The Footprint and Biocapacity of Ontario, Canada:

Comparing Results for 2005 and 2010

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TECHNICAL SUMMARY REPORT
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ACRONYMS AND ABBREVIATIONS

COICOP	Classification of Individual Consumption by Purpose
IO	input-output (economic analysis)
CLUM	Consumption Land Use Matrix
gha	global hectare
ha	hectare
MRIO	multi region input output
NFA	National Footprint Account
nha	national hectare
NPP	net primary productivity
wha	world hectare
Footprint	short version of Ecological Footprint

1. PURPOSE OF THIS REPORT

Ecological Footprint Accounting measures humanity's demand on the biosphere by comparing human consumption of renewable goods and services (Ecological Footprint) with the Earth's ability to provide these goods and services (Biocapacity). These are calculated as the area of five bioproductive land classes required to meet human demands for renewable resources and carbon sequestration, using current management schemes and extraction technologies. Both Ecological Footprint and biocapacity are measured in global hectares (gha), a hectare of land with globally average productivity, and together they represent all the competing human demands for biologically productive space. Hence, the Ecological Footprint is a relevant environmental indicator for tracking degradation of ecological assets, depletion of natural reserves, biodiversity loss,[1] and ecosystem collapse.

This report summarizes an Ecological Footprint and biocapacity analysis of Canada and the province of Ontario, conducted by Global Footprint Network for the Ontario Ministry of Natural Resources and Forestry (OMNRF). The results in this report are based on an analysis using the 2014 edition of the National Footprint Accounts (NFA). These results differ from those using NFA 2008. As such, for consistency of comparison, we compared the 2005 and 2010 figures using the NFA 2015 Edition. Refer to Annex B for description of applied changes and improvements between the 2008 and 2014 NFA editions for Canada.

2. ECOLOGICAL FOOTPRINT RESULTS

2.1 Humanity's Ecological Footprint

Between 2005 and 2010, humanity's Ecological Footprint rose from 17 billion global hectares (gha) to 18 billion gha, while the planet's biocapacity increased only slightly by 21 million gha to about 12 billion gha over the same five-year time period. Humanity entered a state of global ecological overshoot in the early 1970s, when global Ecological Footprint started to exceed the Earth's biocapacity. In 2010 humanity's Ecological Footprint (2.63 gha per person) was 51% larger than the planet's biocapacity (1.74 gha per person; see Figure 1). The carbon Footprint alone contributed to 54% of the total Ecological Footprint in 2010 compared to 36% in 1961.

[1] While the Footprint does not measure biodiversity loss directly, it tracks global pressures on biodiversity and can be used to complement other measures of ecosystem-specific impacts on biodiversity (Galli et al., 2014).

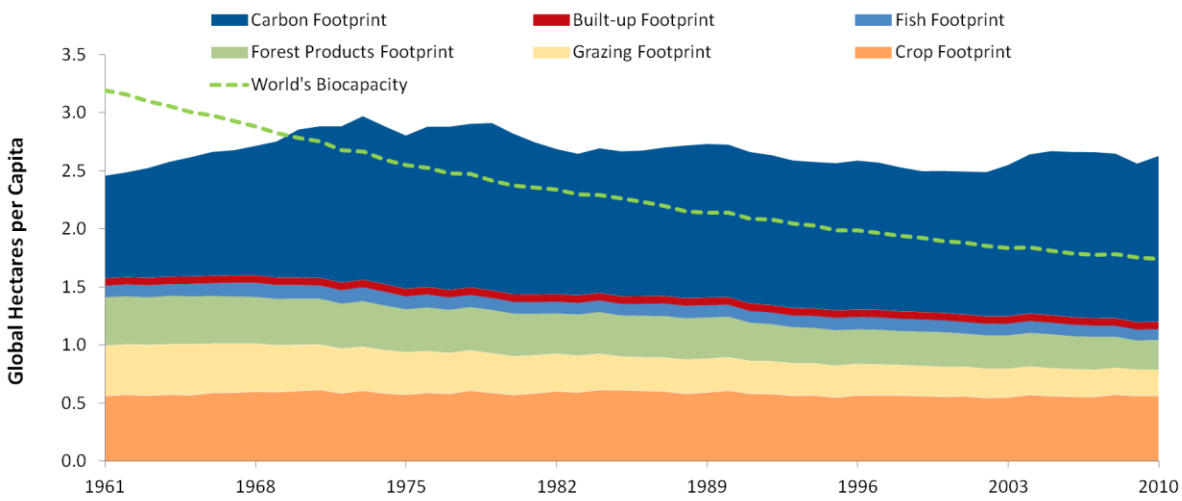

Figure 1: Humanity's Ecological Footprint per capita by components compared to per capita biocapacity on the planet (dashed green line).

2.2 Canada's Ecological Footprint

For the time span covered by Global Footprint Network's accounts (1961-2011) Canada has been an ecological creditor (see Figure 2), meaning the country's domestic biocapacity has remained higher than its population's consumption. In 2010 Canada was one of the top ten biocapacity-rich nations (in absolute, not per capita, terms). These top ten nations combined contribute more than 60% of Earth's total biocapacity. As illustrated in Figure 3, Canada harbored 4% of the planet's biocapacity.

In 2010 Canada produced approximately 97 million global hectares of forest products, 75% of which was exported to other countries. Despite the major export of the forest products, and including much lower forest product imports, Canada's forest products Footprint was about 38.5 million gha, which accounted for 18% of its total Footprint.

Canada's Ecological Footprint (6.4 gha per person) ranked among the top 12 contributors in 2010, and its largest Footprint component was carbon, comprising 55% of its Footprint per capita.

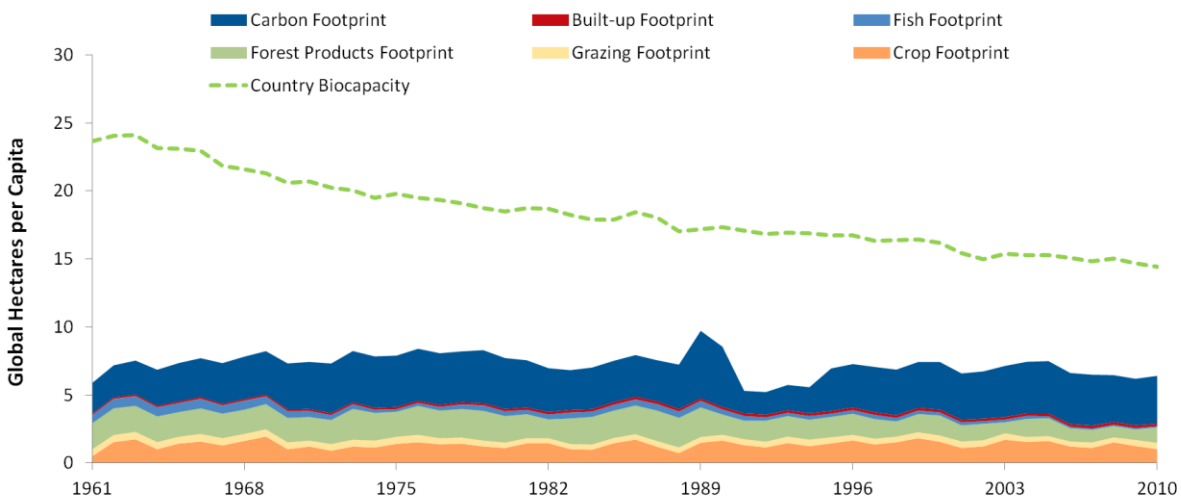

Figure 2: Canada's Ecological Footprint per capita by components. The dashed green line shows the per capita biocapacity in Canada. The per capita reduction in biocapacity is mainly driven by Canada's population size. The carbon Footprint spikes and dips from 1989 to 1994 may be data noise, as these features have consistently appeared in the UN data set.

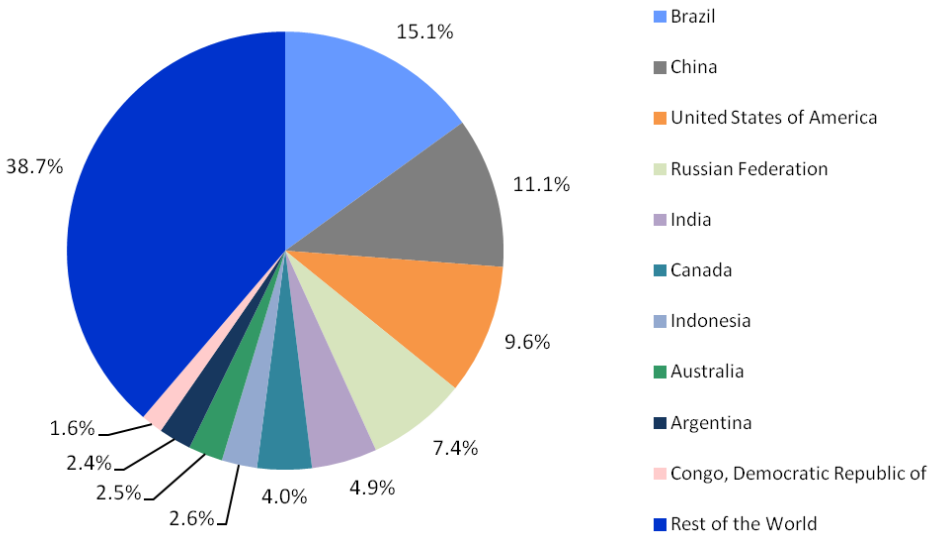

Figure 3: The planet's biocapacity by country.

Canada's Footprint data was split into consumption categories using environmentally extended Multi-Regional Input Output assessments (ee-MRIO). MRIO is a mathematical tool used for analyzing flow of resources through multiple economies. Global Footprint Network uses environmentally extended MRIO with global cover, built on top of the NFA Ecological Footprint of production results. Using financial information that maps the link between economic sectors and physical information about Footprint intensities of those sectors, the GTAP Multi-Region Input Output data allows researchers to break the

overall demand, documented by NFAs, into its sector components. GTAP, provided by Purdue University, stands for Global Trade Analysis Project, and it is a leading global MRIO data set. MRIO uses financial flows as a proxy for Ecological Footprint flows through national economies (segregated into 57 sectors), and in multilateral sectoral-level trade. Using Footprint intensities (gha/per dollar) then turns the financial MRIO into an environmentally extended MRIO, which allows us to generate a Consumption Land Use Matrix (CLUM) that presents final demand by land type. CLUM results highlight underlying features of a nation's consumption patterns (see Annex D for a more in-depth description).

Consumption in MRIO is organized in three main groups: 1) short-term consumption paid for by households (HH); 2) short-term consumption paid for by government (GOV), such as police equipment, school supplies for public schools, health care, paper for public administration; and 3) lasting goods and services, or "gross fixed capital formation" (GFCF), such as construction of housing, bridges, roads and factories.

The first component is further broken down into five categories: food, housing, personal transport, goods and services. This breakdown provides the basic data to identify the size of the various Ecological Footprint components, which enables government and private sector decision-makers to focus on potential areas and strategies to reduce overall Footprints.

Based on Canada's 2010 CLUM results (see Annex B), the subtotal of all short-term household consumption categories accounted for 68 percent of the total consumption. Figure 4 shows how much each category contributed to the Ecological Footprint.

Each household sub-category had a different contribution to Canada's Ecological Footprint. Whereas "Personal Transportation" and "Housing" mainly affected the carbon and built-up land Footprint, "Food" put more demand on cropland, grazing land, and fishing grounds. The major contributor to Canada's overall Footprint in 2010 was individual transportation at 1.6 gha per person, with little change from 2005 (1.8 gha per person).

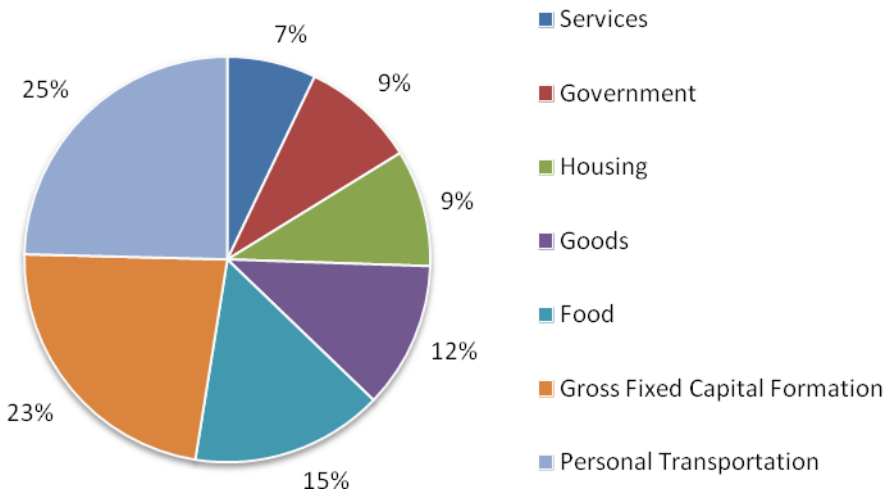

Figure 4: Composition of Canada's Footprint by consumption category.

3. ONTARIO'S ECOLOGICAL FOOTPRINT AND BIOCAPACITY

3.1 Ontario's Ecological Footprint

Ontario is the most populous province in Canada, comprising about 39 percent of its total population. Ontario's per capita Footprint composition is very similar to Canada's; for example, the carbon Footprint contributes 55% of both Ontario's and Canada's total Footprint in 2010 (see Figure 5). Ontario and Canada rank closely to one another when compared to the Footprint of countries around the world (see Figure 6, which shows Ontario's per capita Footprint compared to national per capita Footprints from around the world).

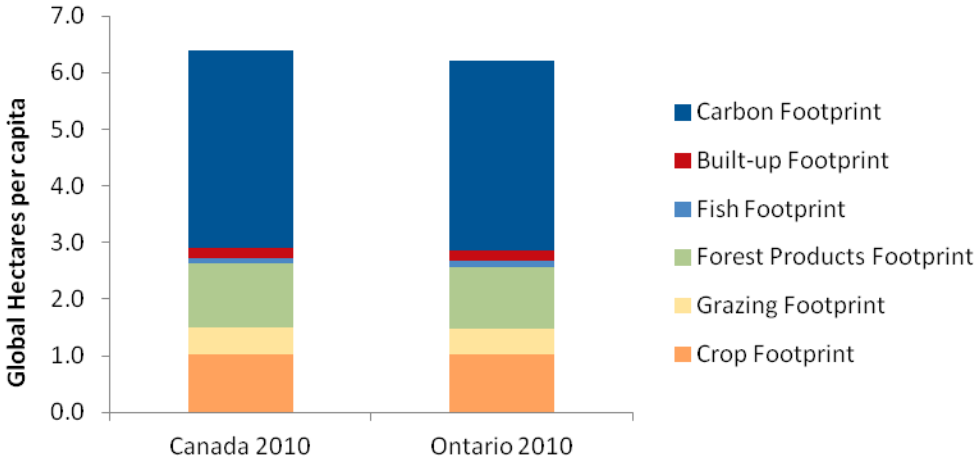

Figure 5: Comparing the Footprints of Canada and Ontario by demand component.

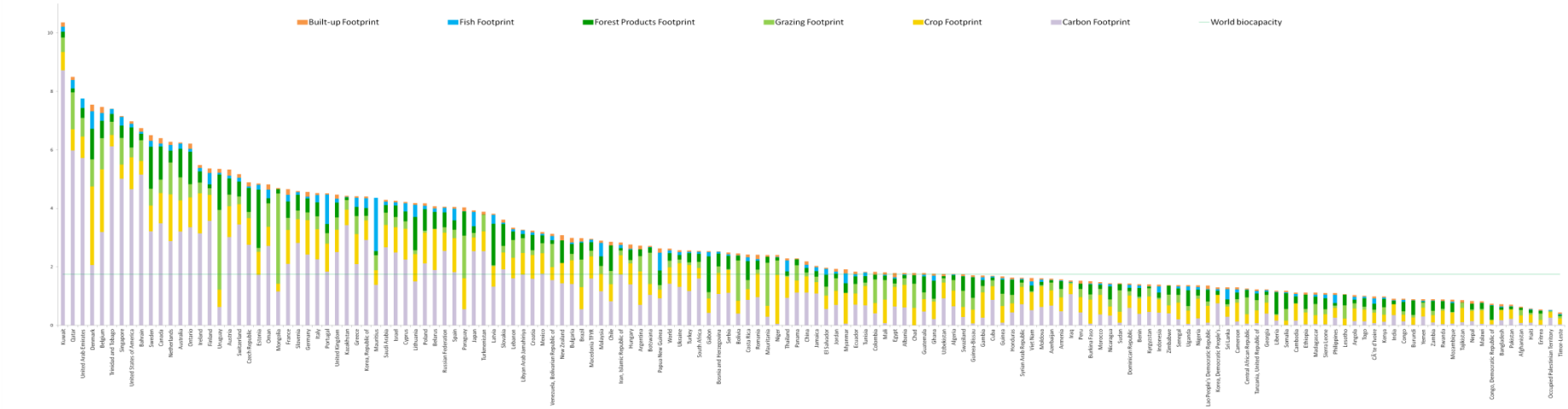

Figure 6: Ecological Footprint per capita, per country, compared with Ontario in the year 2010. The green line represents world average biocapacity per person in 2010.

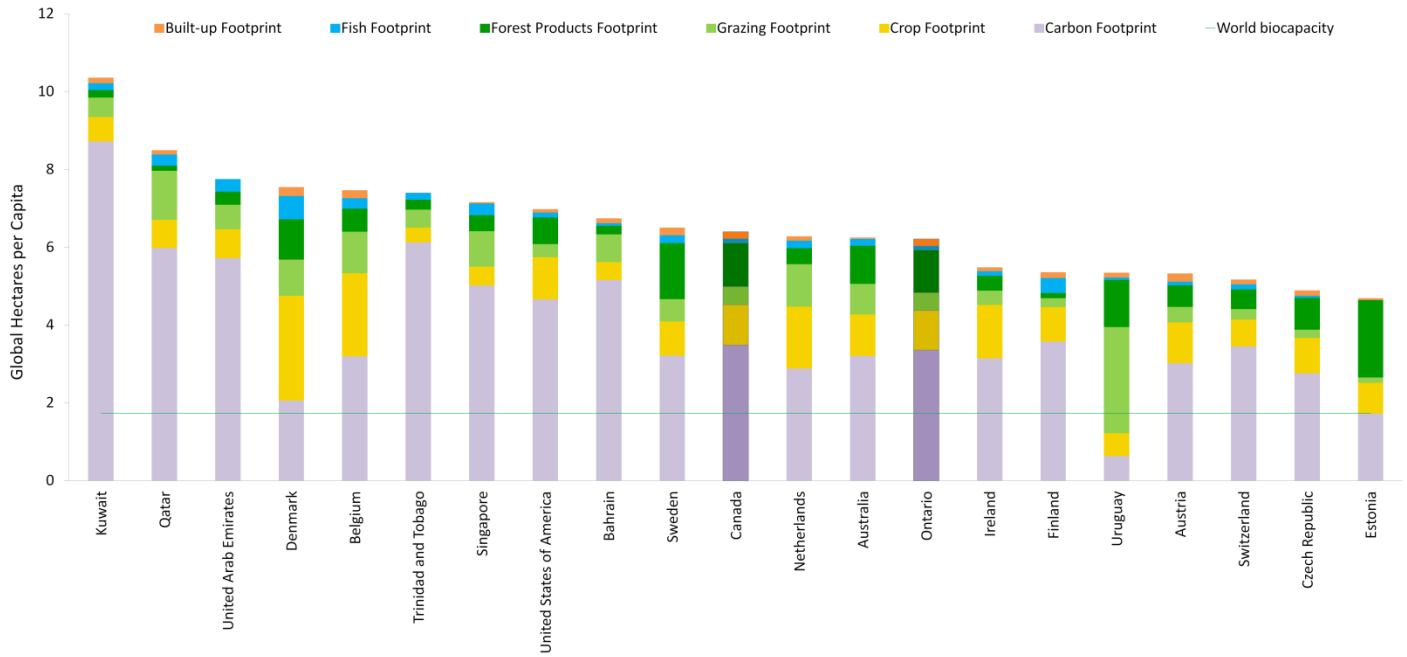

Figure 7: Ecological Footprint per capita per country for twenty countries with highest Ecological Footprint, compared with Ontario. The green line represents world average biocapacity per person in 2010.

Ontario's sub-national Footprint was calculated by scaling down the national-level data using energy intensity, household expenditure and Consumer Price Index as a way to estimate Ontario's consumption from the Canadian average. See Annex E for description on sub-national Consumption Land Use Matrix methodology.

Ontario's Footprint (7.71 gha/capita) was higher than Canada's (7.48 gha/capita) in 2005 but lower (6.21 vs. 6.40 gha per capita) in 2010 (see Figures 8 and 9). Although Ontario's population growth from 12.5 to 13.1 million between 2005 and 2010 caused a decrease in total Footprint per capita, this reversal is mainly due to changes in energy intensity, which is calculated as the ratio of greenhouse gas emissions to electricity generation. The energy intensity for Ontario (0.22 kt/GWh) was equal to the national average (0.22 kt/GWh) in 2005, but it was 29% less than the national average in 2010 (0.13 kt/GWh vs. 0.19 kt/GWh). Canada's Greenhouse Gas Emissions associated with electricity and heat generation decreased 18% from 122,900 to 101,100 $ktCO_2$ eq, but Ontario's Greenhouse Gas Emissions associated with electricity and heat generation showed a 43% decrease from 34,100 to 19,600 $ktCO_2$ eq. Electricity Generation decreased by 3% over this period on both the provincial and national scale (Environment Canada, 2014).

Ontario's per capita Footprint decreased from 7.71 gha to 6.21 gha between 2005 and 2010, and likewise its total Footprint decreased from 97 million gha to 82 million gha despite a population increase over the same period.

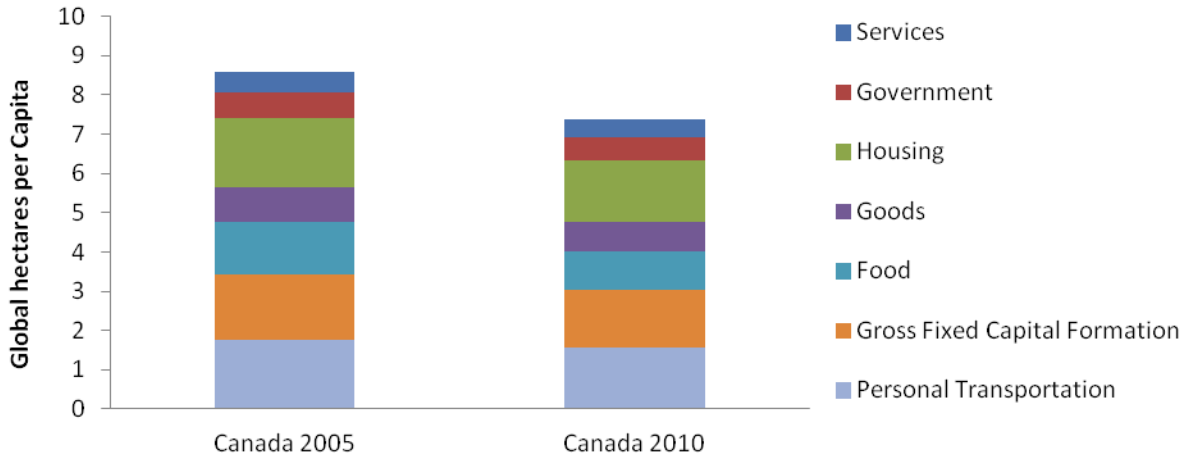

Figure 8: Comparing the Footprints of Canada by consumption category for the years 2005 and 2010

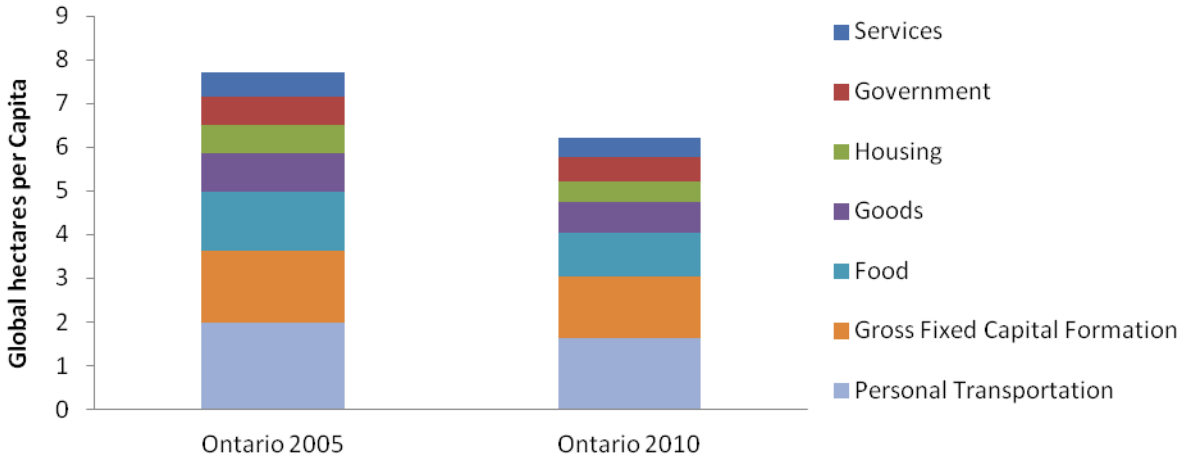

Figure 9: Comparing the Footprints of Ontario by consumption category for the years 2005 and 2010

Table 1: Ontario's Ecological Footprint, in global hectares per capita in 2010 (by demand component).

[gha person^{-1}]	Crop Footprint	Grazing Footprint	Forest Products Footprint	Fish Footprint	Built-up Footprint	Carbon Footprint	Ecological Footprint
Food	0.56	0.19	0.03	0.07	0.01	0.12	0.98
Housing	0.01	0.00	0.07	0.00	0.01	0.38	0.46
Personal Transportation	0.11	0.07	0.09	0.01	0.04	1.32	1.64
Goods	0.17	0.10	0.18	0.01	0.02	0.23	0.71
Services	0.04	0.02	0.08	0.00	0.02	0.28	0.45
Sub-total short-term Household Consumption	0.88	0.39	0.44	0.09	0.10	2.33	4.23
Government provided household consumption	0.04	0.02	0.13	0.00	0.03	0.35	0.56
Gross Fixed Capital Formation	0.10	0.04	0.53	0.01	0.05	0.69	1.42
Total	**1.02**	**0.45**	**1.10**	**0.10**	**0.18**	**3.36**	**6.21**

Table 2: Canada's Ecological Footprint, in global hectares per capita in 2010 (by demand component).

[gha person^{-1}]	Crop Footprint	Grazing Footprint	Forest Products Footprint	Fish Footprint	Built-up Footprint	Carbon Footprint	Ecological Footprint
Food	0.57	0.19	0.03	0.07	0.01	0.12	0.98
Housing	0.01	0.00	0.06	0.00	0.01	0.51	0.60
Personal Transportation	0.10	0.07	0.09	0.01	0.04	1.27	1.57
Goods	0.18	0.11	0.19	0.01	0.02	0.24	0.75
Services	0.04	0.02	0.08	0.00	0.02	0.28	0.45
Sub-total short term Household Consumption	0.89	0.39	0.45	0.10	0.10	2.42	4.35
Government provided household consumption	0.04	0.02	0.13	0.00	0.03	0.36	0.58
Gross Fixed Capital Formation	0.10	0.05	0.55	0.01	0.05	0.71	1.46
Total	**1.03**	**0.46**	**1.13**	**0.10**	**0.18**	**3.49**	**6.40**

3.2 Ontario's Biocapacity

The province of Ontario covers 107 million hectares, which comprises about 11% of Canada's total land. Of these 107 million hectares, 33% was covered with forest, 33% was wetlands, and only 1% was classified as unproductive (see annex E for land-use classification mapping). Ontario's total biocapacity is approximately 73 million global hectares compared to 491 gha nationwide. This also means that an Ontario hectare is about 68 percent as productive as a world average biologically productive hectare. With a population of more than 13 million, provincial biocapacity for the average Ontarian was 5.6 gha in 2010 compared to 5.8 gha in 2005. This is change is only due to population growth since the total biocapacity estimate for both years was about 73 million gha.

The province of Ontario is divided into three major Ecozones: Mixedwood Plains, covered mostly by agricultural land (58%); Ontario Shield, covered mostly by forest; and Hudson Bay Lowlands, dominated by wetlands (approximately 82%).

Due to the large amount of wetlands and other land types that do not have clear biological productivity values assigned to them, those land types could not be included in the biocapacity assessment. As a result, almost one-quarter of the overall land area was excluded from this analysis. If we included wetlands, applying the yield and equivalence factors for grazing land as a first approximation, the wetlands' biocapacity would account for an additional 1.4 global hectares per capita in 2010. Tables 3

and 4 do not include this value because of the explained data gap. However, this gap could be closed through additional analysis.

Table 3: Ontario's current estimate of biocapacity composition in 2010, based on NFA 2014

gha	Mixedwood plains	Ontario Shield	Hudson Bay Lowlands	Great Lakes (ON portion)	Ontario	Global Hectares per capita
Agriculture	10,726,946	1,014,923	-	-	11,741,869	0.9
Grazing land	1,097	0.20	-	-	1,097	0.0
Other wooded land	30,804	4,229,176	212,659	-	4,472,639	0.3
Forests	1,762,931	44,007,695	1,321,415	-	47,092,041	3.6
Inland water	148,180	3,723,612	536,054	3,215,960	7,623,805	0.6
Infrastructure	1,468,118	714,270	5,556	-	2,187,944	0.2
total biocapacity	14,138,077	53,689,676	2,075,683	3,215,960	73,119,396	
gha per capita						**5.6**

Table 4: Ontario's current estimate of biocapacity composition in 2005, based on NFA 2014

gha	Mixedwood plains	Ontario Shield	Hudson Bay Lowlands	Great Lakes (ON portion)	Ontario	Global Hectares per capita
Agriculture	10,263,978	980,801	-	-	11,244,779	0.9
Grazing land	1,096	0.20	-	-	1,096	0.0
Other wooded land	32,862	4,207,739	225,371	-	4,465,972	0.4
Forests	1,821,459	44,025,944	1,432,378	-	47,279,781	3.8
Inland water	153,976	3,666,588	572,924	3,212,649	7,606,137	0.6
Infrastructure	1,445,322	656,975	5,460	-	2,107,757	0.2
total biocapacity	13,718,692	53,538,048	2,236,133	3,212,649	72,705,522	
gha per capita						**5.8**

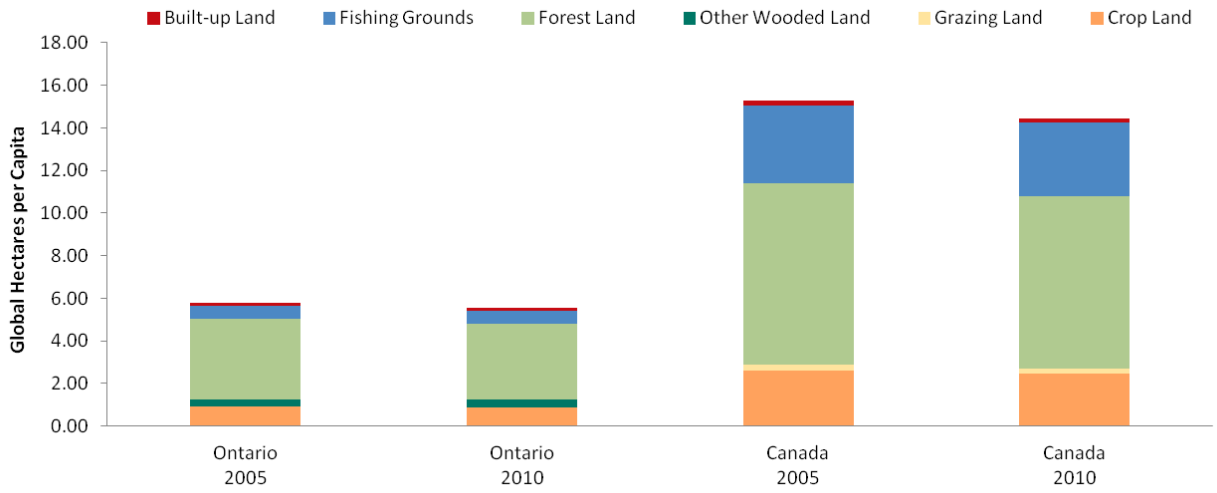

Figure 10: Comparing the biocapacity per capita of Canada and Ontario by land type between 2005 and 2010. Between 2005 and 2010, the Canadian population rose from 12.5 million to 13.1 million.

3.3 Conclusion

Life, including human life, competes for biologically productive surfaces. Ontario, as well as Canada, is well endowed with such surfaces. But people's demand for such surfaces is high. Ontario, the most populous province in Canada, comprising about 39 percent of its total population, has a similar per capita Footprint, in both size and composition, to Canada.

While Ontario is large in physical size, its geographic and climactic location reduces its productivity per hectare. Still, Ontario is endowed with over four times more biocapacity per person than the average world resident (if wetlands are included). This is true even though an Ontario hectare is only 68 percent as productive as a world average biologically productive hectare.

According to our estimates, using the newest data sets and newest methodology to compare 2005 and 2010, the biocapacity-to-Footprint ratio has become more favorable in Ontario in spite of population growth during the same period. Some of this progress could be driven by efficiency gains or shifts to less carbon intensive energy sources. However, Ontario's demand on the biosphere is still far above a level that could be replicable worldwide. Its biocapacity endowment is a significant asset, far above what most regions have available.

Since life, including wild life, requires biologically productive spaces, Ontario has more opportunities than other areas to make space for wild species. Overusing the landscape can increase pressures on biodiversity. If resources are managed well, Ontario has the potential to avoid biodiversity loss, both in Ontario and abroad.

Canada as a whole is in an even more favorable position. Considering future pressures on biocapacity as the world population further expands (as most assessments predict), and as demand or climate-driven resource constraints may become more prevalent, paying attention to one's biocapacity assets—and managing one's demand on those assets—become essential strategies for increasing resilience and maintaining prosperity.

A. Annex A – Ecological Footprint and Biocapacity Methodology

ECOLOGICAL FOOTPRINT

Ecological Footprint and Biocapacity Accounting answers a simple research question: How much do people demand from biologically productive surfaces (Ecological Footprint) compared to how much can the planet (or a country's productive surfaces) regenerate (biocapacity)?

Economic activities fundamentally depend on ecological assets and their capacity for provisioning primary resources and life-supporting ecological services. Managing an economy's resource dependence is becoming a central issue for decision-makers, particularly for planners and economic strategists. Adequate access to ecological assets is a necessary condition for economic success and lasting development gains.

Global Footprint Network uses UN data sets to calculate the Footprint and biocapacity of nations including Canada's assessment. The calculations are based on over 6,000 data points per country and year – therefore the Footprint can be disaggregated into components. Because of data gaps, National Footprint Accounts probably underestimate biocapacity deficits.

The Ecological Footprint, in its most basic form, is calculated using the following equation:

$$EF = D/Y \qquad \text{Equation 1}$$

Where D is the annual demand of a product and Y is the annual yield of the same product (Borucke et al, 2013). Yield is expressed in global hectares. In practice, global hectares are estimated with the help of two factors: the yield factors, which compare national average yield per hectare to world average yield in the same land category; and the equivalence factors, which capture the relative productivity among the various land and sea area types.

Taking into account these factors, the formula of the Ecological Footprint becomes:

$$EF = (P/Y_N)*YF*EQF \qquad \text{Equation 2}$$

where P is the amount of a product harvested or waste emitted (equal to D above), Y_N is the national average yield for P, and YF and EQF are the respective yield factors and equivalence factors for the country and land use type in question. The yield factor is the ratio of national-to-world-average yields, which is calculated as the annual availability of usable products and varies by country and year. Equivalence factors translate the supply of or demand for an area of a specific land use type (e.g. world average cropland or grazing land) into units of world average biologically productive area expressed in global hectares. These factors can vary by land use type and year.

BIOCAPACITY

The calculation of a country's biocapacity begins with the total amount of bioproductive land and sea available in that country. "Bioproductive" refers to areas of land and water that support significant photosynthetic activity and accumulation of biomass. Barren areas of low or dispersed productivity are ignored. This is not to say that places such as the Sahara Desert, Antarctica, or the alpine environments of various countries do not support life; simply that their production is too widespread to be directly harvestable and is negligible in quantity.

Biocapacity is an aggregate measure of the amount of area available, weighted by the productivity of that area. It represents the ability of a biosphere to produce crops, livestock (pasture), timber products (forest) and seafood; as well as the biosphere's ability to uptake CO_2 in forests. It also measures how much of this regenerative capacity is occupied by infrastructure (built-up land). In short, it measures the ability of the available terrestrial and aquatic areas to provide ecological services. A country's biocapacity for any land use type is calculated as:

$$BC = A*YF*EQF \qquad \text{Equation 3}$$

Where BC is the biocapacity, A is the available area of a given land use type, and YF and EQF are the yield factors and equivalence factors, respectively, for the land use type in question in that country.

B. Annex B – Methodology Improvements between NFA 2008 and NFA 2014

Source of change	Element	Reason
Area	Hydro	There was conversion error between TWh, GWh, and MWh
Area	Other wooded land	Removed from NFA grazing land due to double counting inconsistencies with other grazing land
YF	Cropland	New values for total crop area for year 2005
YF	Infrastructure	Set equal cropland yield: In the Global Footprint Network National Accounts Methodology (Ewing et al., 2008), built-up land is assumed to be the same as that for cropland since urban areas are typically built on or near the most productive agricultural lands
EQF	Cropland	EQFs change from year to year and as methodologies are updated.
EQF	Grazing land	See Cropland EQF above
EQF	Forest	See Cropland EQF above
EQF	Marine	See Cropland EQF above
EQF	In land water	See Cropland EQF above
EQF	Infrastructure	Set equal to cropland EQF

The Footprint in the Built-Up land type (i.e., the hydropower fraction) was 4,657 gha in the NFA 2008 edition for year 2005. However, an error in units was detected and fixed in the NFA 2014 edition resulting in an increased Ecological Footprint due to hydropower of 4.5 million gha (a 1000-fold increase).

The Yield Factor, calculated as Crop Yield of the nation divided by the Crop Yield of the world, was 1.14 in the NFA 2008 Edition for year 2005. However, the Yield Factor in the NFA 2014 Edition decreased to 0.68 for the year 2005. The reported area for all crops in NFA 2008 (data year 2005) is half of the reported area for all crops in the NFA 2014 (data year 2005), and this is the main reason for the decrease in Canada's crop yield factor, as the yield factor for crops is calculated as the ΣArea_crops (Nation)/ ΣArea_crops (World). The crops largely responsible for the decreased area are the cereal crops (Wheat, Rapeseed, Barley, Oats) and legumes (Peas, Soybeans).

The drop in yield factor for built-up land between the NFA 2008 and NFA 2014 editions was due to the same as yet undetermined methodological change for cropland, because we assume built up land has the same yield factor as cropland. It is considered that built-up area compromised this amount of biocapacity that could otherwise be used for crops if the area was not dedicated to urban infrastructure.

'Other Woodland' was its own separate category in the NFA 2008 Edition, whereas in current (and future) editions of the NFA, data that would be categorized as "Other Woodland" is now included in forest land type.

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C. Annex C – Canada Consumption Land Use Matrix (CLUM)

Canada Ecological Footprint Results

Table 5: Canada's CLUM 2010 by Food, Housing, Mobility, Goods, Services groupings

	[gha person^{-1}]	Crop Footprint	Grazing Footprint	Forest Products Footprint	Fish Footprint	Built-up Footprint	Carbon Footprint	Ecological Footprint
Household	**Food**	**0.57**	**0.19**	**0.03**	**0.07**	**0.01**	**0.12**	**0.98**
	Food	0.45	0.14	0.02	0.06	0.01	0.09	0.76
	Non-alcoholic beverages	0.05	0.02	0.00	0.01	0.00	0.01	0.09
	Alcoholic beverages	0.07	0.03	0.00	0.01	0.00	0.02	0.13
	Housing	**0.01**	**0.00**	**0.06**	**0.00**	**0.01**	**0.51**	**0.60**
	Actual rentals for housing	0.00	0.00	0.01	0.00	0.00	0.01	0.02
	Imputed rentals for housing	0.00	0.00	0.01	0.00	0.01	0.01	0.04
	Maintenance and repair of the dwelling	0.00	0.00	0.03	0.00	0.00	0.02	0.05
	Water supply and miscellaneous dwelling services	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Electricity, gas other fuels	0.00	0.00	0.02	0.00	0.00	0.47	0.49
	Service for household maintenance	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	Personal Transportation	**0.10**	**0.07**	**0.09**	**0.01**	**0.04**	**1.27**	**1.57**
	Purchase of vehicles	0.01	0.00	0.02	0.00	0.01	0.12	0.16
	Operation of personal transport equipment	0.09	0.06	0.06	0.01	0.02	0.81	1.05
	Transport services	0.00	0.00	0.01	0.00	0.01	0.34	0.36
	Goods	**0.18**	**0.11**	**0.19**	**0.01**	**0.02**	**0.24**	**0.75**
	Clothing	0.04	0.03	0.00	0.00	0.01	0.04	0.12
	Footwear	0.01	0.00	0.00	0.00	0.00	0.01	0.02
	Furniture, furnishings, carpets etc.	0.01	0.01	0.01	0.00	0.00	0.02	0.05
	Household textiles	0.01	0.00	0.00	0.00	0.00	0.01	0.02
	Household appliances	0.00	0.00	0.00	0.00	0.00	0.02	0.03
	Glassware, tableware & household utensils	0.00	0.00	0.00	0.00	0.00	0.01	0.01
	Tools and equipment for house & garden	0.00	0.00	0.01	0.00	0.00	0.01	0.01
	Medical products, appliances & equipment	0.00	0.00	0.00	0.00	0.00	0.01	0.02
	Telephone & telefax equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00

[gha person^{-1}]	Crop Footprint	Grazing Footprint	Forest Products Footprint	Fish Footprint	Built-up Footprint	Carbon Footprint	Ecological Footprint
Audio-visual, photo & info. Processing equipment	0.00	0.00	0.01	0.00	0.00	0.03	0.05
Other major durables for recreation & culture	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Other recreational equipment etc.	0.02	0.01	0.13	0.00	0.00	0.03	0.19
Newspapers, books & stationery	0.00	0.00	0.02	0.00	0.00	0.02	0.03
Goods for household maintenance	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Tobacco	0.09	0.04	0.01	0.01	0.00	0.02	0.17
Services	**0.04**	**0.02**	**0.08**	**0.00**	**0.02**	**0.28**	**0.45**
Out-patient services	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Hospital services	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Postal services	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Telephone & telefax services	0.00	0.00	0.01	0.00	0.00	0.03	0.04
Recreational & cultural services	0.00	0.00	0.00	0.00	0.00	0.02	0.03
Package holidays	-	-	-	-	-	-	-
Education	0.00	0.00	0.01	0.00	0.00	0.03	0.06
Catering services	0.01	0.00	0.01	0.00	0.00	0.03	0.05
Accommodation services	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Personal care	0.00	0.00	0.01	0.00	0.00	0.03	0.04
Personal effects nec	0.01	0.01	0.02	0.00	0.00	0.02	0.05
Social protection	0.00	0.00	0.01	0.00	0.00	0.03	0.04
Insurance	0.00	0.00	0.01	0.00	0.00	0.03	0.05
Financial services nec	0.00	0.00	0.00	0.00	0.00	0.02	0.03
Other services nec	0.00	0.00	0.00	0.00	0.00	0.01	0.02
Sub-total short-term Household Consumption	**0.89**	**0.39**	**0.45**	**0.10**	**0.10**	**2.42**	**4.35**
Government paid short term household consumption	0.04	0.02	0.13	0.00	0.03	0.36	**0.58**
Gross Fixed Capital Formation	0.10	0.05	0.55	0.01	0.05	0.71	**1.46**
Total	**1.03**	**0.46**	**1.13**	**0.10**	**0.18**	**3.49**	**6.40**

Table 6: Canada's CLUM 2005 by Food, Housing, Mobility, Goods, Services groupings

	[gha person^{-1}]	Crop Footprint	Grazing Footprint	Forest Products Footprint	Fish Footprint	Built-up Footprint	Carbon Footprint	Ecological Footprint
Household	**Food**	**0.89**	**0.15**	**0.03**	**0.10**	**0.01**	**0.13**	**1.32**
	Food	0.71	0.11	0.02	0.09	0.01	0.10	1.03
	Non-alcoholic beverages	0.07	0.02	0.00	0.01	0.00	0.01	0.11
	Alcoholic beverages	0.11	0.02	0.00	0.01	0.00	0.02	0.17
	Housing	**0.01**	**0.00**	**0.07**	**0.00**	**0.01**	**0.56**	**0.66**
	Actual rentals for housing	0.00	0.00	0.01	0.00	0.00	0.01	0.02
	Imputed rentals for housing	0.00	0.00	0.01	0.00	0.01	0.02	0.04
	Maintenance and repair of the dwelling	0.00	0.00	0.03	0.00	0.00	0.02	0.05
	Water supply and miscellaneous dwelling services	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Electricity, gas other fuels	0.00	0.00	0.02	0.00	0.00	0.51	0.54
	Service for household maintenance	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	Personal Transportation	**0.16**	**0.05**	**0.10**	**0.01**	**0.04**	**1.39**	**1.76**
	Purchase of vehicles	0.02	0.00	0.02	0.00	0.01	0.13	0.19
	Operation of personal transport equipment	0.14	0.05	0.07	0.01	0.02	0.89	1.19
	Transport services	0.01	0.00	0.01	0.00	0.01	0.37	0.39
	Goods	**0.28**	**0.08**	**0.22**	**0.02**	**0.02**	**0.26**	**0.89**
	Clothing	0.06	0.02	0.00	0.00	0.01	0.05	0.14
	Footwear	0.01	0.00	0.00	0.00	0.00	0.01	0.02
	Furniture, furnishings, carpets etc.	0.01	0.01	0.01	0.00	0.00	0.02	0.05
	Household textiles	0.01	0.00	0.00	0.00	0.00	0.01	0.02
	Household appliances	0.01	0.00	0.00	0.00	0.00	0.02	0.03
	Glassware, tableware & household utensils	0.00	0.00	0.00	0.00	0.00	0.01	0.01
	Tools and equipment for house & garden	0.00	0.00	0.01	0.00	0.00	0.01	0.02
	Medical products, appliances & equipment	0.00	0.00	0.00	0.00	0.00	0.01	0.02
	Telephone & telefax equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Audio-visual, photo & info. Processing equipment	0.01	0.00	0.01	0.00	0.00	0.04	0.06

	[gha person^{-1}]	Crop Footprint	Grazing Footprint	Forest Products Footprint	Fish Footprint	Built-up Footprint	Carbon Footprint	Ecological Footprint
	Other major durables for recreation & culture	0.00	0.00	0.00	0.00	0.00	0.01	0.02
	Other recreational equipment etc.	0.03	0.01	0.15	0.00	0.00	0.03	0.23
	Newspapers, books & stationery	0.00	0.00	0.02	0.00	0.00	0.02	0.04
	Goods for household maintenance	0.00	0.00	0.00	0.00	0.00	0.01	0.01
	Tobacco	0.14	0.03	0.01	0.01	0.00	0.03	0.22
	Services	**0.06**	**0.02**	**0.10**	**0.00**	**0.03**	**0.31**	**0.52**
	Out-patient services	0.00	0.00	0.00	0.00	0.00	0.01	0.02
	Hospital services	0.00	0.00	0.00	0.00	0.00	0.01	0.02
	Postal services	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Telephone & telefax services	0.00	0.00	0.01	0.00	0.00	0.03	0.04
	Recreational & cultural services	0.01	0.00	0.01	0.00	0.00	0.02	0.04
	Package holidays	-	-	-	-	-	-	-
	Education	0.01	0.00	0.01	0.00	0.00	0.04	0.06
	Catering services	0.01	0.00	0.01	0.00	0.00	0.03	0.06
	Accommodation services	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	Personal care	0.01	0.00	0.01	0.00	0.00	0.03	0.05
	Personal effects nec	0.01	0.01	0.02	0.00	0.00	0.02	0.06
	Social protection	0.00	0.00	0.01	0.00	0.00	0.03	0.05
	Insurance	0.00	0.00	0.01	0.00	0.00	0.04	0.06
	Financial services nec	0.00	0.00	0.01	0.00	0.00	0.02	0.04
	Other services nec	0.00	0.00	0.00	0.00	0.00	0.01	0.02
	Sub-total short-term Household Consumption	**1.41**	**0.31**	**0.52**	**0.14**	**0.11**	**2.66**	**5.14**
Government paid short term household consumption		0.06	0.02	0.15	0.00	0.03	0.39	**0.66**
Gross Fixed Capital Formation		0.16	0.04	0.64	0.01	0.06	0.78	**1.68**
Total		**1.63**	**0.36**	**1.31**	**0.15**	**0.20**	**3.83**	**7.48**

D. Annex D – Ontario Consumption Land Use Matrix (CLUM)

Ontario Ecological Footprint Result

Table 7: Ontario's CLUM 2010 by Food, Housing, Mobility, Goods, Services groupings

	[gha person^{-1}]	Crop Footprint	Grazing Footprint	Forest Products Footprint	Fish Footprint	Built-up Footprint	Carbon Footprint	Ecological Footprint
Household	**Food**	**0.56**	**0.19**	**0.03**	**0.07**	**0.01**	**0.12**	**0.98**
	Food	0.45	0.14	0.02	0.06	0.01	0.09	0.77
	Non-alcoholic beverages	0.04	0.02	0.00	0.00	0.00	0.01	0.08
	Alcoholic beverages	0.07	0.03	0.00	0.01	0.00	0.02	0.13
	Housing	**0.01**	**0.00**	**0.07**	**0.00**	**0.01**	**0.38**	**0.46**
	Actual rentals for housing	0.00	0.00	0.00	0.00	0.00	0.01	0.01
	Imputed rentals for housing	0.00	0.00	0.01	0.00	0.01	0.01	0.03
	Maintenance and repair of the dwelling	0.00	0.00	0.03	0.00	0.00	0.02	0.06
	Water supply and miscellaneous dwelling services	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Electricity, gas other fuels	0.00	0.00	0.01	0.00	0.00	0.33	0.35
	Service for household maintenance	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	Personal Transportation	**0.11**	**0.07**	**0.09**	**0.01**	**0.04**	**1.32**	**1.64**
	Purchase of vehicles	0.01	0.00	0.02	0.00	0.01	0.12	0.17
	Operation of personal transport equipment	0.09	0.06	0.06	0.01	0.02	0.85	1.10
	Transport services	0.00	0.00	0.01	0.00	0.01	0.35	0.37
	Goods	**0.17**	**0.10**	**0.18**	**0.01**	**0.02**	**0.23**	**0.71**
	Clothing	0.04	0.03	0.00	0.00	0.01	0.04	0.12
	Footwear	0.01	0.01	0.00	0.00	0.00	0.01	0.02
	Furniture, furnishings, carpets etc.	0.01	0.01	0.01	0.00	0.00	0.02	0.05
	Household textiles	0.01	0.01	0.00	0.00	0.00	0.01	0.02
	Household appliances	0.00	0.00	0.00	0.00	0.00	0.02	0.03
	Glassware, tableware & household utensils	0.00	0.00	0.00	0.00	0.00	0.01	0.01
	Tools and equipment for house & garden	0.00	0.00	0.01	0.00	0.00	0.01	0.01
	Medical products, appliances & equipment	0.00	0.00	0.00	0.00	0.00	0.01	0.01
	Telephone & telefax equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00

[gha person^{-1}]	Crop Footprint	Grazing Footprint	Forest Products Footprint	Fish Footprint	Built-up Footprint	Carbon Footprint	Ecological Footprint
Audio-visual, photo & info. Processing equipment	0.00	0.00	0.01	0.00	0.00	0.03	0.05
Other major durables for recreation & culture	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Other recreational equipment etc.	0.02	0.01	0.12	0.00	0.00	0.03	0.19
Newspapers, books & stationery	0.00	0.00	0.01	0.00	0.00	0.01	0.03
Goods for household maintenance	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Tobacco	0.08	0.03	0.00	0.01	0.00	0.02	0.14
Services	**0.04**	**0.02**	**0.08**	**0.00**	**0.02**	**0.28**	**0.45**
Out-patient services	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Hospital services	0.00	0.00	0.00	0.00	0.00	0.01	0.02
Postal services	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Telephone & telefax services	0.00	0.00	0.01	0.00	0.00	0.03	0.04
Recreational & cultural services	0.00	0.00	0.01	0.00	0.00	0.02	0.04
Package holidays	-	-	-	-	-	-	-
Education	0.00	0.00	0.01	0.00	0.00	0.04	0.06
Catering services	0.01	0.00	0.01	0.00	0.00	0.03	0.05
Accommodation services	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Personal care	0.00	0.00	0.01	0.00	0.00	0.03	0.04
Personal effects nec	0.01	0.01	0.01	0.00	0.00	0.02	0.05
Social protection	0.00	0.00	0.01	0.00	0.00	0.03	0.04
Insurance	0.00	0.00	0.01	0.00	0.00	0.03	0.05
Financial services nec	0.00	0.00	0.00	0.00	0.00	0.02	0.03
Other services nec	0.00	0.00	0.00	0.00	0.00	0.01	0.02
Sub-total short-term Household Consumption	**0.88**	**0.39**	**0.44**	**0.09**	**0.10**	**2.33**	**4.23**
Government paid short term household consumption	0.04	0.02	0.13	0.00	0.03	0.35	**0.56**
Gross Fixed Capital Formation	0.10	0.04	0.53	0.01	0.05	0.69	**1.42**
Total	**1.02**	**0.45**	**1.10**	**0.10**	**0.18**	**3.36**	**6.21**

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Table 8: Ontario's CLUM 2005 by Food, Housing, Mobility, Goods, Services groupings

	[gha person^{-1}]	Crop Footprint	Grazing Footprint	Forest Products Footprint	Fish Footprint	Built-up Footprint	Carbon Footprint	Ecological Footprint
Household	**Food**	**0.90**	**0.15**	**0.03**	**0.11**	**0.01**	**0.13**	**1.33**
	Food	0.73	0.11	0.02	0.09	0.01	0.10	1.06
	Non-alcoholic beverages	0.08	0.02	0.00	0.01	0.00	0.01	0.12
	Alcoholic beverages	0.10	0.02	0.00	0.01	0.00	0.02	0.15
	Housing	**0.01**	**0.00**	**0.07**	**0.00**	**0.01**	**0.56**	**0.65**
	Actual rentals for housing	0.00	0.00	0.01	0.00	0.00	0.01	0.01
	Imputed rentals for housing	0.00	0.00	0.01	0.00	0.01	0.01	0.03
	Maintenance and repair of the dwelling	0.00	0.00	0.03	0.00	0.00	0.02	0.06
	Water supply and miscellaneous dwelling services	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Electricity, gas other fuels	0.00	0.00	0.02	0.00	0.00	0.52	0.54
	Service for household maintenance	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	Personal Transportation	**0.19**	**0.06**	**0.12**	**0.01**	**0.04**	**1.57**	**1.99**
	Purchase of vehicles	0.02	0.00	0.03	0.00	0.01	0.15	0.21
	Operation of personal transport equipment	0.16	0.06	0.08	0.01	0.03	1.05	1.39
	Transport services	0.01	0.00	0.01	0.00	0.01	0.37	0.39
	Goods	**0.28**	**0.09**	**0.22**	**0.02**	**0.02**	**0.27**	**0.90**
	Clothing	0.06	0.03	0.01	0.00	0.01	0.05	0.16
	Footwear	0.01	0.00	0.00	0.00	0.00	0.01	0.03
	Furniture, furnishings, carpets etc.	0.01	0.01	0.01	0.00	0.00	0.02	0.06
	Household textiles	0.01	0.00	0.00	0.00	0.00	0.01	0.02
	Household appliances	0.01	0.00	0.00	0.00	0.00	0.02	0.03
	Glassware, tableware & household utensils	0.00	0.00	0.00	0.00	0.00	0.01	0.01
	Tools and equipment for house & garden	0.00	0.00	0.01	0.00	0.00	0.01	0.02
	Medical products, appliances & equipment	0.00	0.00	0.00	0.00	0.00	0.01	0.02
	Telephone & telefax equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	[gha person^{-1}]	Crop Footprint	Grazing Footprint	Forest Products Footprint	Fish Footprint	Built-up Footprint	Carbon Footprint	Ecological Footprint
	Audio-visual, photo & info. Processing equipment	0.01	0.00	0.01	0.00	0.00	0.04	0.07
	Other major durables for recreation & culture	0.00	0.00	0.00	0.00	0.00	0.01	0.01
	Other recreational equipment etc.	0.03	0.01	0.14	0.00	0.00	0.03	0.22
	Newspapers, books & stationery	0.00	0.00	0.02	0.00	0.00	0.02	0.04
	Goods for household maintenance	0.00	0.00	0.00	0.00	0.00	0.01	0.01
	Tobacco	0.13	0.03	0.01	0.01	0.00	0.02	0.20
	Services	**0.06**	**0.02**	**0.10**	**0.00**	**0.03**	**0.32**	**0.54**
	Out-patient services	0.00	0.00	0.00	0.00	0.00	0.01	0.01
	Hospital services	0.00	0.00	0.00	0.00	0.00	0.01	0.01
	Postal services	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Telephone & telefax services	0.00	0.00	0.01	0.00	0.00	0.03	0.05
	Recreational & cultural services	0.00	0.00	0.01	0.00	0.00	0.02	0.04
	Package holidays	-	-	-	-	-	-	-
	Education	0.01	0.00	0.02	0.00	0.00	0.05	0.08
	Catering services	0.01	0.00	0.01	0.00	0.00	0.03	0.05
	Accommodation services	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	Personal care	0.01	0.00	0.01	0.00	0.00	0.04	0.06
	Personal effects nec	0.01	0.01	0.02	0.00	0.00	0.02	0.06
	Social protection	0.00	0.00	0.01	0.00	0.00	0.03	0.05
	Insurance	0.01	0.00	0.01	0.00	0.00	0.04	0.06
	Financial services nec	0.00	0.00	0.01	0.00	0.00	0.03	0.04
	Other services nec	0.00	0.00	0.00	0.00	0.00	0.01	0.02
	Sub-total short-term Household Consumption	**1.45**	**0.32**	**0.54**	**0.14**	**0.11**	**2.86**	**5.42**
Government paid short term household consumption		0.06	0.02	0.15	0.00	0.03	0.38	**0.65**
Gross Fixed Capital Formation		0.16	0.04	0.62	0.01	0.05	0.76	**1.64**
Total		**1.66**	**0.37**	**1.31**	**0.16**	**0.20**	**4.01**	**7.71**

E. Annex E – Consumption Land Use Matrix (CLUM) Methodology

National CLUM

The CLUM indicates the Ecological Footprint associated with purchases in major consumption categories. A CLUM is unique to the economic system of a country, and can often highlight surprising findings that reveal important underlying features of a nation's consumption and its impact on ecological systems.

Within the CLUM, there are two broad classifications:

1. Areas that are under direct short-term influence by households, such as direct consumption under the broad categories of food, shelter, personal transportation, goods, and services.
2. Areas that are under long-term or indirect influence by households, such as gross fixed capital formation and government expenditure.

Gross fixed capital formation may be due to household investment (e.g. new housing), investment by firms (e.g. new factories and machinery), or investment by government (e.g. transport infrastructure). Government consumption relates to the ongoing consumption associated with the functions of the government, some of which might directly and materially benefit households (for example, government-provided school books and school utensils).

Within the areas of direct short-term influence, the top level row categories are shaded in gray: food, housing, mobility (or personal transportation), goods, and services. Each top-level category is further broken down into sub-categories given by COICOP classifications.

Two categories of particular interest are "Electricity, gas and other fuels" under Housing, and "Operation of personal transport equipment" under Mobility. These categories include direct emissions from households due to fossil fuel combustion (e.g. gasoline for transportation and natural gas for heating) which are not passed through the IO analysis.

The columns list each land use type and the total, therefore each cell refers to the Ecological Footprint on a certain land use type resulting from final purchases falling under each consumption category. For example, the grazing land Footprint associated with tobacco purchases is 0.05 gha per capita.

CLUM is generated by using environmentally extended Multi Region Input Output model. Input-Output (IO) analysis is a mathematical tool widely used in economics to analyze the flows of goods and services between sectors in an economy, using data from IO table.

Sub-National CLUM

Sub-national CLUM containing all six major Footprint components is generated through a scaling procedure from the national-level data. Household Expenditure (HHE) is used as a scaling factor for all

Footprint components other than the carbon Footprint. HHE is adjusted by using Consumer Price Index (CPI) to fix the different price levels in national and provincial level. Energy Intensity data was used to scale the carbon Footprint component, as energy intensity is the ratio of Greenhouse Gas Emissions ($ktco_2eq$) to electricity generation (GWh)

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F. Annex F – Ontario Biocapacity Results

Cropland Yield Factor

Ontario's cropland yield factor was developed by scaling Canada's YF (0.69) (wha/nha) based on ratio of yield between Ontario and Canada for different crop types. Yield is calculated as production over seeded area. In case of missing data the most suitable data available was used. See Table 9 below for more information.

Table 9: Ontario agriculture land yield factor

Crop Type	Ontario Seeded area (ha) 2010	Ontario production (000 tonnes per year) 2010	Canada average yield-production over seeded (kg per ha and year) 2010	Ontario average yield (kg per ha and year) 2010	Ontario yield compared to Canadian yield 2010
Spring wheat	46,539	160.6	2,724	3,451	1.27
Winter wheat	329,819	1,763.6	2,724	5,347	1.96
Oats	34,398	75.6	2,026	2,198	1.08
Barley	76,890	256.9	2,725	3,341	1.23
All rye	-	-	1,805	2,500**	1.38
Mixed grains	48,562	133.4	2,700*	2,747	1.02
Grain Corn	758,786	7,747.4	9,662	10,210	1.06
Dry white beans	34,398	82.6	2,100*	2,401	1.14
Coloured beans	22,258	46.7	2,100*	2,098	1.00
Soybeans	987,434	3,048.1	2,938	3,087	1.05
Canola (rapeseed)	28,328	66.7	1,797	2,355	1.31
Hay	1,021,832	5,942.1	4,037	5,815	1.44
Fodder corn	109,265	4,472.4	37,870*	40,932	1.08
Average weighted crop yield per hectare for Ontario					1.26
Yield of crop for Canada for 2010 (National Footprint Account 2014)					0.69
Crop Land Yield Factor					0.87
* data from 2005					
** Ontario average yield- production over harvested (kg per ha) 2010					

Forest Yield Factor

Ontario's forest yield factor is calculated based on the ratio of annual increment per hectares over global forest yield. In absolute numbers, the mean annual increment (PIC) for 2005 was 86,942,000 m3 per year compared to the current estimate of 62,518,000 m3 per year for 2010, whereas the estimate for the world annual increment did not change between 2005 and 2010 (1.82 m^3 per ha). In order to fill

the data availability gap, forest yield for year 2005 was adjusted by using the current estimate of annual increment (2010) instead of mean annual increment reported in 2005.

Table 10: Ontario forest yield factor

Species	*Total Area (ha)*	*Current Annual Increment (000's of m^3 per year)*	*Current Annual Increment (m^3 per hectare per year)*
White Pine	789,788	1,709.8	2.16
Red Pine	174,875	544.9	3.12
Jack Pine	4,752,693	8,069.3	1.70
Black Spruce	12,774,963	22,326.7	1.75
White Spruce	330,990	1,744.6	5.27
Balsam Fir	935,450	4,289.5	4.59
Cedar	765,007	1,321.3	1.73
Larch		937.6	
Hemlock	157,654	318.0	2.02
Other Conifers	258,564	15.4	0.06
Poplar	5,907,699	12,616.1	2.14
White Birch	3,190,415	2,934.4	0.92
Hard Maple	1,838,283	2,498.3	1.36
Soft Maple		1,377.1	
Yellow Birch	165,695	439.3	2.65
Ash		366.2	
Oak	280,896	652.1	2.32
Basswood		149.8	
Beech		196.6	
Other Hardwoods	473,017	11.5	0.02
Total	**32,795,989**	**62,518.5**	**1.91**
Ontario Yield Factor			**1.05**
World Yield			**1.82**

Grazing Land and Other Wooded Land Yield Factor

"Other wooded land" was counted as part of grazing land in NFA 2010. Because there were not sufficient data available to calculate the grazing yield factor for Ontario, the Canadian yield factor was substituted (1.09 wha/nha) in this calculation.

Inland water

Inland water, which includes Ontario's portion of the Great Lakes and all other areas classified as inland water, has yield factor of 1.00 [wha/nha]. This approach is adopted from Global Footprint Accounts for Canada (2010).

Built-up land or Infrastructure

The built-up or Infrastructure yield is set equal cropland yield: In the Global Footprint Network National Accounts Methodology (Ewing et al., 2008), built-up land is assumed to be the same as that for cropland because urban areas are typically built on or near the most productive agricultural lands.

Yield Factor for Ecozones

Net Primary Productivity (NPP) from 2005 and 2010 was used for calculating average productivity of each land type in each ecozones. The YF calculated for province of Ontario was indexed to ecozones using this average primary productivity. NPP is the net amount of energy a plant accumulates during a certain period of time. NPP can also be understood as the amount of mass a plant gains (or how much it grows) over specific period of time. NPP is calculated by subtracting the plant's respiration (the total amount of energy/mass lost by the plant as it breathes) from the gross primary productivity (the total amount of energy/mass taken in by the plant) (Foley et al., 1996; Kucharik et al., 2000).

Table 11: Yield factor estimates by Ecozone for Ontario, 2005 and 2010

Land type	Mixedwood plains 2005	Ontario Shield 2005	Hudson Bay Lowlands 2005	Mixedwood plains 2010	Ontario Shield 2010	Hudson Bay Lowlands 2010
Agriculture	0.82	0.88	-	0.86	0.91	-
Grazing land	1.09	1.09*	-	1.09	1.09*	-
Other wooded land	1.15	1.13	0.68	1.08	1.14	0.64
Wetlands	1.41	1.31	0.93	1.40	1.35	0.90
Forests	1.02	1.06	0.79	0.99	1.07	0.73
Inland water	1.14	1.10	0.69	1.10	1.11	0.64
Infrastructure	0.81	0.86	0.78	0.83	0.94	0.80

*Value set equal to Ontario's YF, since there were not enough NPP data available

Equivalence Factor

Equivalence Factor (EQF) is a scaling factor for converting actual areas in hectares for each land type to their global hectares' equivalence. In order to have consistent and comparable measure EQF is applied both to Footprint and biocapacity. For the purpose of this report, all EQF values were set equal to national data.

Table 12: Equivalence Factors for Canada and Onatrio 2005 and 2010 based on NFA 2014 edition

Land type	Equivalence factors (2005)	Equivalence factors (2010)
Agriculture	2.52	2.51
Grazing land	0.46	0.46
Other wooded land	0.46	0.46
Forests	1.26	1.26
Inland water	0.37	0.37
Infrastructure	2.52	2.51

Table 13: Ontario Areas by Ecozones

Area hectares (ha)	Mixedwood plains	Ontario Shield	Hudson Bay Lowlands	Great Lakes (ON portion)	Total
Agriculture	4,947,028	441,928	-	-	5,388,956
Grazing land	2,184	0.41	-	-	2,184
Other wooded land	62,198	8,104,059	727,168	-	8,893,426
Wetlands	956,267	14,112,769	20,269,844	-	35,338,880
Forests	1,418,206	32,783,648	1,432,111	-	35,633,966
Inland water	367,036	9,119,664	2,269,244	8,752,300	20,508,244
Infrastructure	706,328	303,809	2,777	-	1,012,915

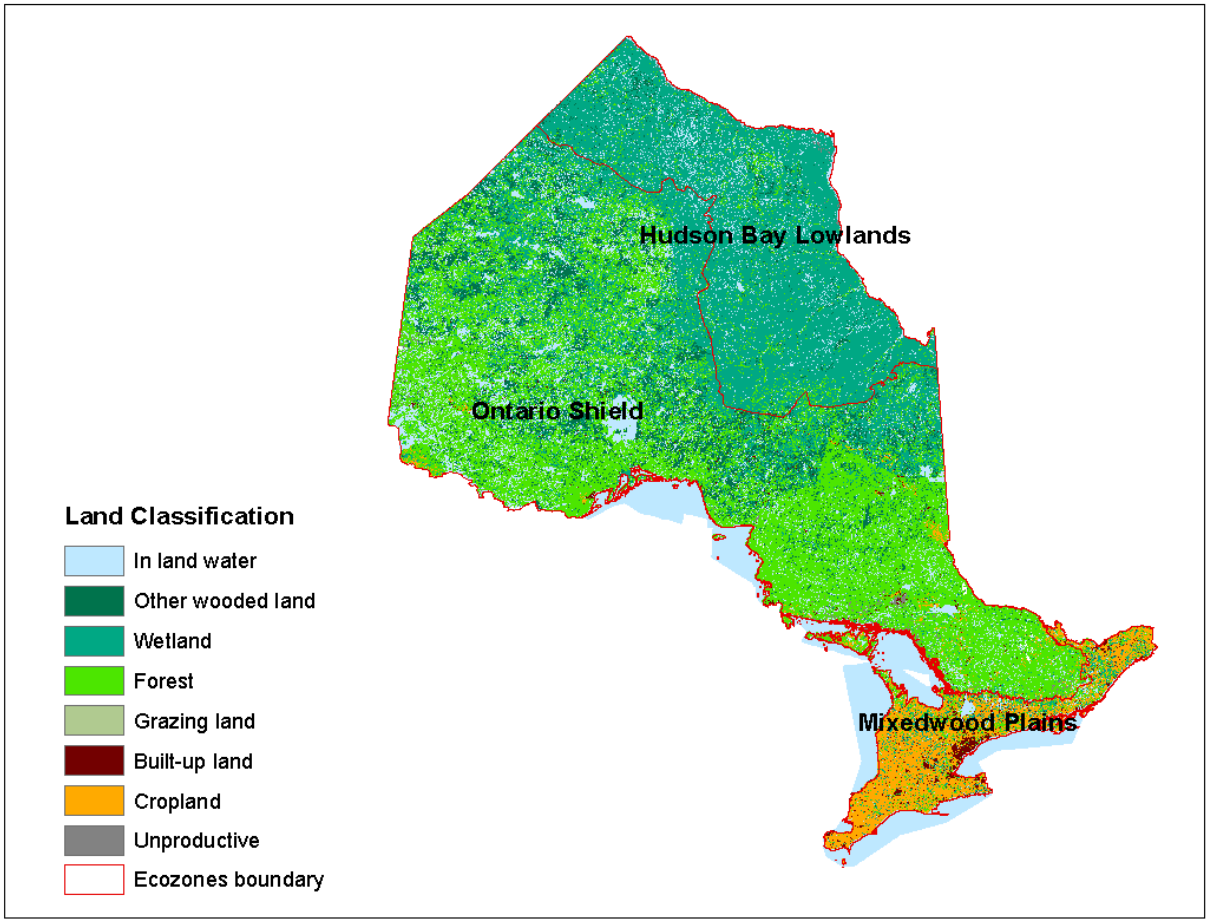

Figure 11: Ontario Map by Ecozones

Table 14: Land-use classification

Code	Name	Global Footprint Network Classification
1	water	in land water
2	shallow water	in land water
3	shoreline	other wooded land
4	mudflats	in land water
5	marsh	in land water
6	swamp	Wetlands
7	fen	Wetlands
8	bog	Wetlands
9	treed peatland	unproductive
10	heath	unproductive
11	sparse treed	Forest
12	treed upland	Forest
13	deciduous treed	Forest
14	mixed treed	Forest
15	coniferous treed	Forest
16	plantation-treed cultivated	Forest
17	hedge rows	other wooded land
18	disturbance	other wooded land
19	open cliff and talus	unproductive
20	Alvar	other wooded land
21	san barren and dune	other wooded land
22	open tallgrass prairie	Grazing
23	tallgrass savannah	Grazing
24	tallgrass woodland	Grazing
25	sand/gravel/mine tailings/extraction	unproductive
26	bedrock	unproductive
27	community/infrastructure	Built-up
28	Agriculture and undifferentiated rural land use	Cropland
-99	other	unproductive
-9	cloud shadow	unproductive

G. Annex G – Glossary of Footprint Terms

Biocapacity: The capacity of ecosystems to produce useful biological materials and to absorb waste materials generated by humans, using current management schemes and extraction technologies.

Carbon Footprint: The carbon Footprint measures CO2 emissions associated with fossil fuel use. In Ecological Footprint accounts, these amounts are converted into biologically productive areas necessary for absorbing this CO2. The carbon Footprint is added to the Ecological Footprint because it is a competing use of bioproductive space, since increasing CO2 concentrations in the atmosphere is considered to represent a build-up of ecological debt.

Consumption Land Use Matrix (CLUM): Starting with data from the National Footprint Accounts, a Consumption Land Use Matrix shows the six major Footprint land uses (shown in column headings, representing the five land types and CO2 area) allocated to the five Footprint consumption components (row headings). For additional resolution, each consumption component can be disaggregated further. These matrices are often used as a starting point for sub-national (e.g. state, county, city) Footprint assessments. In this case, national data for each cell is scaled up or down depending on the unique consumption patterns in that sub-national region compared to the national average.

Ecological Footprint: A measure of how much area of biologically productive land and water an individual, population or activity requires to produce all the resources it consumes and to absorb the waste it generates, using prevailing technology and resource management practices.

Equivalence factor: A productivity-based scaling factor that converts a specific land type (such as cropland or forest) into a universal unit of biologically productive area, a global hectare.

Global hectare (gha): Global hectares are the accounting unit for Footprint and biocapacity accounts. These productivity weighted biologically productive hectares allow researchers to report both the biocapacity of the earth or a region, and the demand on biocapacity (the Ecological Footprint). A global hectare is a biologically productive hectare with world average biological productivity for a given year.

Land or area type: The Earth's approximately 12 billion hectares of biologically productive land and water areas are categorized into five types: cropland, grazing land, forest, fishing ground, and built-up land. Forests serve two distinct, competing uses: Forest products and CO2 sequestration.

National Footprint Accounts: The central data set that calculates the Footprint and biocapacity of the world and more than 200 nations from 1961 to the present.

Primary product: In Footprint studies, a primary product is the least-processed form of a biological material that humans harvest for use. There is a difference between the raw product, which is all the biomass produced in a given area, and the primary product, which is the biological material humans will harvest and use.

Productivity: The amount of biological material useful to humans that is generated in a given area. In agriculture, productivity is called yield.

Yield factor: A factor that accounts for differences between countries in productivity of a given land type. Each country and each year has yield factors for cropland, grazing land, forest, and fisheries.

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