  Seed coverings and other debris separated from the seed by threshing at time of harvest.

- **Straw**

  The dry coarse stems of crop plants separated from the grain, chaff and stubble during harvest.

- **Stubble**

  The short standing base of stems remaining on a field after harvest.

- **Crop yield and production**

  Yield is the amount of grain or residue produced per unit of land area (e.g.. hectare, acre) while production is the amount produced in a geographic area (e.g. field, BIMAT grid cell, Statistics Canada reporting area). The production is yield multiplied by the land area.

- **Conventional tillage**

  A tillage system that uses cultivation (inverting the soil) as a means to prepare the soil for seeding and control weeds.

- **Feedstock**

  Raw material used in the manufacture of a product or an industrial process. When discussing biomass, feedstock is the biological raw material for end products such as biodiesel, ethanol, or fibre board.

- **Zero Till**

  A method of planting crops with minimal disturbance of the soil surface. This is sometimes referred to as no-till farming or direct seeding.

1.4. Abbreviations

BIMAT - Biomass Inventory Mapping and Analysis Tool

IBSAL - Integrated Biomass Supply Analysis and Logistics

NDVI - Normalized Difference Vegetation Index

NRN - National Road Network

2. SPECIFICATION SCOPE

This data specification has only one scope, the general scope.

NOTE: The term ‘specification scope’ originates from the International Standard ISO19131.

‘Specification scope’ does not express the purpose for the creation of a data specification or the potential use of data, but identifies partitions of the data specification where specific requirements apply.

3. DATA PRODUCT IDENTIFICATION

3.1. Data series identification

3.1.1. BIMAT – Business Data

Title	BIMAT – Business Data
Alternate Title	none
Abstract	"Biomass Inventory Mapping and Analysis Tool – Business Data" provides a number of datasets related to the yield and production of residues from the agricultural and forestry industry, agricultural crops, and Municipal Solid Waste across Canada. The datasets contain agricultural residue production information (for example, straw or stover) for barley, wheat, flax, oats and corn, and crop production information for barley, wheat, flax, oats, corn, canola and soybean. They also include information about amounts of straw required for cattle bedding and feeding, the type of tillage used in an area, and the amount of residue needed for soil conservation purposes. Datasets in the series provide the yield, production and other information for the median year and 1-in-10 year and 1-in-20 year lows. The forestry inventory dataset provides information about the location and quantity of residues from the forestry industry, as well as urban wood waste and modeled productivity of hybrid poplar and willow plantations. Forestry residues include material left at the roadside after harvesting as well as excess and waste materials from mills. The municipal solid waste inventory dataset provides information about the approximate location and quantity of different types of municipal solid wastes, such as organics (including food and yard), paper and total. The forest sustainability indicators dataset provides information on risk indices related to forest sustainability; this includes slope, pH, soil texture and peatland information, as well as a combined forest sustainability indicator.
Purpose	The datasets in the series are used in the Biomass Inventory Mapping and Analysis Tool to create digital maps that show the location, yield, and production amounts of different types of biomass in Canada. The tool also allows users to create customized queries of the information that generate reports on the availability of biomass based on a specific location or required amount of biomass.
Topic Category	Economy, Farming, Transportation
Spatial Reference Type	Vector, textTable
Spatial Resolution	The data is fit to a grid of 10 km by 10 km.
Geographic Description	This specification is applicable within the extent of Canada.
Supplemental Information	
Constraints	Data are subject to the Government of Canada Open Data Licence Agreement available at http://open.canada.ca.
Keywords	Thesaurus: Government of Canada Core Subject Thesaurus (http://www.thesaurus.gc.ca/recherche-search/thes-eng.html) Date: February 1, 2000 Keywords: biomass, bioenergy, forestry, agriculture, environment, transport, harvest, municipal solid waste
Scope identification	Series

3.2. Data product identification

3.2.1. Biomass Report Framework

Title	Biomass Report Framework (BIOMASS_REPORT_FRMWRK)
Alternate Title	None
Abstract	The “Biomass Report Framework” dataset is a fishnet polygon fabric used as a common spatial reporting framework for BIMAT that covers the extent of Canada.
Purpose	The dataset was created to provide a national spatial reporting framework for the Biomass Inventory Mapping and Analysis Tool (BIMAT) application. The dataset allows forestry, municipal solid waste, and agricultural data to be mapped using a common spatial framework.
Topic Category	Economy
Spatial Reference Type	Vector
Spatial Resolution	The data is fit to a grid of 10 km by 10 km.
Geographic Description	This specification is applicable within the extent of Canada.
Supplemental Information	None
Constraints	Data are subject to the Government of Canada Open Data Licence Agreement available at http://open.canada.ca.
Keywords	Thesaurus: Government of Canada Core Subject Thesaurus (http://www.thesaurus.gc.ca/recherche-search/thes-eng.html) Date: February 1, 2000 Keywords: biomass, bioenergy, forestry, agriculture, environment
Scope Identification	Dataset
Aliases	
Feature Attribute Names	Biomass Grid ID X Lambert Coordinate Y Lambert Coordinate

3.2.2. Biomass Agriculture Inventory Median Values

Title	Biomass Agriculture Inventory Median Values (BIOMASS_AG_INV)
Alternate Title	None
Abstract	The “Biomass Agriculture Inventory Median Values” dataset is a table that contains the median agricultural residue yield and crop production for each Biomass Report Framework cell. It provides the median annual value for the years 1985-2016. The table includes straw or stover information for barley, wheat, flax, oats and corn, and crop information for barley, wheat, flax, oats, corn, canola and soybean. This dataset also includes information about the type of tillage used in the area and demand for straw used for cattle bedding and feed. These values are derived from Statistics Canada data. Additionally, the dataset includes the amount of agricultural residue calculated as necessary to remain on the field to prevent soil degradation. The risk of soil degradation is directly related to the type of tillage in use as well as the landscape attributes of the area.
Purpose	When linked to the Biomass Report Framework, the dataset provides crop and residue information for each cell. BIMAT uses the information to generate biomass inventory maps and reports that are based on queries created by users.
Topic Category	Farming
Spatial Reference Type	textTable
Spatial Resolution	The data is fit to a grid of 10 km by 10 km.
Geographic Description	This specification is applicable within the extent of Canada.
Supplemental Information	
Constraints	Data are subject to the Government of Canada Open Data Licence Agreement available at http://open.canada.ca.
Keywords	Thesaurus: Government of Canada Core Subject Thesaurus (http://www.thesaurus.gc.ca/recherche-search/thes-eng.html) Date: February 1, 2000 Keywords: biomass, bioenergy, agriculture, environment
Scope Identification	Dataset
Aliases	
Feature Attribute Names	Biomass Grid ID, Barley Crop Area, Corn Crop Area, Flax Crop Area, Oats Crop Area, Wheat Crop Area, Barley Crop Quantity, Oats Crop Quantity, Wheat Crop Quantity, Flax Crop Quantity, Corn Crop Quantity, Canola Crop Quantity, Soybean Crop Quantity, Barley Chaff Yield, Oats Chaff Yield, Wheat Chaff Yield, Barley Stubble Yield, Corn Stubble Yield, Oats Stubble Yield, Wheat Stubble Yield, Barley Straw Yield, Corn Stover Yield, Flax Straw Yield, Oats Straw Yield, Wheat Straw Yield, Zero Till Residue Yield, Conventional Tillage Residue Yield, Land Under Zero Tillage, Straw Required For Cattle

3.2.3. Biomass Agriculture Inventory 1-in-10 Probability

Title	Biomass Agriculture Inventory 1-in-10 Probability (BIOMASS_AG_INV_10)
Alternate Title	
Abstract	The “Biomass Agriculture Inventory 1-in-10 Probability” dataset is a table that contains the estimated 1-in-10 year low for agricultural residue yield and crop production for each Biomass Report Framework. It provides the tenth percentile values for the years 1985-2016. The table includes straw or stover information for barley, wheat, flax, oats and corn, and crop information for barley, wheat, flax, oats, corn, canola and soybean. This dataset also includes information about the type of tillage used in the area and demand for straw for cattle bedding and feed. These values are derived from Statistics Canada data. Additionally, the dataset includes the amount of agricultural residue calculated as necessary to remain on the field to prevent soil degradation. Soil degradation is determined by the type of tillage in use as well as the landscape of the area.
Purpose	When linked to the Biomass Report Framework, the dataset provides estimated 1-in-10 year low crop and residue information for each cell. It provides the tenth percentile values for the years 1985-2016 crop production for each Biomass Report Framework cell. BIMAT uses the information to generate biomass inventory reports for 1-in-10 year low for agricultural residue yield and crop production that are based on queries created by users.
Topic Category	Farming
Spatial Reference Type	textTable
Spatial Resolution	The data is fit to a grid of 10 km by 10 km.
Geographic Description	This specification is applicable within the extent of Canada.
Supplemental Information	None
Constraints	Data are subject to the Government of Canada Open Data Licence Agreement available at http://open.canada.ca.
Keywords	Thesaurus: Government of Canada Core Subject Thesaurus (http://www.thesaurus.gc.ca/recherche-search/thes-eng.html) Date: February 1, 2000 Keywords: biomass, bioenergy, agriculture, environment
Scope Identification	Dataset
Aliases	
Feature Attribute Names	Biomass Grid ID, Barley Crop Area, Corn Crop Area, Flax Crop Area, Oats Crop Area, Wheat Crop Area, Barley Crop Quantity, Oats Crop Quantity, Wheat Crop Quantity, Flax Crop Quantity, Corn Crop Quantity, Canola Crop Quantity, Soybean Crop Quantity, Barley Chaff Yield, Oats Chaff Yield, Wheat Chaff Yield, Barley Stubble Yield, Corn Stubble Yield, Oats Stubble Yield, Wheat Stubble Yield, Barley Straw Yield, Corn Stover Yield, Flax Straw Yield, Oats Straw Yield, Wheat Straw Yield, Zero Till Residue Yield, Conventional Tillage Residue Yield, Land Under Zero Tillage, Straw Required For Cattle

3.2.4. Biomass Agriculture Inventory 1-in-20 Probability

Title	Biomass Agriculture Inventory 1-in-20 Probability (BIOMASS_AG_INV_20)
Alternate Title	
Abstract	The “Biomass Agriculture Inventory 1-in-20 Probability” dataset is a table that contains the estimated 1-in-20 year low for agricultural residue yield and crop production for each Biomass Report Framework. It provides the fifth percentile values for the years 1985-2016. The table includes straw or stover information for barley, wheat, flax, oats and corn, and crop information for barley, wheat, flax, oats, corn, canola and soybean. This dataset also includes information about the type of tillage used in the area and demand for straw used for cattle bedding and feed. These values are derived from Statistics Canada data. Additionally, the dataset includes the amount of agricultural residue calculated as necessary to remain on the field to prevent soil degradation. Soil degradation is determined by the type of tillage in use as well as the landscape type of the area.
Purpose	When linked to the Biomass Report Framework, the dataset provides estimated 1-in-20 year low crop and residue information for each cell. It provides the fifth percentile values for the years 1985-2016 crop production for each Biomass Report Framework cell. BIMAT uses the information to generate biomass inventory reports for 1-in-20 year low for agricultural residue yield and crop production that are based on queries created by users.
Topic Category	Farming
Spatial Reference Type	textTable
Spatial Resolution	The data is fit to a grid of 10 km by 10 km.
Geographic Description	This specification is applicable within the extent of Canada.
Supplemental Information	
Constraints	Data are subject to the Government of Canada Open Data Licence Agreement available at http://open.canada.ca.
Keywords	Thesaurus: Government of Canada Core Subject Thesaurus (http://www.thesaurus.gc.ca/recherche-search/thes-eng.html) Date: February 1, 2000 Keywords: biomass, bioenergy, agriculture, environment
Scope Identification	Dataset
Aliases	
Feature Attribute Names	Biomass Grid ID, Barley Crop Area, Corn Crop Area, Flax Crop Area, Oats Crop Area, Wheat Crop Area, Barley Crop Quantity, Oats Crop Quantity, Wheat Crop Quantity, Flax Crop Quantity, Corn Crop Quantity, Canola Crop Quantity, Soybean Crop Quantity, Barley Chaff Yield, Oats Chaff Yield, Wheat Chaff Yield, Barley Stubble Yield, Corn Stubble Yield, Oats Stubble Yield, Wheat Stubble Yield, Barley Straw Yield, Corn Stover Yield, Flax Straw Yield, Oats Straw Yield, Wheat Straw Yield, Zero Till Residue Yield, Conventional Tillage Residue Yield, Land Under Zero Tillage, Straw Required For Cattle

3.2.5. Biomass Inventory Cartographic Layer

Title	Biomass Inventory Cartographic Layer (BIOMASS_INV_CT)
Alternate Title	None
Abstract	The “Biomass Inventory Cartographic Layer” dataset provides the information that is used with the Biomass Report Framework to generate a visual representation of the availability of agricultural and forestry biomass and municipal solid waste in Canada. In addition to yield and production information for biomass produced by the agricultural and forestry industries, this dataset also provides information about the demand for agricultural residues for cattle feed and bedding, tillage systems currently in use on agricultural lands, and land suitability for hybrid poplar and willow plantations that are grown specifically to produce biomass. Agricultural information includes the median annual residue yield and available residue amounts. Residue yields were calculated using crop-to-residue ratios. The available residue information includes the amount that is available after adjusting for the estimated demand of straw used for cattle feed and bedding. Forestry estimates include average residue production, based on forestry activities including permitted amounts of harvesting, mills in operation and mill production. Municipal Solid Waste information includes organic waste (food and yard), paper waste and total residential municipal solid waste (which includes organic and paper waste, among others).
Purpose	BIMAT uses this dataset to generate electronic maps that show biomass availability by both location and amount. Users select an item from BIMAT’s list of maps to display yield, production or other information for a specific type of biomass. These availability maps help BIMAT visualize Canada’s agricultural and forestry biomass and Municipal Solid Waste resources.
Topic Category	Economy
Spatial Reference Type	Vector
Spatial Resolution	The data is fit to a grid of 10 km by 10 km.
Geographic Description	This specification is applicable within the extent of Canada.
Supplemental Information	
Constraints	NRCan grants AAFC permission to allow AAFC users permission to view, query and analyze the products set out above, using the GIS decision support tools, as well as to make hard copy prints of maps, graphs and tables from the Internet Website. AAFC will take the necessary technical measures to ensure that no portion of the data can be downloaded by anyone from the Internet Web site.
Keywords	Thesaurus: Government of Canada Core Subject Thesaurus (http://www.thesaurus.gc.ca/recherche-search/thes-eng.html) Date: February 1, 2000 Keywords: biomass, bioenergy, forestry, agriculture, environment
Scope Identification	Dataset
Aliases	
Feature Attribute Names	Biomass Grid ID, Wheat Straw Yield, Wheat Straw Residual Available Quantity, Wheat Straw Livestock Available Quantity, Wheat Crop Yield, Wheat Crop Quantity, Barley Straw Yield, Barley Straw Residual Available Quantity, Barley Straw Livestock Available Quantity, Barley Crop Yield, Barley Crop Quantity, Oats Straw Yield, Oats Straw Residual Available Quantity, Oats Straw Livestock Available Quantity, Oats Crop Yield, Oats Crop Quantity, Flax Straw Yield, Flax Straw

	Residual Available Quantity, Flax Crop Yield, Flax Crop Quantity, Corn Stover Yield, Corn Stover Residual Available Quantity, Corn Crop Yield, Corn Crop Quantity, Canola Crop Yield, Canola Crop Quantity, Soybean Crop Yield, Soybean Crop Quantity, Land Under Zero Tillage, Straw Required For Cattle, Gross Hardwood Roadside Harvest Residue Volume , Gross Softwood Roadside Harvest Residue Volume, Full Tree Hardwood Roadside Harvest Residue Volume Full Tree Softwood Roadside Harvest Residue Volume, Cut-To-Length Hardwood Roadside Harvest Residue Volume, Cut-To-Length Softwood Roadside Harvest Residue Volume, Hardwood Wood Mill Residue Volume, Hardwood Bark Mill Residue Volume, Softwood Wood Mill Residue Volume, Softwood Bark Mill Residue Volume, Residential Urban Wood Waste Volume, Non-Residential Urban Wood Waste Volume, Total Urban Wood Waste Volume, Forest Area Hectares, Projected Poplar Annual Growth Volume, Projected Willow Annual Growth Volume, Average Poplar Annual Growth Yield, Average Willow Annual Growth Yield, Total Residential Municipal Solid Waste, Total Organic Waste, Total Paper Waste

3.2.6. Biomass Forestry Inventory

Title	Biomass Forestry Inventory (BIOMASS_FOREST_INV)
Alternate Title	None
Abstract	"The Biomass Forestry Inventory" dataset is a stand-alone summary table that contains estimates of average annual availability of forestry residue and other sources of biomass related to forestry. The information was supplied by the Canadian Forestry Service of Natural Resources Canada and is based on data for forestry activities for the years 2013-2014. The dataset information was summarized from source datasets to the Biomass Report Framework and includes: residues generated by mills, residue left at the roadside after harvest and urban wood waste. It also includes information on the proportion of each area that is forested and both the suitability and potential output of locations for tree plantations that are grown specifically to produce biomass feedstocks.
Purpose	The dataset provides information about sources of biomass related to forestry for each Biomass Report Framework cell. BIMAT uses the information to generate biomass inventory reports that are based on queries created by users.
Topic Category	Economy
Spatial Reference Type	textTable
Spatial Resolution	The data is fit to a grid of 10 km by 10 km.
Geographic Description	This specification is applicable within the extent of Canada.
Supplemental Information	Commercial forestry production and harvesting has traditionally focused on the management of natural stands for structural materials and woody fibre. As woody biomass for energy and bioproducts opportunities emerge, adaptations in present economic and environmentally sustainable harvesting practices will evolve. These practices will effectively recover woody biomass from previously considered non-commercial sources, and from sources that were once considered waste. Opportunities to access woody biomass exist with the recovery of roadside harvest residues, the harvest of fire, pest, and diseased damaged/wind-thrown trees or stands, historic mill residue piles and urban wood waste. Purpose grown stands of fast growing tree species such as hybrid poplar and willow may also have the potential to increase the supply of woody biomass available for energy or bioproduct conversion. Knowledge of natural, purpose grown and salvageable woody biomass availability is necessary for the establishment of a sustainable national bioenergy industry. This inventory information is essential for ecological/industrial/economic decision making, management planning and greenhouse gas accounting. Woody biomass resources are not uniformly distributed across Canada. Therefore, it is essential that an inventory of woody biomass availability not only identify the type and amount of woody biomass that exists, but also where it is located. This data product represents a spatially-explicit inventory of potential woody biomass resources across Canada. The purpose of producing the Forestry Biomass Inventory is to provide users the ability to make well informed decisions based on information that presents a nationally comprehensive and consistent picture of biomass quantity, quality, cost and distribution/opportunity across Canada.

	A brief overview of the individual data products included in the inventory is provided below, as well as the purpose for creating each of the datasets within the inventory: 1. Land Cover MODIS (Moderate Resolution Imaging Spectroradiometer): Land cover data from the central part of the 2011 growing season was used to generate a land cover product for Canada. The land cover product was used to delineate the hardwood/deciduous, softwood/coniferous, mixed wood and total commercial forested land bases available and aid in the estimation and delineation of sustainable harvest areas and roadside residues associated with major mills across Canada. The original purpose of producing this land cover map was to generate a product that characterizes land cover distribution for the landmass of Canada, in as consistent manner as possible, and representing one point in time. The classification scheme was selected to be compatible with satellite data, to retain the integrity of the information available in these data, and to permit comparing this land cover product with others derived at continental or global scales. 2. Roadside Residues: Current forestry practices in Canada result in non-utilized forest harvest biomass residues. These forest residues, commonly concentrated at roadside access landings, are either burned or physically distributed back onto the forest floor at a significant cost (economic and environmental). These residues, which primarily consist of non-merchantable tree branches and tops, and the under-sized trees/species felled that are separated from the desired merchantable wood during harvesting, represent a major source of woody biomass available for bioenergy conversion. In general, the desired forest product (pulp, paper, lumber, OSB, plywood) and the forest stand characteristics (size, species, mixture) dictate the type of harvesting method (cut-to-length, tree-length, full tree, whole tree) employed on the landscape. The type of harvesting method, in turn, influences the volume of forest residues produced and left at roadside landings. Information pertaining to mill consumption volume, mill feedstock, product type (pulp, paper, lumber, etc.), harvesting method(s) and geographic locations were compiled for all mills in Canada that consume in excess of 100,000 cubic metres of wood fibre annually. This information was combined with regional rotation length and yield estimates to spatially delineate the harvest area required to sustainably support each mill at its current level of consumption, and estimate the volume of residues that would be available within each mill's harvest area on an annual basis. Accordingly, this data product represents an estimate of the spatial distribution and volume of roadside residues that are available annually for recovery across Canada. The purpose of developing this data product is to provide a spatially explicit estimate of the location and volume of forest harvest residues at roadside landings within the commercial forest land base in Canada that may be available, recovered and used annually for development of new bioproducts and/or the generation of bioenergy. 3. Full Tree Harvesting: Trees are felled and transported to roadside with branches and top intact. Transport to roadside is mainly by cable or grapple skidders. The full trees are processed at roadside or hauled as full trees to central processing yards or the mill. With the full tree method the limbs, tops and wood residue, and in the case of the chain flail-delimber-debarker-chippers also the bark, are left in piles at roadside. The full tree method is most applicable to clear felling operations, and in some cases for commercial thinning where the material is transported to roadside by a forwarder. The landing requirement is the highest with this method.

	4. Cut-To-Length Harvesting (Enhanced/Modified): With traditional Cut-To-Length (CTL) harvesting, trees are felled (cut-off above the stump with stump height less than one-half butt diameter), delimbed and bucked to various assortments (pulpwood, sawlog, veneer bolt, etc.) directly in the stump area. In softwoods, trees can be topped down to a 5 cm top diameter and limbs and tops can be left in windrows or spread over the cut-over. Roadside landings are minimal since all processing is done in the cut-over. In this hypothetical "enhanced", “modified” variation of CTL harvesting, trees would be delimbed at the stump and then topped at a roadside landing, and be characterized by a moderate landing requirement. 5. Mill Residues: The forest products industry has long been using mill residues, or the non-merchantable sawdust, wood chips, wood chunks and bark components produced at the mill site during processing of logs into conventional forest products, as a source of energy. With the development of new wood products, and increasing energy prices, the demand for mill residues is growing. In order to understand the potential of forest biomass in the manufacturing of wood products and the production of bioenergy, an accurate spatially explicit estimation of residue availability across Canada is required. While data is available to determine the volume of biomass used for energy generation in the wood products and pulp and paper sectors, up-to-date information on quantities of biomass residue produced and disposed of at wood products manufacturing sites is lacking. This data product is a spatially-explicit estimation of the amount of wood waste residues (sawdust, wood chunks, wood chips, shavings, and bark) that are produced at Canadian mills that consume greater than 100,000 cubic metres of wood fibre annually. These estimates can then be used in the development of new bioproducts and/or the generation of bioenergy. 6. Residential Wood Residues: Originates from households as a function of the “living” activities in those households. In the strict definition, it does not include waste generated by business activity conducted at households, although for practical purposes it can be difficult to distinguish home business waste from consumer waste in a characterization study. Consumer waste also does not include waste generated by construction, remodeling, or landscaping activities that are conducted by hired companies at a residential location. The purpose of developing this data product as well as Non-Residential Wood Residues was to provide an estimate of the wood waste produced annually in urban centres with populations greater than 1,000 persons that may be available for the development of new bioproducts and/or generation of bioenergy. 7. Non-Residential Wood Residues: Originates from businesses, government agencies, and institutions engaged in activities that typically occur in an urban setting (i.e. it does not include agriculture, resource extraction, or manufacturing waste). Examples include, waste originating from retail and wholesale businesses, medical facilities, schools, government agencies, and park and street maintenance. 8. Hybrid Poplar/Willow Site Suitability and Purpose Grown Woody Biomass: Determining the feasibility of a large-scale afforestation program is one approach being investigated by the Government of Canada to increase Canada's potential to sequester carbon from the atmosphere and/or to provide the feedstock necessary to support a national bioenergy industry. Large-scale afforestation, however, requires knowledge of where it is suitable to establish and grow trees.

	Spatial models based on Boolean logic and/or statistical models within a geographic information system may be used for this purpose, but empirical environmental data are often lacking, and the association of these data to site suitability is most often a subjective process. As a solution to this problem, this data represents the product of a fuzzy-logic modeling approach used to assess site suitability for afforestation of hybrid poplar (Populus spp.) and willow (Salix spp.) across Canada. Expert knowledge regarding the selection and magnitudes of environmental variables were integrated into fuzzy rule sets from which estimates of site suitability and yield projections were generated and presented in spatial form. The environmental variables selected to assess site suitability included growing season precipitation, climate moisture index, growing degree days, and Canada Land Inventory capability for agriculture, soil drainage and elevation. Yield projections at established hybrid poplar and willow sites were used to estimate the amount of purpose grown woody biomass available on an annual basis. The planting of hybrid poplar, controlled crosses of native and non-native poplar species, and willow has been of interest in several regions across Canada. Much of the current knowledge about area-based, fast-growing high-yield hybrid poplar/willow plantations and the environmental conditions required for this species is qualitative and based on expert knowledge. To build from this knowledge base, the purpose of creating this spatial data product was to integrate expert knowledge of hybrid poplar and willow suitability into a fuzzy logic modeling framework from which to evaluate site suitability and project annual yield potentials for each of the species.
Constraints	NRCan grants AAFC permission to allow AAFC users permission to view, query and analyze the Products set out above, using the GIS decision support tools, as well as to make hard copy prints of maps, graphs and tables from the Internet Website. AAFC will take the necessary technical measures to ensure that no portion of the data can be downloaded by anyone from the Internet Web site.
Keywords	Thesaurus: Government of Canada Core Subject Thesaurus (http://www.thesaurus.gc.ca/recherche-search/thes-eng.html) Date: February 1, 2000 Keywords: biomass, bioenergy, forestry, environment
Scope Identification	Dataset
Aliases	
Feature Attribute Names	Biomass Grid ID, Gross Hardwood Roadside Harvest Residue Volume, Gross Softwood Roadside Harvest Residue Volume, Full Tree Hardwood Roadside Harvest Residue Volume, Full Tree Softwood Roadside Harvest Residue Volume, Cut-To-Length Hardwood Roadside Harvest Residue, Volume, Cut-To-Length Softwood Roadside Harvest Residue Volume, Hardwood Wood Mill Residue Volume, Hardwood Bark Mill Residue Volume, Softwood Wood Mill Residue Volume, Softwood Bark Mill Residue Volume, Residential Urban Wood Waste Volume, Non-Residential Urban Wood Waste Volume, Total Urban Wood Waste Volume, Forest Area Hectares, Maximum Poplar Annual Growth Yield, Average Poplar Annual Growth Yield, Minimum Poplar Annual Growth Yield, Projected Poplar Annual Growth Volume, Maximum Willow Annual Growth Yield, Average Willow Annual Growth Yield, Minimum Willow Annual Growth Yield, Projected Willow Annual Growth Volume

3.2.7. Biomass Municipal Solid Waste Inventory

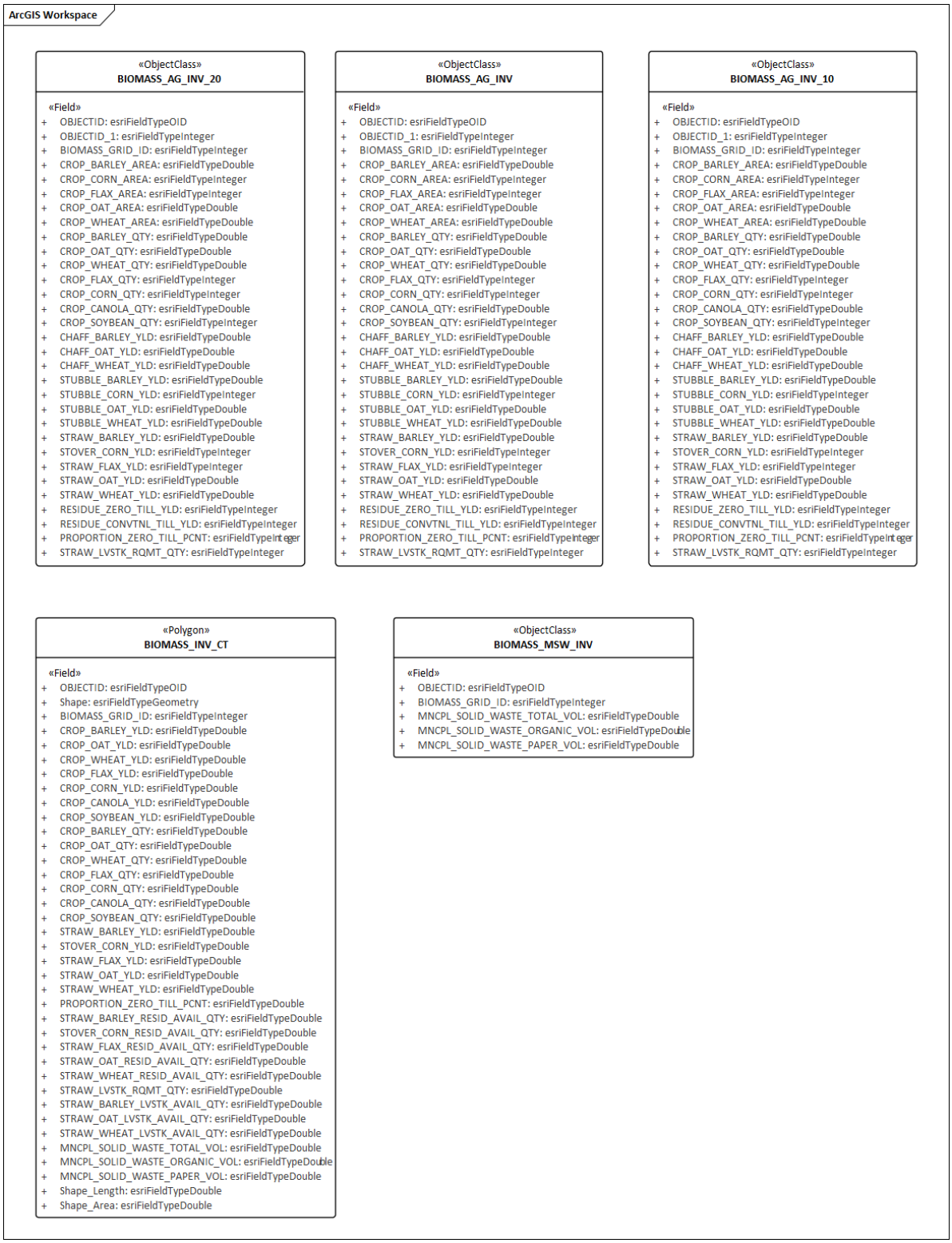
Title	Biomass Municipal Solid Waste Inventory (BIOMASS_MSW_INV)
Alternate Title	None
Abstract	The “Municipal Solid Waste Biomass Inventory” dataset is a stand-alone product that provides information on the calculated amount of Municipal Solid Waste within each BIMAT grid cell that includes a population centre. Data was provided by National Research Council Canada, with estimates based on census data collected in 2016. This dataset was calculated using an area-weighted analysis between population centres across Canada, Municipal Solid Waste data and the Biomass Report Framework fishnet. It includes information for total residential municipal solid waste, total organic waste (food and yard) and total paper waste.
Purpose	The dataset provides calculated municipal solid waste information for each biomass grid cell containing a population centre. This can be used to indicate the amount of solid waste in tonnes that a population produces. Users can choose between total residential municipal solid waste, total organic waste (including food and yard) and total paper waste. BIMAT uses the information to generate biomass inventory reports that are based on queries created by users.
Topic Category	Economy
Spatial Reference Type	textTable
Spatial Resolution	The data is fit to a grid of 10 km by 10 km.
Geographic Description	This specification is applicable within the extent of Canada.
Supplemental Information	Methodology used to estimate MSW quantities is described in following publication: Kannangara, M., Dua, R., Ahmadi, L., Bensebaa, F., 2018. Modeling and prediction of regional municipal solid waste generation and diversion in Canada using machine learning approaches. Waste Manag. 74, 3–15. doi:https://doi.org/10.1016/j.wasman.2017.11.057
Constraints	Data are subject to the Government of Canada Open Data Licence Agreement available at http://open.canada.ca.
Keywords	Thesaurus: Government of Canada Core Subject Thesaurus (http://www.thesaurus.gc.ca/recherche-search/thes-eng.html) Date: February 1, 2000 Keywords: biomass, bioenergy, agriculture, environment
Scope Identification	Dataset
Aliases	
Feature Attribute Names	Biomass Grid ID, Total Residential Municipal Solid Waste, Total Organic Waste, Total Paper Waste

3.2.8. Forest Sustainability Indicators - Risk

Title	Forest Sustainability Indicators - Risk
Alternate Title	None
Abstract	The “Forest Sustainability Indicators – Risk” dataset is a raster dataset that contains information on overall risk to forest sustainability and sensitivity based on various factors including slope, pH, soil texture, peatland, as well as a combined indicator. This information was provided by Natural Resources Canada and is available to view within the BIMAT application.
Purpose	Each forest sustainability indicator is available to view as a separate map within the BIMAT application. Users can view and compare various indices to each other to determine potential risk to forest sustainability and sensitivity in an area. This data is for visualization purposes only and is not used within the current BIMAT query.
Topic Category	Economy, Forestry
Spatial Reference Type	Raster
Spatial Resolution	250m
Geographic Description	This specification is applicable within the extent of Canada.
Supplemental Information	Several site properties can be used to identify sites that would be potentially sensitive to the extraction of forest harvest residues, based on thresholds and definitions in biomass removal guidelines from different jurisdictions, and which reflect regional conditions and knowledge gained from both operational practices and scientific studies (Roach & Berch, “A compilation of forest biomass harvesting and related policy in Canada”, 2014). Experimental trials across Canada and the US established in the Long-Term Site Productivity (LTSP) network have not yet show detrimental impacts from removal of all harvest residues, and there are few consistent effects. However, site productivity is known to be sensitive to intensity of biomass removal, and some site properties can be affected; this suggests that caution should be used on sites that are rated as “sensitive”. Application of the precautionary principle by using indicators to rate a site as “sensitive” does not mean that full-tree harvesting is inappropriate or that harvest residue should not be removed. Rather, it means that more attention should be given to monitoring the impact of extracting logging residues from these sites and, through adaptive management approaches, harvest techniques and forest management practices should be modified if there are concerns. The issues are different for each indicator, and so are the mitigation measures. For example, the main concern on steep slopes is increased erosion, but there is no single preventative solution: options (singly or in combination) include avoiding full-tree logging to leave a slash mat for equipment, or using cable logging, or only harvesting when the ground is frozen. On soil with low nutrient reserves, which are generally characterized by an acidic and sandy substrate (Fleming et al., “Effects of biomass harvest intensity and soil disturbance on jack pine stand productivity 15 year results”, 2014), avoiding displacement of the organic layer, and monitoring sites with a view to fertilizing to mitigate reductions in soil fertility and tree growth if they arise may be practical options.
Constraints	Data are subject to the Government of Canada Open Data Licence Agreement available at http://open.canada.ca.
Keywords	Thesaurus: Government of Canada Core Subject Thesaurus (http://www.thesaurus.gc.ca/recherche-search/thes-eng.html) Date: February 1, 2000 Keywords: biomass, bioenergy, agriculture, environment
Scope Identification	Dataset
Aliases	
Feature Attribute Names	Combined Indicator, Sand, pH, Slope, Peatland

4. DATA CONTENT AND STRUCTURE

4.1. Feature-based application schema



4.2. Feature catalog

Title	Biomass Inventory Analysis and Mapping – Business Data
Scope	Applies to “Biomass Inventory Mapping and Analysis Tool – Business Data” series data
Version Number	3.0
Version Date	2019-10-04
Producer	Agriculture and Agri-food Canada, Canadian Forestry Service of Natural Resources Canada, National Research Council Canada

4.2.1. Feature attributes

System-generated attributes (for example, OBJECTID, Shape, Shape Length and Area) are not defined in the feature catalog.

4.2.1.1. Biomass Grid ID

Name	BIOMASS_GRID_ID (Biomass Grid ID)		
Definition	Unique identifier for each of the fishnet grid reporting framework cells. The values in this field are based on the unique identifier values in the 'NID' field in the Daily 10 km Gridded Climate Dataset for Canada south of 60° North, 1950-2010 from Natural Resources Canada.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.2. X Lambert Coordinate

Name	X_LAMBERT_COORD (X Lambert Coordinate)		
Definition	Spatial representation of the feature type.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.3. Y Lambert Coordinate

Name	Y_LAMBERT_COORD (Y Lambert Coordinate)		
Definition	Spatial representation of the feature type.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.4. Barley Crop Area

Name	CROP_BARLEY_AREA (Barley Crop Area)		
Definition	Total area where barley is grown in hectares.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.5. Corn Crop Area

Name	CROP_CORN_AREA (Corn Crop Area)		
Definition	Total area where corn is grown in hectares.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.6. Flax Crop Area

Name	CROP_FLAX_AREA (Flax Crop Area)		
Definition	Total area where flax is grown in hectares.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.7. Oats Crop Area

Name	CROP_OAT_AREA (Oats Crop Area)		
Definition	Total area where oats are grown in hectares.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.8. Wheat Crop Area

Name	CROP_WHEAT_AREA (Wheat Crop Area)		
Definition	Total area where wheat is grown in hectares.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.9. Barley Crop Quantity

Name	CROP_BARLEY_QTY (Barley Crop Quantity)		
Definition	The estimated amount of grain produced in an area each year, in tonnes. In the “Biomass Agriculture Inventory Median Values” dataset, this is the median annual value for the years 1985-2016. In the “Biomass Agriculture Inventory 1-in-10 Probability” dataset, this amount is the estimated ten-year low. In the “Biomass Agriculture Inventory 1-in-20 Probability” dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.10. Oats Crop Quantity

Name	CROP_OAT_QTY (Oats Crop Quantity)		
Definition	The estimated amount of grain produced in an area each year, in tonnes. In the “Biomass Agriculture Inventory Median Values” dataset, this is the median annual value for the years 1985-2016. In the “Biomass Agriculture Inventory 1-in-10 Probability” dataset, this amount is the estimated ten-year low. In the “Biomass Agriculture Inventory 1-in-20 Probability” dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.11. Wheat Crop Quantity

Name	CROP_WHEAT_QTY (Wheat Crop Quantity)		
Definition	The estimated amount of grain produced in an area each year, in tonnes. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.12. Flax Crop Quantity

Name	CROP_FLAX_QTY (Flax Crop Quantity)		
Definition	The estimated amount of seed produced in an area each year, in tonnes. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.13. Corn Crop Quantity

Name	CROP_CORN_QTY (Corn Crop Quantity)		
Definition	The estimated amount of seed produced in an area each year, in tonnes. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.14. Canola Crop Quantity

Name	CROP_CANOLA_QTY (Canola Crop Quantity)		
Definition	The estimated amount of seed produced in an area each year, in tonnes. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.15. Soybean Crop Quantity

Name	CROP_SOYBEAN_QTY (Soybean Crop Quantity)		
Definition	The estimated amount of soybeans produced in an area each year, in tonnes. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.16. Barley Chaff Yield

Name	CHAFF_BARLEY_YLD (Barley Chaff Yield)		
Definition	The estimated amount of barley chaff produced in an area, in oven-dried tonnes per hectare. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.17. Oats Chaff Yield

Name	CHAFF_OAT_YLD (Oats Chaff Yield)		
Definition	The estimated amount of oats chaff produced in an area, in oven-dried tonnes per hectare. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.18. Wheat Chaff Yield

Name	CHAFF_WHEAT_YLD (Wheat Chaff Yield)		
Definition	The estimated amount of wheat chaff produced in an area, in oven-dried tonnes per hectare. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.19. Barley Stubble Yield

Name	STUBBLE_BARLEY_YLD (Barley Stubble Yield)		
Definition	The estimated amount of barley stubble produced in an area, in oven-dried tonnes per hectare. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.20. Corn Stubble Yield

Name	STUBBLE_CORN_YLD (Corn Stubble Yield)		
Definition	The estimated amount of corn stubble produced in an area, in oven-dried tonnes per hectare. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.21. Oats Stubble Yield

Name	STUBBLE_OAT_YLD (Oats Stubble Yield)		
Definition	The estimated amount of oats stubble produced in an area, in oven-dried tonnes per hectare. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.22. Wheat Stubble Yield

Name	STUBBLE_WHEAT_YLD (Wheat Stubble Yield)		
Definition	The estimated amount of wheat stubble produced in an area, in oven-dried tonnes per hectare. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.23. Barley Straw Yield

Name	STRAW_BARLEY_YLD (Barley Straw Yield)		
Definition	The estimated amount of barley straw produced in an area, in oven-dried tonnes per hectare. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.24. Corn Stover Yield

Name	STOVER_CORN_YLD (Corn Stover Yield)		
Definition	The estimated amount of corn stover produced in an area, in oven-dried tonnes per hectare. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.25. Flax Straw Yield

Name	STRAW_FLAX_YLD (Flax Straw Yield)		
Definition	The estimated amount of flax straw produced in an area, in oven-dried tonnes per hectare. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.26. Oats Straw Yield

Name	STRAW_OAT_YLD (Oats Straw Yield)		
Definition	The estimated amount of oats straw produced in an area, in oven-dried tonnes per hectare. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.27. Wheat Straw Yield

Name	STRAW_WHEAT_YLD (Wheat Straw Yield)		
Definition	The estimated amount of wheat straw produced in an area, in oven-dried tonnes per hectare. In the "Biomass Agriculture Inventory Median Values" dataset, this is the median annual value for the years 1985-2016. In the "Biomass Agriculture Inventory 1-in-10 Probability" dataset, this amount is the estimated ten-year low. In the "Biomass Agriculture Inventory 1-in-20 Probability" dataset, this amount is the estimated 20-year low.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.28. Zero Till Residue Yield

Name	RESIDUE_ZERO_TILL_YLD (Zero Till Residue Yield)		
Definition	For areas under zero tillage, the estimated number of tonnes of residue in each hectare that should not be harvested to prevent soil erosion.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.29. Conventional Tillage Residue Yield

Name	RESIDUE_CONVTNL_TILL_YLD (Conventional Tillage Residue Yield)		
Definition	For areas under conventional tillage, the estimated number of tonnes of residue in each hectare that should not be harvested to prevent soil erosion.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.30. Land Under Zero Tillage

Name	PROPORTION_ZERO_TILL_PCNT (Land Under Zero Tillage)		
Definition	The estimated percentage of land in an area under zero tillage, expressed as a decimal.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.31. Straw Required for Cattle

Name	STRAW_LVSTK_RQMT_QTY (Straw Required for Cattle)		
Definition	The estimate of the amount of straw required to meet cattle demand in an area, in oven-dried tonnes.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.32. Available Wheat Straw

Name	STRAW_WHEAT_RESID_AVAIL_QTY (Available Wheat Straw)		
Definition	The median amount of straw produced in an area for the years 1985-2016, in oven-dried tonnes. This amount is adjusted to account for residue that is left behind to help prevent erosion.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.33. Available Wheat Straw Less Cattle Usage

Name	STRAW_WHEAT_LVSTK_AVAIL_QTY (Available Wheat Straw Less Cattle Usage)		
Definition	The median amount of straw produced in an area for the years 1985-2016, in oven-dried tonnes. This amount is adjusted to account for residue that is left behind to help prevent erosion and the demand for straw that is used as cattle feed and bedding.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.34. Wheat Crop Yield

Name	CROP_WHEAT_YLD (Wheat Crop Yield)		
Definition	The median amount of grain produced annually for each hectare in an area for the years 1985-2016, in kilograms per hectare.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.35. Available Barley Straw

Name	STRAW_BARLEY_RESID_AVAIL_QTY (Available Barley Straw)		
Definition	The median amount of straw produced in an area for the years 1985-2016, in oven-dried tonnes. This amount is adjusted to account for residue that is left behind to help prevent erosion.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.36. Available Barley Straw Less Cattle Usage

Name	STRAW_BARLEY_LVSTK_AVAIL_QTY (Available Barley Straw Less Cattle Usage)		
Definition	The median amount of straw produced in an area for the years 1985-2016, in oven-dried tonnes. This amount is adjusted to account for residue that is left behind to help prevent erosion and the demand for straw that is used as cattle feed and bedding.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.37. Barley Crop Yield

Name	CROP_BARLEY_YLD (Barley Crop Yield)		
Definition	The median amount of grain produced annually for each hectare in an area for the years 1985-2016, in kilograms per hectare.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.38. Available Oats Straw

Name	STRAW_OAT_RESID_AVAIL_QTY (Available Oats Straw)		
Definition	The median amount of straw produced in an area for the years 1985-2016, in oven-dried tonnes. This amount is adjusted to account for residue that is left behind to help prevent erosion.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.39. Available Oats Straw Less Cattle Usage

Name	STRAW_OAT_LVSTK_AVAIL_QTY (Available Oats Straw Less Cattle Usage)		
Definition	The median amount of straw produced in an area for the years 1985-2016, in oven-dried tonnes. This amount is adjusted to account for residue that is left behind to help prevent erosion and the demand for straw that is used as cattle feed and bedding.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.40. Oats Crop Yield

Name	CROP_OAT_YLD (Oats Crop Yield)		
Definition	The median amount of grain produced annually for each hectare in an area for the years 1985-2016, in kilograms per hectare.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.41. Available Flax Straw

Name	STRAW_FLAX_RESID_AVAIL_QTY (Available Flax Straw)		
Definition	The median amount of straw produced in an area for the years 1985-2016, in oven-dried tonnes. This amount is adjusted to account for residue that is left behind to help prevent erosion.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.42. Flax Crop Yield

Name	CROP_FLAX_YLD (Flax Crop Yield)		
Definition	The median amount of seed produced annually for each hectare in an area for the years 1985-2016, in kilograms per hectare.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.43. Available Corn Stover

Name	STOVER_CORN_RESID_AVAIL_QTY (Available Corn Stover)		
Definition	The median amount of corn stover produced in an area for the years 1985-2016, in oven-dried tonnes. This amount is adjusted to account for residue that is left behind to help prevent erosion.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.44. Corn Crop Yield

Name	CROP_CORN_YLD (Corn Crop Yield)		
Definition	The median amount of seed produced annually for each hectare in an area for the years 1985-2016, in kilograms per hectare.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.45. Soybean Crop Yield

Name	CROP_SOYBEAN_YLD (Soybean Crop Yield)		
Definition	The median amount of soybeans produced annually for each hectare in an area for the years 1985-2016, in kilograms per hectare.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.46. Canola Crop Yield

Name	CROP_CANOLA_YLD (Canola Crop Yield)		
Definition	The median amount of seed produced annually for each hectare in an area for the years 1985-2016, in kilograms per hectare.		
Aliases			
Producer	Agriculture and Agri-food Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.47. Gross Hardwood Roadside Harvest Residue Volume

Name	HARDWOOD_RESIDUE_VOL (Gross Hardwood Roadside Harvest Residue Volume)		
Definition	Potential non-merchantable deciduous/hardwood harvest residue volume available annually. Residue volume includes wood and bark, in oven-dried tonnes per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.48. Gross Softwood Roadside Harvest Residue Volume

Name	SOFTWOOD_RESIDUE_VOL (Gross Softwood Roadside Harvest Residue Volume)		
Definition	Potential non-merchantable coniferous/softwood harvest residue volume available annually. Residue volume includes wood and bark, in oven-dried tonnes per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.49. Full Tree Hardwood Roadside Harvest Residue Volume

Name	HARDWOOD_RESIDUE_FULL_VOL (Full Tree Hardwood Roadside Harvest Residue Volume)		
Definition	Potential deciduous/hardwood residue volume available annually at roadside following full tree harvesting. Residue volume includes wood and bark, in oven-dried tonnes per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.50. Full Tree Softwood Roadside Harvest Residue Volume

Name	SOFTWOOD_RESIDUE_FULL_VOL (Full Tree Softwood Roadside Harvest Residue Volume)		
Definition	Potential coniferous/softwood residue volume available annually at roadside following full tree harvesting. Residue volume includes wood and bark, in oven-dried tonnes per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.51. Cut-To-Length Hardwood Roadside Harvest Residue Volume

Name	HARDWOOD_RESIDUE_CUT_VOL (Cut-To-Length Hardwood Roadside Harvest Residue Volume)		
Definition	Potential deciduous/hardwood residue volume available annually at roadside following modified cut-to-length harvesting. Residue volume includes wood and bark, in oven-dried tonnes per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.52. Cut-To-Length Softwood Roadside Harvest Residue Volume

Name	SOFTWOOD_RESIDUE_CUT_VOL (Cut-To-Length Softwood Roadside Harvest Residue Volume)		
Definition	Potential coniferous/softwood residue volume available annually at roadside following modified cut-to-length harvesting. Residue volume includes wood and bark, in oven-dried tonnes per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.53. Hardwood Wood Mill Residue Volume

Name	HARDWOOD_RESIDUE_WD_MILL_VOL (Hardwood Wood Mill Residue Volume)		
Definition	Potential deciduous/hardwood mill residue wood volume available annually. Residue volume includes sawdust, chips, and shavings, in oven-dried tonnes per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.54. Hardwood Bark Mill Residue Volume

Name	HARDWOOD_RESIDUE_BRK_MILL_VOL (Hardwood Bark Mill Residue Volume)		
Definition	Potential deciduous/hardwood mill residue bark volume available annually, in oven-dried tonnes per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.55. Softwood Wood Mill Residue Volume

Name	SOFTWOOD_RESIDUE_WD_MILL_VOL (Softwood Wood Mill Residue Volume)		
Definition	Potential coniferous/softwood mill residue wood volume available annually. Residue volume includes sawdust, chips, and shavings, in oven-dried tonnes per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.56. Softwood Bark Mill Residue Volume

Name	SOFTWOOD_RESIDUE_BRK_MILL_VOL (Softwood Bark Mill Residue Volume)		
Definition	Potential coniferous/softwood mill residue wood volume available annually, in oven-dried tonnes per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.57. Residential Urban Wood Waste Volume

Name	URBANWOOD_WASTE_RSDNTL_VOL (Residential Urban Wood Waste Volume)		
Definition	Potential wood waste originating from households as a function of typical “living” activities and owner-performed renovations and construction, in oven-dried tonnes per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.58. Non-Residential Urban Wood Waste Volume

Name	URBANWOOD_WASTE_NRSDNTL_VOL (Non-Residential Urban Wood Waste Volume)		
Definition	Potential wood waste originating from businesses, government agencies, and institutions engaged in activities that typically occur in an urban setting, but not including agriculture, resource extraction, or manufacturing activities, in oven-dried tonnes per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.59. Total Urban Wood Waste Volume

Name	URBANWOOD_WASTE_TOTAL_VOL (Total Urban Wood Waste Volume)		
Definition	Combined potential wood waste originating from households and businesses, government agencies, and institutions engaged in activities that typically occur in an urban setting, in oven-dried tonnes per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.60. Forest Area Hectares

Name	FOREST_HA_AREA (Forest Area Hectares)		
Definition	Total forested area in hectares.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.61. Maximum Poplar Annual Growth Yield

Name	POPLAR_MAX_ANN_GROWTH_YLD (Maximum Poplar Annual Growth Yield)		
Definition	Hybrid poplar maximum annualized growth rate/yield potential, in oven-dried tonnes per hectare per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.62. Average Poplar Annual Growth Yield

Name	POPLAR_AVG_ANN_GROWTH_YLD (Average Poplar Annual Growth Yield)		
Definition	Hybrid poplar average annualized growth rate/yield potential, in oven-dried tonnes per hectare per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.63. Minimum Poplar Annual Growth Yield

Name	POPLAR_MIN_ANN_GROWTH_YLD (Minimum Poplar Annual Growth Yield)		
Definition	Hybrid poplar minimum annualized growth rate/yield potential, in oven-dried tonnes per hectare per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.64. Projected Poplar Annual Growth Volume

Name	POPLAR_PROJECTED_ANN_VOL (Projected Poplar Annual Growth Volume)		
Definition	Projected annually available volume from established plantations, in oven-dried tonnes per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.65. Maximum Willow Annual Growth Yield

Name	WILLOW_MAX_ANN_GROWTH_YLD (Maximum Willow Annual Growth Yield)		
Definition	Willow maximum annualized growth rate/yield potential, in oven-dried tonnes per hectare per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.66. Average Willow Annual Growth Yield

Name	WILLOW_AVG_ANN_GROWTH_YLD (Average Willow Annual Growth Yield)		
Definition	Willow average annualized growth rate/yield potential, in oven-dried tonnes per hectare per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.67. Minimum Willow Annual Growth Yield

Name	WILLOW_MIN_ANN_GROWTH_YLD (Minimum Willow Annual Growth Yield)		
Definition	Willow minimum annualized growth rate/yield potential, in oven-dried tonnes per hectare per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.68. Projected Willow Annual Growth Volume

Name	WILLOW_PROJECTED_ANN_VOL (Projected Willow Annual Growth Volume)		
Definition	Projected annually available volume from established plantations, in oven-dried tonnes per year.		
Aliases			
Producer	Canadian Forestry Service of Natural Resources Canada		
Value Data Type	Integer		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.69. Total Residential Municipal Solid Waste

Name	MNCPL_SOLID_WASTE_TOTAL_VOL (Total Residential Municipal Solid Waste Volume)		
Definition	Total Residential Municipal Solid Waste in tonnes, calculated for each BIMAT grid cell within a population centre.		
Aliases			
Producer	National Research Council Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.70. Total Organic Waste

Name	MNCPL_SOLID_WASTE_ORGANIC_VOL (Total Organic Waste Volume)		
Definition	Total Organic Waste (including Food and Yard waste) in tonnes, calculated for each BIMAT grid cell within a population centre. This includes both diverted and non-diverted waste quantities.		
Aliases			
Producer	National Research Council Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.71. Total Paper Waste

Name	MNCPL_SOLID_WASTE_PAPER_VOL (Total Paper Waste Volume)		
Definition	Total Paper Waste in tonnes, calculated for each BIMAT grid cell within a population centre. This includes both diverted and non-diverted waste quantities.		
Aliases			
Producer	National Research Council Canada		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.72. Combined Indicator

Name	Combined Indicator (Forest Sustainability)			
Definition	The combined indicator displays the estimated risk to forest sustainability based on a combination of Sand, pH and Slope. Peatland is omitted due to conflicting studies regarding nutrient extraction and nutrient cycling within peatlands. The remaining indicators provide a more robust short and long-term indication of site sensitivity, and are thus used for this analysis.			
Aliases				
Producer	Natural Resources Canada			
Value Data Type	Integer			
Value Domain Type	0 (not enumerated)			
Value Domain				
	Feature Attribute Value			
	Label	Code	RGB	Definition
	Low	1	56, 168, 0	When all of the three indicators are low, the combined indicator will be low.
	Medium	2	255, 255, 0	When any of the three indicators are medium but none of them are high, the combined indicator will be medium.
	High	3	255, 0, 0	When any of the three indicators are high, the combined indicator will be high.

4.2.1.73. Sand

Name	Sand (Forest Sustainability)			
Definition	The Sand indicator displays the estimated risk to forest sustainability based on the percentage of sand within the soils of an area. Soils with less than 85% sand are classified as “sand” and usually have very low nutrient and organic matter levels. Poor, dry sandy soils have been shown to be more sensitive to harvest residue removal.			
Aliases				
Producer	Natural Resources Canada			
Value Data Type	Integer			
Value Domain Type	0 (not enumerated)			
Value Domain				
	Feature Attribute Value			
	Label	Code	RGB	Definition
	Low	1	56, 168, 0	Any area with soils containing less than 85% sand is considered low risk.
	High	2	255, 0, 0	Any area with soils containing greater than or equal to 85% sand is considered high risk.

4.2.1.74. pH

Name	pH (Forest Sustainability)			
Definition	The pH indicator displays the estimated risk to forest sustainability based on the continuous value of pH in an area. Soil acidification is buffered by base cations in the 5.0 to 4.2 pH range, and by aluminum in the 4.2-3.0 pH range; as slash decomposition buffers soil acidity, acidic soils are considered more at risk of aluminum toxicity with full-tree logging.			
Aliases				
Producer	Natural Resources Canada			
Value Data Type	Integer			
Value Domain Type	0 (not enumerated)			
Value Domain				
	Feature Attribute Value			
	Label	Code	RGB	Definition
	Low	1	56, 168, 0	Any area with a pH greater than 5 is considered low risk.
	Medium	2	255, 255, 0	Any area with a pH between greater than 4.2 and less than or equal to 5 is considered medium risk.
	High	3	255, 0, 0	Any area with a pH less than or equal to 4.2 is considered to be high risk.

4.2.1.75. Slope

Name	Slope (Forest Sustainability)			
Definition	The Slope indicator displays the estimated risk to forest sustainability based on the slope of an area. Risks of erosion are greater on steep slopes, and slopes greater than 30% could be at risk in some regions, depending on other site factors such as depth to the water table, or the length of the back slope.			
Aliases				
Producer	Natural Resources Canada			
Value Data Type	Integer			
Value Domain Type	0 (not enumerated)			
Value Domain				
	Feature Attribute Value			
	Label	Code	RGB	Definition
	Low	1	56, 168, 0	Any area with a slope value of less than 20% is considered low risk.
	Medium	2	255, 255, 0	Any area with a slope value between 20% and less than 30% is considered medium risk.
	High	3	255, 0, 0	Any area with a slope value of greater than or equal to 30% is considered high risk.

4.2.1.76. Peatland

Name	Peatland (Forest Sustainability)			
Definition	The Peatland indicator displays the estimated risk to forest sustainability based on the type of peatland in an area. Forested bogs and forested poor fen acquire very few nutrients from external sources (such as the atmosphere or weathering of minerals), and some jurisdictions consider these sites as potentially at risk of nutrient depletion with full-tree harvesting.			
Aliases				
Producer	Natural Resources Canada			
Value Data Type	Integer			
Value Domain Type	0 (not enumerated)			
Value Domain				
	Feature Attribute Value			
	Label	Code	RGB	Definition
	Low	1	56, 168, 0	Any area that has peat types other than Forested Bog and Forested Poor Fen are considered low risk.
	High	2	255, 0, 0	Any area that has Forested Bog or Forested Poor Fen peat types are considered high risk.

5. REFERENCE SYSTEMS

5.1. Spatial reference system

Horizontal coordinate reference system: WGS 84

Map projection: Web Mercator Auxiliary Sphere; EPSG: 3857

5.2. Temporal reference system

Gregorian calendar

6. DATA QUALITY

6.1. Completeness

Measure not defined at this time.

6.2. Logical consistency

Measure not defined at this time.

6.3. Positional accuracy

Measure not defined at this time.

6.4. Temporal accuracy

Measure not defined at this time.

6.5. Thematic accuracy

Measure not defined at this time.

6.6. Lineage statement

6.6.1. Biomass Report Framework

Lineage Statement	The fishnet polygon fabric used by BIMAT as a common reporting structure is derived from the Daily 10 km Gridded Climate Dataset for Canada south of 60° North, 1950-2010 from Natural Resources Canada.
Scope	Dataset (Biomass Report Framework)

6.6.2. Biomass Agriculture Inventory Median Values, Biomass Agriculture Inventory 1-in-10 Probability, Biomass Agriculture Inventory 1-in-20 Probability, Biomass Cartographic Layer

Lineage Statement	• The base yield and production information for Nova Scotia, New Brunswick and Prince Edward Island is derived from Statistics Canada crop summary data, 1985-2016 and base yield and production for the rest of Canada is derived from Statistics Canada Crops Small Area Data, 1985-2016 and Census of Agriculture 1986, 1991, 1996, 2001, 2006, 2011, 2016. • The Statistics Canada coarse resolution yield and production data was disaggregated to the Biomass Report Framework grid cells using Canada 10-day AVHRR VIS Surface Reflectance and NDVI Time Series, 1985 to 1999, provided by the Canada Centre for Remote Sensing, Natural Resources Canada and MODIS EVI2 7 day composite derived from MODIS time series from NASA, 2000 to 2016. • Linear regression equations were developed from recently published data (post 1995) for a broad range of growing conditions from the global crop production literature to model crop residue production from grain yield. • Soil conservation data is derived from tillage system data provided by Statistics Canada and from landscape models that estimate the amount of crop residue that is required to prevent soil erosion. • Cattle demand is derived from beef cow population data from Statistics Canada Census of Agriculture and livestock production surveys.
Scope	Dataset (Biomass Agriculture Inventory Median Values, Biomass Agriculture Inventory 1-in-10 Probability, Biomass Agriculture Inventory 1-in-20 Probability, Biomass Cartographic Layer)

6.6.3. Biomass Forestry Inventory

Lineage Statement	The woody biomass data was provided by the Canadian Forestry Service of Natural Resources Canada and estimates average annual production based on forestry activities for the years 2013-2014 based on the following sources: • Estimates of the hardwood and softwood land base derived from satellite imagery (a land cover dataset developed by the Canadian Forest Service). • Annual Allowable Cut statistics from the State of the Forest report, produced by the Canadian Forest Service, and the National Forest Database (Annual Allowable Cut measures the amount of wood that is permitted to be harvested within a one year period to ensure forest sustainability and productivity). • Mill locations and estimates of mill production and fibre use (inventory dataset developed by the Canadian Forest Service and the Canadian Wood Fibre Centre). • Population and population growth statistics from the 2011 Census, provided by Statistics Canada. • Hybrid poplar and willow growth and yield estimates from land suitability modeling (model developed by the Canadian Forest Service and the Canadian Wood Fibre Centre) and statistics from a national network of plantations (a demonstration network developed by the Canadian Forest Service and the Canadian Wood Fibre Centre).
Scope	Dataset (Biomass Forestry Inventory)

6.6.4. Biomass Municipal Solid Waste Inventory

Lineage Statement	The Municipal Solid Waste data was provided by National Research Council of Canada and includes information on total, paper and organic waste within a population centre. Estimates for Municipal Solid Waste are based on census data collected in 2016 from Statistics Canada and municipal solid waste data from Ontario municipalities.
Scope	Dataset (Biomass Municipal Solid Waste Inventory)

7. DATA CAPTURE

For agricultural crops and residues, yield information for each BIMAT cell is calculated using annual production information for the years 1985-2016.

- Yield information and estimates of vegetation health were used to calculate the grain yield for each cell in the reporting framework grid. Residue yields were calculated from the grain yield. Yield was combined with crop area to produce crop and residue production data for 1985-2016. Median, 1-in-10-year low and 1-in-20-year low production information was extracted from the crop and residue production data.
- Soil conservation requirements were calculated using tillage system data and landscape modeling.
- Demand for straw used for cattle feed and bedding was calculated using cattle population data.

The woody biomass data was provided by the Canadian Forestry Service of Natural Resources Canada and estimates average annual production based on forestry activities for the years 2013-2014.

- Land cover, regional growth, rotation length and inventory data were used to estimate roadside harvest residues and mill residues.
- Population size, population growth and area statistics from census data were used to estimate urban wood residues.
- A national inventory of established plantations was used to estimate sustainable annual yields of hybrid poplar and willow. The land base suitable for purpose grown plantations of hybrid poplar and hybrid willow was determined using models that were developed by the Canadian Forest Service and the Canadian Wood Fibre Centre.

The Municipal Solid Waste data was provided by the National Research Council of Canada and estimates the approximate amount of waste within a population centre based on census data collected in 2016 and municipal solid waste data from Ontario municipalities.

- Total residential municipal solid waste, total organic waste (including food and yard) and total paper waste were calculated using census data for each population centre in 2016 and model coefficients correlating demographic data with available municipal solid waste data.

8. DATA MAINTENANCE

Frequency: irregular

Updates to the BIMAT – Business Data dataset series is performed on an as-required basis as determined by subject-matter experts. For example, when updated annual production information becomes available or the functionality of the BIMAT application is enhanced with additional options or data.

9. PORTRAYAL

Not applicable.

10. DATA PRODUCT DELIVERY

File Geodatabase

format name: ESRI Geodatabase (File-based) format version: 10.0

specification: A collection of various types of GIS datasets held in a file system folder.

(http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#/Types_of_geodatabases/003n00000007000000/)

languages: eng

character set: utf8

11. METADATA

The metadata requirements follow the Government of Canada's Treasury Board Standard on Geospatial Data (ISO 19115).