

DESCRIBING THE TORONTO AND GREATER GOLDEN HORSESHOE CITY REGION FOOD SYSTEM



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Acronyms:

GGH: Greater Golden Horseshoe

GH: Golden Horseshoe

GHFFA: Golden Horseshoe Food and Farming Alliance

Overview

The city region of Toronto occupies a significant and unusual landscape in southern Canada that comprises the Greater Golden Horseshoe (GGH) in a half-loop around the western end of Lake Ontario. Radiating outwards from Canada's largest city, 50% of Canada's best farmland, some of the highest population growth in North America, along with almost unchecked urban sprawl, and magnificent natural areas like the Niagara escarpment vie with each other for protection, function and access. The conflicting pressures can result in acrimonious disputes, as when protected countryside such as the Greenbelt reduces farmer control over sale of their land, or municipalities allow suburban development on Canada's scarce Class 1 farmland. On the other hand, the proximity of uses, demands and infrastructure has the potential which is often realized to be a vibrant foodshed that combines production for urban markets, recreation, dense labour markets for processing and accessible retail markets, population scale and diversity sufficient to support farmers' markets, CSAs, family farms and sustainable food ventures, and a potential for food system planning that can support those who eat as well as those who grow food.

The New Urban Agenda, adopted during Habitat III in Quito, Ecuador in October 2016, recognises that urbanisation has increasingly linked cities with their peri-urban and rural hinterland, spatially as well as functionally. Integrated territorial approaches to food system development are characterised by planning of and interventions in a specific territory (including both more rural and more urban areas in a defined space), at the same time as addressing the development of multiple sectors, implemented by a range of stakeholders and multiple vertical and horizontal levels of government (CFS, 2016).

"In the latter half of the 20th century the world's urban population trebled in size and for the first time in human history, more than 50% of people were classed as urban dwellers. By 2050, two thirds of the planet's population is expected to be living in urban areas." (FAO 2015).

This city region food system approach has begun to gain ground since 2013. The approach assesses the possibilities of linking urban and rural potential and needs to create vibrant and resilient local economies and communities with sustainable food production enterprises. As noted in the [Urban Agriculture Magazine on City Region Food Systems](#) of the RUAF Foundation "food systems are recently being considered key in operationalizing, among other things, the integration of rural-urban linkages, planning and climate-change adaptation at the territorial level" (2015: 4). Food system thinking is able to address issues at the level of territories, combining and linking issues from more narrow sets of stakeholders and interests.

As more than half the world's population resides in urban areas, the links between urban and rural areas, and the mobilization of food-growing areas both urban and rural, has become an urgent issue. In Canada over 80% of the population is in the cities, most of these within a few hundred kilometers of the U.S. border. The GGH is home to almost ¼ of Canada's total population. As Toronto Public Health points out in their 2010 *Cultivating Food Connections* report, "Food system thinking is a way of seeing the bigger picture, of developing solutions to food problems by seeing and leveraging their connections to other health, social, economic, and environmental issues." (TPH 2010: 5).

This report highlights research done in Toronto. This research is part of the [CityFoodTools project](#), assessing City Region Food Systems (CRFS) in seven cities, including Toronto, Utrecht

(The Netherlands), Lusaka and Kitwe (Zambia), Colombo (Sri Lanka), Quito (Ecuador and Medellin (Colombia). Overall, the research project seeks to map and assess city region food systems in different locations, identify opportunities for change towards greater sustainability, and plan for city region food policies and strategies. This first report identifies the parameters and character of the existing food system.

As noted by RUAF and the Food and Agriculture Organization of the United Nations (FAO), a city region approach does not assume that market forces will deliver all that is needed for local consumers or for local food producers, distributors or processors. The CRFS approach “recognises the central role of the private sector in the food system, but is based on the understanding that public goods will not be delivered by market forces alone, and that greater transparency and democratic participation are prerequisites.” (FAO 2015: 28). The question for policy development is how to balance the overlapping forces, pressures and needs.

The CRFS Toronto Task Force identified the vision for the local city region food system during the planning phase of the project: “Healthy food for all, sourced as regionally as possible, and as sustainably produced, processed, packaged, and distributed as possible”. The vision engages all aspects of the food system, and demands an approach that considers sustainable rapprochement among interlocking and overlapping needs.

The Toronto and GHG city region food system vision:
“Healthy food for all, sourced as regionally as possible, and as sustainably produced,
processed, packaged, and distributed as possible”.

This report first reviews interlocking, overlapping and conflicting demands of different sectors and interests. The report then reviews each food system area in the Greater Golden Horseshoe built from a database of basic numbers and indicators identified as critical during Task Force planning. This report provides the framework for Phase 2 primary research, with the eventual goal of identifying and populating the critical indicators, and identifying policy directions for positive change. An FAO report (2015: 66) argues that, “This approach seeks to strengthen the functionality of ecological, socio-economic and governance linkages across the rural urban divide in a given geographical region, in order to consciously plan and facilitate the emergence of food systems that avoid many of the adverse consequences described above, and maximize the delivery of public goods on a more egalitarian basis: across rural-urban boundaries and income divisions.”

The Greater Golden Horseshoe: A Conjunction of Stakeholder Interests

Summary

A city region is “the complex network of actors, processes and relationships to do with food production, processing, marketing, and consumption that exist in a given geographical region that includes a more or less concentrated urban centre and its surrounding peri-urban and rural hinterland; a regional landscape across which flows of people, goods and ecosystem services are managed.” (www.cityregionfoodsystems.org). The CRFS Task Force identified the Greater Golden Horseshoe (GGH) as Toronto’s city region.

This first report reviews and aggregates the secondary research across the food system in the Greater Golden Horseshoe. Wherever possible, more than one dataset was reviewed and compared. In some cases (for instance, some environmental measurements) the methodology for assessment may still be under development, but in general the report focuses on sources that use accepted and professional methods of collection (such as Statistics Canada). The situational analysis here sets the framework for the primary research phase and subsequent report.

Although little primary production occurs within the Greater Golden Horseshoe urban municipalities (though that is changing), the horseshoe that stretches from just east of the Toronto around the tip of the lake to the prime wine and fruit-growing Niagara region represents a key agricultural area for Ontario and one of the most prolific and diverse food growing regions in Canada. The 32,000 square kilometers incorporates 41% of Ontario’s farms, over 50% of most food manufacturing, 21 upper and single tier municipalities, 89 lower tier municipalities, and around 65% of agri-food jobs according to a recent Synthesis report (GHFFA 2016: 8, 25, 28). Around 40,000 jobs in agriculture alone are sustained in the Golden Horseshoe (a slightly smaller area than the GGH) (Walton 2014: 2.37). A recent study puts primary agricultural jobs at 35,584, indicating both dwindling numbers and perhaps a different statistical analysis (GHFFA 2016). Over 200 different agricultural products are grown or raised in the GGH (Ibid.: 1.2).

Population in the GGH is growing and is predicted to continue to grow at 1.4% compounded annually. By 2031 the total Golden Horseshoe population is forecasted at almost 9.6 million (Walton 2014: 3.2). The Greater Golden Horseshoe is expected to see population increases of over 4 million in the next 30 years (Allen and Campsie, 2013: 1).

General trends in the GGH show a preponderance of small to medium scale farms but a tendency towards consolidation, as Gross Farm Receipts (GFRs) continue to rise but the number of farms and acreage is dropping (Walton 2014). This can mean both higher food prices as well as higher productivity, and can mean the loss of jobs and related knowledge. Although food system jobs have been increasing, these are generally in the realm of food services, many of which are transnational corporations that contribute less to economic multipliers than regionally owned and operated retail markets.

Despite the high agricultural productivity of the area, opportunities for regional processing have dropped significantly (Carter-Whitney and Miller 2010); producers must send raw ingredients abroad for processing, weakening the overall food system as the higher manufacturing margins go to other regions or countries.

The GGH region is also home to important environmentally sensitive areas, and includes most of the area protected under the Greenbelt plan. Estimates of the value of ecosystem services are high: “This report quantifies the value of the ecosystem services provided by the Greenbelt’s natural capital, revealing the annual value of the region’s measurable non-market eco-system services at an estimated \$2.6 billion annually; an average of \$3487 per hectare.” (Wilson 2008: 1). The agricultural areas alone account for a significant portion of this value: “The Greenbelt’s agricultural lands total value is also substantial at an estimated \$329 million per year including cropland, idle land, hedgerows, and orchards. Key values include the pollination value of idle land and hedgerows, the storage of carbon in soils, and the cultural value of agricultural lands.” (Wilson 2008: 2). Wilson (2013: 5) notes that “Between 1996 and 2001, 16% of the prime farmland in the region was lost to urbanization.”

The Advisory Panel on the Coordinated Review of the Growth Plan for the Greater Golden Horseshoe found that the diversity and mixed land uses of the GGH were valued by the resident population: “We heard that people value a diverse mix of land uses and housing types, a range of employment opportunities, high-quality public open space, a variety of transportation choices, and easy access to stores and services. We call these places ‘complete communities’” (Advisory Panel 2015: 11; see also Growth Plan for the Greater Golden Horseshoe 2006: 7). “Complete communities” may require a different lens to measure impact, goals and conduct planning; they require robust and effective approaches to problem-solving, conflict resolution and long-term participatory planning involving all stakeholders. The Golden Horseshoe Food and Farming Alliance, the Toronto Food Policy Council, and other stakeholders have begun this task, bringing diverse stakeholders together to participate in planning and policy-making.

The diversity of jurisdictions and regulations, often contradictory and overlapping, can be frustrating (Caldwell and Proctor, 2013), while access to excellent growing conditions and lucrative markets in the GGH as well as the eastern United States for export-oriented producers continue to be a draw for food producers. A variety of planning acts seek to reconcile the different users in the area: “The 2006 Growth Plan for the Greater Golden Horseshoe was prepared under the Places to Grow Act and works in concert with the Greenbelt Plan to ensure that communities can accommodate new settlement while still protecting the natural areas and farmland that provide critical ecosystem services for residents, such as clean air, water, and local food.” (Wilson 2013: 8).

External legislation and arrangements like trade deals also affect the food systems in the area. The ability to make change is not distributed evenly among all actors, a fact that can lead to frustration as well as new initiatives to change the status quo. “Power circulates and value accrues at different stages along the chain, partly determined by enabling conditions such as subsidies, trade rules, transport infrastructure and business norms.” (FAO 2015: 17).

In summary, demands for land use in the GGH come from agriculture, housing, food security challenges, recreation, industrial use, infrastructure for all uses, and aggregate extraction. These can be compatible, as in the case of farmers who promote agri-tourism with hay-rides and corn mazes, or on-farm stores that combine marketing with production, or incompatible, as in the aggregate extraction sites where rehabilitation for agriculture has only been partially effective.

A variety of pressures are driving food producers away. Walton (2014: 2.21) observes that uses that are incompatible with near-urban development, such as livestock, tend to move to the

periphery (see also GHFFA 2016: 45). Likewise, food production that requires high capital investment tend to focus elsewhere, as tenure uncertainty, increase in rental properties, and the encroaching urban edge can reduce the appeal of long-term investment for food producers. The diversity of potential users, including many who can realistically pay more than farmers, drives the property values up, to the point that new agricultural producers cannot get entry to the area (Walton 2014: 2.32). The report from Advisory Panel for the review of the Growth Plan (2015: 73) observed that,

The development sector has generally assumed that the lands below the Greenbelt will eventually be urbanized, and most of these lands have now been purchased or optioned by investors. This has led to significant impacts on the viability of agriculture, including an increase in the number of tenant farmers, lack of investment in agricultural infrastructure, fragmentation of the land base by development-related uses, and near-urban pressure on agricultural operations.

Food production has been estimated to engage economic multipliers of 2-3 times the original impact of farmgate sales. This means that food production activities provide revenues to a municipality in the form of jobs, taxes and indirect impacts like revenues from farm supply stores, large animal veterinarians, and farm equipment suppliers. The revenues from agriculture tend to circulate, going to income for local residents, who may spend some of it at local stores, and support additional jobs and businesses through the circulation of this money. Other businesses, such as transnational corporations, tend to remove profits from local economies and aggregate it elsewhere, often in other countries, and to rely on specialized equipment and expertise that is not available locally. This process of multiplying agricultural revenues locally and building local economies can be a long-term process, with new jobs and businesses gradually forming as the process unfolds. In comparison, housing development creates short-term profits for a non-local developer, and short term construction jobs (often taken by people who are non-residents). Housing also costs the municipality through requirements for new public infrastructure like water and sewage.

The long-term resilience of strong local economies, with money circulating from local farms to local markets and farm suppliers through local jobs and back to local food producers can be undermined by the appeal of immediate short-term profit from the sale of land to the highest bidder, generally housing development. The actual higher cost of housing development, particularly sprawl, in new infrastructure like water and sewage to service the new developments is generally paid by the municipality through tax-payer funds in Ontario. Development charges to offset these costs have generally not been effective or applied to move the cost of sprawl to those who profit from the development (Baumeister 2012).

Sectoral Demands and Stakeholder Interests in the GGH

Residential and related infrastructure

The Growth Plan (2006: 22) summarizes the problem from the point of view of housing development. The GGH has experienced “increasing demand, low-density land-use patterns and historic underinvestment have resulted in a substantial infrastructure deficit.” Yet some have argued that the Growth Plan did not go far enough, setting density targets that were either “business as usual” or were ignored by municipalities in their local plans. Allen and Campsie, writing for the Neptis Foundation (2013: foreword), discovered that the plan would lead to the urbanization of almost 107,100 hectares of land, increasing the urbanized area by an area about half the size of the City of Toronto. Yet the predicted 4 million new residents to the area will need to live somewhere; the City of Toronto is not even included in the plan because it is already fully built.

The problem engages cultural issues of “home” and Canadian identity. For many Canadians, urban life is not considered appealing; Canadian identity is often expressed in images of wilderness and nature despite the fact that the vast majority of us live in cities. The idea of living in closely packed condominium spaces or, in the case of low income people, towers with no local amenities or green space, does not meet the Canadian dream of home (similar to the American dream, though perhaps with more water). Sky-rocketing urban housing prices means that fewer people can afford homes or condominiums in Toronto, a process that further drives people out to suburban developments in search of a place to live.

This is not insoluble; the residential development need confronts a legacy that has under-emphasized the opportunity to make urban areas and urban communities places that offer convenient and affordable access to amenities, including healthy food, sufficient living space, healthy shared water areas like the Great Lakes, and access to urban agriculture areas. Food growing in Toronto has been reduced to the point that the census of agriculture no longer assesses the city area. Yet the Toronto Food Policy Council and the City of Toronto, working with Toronto Hydro, are exploring new urban areas to grow food for urban people. Such projects can begin to break down the barriers that see rural areas for food production and urban areas for consumers, and to recognize the potential for urban areas to provide the kind of living space that meets both needs and desires.

Agriculture

As noted above, some kinds of agriculture co-habit near-urban areas with difficulty. Large livestock operations can result in noise and odor complaints; export orientation for large farms can mean that a more rural area with easy access to transportation corridors is more important than urban markets. Export-oriented farmers with large consolidated farms across multiple farm parcels are more likely to find themselves in conflict with “urban refugees” who buy rural estates on prime farmland but commute to city centres for their incomes. They expect to find a pastoral idyll; the industry of farming, with noise, dust, chemicals, and odor can be a shock. For farmers where expansion is the main growth opportunity, competing with urbanites for new parcels is frustrating as the urbanites are able to pay much more for the rural property than a farming operation can justify (generally agricultural rates per acre should be no more than \$10,000 per acre, while land values in the GGH area have risen to 20K/ acre and above).

Some kinds of agriculture thrive on the proximity of urban markets, and build on the rapidly growing support and interest in direct purchases of fresh local food. Farmers' markets, CSAs, pick-your-own operations and on-farm stores all benefit from proximity to urban areas. Likewise specialty crop and organic/ sustainable operations that sell to the growing local food stores, co-ops and local food-oriented chefs and butchers, or to the expanding ethnic populations, all benefit from operating in the area. Alternative and mixed farming operations may be under-reported as the census identifies farms by their majority crop (that is, a farm that produces 60% hogs, and 40% mixed fruits and vegetables would be identified as a "hog farm").

All kinds of agriculture require nearby infrastructure for farm supply, marketing, processing, storage and distribution. The need for infrastructure applies to urban and rural farming alike: "Appropriate facilities such as washing stations, community and commercial kitchens, business incubators and packing centres are critical for realizing the full economic potential for urban agriculture." *GrowTO: an urban agriculture Action Plan for Toronto*: 16). Agricultural community that goes beyond farmland to include secondary infrastructure from storage to farm supply is crucial for the persistence of agriculture. One study (Daniels 1997: 72) in the U.S. found that for every 1 acre that is converted from agriculture, three acres are lost as infrastructure dwindles and other farmers also move away. Reports show that processing infrastructure has decreased in the GGH over the last few decades, leaving a significant gap in the regional food system (Carter Whitney and Miller 2010; Synthesis 2016).

Ecosystem

The GGH foodshed occupies a significant area of environmentally sensitive lands that provide important ecosystem services. The GGH includes watershed for urban areas, extensive wetlands and forests, and important geological structures such as the Niagara Escarpment and the Oak Ridges Moraine. A study of the watersheds just in the Greenbelt (Molnar and Iseman 2012: 6) describes the Greenbelt's 1.8 million plus acres: "It intersects four major watersheds and protects the range of habitats contained within them, from the headwaters and riparian forests, to the streams and groundwater reserves." Assessing the impact of agriculture and food systems can be challenging. A recent report (Cummings 2014: 2) notes that, "There is no single or collection of standard and generally accepted environmental indicators that adequately capture the environmental impacts of the three systems [production, consumption, transportation]."

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(Cummings 2014b: 2)

Agriculture also provides important services in ecosystem protection and management. Wilson (2008: 1) provides estimates of the Greenbelt's ecosystem services, estimating a total of \$2.6 billion/ year in value, an average of \$3487/ hectare. Wilson (2008: 11) assesses an array of ecosystem services, including water regulation, climate regulation, soil retention, nutrient cycling, waste treatment, pollination, habitat and recreation. Tomalty's *Carbon in the Bank* report (2012) assesses carbon storage and sequestration for the same area, finding storage values of \$919/ hectare/ year for forests, \$429 to \$1360/ year for wetlands, and \$300/ year for agricultural soils. Wilson's work (2013: 10) identifies a range of techniques for assessing the ecosystem services, including "1) assessing economic damages; 2) the willingness of individuals to pay for goods and services; 3) the willingness to accept compensation for losses".

Although ecosystem stewardship is sometimes seen to be in conflict with agriculture, the problem is exacerbated by assumptions that environmental and agricultural needs are in different realms. “There is a perception that there are many environmental impacts associated with agricultural practices. There are also many regulations, policies, programs and sources of information designed to mitigate these impacts. Through evaluation of existing resources and information, it became apparent that there is little data to evaluate the actual extent of environmental impact from farming.” (Walton 2014: 5.13). As Walton points out, this has meant that the protection and stewardship provided as part of agricultural operations does not tend to be measured, though there are many positive effects and synergies between ecosystem protection and strong agricultural systems. She lists for instance biodiversity, habitat, wildlife corridors woodlot services such as windbreaks, reduction of soil loss, water filtration, and natural landscape preservation (Walton 2014: 5.1).

Some kinds of agriculture may contribute more; mixed use farming offers more biodiversity and pollinator options. Animals can contribute manure for future crops; small farm parcels can mean more windbreaks dividing farms and parcels, reducing soil erosion. Many windbreaks and hedgerows have important pollinator attractors, further enriching the local agricultural and eco-systems. Graves et al (2015: 135) in their review of resilience in food systems note that “More complex systems have been shown to be more resilient.” MacRae et al. 2013: 950) cites studies that show reduced energy consumption from sustainable practices “usually attributable to the absence of synthetic fertilizers, particularly nitrogen, and synthetic pesticides.”

Graves et al. (2015: 144) argue that for questions of ecosystem protection through reduction in soil erosion, the type of agriculture may not matter as much as good soil management. The greatest opportunity for energy reduction in the food system may be in greater consumption of fresh foods (due to high levels of energy use in processing), reduction of storage energy (through local distribution schemes) and reduction of wasted food and its associated unnecessary energy consumption (MacRae et al. 2013).

This section is meant to provide only a general overview. Specific emissions by sector will be addressed in the food system areas later in this report.

Industrial

The Greater Golden Horseshoe is home to over 50% of Ontario’s agri-food manufacturing. Industrial development has been shown to bring revenue to a municipality in Cost of Community Services studies, as does agriculture (whereas residential development has been shown to cost tax-payers money) (see for instance Daniels 1997: 55). The needs for industrial developments are specific and not always compatible with other sectors. Food manufacturing requires access to water and waste disposal, convenient access to labour markets (nearby urban areas), access to functioning transport corridors, zoning approvals and, in the case of large facilities, facilitated trade arrangements. Municipalities will change zoning and make special tax or subsidy arrangements to attract large-scale manufacturing to the area.

Many forms of industry are not particularly compatible with other uses; as welcome as beer may be to the Canadian population, the production of it can produce noise, odor and air pollution that are less welcome. Likewise, as non-farmers take up residence near working landscapes, abattoirs may seem objectionable sources of smell, waste and noise, not to mention offending those who are used to their meat coming in a neat package rather than vocal and packed tightly on a truck. However, longer distance transportation for abattoirs can lead to more injured and sick animals, as well as unsustainable transportation costs. Certain food processing plants, such as pea and vegetable freezing facilities, must be within a fairly limited distance from the farms they serve. Peas for instance rapidly lose their sugar content and must be frozen as quickly as possible. The loss of freezer facilities means that farmers cannot just send their peas elsewhere; they must turn to other crops.

Case: Greenbelt Greenhouse

This commercial scale greenhouse has innovations from soil to labour practices. The 1 acre greenhouse is owned and operated by Ian Adamson, who began to develop his special growing approach to microgreens in 1998 (<https://greenbeltgreenhouse.ca/about-us>). He opened Greenbelt Greenhouse in 2010. Unlike most sprout operations, their micro-greens are grown in soil, which permits them to receive organic certification (hydroponic greens cannot qualify for organic certification).

The state of the art facility boasts powerful LED lights, huge flats of about fifteen different types of microgreens, a customized soil mix and mixing equipment, seeding, washing and packing equipment, heated floors, and a ready market of chefs and natural food stores supporting the product. The micro-greens take about a week to grow to market size, and are picked by 10 am for next day shipping. The entire cycle is rapid and flexible to respond to changing market demands.

Despite the state of the art machinery, often customized for their operation, the work can also be labour intensive. The greens are sorted by hand, the huge trays are pushed on the hanging rollers from one side to another. Adamson refuses to hire offshore labour however, despite the challenges with competing on price with imported product.



(Case: Greenbelt Greenhouse continued)

The initial greenhouse is impressive enough, with hanging mechanisms to convey the big trays from one end to the other and the tiny greens in vibrant colours from green to red and into purple. But next door another space of similar size is under construction, as well as a new space located on another site. The Greenbelt Greenhouse is in the Holland Marsh, just north of Toronto, within easy reach of the urban markets farther south. Their marketing target is mid-scale retailers, and a diversified market to spread the risk.

Although the environmental impact of greenhouse operations is high, Greenbelt Greenhouse invested in the LED lights because they induce better flavour. The LED lights will provide significant savings in energy costs for such an operation, so the investment will pay off as well as contribute to reduced energy use. The lights are only needed three months of the year. They now buy their compost from Quebec, but would prefer to make their own. Ultimately they would like to compost and reuse the soil mix, but they must solve the problem of seeds from previous plantings showing up in recycled soil. The new facility will use wood-fired combustion heat.

Aggregate extraction

Resource extraction has become a sore point in the Greater Golden Horseshoe. Thousands turned out to protest the Melancthon limestone quarry on prime farmland and watershed north of Toronto. It would have been the largest open pit limestone quarry in Canadian history (<http://www.ndact.com/>); protests inspired the foreign owners to sell the land back to farmland investors. However, if the municipality had wanted to halt the operation themselves, they did not have legislation to prevent it. Aggregate extraction is permitted even in protected countryside such as the Greenbelt.

On the other hand, with the need for housing for the millions of people moving to the area, aggregates are essential for the construction industry, particularly for densification. The Advisory Panel (2015: 111) for the Greenbelt Plan review reports that “The GGH consumes approximately 90 to 100 million tonnes of aggregate per year, more than half of Ontario total consumption... About 35 per cent of this amount is produced within the areas of the four plans.” The transportation corridors that move all the people and goods around also require aggregates. Aggregates are expensive to transport, so extracting them close to where they will be used is much more cost-effective (and reduces emissions from long-distance transport).

Generally, land converted out of food production may be difficult to return to agriculture; urban centres, factories and mining can leave toxic grounds behind (brownfields) that would make agricultural activities difficult. Asphalt is so toxic that disposal is highly regulated; Toronto homeowners that replace their driveways with more eco-friendly materials (or gardens) find themselves challenged to get rid of the resulting chunks of tar. Over the long-term, land uses are not always compatible; short-term decisions for windfall profits may curtail our later options.

Protected land covenants

North American and European jurisdictions have used zoning regulations to protect or permit certain uses in a range of circumstances. Fishel (in Cole 2012: 260) writes “Zoning extends to local voters (or to those who are decisive in local politics) the right to control other people’s property within a jurisdiction.” The Greater Golden Horseshoe is home to numerous zoning restrictions, including the protected areas of the Greenbelt, Niagara Escarpment, and Oak Ridges Moraine, but also industrial, residential and commercial zoning. The Greenbelt and other protected areas overlap. However, the boundaries are not matched with each other, or with the Golden Horseshoe or the larger Greater Golden Horseshoe area. The three protected countryside and rural zones provide overlapping and sometimes contradictory stipulations designed first and foremost to protect environmentally sensitive areas. They also protect existing uses such as agriculture, while allowing certain priority uses such as aggregation extraction or designated development percentages for future population growth.

From the point of view of farmers, who felt the Greenbelt protected area was imposed without their input, the boundaries, which follow environmental protection lines, are arbitrary, cutting farms apart and dividing prime farmland on either side. Some have suggested that the best approach, given the importance of southwestern Ontario’s fertile farmland to the viability of the food system, would be for the whole province to be “greenbelted”, with new designations for housing then ruled as needed. The JRG Consulting group (2014: 9) notes that: “the Greenbelt accounted for approximately 88% of the area farmed in the Golden Horseshoe, and 90% of the total number of farms in the Golden Horseshoe. In the Greater Golden Horseshoe, the Greenbelt made up 24% of farmland and 31% of farms.” That is, the Greenbelt corresponds closely to agricultural lands in the Golden Horseshoe, but when the focus is expanded to the Greater Golden Horseshoe just beyond the Greenbelt, the protected area covers much less than half of the farmland and farms. The difference indicates the extent of near-urban unprotected farmland.

Deaton and Vyn (2010: 141) write that, “There is no clear consensus in the literature as to the nature of the effects of zoning or conservation easements on the value of agricultural properties.” The zoning may also not have changed the general progress of change within the GGH borders, though it may have slowed the land conversions somewhat. A Golden Horseshoe

Food and Farming Alliance report (2014: 2.37) shows that “While the establishment of the Greenbelt may have slowed the decline in some regions and improved support for farm practices, it did not slow the overall decline of the number of farms or area of farmland in the GH and there continues to be uncertainty within the near urban area about the future of agriculture.”

The GH continues to lose farms and farmers at about the same rate as the province as a whole. Although the decline is a cause for concern, the development pressure in these areas suggests that the loss rates might be much higher with the protected areas. The face of farming has also changed, with livestock and large operations moving to the fringes of the Greenbelt or out of the zone. Rental tenure has increased as would be expected in a rural area near a rapidly expanding urban territory. One study found that decline in fruit farming was lower than the rest of the province, but since the climate is ideal in the area for fruit, that might be predictable regardless of zoning. The economic impact of near-urban agricultural activity may be higher than in other areas. A focus on higher value crops like fruits and vegetables can mean higher revenues as well as more labour intensive work with more jobs. One report (JRG Consulting 2014: 20) for the Greenbelt Foundation found that “This suggests that the average Golden Horseshoe farm operation supports more families through employment than farms outside the region. Farming in the region is more labour-intensive; this reflects its much larger proportion of Ontario’s horticulture output.”

Some leapfrog development has occurred over the Greenbelt zone, with prime farmland converted to housing just over the Greenbelt border in the GGH. The GH Food and Farming Alliance (2014: 2.37) reports that “A trend of converting farms to rural estates in the rural areas of the GH drives up land prices in certain areas and increases conflicts.” The housing pressure that has moved outside the Greenbelt has made agricultural even more tenuous in some cases, as developers are beginning to break rental contracts to seize the moment of development. Even the one year leases that farmers are offered now may not guarantee access to their farm. The increase in farmland rentals has both economic and social impacts. Walton (2014: 2.7) notes that “A farmer with a year-to-year rental agreement is not going to plant crops that require capital investment and a number of years to reach full production.” Higby writes, “Recent studies confirm what we all know intuitively—oral and year-to-year leases offer little incentive to use resource-conserving farming practices, while long-term leases that offer relatively secure tenure stimulate good management” (Ruhf 2004: 67).

Although many farmers feared the loss of property value when they were designated in the Greenbelt, it is unclear if that has come to pass. For farmers, who have taken on increasing debt as the amount they receive for their products has remained frozen in real dollars at 1970s levels, they can only clear the debt and retire by selling at the highest rate. This highest bidder close to urban areas is inevitably a housing developer rather than another farmer. A recent study (Deaton 2010) shows that the Greenbelt land values have diminished near the urban centres but not at the fringes, suggesting that developers and farmers expect the fringes to be converted but not the centre. The researchers write, “We find that Ontario’s Greenbelt decreased the value of agricultural property in close proximity to urban areas: i.e., agricultural property with the greatest likelihood of development in the short term” (Deaton 2010: 142)¹.

¹ The prices that they cite for Greenbelt land seem unusually low both before and after the zoning occurred (compared to anecdotal reports as well as real estate assessments), perhaps a result of the focus on MPAC registered land transactions.

It remains unclear what effect the zoning strategy has on the local agricultural economy. Local municipal officers report promotion of local food and farming and engagement with the sector through Agricultural Advisory Committees and other means. They report (Hertel 2015) however that this attention has more to do with economic development than the requirements of the Greenbelt Plan, though the results are in support of the Greenbelt goals and mandate. They support a range of promotional events and activities for the sector, including farmers' markets, farm directories, local food maps, farm tours for staff and councilors, support for value-added on-farm activities, and specific staff positions.

"Results show that a shift of approximately 10% of currently cropped hectares to the production of key nutritious foods would be both agriculturally feasible and nutritionally significant to the growing population." (Desjardins et al. 2010: 129) for Waterloo Region, Canada

Recreational and public lands

Marketing by the Friends of the Greenbelt Foundation has helped to raise the profile of the Greenbelt's working landscapes as a source of recreation as well as food. New trails, bike tours and access to natural areas have been promoted throughout the Greenbelt. Fairly large parks snake through the urban area and along the peripheries. Rouge Park at the northeast of the city is now a federal park but is still home to significant multi-generational farming activity. The expropriation and ensuing year-to-year leases led to a reduction in perennials and other long-term investments except on grandfathered parcels with better tenure security. The new five year rolling leases provide better tenure security and presumably will lead to more long-term investment by local farmers. Farming and recreation are fairly compatible; easements and other permissions make room for hiking, skiing, or snowmobile trails through private property. Mutual respect is all that is required to maintain the integrated uses.

The Toronto Region Conservation Authority (TRCA) has made significant policy changes to support and stimulate agricultural activities. TRCA land is home to a number of farms that are focused on urban agriculture and community benefit, including the Black Creek Community Farm, and FarmStart's McVean farm that provides mentoring and incubation for new farmers. The five year rolling leases provide better tenure security, and the compatibility and collaborative opportunities are evident in various food and farming programs offered to the public through these projects. The TRCA policy for Near-Urban Agriculture has the following goal: "To promote the benefits of near-urban agriculture to the planning and development of sustainable communities." (<https://trca.ca/planning-permits/living-city-policies/>). As the GHFFA reports (2015), the TRCA staff "put a conscientious effort into developing appropriate lease frameworks, helping to develop the sites, establishing the infrastructure for sustainable farming (from greenhouse to laneways, from parking to irrigation), and treating each farm as its own unique partnership."

Food security

The City of Toronto's consultations (2010: 18) on the local food system yielded clear themes: "especially the affordability of healthy food, lack of access to quality food stores, the specific needs of newcomers adjusting to a new food system, a range of food safety and quality issues, concern about the lack of basic food skills and the unhealthy diets of children and youth, and the poor quality of food available through food banks." The report notes the tendency to create siloes in the food system, rather than incentives that stimulate local food production to support

more equitable food access. The report (2010: 11) notes that “Most farm incentives and supports encourage farmers to produce more commodities at a lower price, rather than rewarding them for growing healthier food or providing environmental benefits.” As Desjardins et. al. (2010: 130) note, “current agricultural production in North America is not primarily organized around the nutritional requirements of the population.”

A city region lens seeks to create linkages between all parts of the food system and across the urban-rural divide. This means combining food access goals with food production goals, and identifying shared values and visions. An FAO report (2015: 44) describes the goals of this work: “The specific benefits to food security that have been proposed from increasing connectivity between urban centres and producers in their rural hinterland are: increased livelihood resilience for small-scale rural producers; reduced food prices for urban consumers; and increased resilience of urban food supply and prices against shocks such as natural disasters, climatic factors, financial speculation, or changing oil prices.”

Although food production and food security goals tend to be de-linked, they are not necessarily incompatible. A recent report (Miller 2013: 5) found that the non-profit and charitable sector, serving meals to people facing food access challenges at no or minimal charge, was spending millions each year on food. Much of that expenditure necessarily comes from public funding, and much of it is spent at local discount supermarkets at retail prices, or at transnational food service distribution companies. If these expenditures were shifted to wholesale and directed to local producers and distributors, more of the money would stay in the local economy, and more of the food could be fresh and healthy with minimal processing. Toronto Food Strategy (part of Toronto Public Health) has initiated an online distribution options for agencies which can draw from local production sources (see foodreach.ca).

Desjardins et al. (2010: 129) report that a significant portion of fresh, healthy foods that are part of the optimal diet could be grown locally. “Results show that a shift of approximately 10% of currently cropped hectares to the production of key nutritious foods would be both agriculturally feasible and nutritionally significant to the growing population.” The Toronto Food Strategy team has undertaken food asset mapping to compare ward income levels with access to fresh healthy food, finding that “there are four less healthy food stores for every healthier food outlet.” (2015: 5). The report quotes Minaker’s 2013 study that shows a correlation between weight and proximity to convenience stores (TPH 2015: 6). The Toronto maps show some correlation between the lack of healthy food and income levels, a problem sometimes referred to as food swamps (as opposed to food deserts, where there is no food available as in low income areas of some American cities).

Whether due to access or preference issues, Canadians suffer from lack of nutritious diets. Walton (2014: 3.19) notes that “A national poll conducted by the Heart and Stroke Foundation of Canada concluded that almost half (47%) of Canadians report going without fresh fruit, vegetables, dairy products, whole grain products, lean meat or fish because they are too expensive.” The unhealthy food practices (highly processed, high in corn syrup, high in salt) mean widespread diet-related health issues. The Toronto Food Strategy 2010 report (page 3) shows that “Alongside hunger, approximately one in three Toronto children (age 2-11) is either overweight or obese³. According to a 2010 report from Statistics Canada, children as a group are “taller, heavier, fatter and weaker than in 1981”, which may lead to accelerated “non-communicable disease development, increased health care costs, and loss of future productivity”. Statistics Canada conducts an annual Community Health Survey that assesses incidences of various health indicators that can be correlated to fruit and vegetable

consumption over time. Overall, fruit and vegetable consumption of five or more servings a day hovers around 40% of the Greater Golden Horseshoe population, according to reports from the public health units in the study area. However, the consumption decreased by about 2.5% between 2010 and 2014.

The TPH 2014 Nutritious Food Basket Survey found that food prices had increased 5.4% in one year, further reducing access for people living in poverty (2015: 4). The Consumer Price Index from Statistics Canada shows that food prices have increased over 40% since 2002 (Statistics Canada, Table 326-0021 Consumer Price Index, annual (2002=100)). As wage increases have not kept pace with food prices, it is likely that people are trying to spend less on all categories of household expenditures, including food. Food purchases may be less “elastic” however than other expenditures. The Consumer Price Index shows an increase of over 10% in the cost of food in Ontario from 2011 to 2015 (based on a set of basic food items tracked over time). Household expenditure on food as a percentage of expenditures in Canada dropped only slightly (less than 1%) between 2010 and 2014, despite rising food prices (Statistics Canada, Table 203-0023 Survey of household spending (SHS), household spending, by household type, annual (dollars)).

A 2014 report (Tarasuk 2014: 28 Appendix F) found that in Ontario 11.9% of people face varying levels of food insecurity, while the number rises to 12.6% in the Greater Toronto Area (GTA). The study (Tarasuk 2014: 28 Appendix F) shows that hunger varies between 10 and 17.6% in the Greater Golden Horseshoe. Food Banks Canada (2015: 3) reports that 358,963 individuals accessed food banks in Ontario in March 2015. Nonetheless, in 2010, only 10% of household spending was on food (TPH 2010: 11). Low income households will pay the rent before they buy food. Many people accessing food banks or the community food agencies may be working people with homes. The wages are enough to cover housing but cannot be stretched to food as well.

As MacRae and others have argued, public intervention in the food system, from protecting agriculture to ensuring healthy food is available to all, is recognized by many as an important tool to improving food systems. Careful planning (Ibid: 17) allows us to identify short, medium and long-term processes that eventually can unite sectoral change to create a food system that benefits all, from land to plate.

Labour market

MacRae writes (N.D.: 3) that “All parts of the food system are facing labour-related difficulties.” Overall, Toronto Public Health reports (2010: 4) that the food sector is the second biggest employer in the province.” In Toronto, “Roughly one out of ten jobs (10.5%) in the City of Toronto are related in some way to food” (Zizys 2015: 1). For 2011, Zizys found 144,170 jobs in Toronto that were related to the food sector (Ibid.: 4). The report shows (Ibid.: 7) that between 2006 and 2011, jobs were gained largely in food services and lost in the much of the processing sector (see also GHFFA 2016 report). Proximity to significant urban areas means ready access to a labour market for skilled and non-skilled work. A review of the material indicates an interesting pattern, where labour needs are not necessarily matched to skills training or work preferences (which tend to be based on job quality). Job status (and pay levels) are not aligned with skill levels; farming requires considerable skill, experience and creativity but is low waged, as is much of the food sector (Zizys 2015: 10).

A recent report from the Golden Horseshoe Food and Farming Alliance (GHFFA 2016: 14) shows jobs by agri-food sector for the GGH area. For jobs related to agriculture (direct or secondary) they identify 354,182 jobs, while the entire food and farming sector accounts for 630,325 jobs, not including jobs associated with waste. The report finds that 10% of jobs are in primary production; 13% in food and beverage processing; 3% in retail; 65% in hotels, restaurants and institutions; 1% in agricultural services. The report points out that the majority of jobs are in food service, which often means that the full potential of the food or agriculture multiplier is not realized, as the sector is often national or transnational, so revenues leave the area and expenditures (supplies, management, planning) are made elsewhere.

The report notes (2016: 16) that increased production with declining job numbers can indicate an increase in automation. It can also mean increased agricultural consolidation. A USDA report, cited by MacRae reports (N.D.: 9) that labour can account for around 38% of the cost of a food item. Labour declines due to automation can occur across the food system, where farm corporations purchase larger, more versatile equipment, or hospitals remove their kitchens and staff are reduced to “rethermalizing” food made elsewhere, or grocery stores replace the cashiers with automated bar code readers for customers to do self-service checkout. After all, the famous Luddite movement was not anti-technology, they were pro-labour, as automation in industry was reducing the need for workers.

Various distortions in the labour market exist as well. In general, job quality is low in food sector employment. Precarious employment is high in the food sector; many of the low wage sub-sectors offer positions that are disproportionately part-time; “many employ high proportions of women, visible minorities and/or newcomers, oftentimes in what have come to be termed precarious employment” (Zizys 2015: 11). Improvements and solutions in this sector should address not only job availability but also job quality. Although this was a key area for research, a full review is beyond the scope of the CRFS Toronto project. However, as interviews and focus groups develop, the research team will continue to seek insights into this important aspect of a city region food system.

As MacRae notes (N.D.: 6) , wages do not reflect societal value, but scarcity of workers. In addition, the Seasonal Agricultural Workers Program (part of the federal Temporary Foreign Workers Program) supplies seasonal workers to agriculture and other occupations on a restricted basis (they are required to return to their home country regularly, cannot access many Canadian social services, and are not able to use the program’s residence period to apply for more permanent status). The cost of the program may be underestimated; some estimates go as high as \$12,000/ worker compared to \$125 for domestic workers (MacRae N.D. supplementary: 5). The cost is mostly administrative and is paid in part by the tax-payers. The program may be an inadequate solution to the lack of interest in these jobs from domestic job-seekers, a problem of wage levels and job quality rather than a lack of unemployed workers. Another distortion may derive from the concern with poaching; employers fear that training new employees will inspire other employers to solicit their services (increasing competition among employers and driving the cost of labour up).

Section summary

This section has provided an overview of issues related to agriculture and food. The material shows that there are important opportunities for collaborative solutions that will improve and strengthen more than one sector and address multiple food issues. Across the food system, and

across a terrain of cities, towns, farms, watersheds, natural areas, highways and factories, there are many shared values and goals that can lead to a more resilient food system overall. As one study notes (Desjardins 2010: 138), the goals of strong agricultural economies can be achieved while also shifting to more nutritious eating patterns: “A coordinated program for expanding both demand and supply of studied food is needed to bring about both dietary changes and expanded markets for local producers within a 20-year time frame.” The CRFS Task Force identified a city region food system vision as a similar coordinated effort: “Healthy food for all, sourced as regionally as possible, and as sustainably produced, processed, packaged, and distributed as possible”.

The following sections examine the situation in each link in the food system supply chain from field to waste to plate, identifying opportunities and challenges for movement towards the shared vision. The sections will provide the basic measurements and parameters for each part of the food system from almost two hundred “essential numbers” identified to model the food system. As often as possible, more than one source was identified as the numbers vary from one researcher to another depending on their approach to the data analysis, and what they include and exclude from aggregated numbers.

The focus of the project is on developing and measuring the critical indicators identified by the Task Force planning and Phase 1 research (of which this represents the final report). These are indicators that can measure change towards the vision of a sustainable, healthy food system for all stakeholders, particularly measurements that have an effect on more than one link in the supply chain. For instance, links between new craft breweries with farms have created a supply for the new market for local hops and also provided a waste diversion for the final mash from the brewing process that can be routed back to pigs for fodder. Advertising and programs that encourage healthier eating (such as Toronto Public Health’s Grab Some Good project) can help to build local markets for farmers if connected with new distribution channels to provide access to the new markets, as in Toronto’s FoodReach project. The final project report for Phase 2 will use the primary research to populate and assess the critical indicators as much as possible in the time frame.

Change is rapidly overtaking the numbers cited in this report; the speed of the change (1.4% population increase, compounded over time) creates extensive uncertainty. The Growth Plan attempts to identify places to grow, citing the need for urban densification. Analysis shows the predicted development densities may not increase densification but confirm existing rates and places. One study (Neptis Foundation, cited in Advisory Panel 2015: 74-5) argues that more land has been set aside for development than will be needed, threatening prime farmland with development and sprawl when it could be protected for food production. Although the following assessment by the numbers creates a static picture of the agri-food sector, the change is rapid and driven by a range of pressures, interests and power relations.

“Power circulates and value accrues at different stages along the chain, partly determined by enabling conditions such as subsidies, trade rules, transport infrastructure and business norms.” (FAO 2015: 17)

Framing by Food System Area

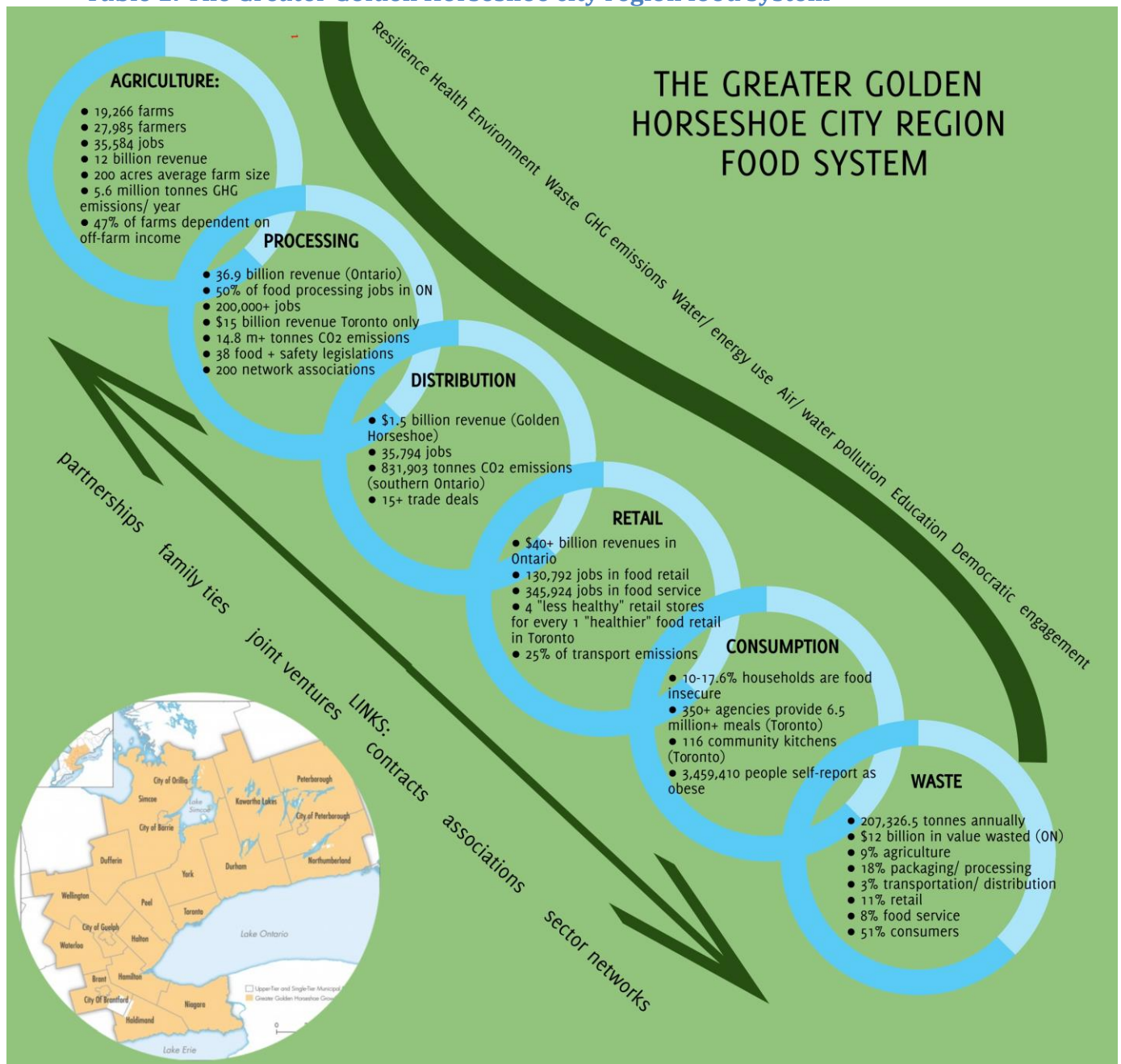
The CRFS project identified seven food system areas for research, from production to waste. Policy was included in the original frame work as a food system area as well. The CRFS Toronto Task Force added “Education” and Democratic Engagement” as part of the frame of the city region food system in Toronto. These are the parameters for the following analysis. Secondary research has identified over two hundred “essential numbers” that can be used to model the parameters of the Toronto city region food system. Some caveats apply; multiple sources were sought wherever possible. Often sources are not comparable, as they measure slightly different areas, draw on different data-sets, or analyze the same data differently. For instance, indirect impacts of economic activity are somewhat subjective: what percentage of retail activity creates work for lawyers who specialize in the food industry? What portion of health workers could be said to be focused on food issues (such as the community health animators whose work is largely focused on food)? There is no definitive answer to such questions, merely the strategy chosen by each researcher.

The focus of researchers and policy-makers on the Greater Golden Horseshoe is fairly recent, but expresses the important recognition that fertile food producing areas for hundreds of kilometers around Lake Ontario stretch beyond the Greenbelt and the Golden Horseshoe. Planning and policy development are taking shape around the Greater Golden Horseshoe, making it an ideal target for this research. However, in many cases there is more secondary research focused on the smaller areas.

Finally, various discrepancies in the census data also conspire to infect the analysis with inaccuracies (see also Walton 2014). The long form was briefly eliminated and now has been reinstated, creating a permanent and recent data gap. Between the 2006 and 2011 censuses of agriculture, Statistics Canada transitioned to the NAICs classification to create better uniformity with other nations (such as the U.S.). This created a level of incomparability between years as the new codes did not conform to previous groupings in all cases. Toronto has also now been left off the agricultural census, despite the growing investment in urban farmers and agriculture. Finally, in order to protect confidentiality, Statistics Canada does not report data where the number of reporting units is so small that the name of the unit would be easy to ascertain. For instance, the mushroom industry is consolidated into one very large actor. This output is not reported, with the result that the official statistics considerably under-report the Ontario production of mushrooms.

Each food system area is assessed for environmental impact and waste production and practices wherever possible. Other key assessment criteria include jobs, land use, regulations, and total economic impact of each sub-sector. A summary chart is below. Certain issues thread through the whole project. Resilience is a central theme that defines the priorities for the chosen indicator inventory.

Table 1: The Greater Golden Horseshoe city region food system



Agriculture

Farming people

How many people are involved? According to Statistics Canada, there were 19,266 farms, and 27,985 farm operators in the Greater Golden Horseshoe (Statistics Canada, 2011, <http://www5.statcan.gc.ca> 2011, Table 004-0237, Census of Agriculture, total number of farms and farm operators). A more recent report separates the categories into more fine detail, finding 14,477 farmers and farm managers (GHFFA 2016). Including farm-workers bring the

total farm-related jobs, according to the GHFFA report (2016: 12), to 22,421 jobs in 2015. Counting all workers in primary agriculture brings their total to 35,584 (GHFFA 2016). The latter measurement does not include part-time and seasonal workers, a significant part of agricultural employment.

In 2014, Walton reported over 6000 farms in the Golden Horseshoe alone, with 8985 operators (down from the previous census almost 10%). The recent GHFFA report also indicates that farmer and farm numbers are decreasing (GHFFA 2016: 4).

Agriculture at a glance

- 19,266 farms
- 27,985 farmers
- 35,584 jobs
- 12 billion revenue
- 200 acres average farm size
- 5.6 million tonnes GHG emissions/year
- 47% of farms dependent on off-farm income

The difference between the Golden Horseshoe and the Greater Golden Horseshoe indicates the production significance of the additional census areas. The larger number in the Statistics Canada summary may depend on how the data is aggregated and what is included; the GHFFA numbers depend on registered farm business data as well as NAICs, and eliminations of data where the NAICs code indicated that farming was not the major occupation. This may introduce some under-reporting, as many farms are supported currently by secondary occupations and off-farm income. Statistics Canada data sets show that almost half the area farmers have off-farm income: 12,215 farmers.

Farm operators are aging towards retirement in the GGH as well as across the province. The average operator age is 54.63 for the sixteen counties.

Farmed area

According to Statistics Canada (<http://www5.statcan.gc.ca> 2011; Table 004-0201 Census of Agriculture, farms classified by total farm area) , the GGH contains 3,817, 475 acres of farmed area. The Advisory Panel for the Growth Plan found that between 2006 and 2011, the “GGH lost over 65,000 hectares, about 4.4% of its agricultural land—and area larger than the city of Toronto” (2015: 28; see also Walton 2014 2.3). The number includes all farm types, from hobby farms with a couple of horses, to Christmas tree farms, to commodity farms. Walton (2014) also argues that the negative impacts of agriculture are overstated because the positive stewardship and soil management outcomes are not measured or reported. A few attributes are assessed in the census of agriculture that relate to sustainability. As MacRae notes (2014: 107) , “The local/ sustainable food sector in Canada is significantly understudied, with limited data on scope and scale”. Statistics Canada tables show that 260 farms are organic, while 218 are certified organic and 54 describe themselves as transitional. In addition, thousands of these farms practice a range of techniques that increase sustainability. Farm size remains mid-scale on average. Although there are large farms in the GGH area, the average is still around 200 acres. Golden Horseshoe farms are smaller on average than the provincial average (Walton 2014: 2.8).

Table 2: Farms with specific sustainable practices

| | |
|---|-------|
| Organic | 260 |
| Certified organic | 218 |
| Transitional | 54 |
| Winter cover crops | 2702 |
| Windbreaks or shelterbelts (natural or planted) | 5255 |
| Rotational grazing | 4079 |
| Plowing down green crops | 3865 |
| Nutrient management planning | 4125 |
| In-field winter grazing or feeding | 1995 |
| Crop rotation | 11321 |
| Buffer zones around water bodies | 4563 |

Source: Statistics Canada, Census of Agriculture 2011. Table 004-0208. <http://www5.statcan.gc.ca>

According to these figures, over half the farms practice crop rotation; some of the farms are perennial or grass-fed livestock and would not need crop rotation, so the number shows a significant attention to diversifying the use of the soil. However, farms that switch only between corn and wheat without including a legume or winter crops would not be replenishing the nutrients unless they used external, often synthetic, inputs.

The 2011 Census of Agriculture shows 65% of the farmer acreage is owned; 37% is rented; and 1% is public land². The farms in the GGH are increasingly under rental tenure (Walton 2014: 2.6); short-term leases are not conducive to good stewardship or long-term investment. The type of ownership tends to constrain the type of agriculture. Farmers who do not know if they will have access to the land next year will hesitate to plant perennials like fruit, or invest in a dairy barn. Walton confirms (2014: 2.7) that “A higher incidence of rental land generally results in a less stable agricultural community”. The Advisory Panel for the Growth Panel reports (2015: 89) that, “Some areas in the GGH have experienced significant changes in ownership of agricultural lands due to purchase by developers and investors, including foreign purchasers, in the expectation that the land will be designated for urban development. This ‘land-banking’ drives prices up beyond affordability for economically viable agricultural operations and limits viability for new entrants.”

The interest and commitment by municipalities to urban agriculture is significant and growing. There are more than 100 food growing gardens on city property, according to the City of Toronto Action Plan for urban agriculture (*growTO*). Hamilton has developed plans to facilitate new urban farming in the city³. The total number is difficult to calculate, as many sites that grow food in the city may be informal, single household or neighbourhood or even guerrilla garden projects that are not included in the total.

² An error in the Statistics Canada summary tables removes York from this calculation. The actual total would be higher if York were included.

³ See <http://www.foodandfarming.ca/hamilton-pushes-for-urban-farming/>.

Farm economics

The total value of food production in the Golden Horseshoe totaled over 2 billion (\$2,253,960,387) in 2014 (Walton page 4.5). With direct, indirect and induced impacts the impact in all of southern Ontario totals more than 15.2 billion (Cummings 2014: 54). For the sixteen counties of the GGH, the total value of output, associated expenditures, wages and taxes totals over \$23 billion (Cummings 2014). Direct output alone comes to almost 3 billion in the Cummings analysis for the Greater Golden Horseshoe (2014), with indirect and induced bringing the total output in the Cummings study to almost \$12 billion. GGH farms are highly productive, with Gross Farm Receipts in the Golden Horseshoe almost twice the provincial average (Walton 2014: 2.15). Walton found a total of \$6.4 billion from direct, indirect and induced impacts for the Golden Horseshoe based on the 2011 agricultural census.

Variations among analyses occur particularly in indirect and induced impacts, resulting in a range of multipliers for the sector. Research found multipliers from 1.16 (Cummings 2014) to 4.3 (Walton 2014) for the sector depending on how it was calculated. Cummings subtracts expenditures (such as farm supply, and other inputs), arguing that including expenditures leads to double-counting.

Farm payments constitute a portion of farm income; farm revenues have not changed in real dollars since the 1970s, while the cost of inputs, land, and labour has steadily increased. Although food is more expensive, the difference is not trickling back to the farmer. Statistics Canada reports over \$550 million in Ontario farm program payments in 2011 (Table 002-0002), almost 25% of farm income, including crop insurance and supply management payments.

A recent study (Cummings 2014: 13) of southern Ontario agricultural production and opportunities (and the impact) of import substitution found that “Imports of agricultural products exceed exports by a wide margin. Actually in 2012 imports (\$19.8 billion) were almost twice as large as exports (\$10.8 billion).” If anything, the rate of trade will be higher in the Greater Golden Horseshoe given the proximity of dense urbanized areas on the eastern U.S. seaboard and the exchange rate. One study in Waterloo (Miedema 2006: 11) found the rate of redundant trade, in which the same products are imported that are exported or grown locally, was quite high. Products that were in season were regularly found on local store shelves. A further study from the Waterloo region (Desjardins et. al 2010: 137) indicates that “between 10% and 100% of the optimum recommended amounts of several key nutritious foods could be met from local production in Waterloo Region.”

As Cummings et. al notes in their recent report (2014: 3),

Unfortunately, there is no single or collection of standard and generally accepted indicators that adequately capture the contributions of the agriculture and food producing sectors and the importance of sustaining their operations. It is necessary, therefore, to take a broad perspective to evaluate alternative indicators of performance in this sector that go beyond the rudimentary metrics of tonnes produced or dollars earned, jobs, and taxes to issues of social stability of local communities and their environmental sustainability.

The Value of Land

The value of land in the area varies between \$8000 and \$18,000 per acre according to several real estate studies (ReMax and Valco). However, many transactions are based on handshake agreements and may not be registered by these studies. Anecdotal reports of sales as high as \$24,000/ acre are common, as farmland is converted from agricultural to housing development. Speculation has increased with the growing pressure for new urbanized areas. Internationally, hedge funds and other speculative investment groups have turned to farmland as a safe investment that will retain its value, further putting pressure on the costs of new land for farmers. The new Commodity Index Funds mechanism have allowed farmland speculation without ownership; investors gamble on the price fluctuations, adding to the instability of our food producing lands (Holtslander 2015: 6).

Rates above \$10,000/ acre render entry for new farmers difficult if not impossible. As farm operators reach retirement (as over half of them will in the next 10 years), they may seek to sell at the highest rate to pay off the debt that years of poor returns have brought them. As the National Farmers Union (NFU) report shows, farm debt increased from 64 billion to 87 billion in 2013 in Canada (Holtslander 2015: 24). They may not be able to sell to another farmer even if they wanted to; for the most part, they will have to sell the entire property and move away in order to retire, as severance rules designed to keep out urban estate owners also prevent them from selling the land and keeping the house. And after all, property owners expect to be able to sell at the highest possible offer; why should farmers be expected to act differently to protect food-growing regions for the rest of us?

High debtloads can shape the way the agricultural land is used. As the NFU report (Holtslander 2015: 27) notes, "Farmers lose autonomy when the loan payments and loan conditions constrain choices about how the farm is run and how willing the farmer is to try different production methods and thus incur financial risk. Increasing integration of farm input suppliers with grain companies further diminishes the farmer's independence."

Employment

Employment figures are particularly challenging to reconcile from one report to another. The calculation of agri-food jobs varies from one researcher to another. For Toronto alone, Zizys has calculated 144,170 food production related jobs. In 2014, Walton reported 377,237 total agri-food employment in the Golden Horseshoe. The recent GHFFA report calculates 354,182 total jobs in the agri-food sector, but 630,325 when including the entire value chain (farming, processing, distribution, access). One study makes the interesting point for Golden Horseshoe farms that employment numbers show that these farms support more households overall than farms elsewhere. The report (JRG 2014: 20) concludes that "Farming in the region is more labour-intensive; this reflects its much greater proportion of Ontario's horticulture output." Farming organically has also been found to be more labour intensive, creating more jobs. "The 2011 Canadian Census of Agriculture found that although organic farmers represented 1.8% of farms, they accounted for 3.75% of farm workers, suggesting again higher labour requirements per farm" (MacRae N.D.: 13).

Furthermore, estimating future impacts is also challenging. The Advisory Panel on the review of the Growth Plan notes (2015: 59) that "There is a general lack of municipal confidence in the employment forecasts in the Growth Plan". The uncertainty effects job growth as well as calculations of the size of future regional food markets.

Wage levels for most agri-food occupations are low, ranging in one study for Toronto from \$31,439 to \$53,248. As Zizys and others note, these jobs are low status, regardless of the skill level required. The lower waged sub-sectors such as food service are often filled by women, people of colour and newcomers.

Agriculture and the environment

The Cummings report (2014b) on the environmental impact of agriculture cites several environmental impact measurements by county, which can be aggregated here for the Greater Golden Horseshoe. These figures show that water use is approximately even in intake and discharge, around 3500 million cubic metres (MCM) annually in both cases. Greenhouse gas emissions overall total 5,594,069.5 in CO₂ tonnes. Energy consumption accounts for around 104,311.1 terajoules of Ontario energy use. Solid, wood and food waste total 207,326.5 tonnes.

Some of the waste (calculated at 9% by Uzea 2013: 6) for agriculture stems from the consumer demand for uniform and blemish-free produce (see MacRae, in review: 11), Grade B produce (“seconds”) may not be worth the time and cost to harvest if in the end it will go to the waste or compost stream, so farmers will leave it in the field and plow it in for next year. Thus, not all the nutrients are lost, but the potential of use for food is lost. Similarly, volatile commodity markets can mean a farmer will abandon entire crops in the field if the price has plummeted; paying for someone to harvest and for fuel for the harvester can easily become more than the going market rate when margins rest on a knife edge of difference between net profit and net loss.

Many environmental benefits reduce the expenditure of public rather than private money, as in the case of the reduction of the cost of water purification. In many cases, however, private actors also have economic reasons to invest in the environment, particularly in the agricultural sector. Environmentally sustainable farming can have positive impacts on the bottom line of operators as well as the province. Long term farmers who protect the soil from erosion, manage the water systems to conserve and distribute, and other stewardship activities, may be saving themselves money in the long run. However, long term financial benefits do not always impress when financial horizons are short, as in tenuous lease situations. One study found that reducing pesticides and chemical fertilizers could save \$18.3 million in fertilizer applications and \$9.1 million if only 10 percent of Ontario production was moved to organic production (MacRae 2009: 129). Vidoni (2011: 8) reports on a study that shows that “the production of one unit of phosphate fertilizer requires as many as three units of carbon to produce and apply (Brown and Leonard, 2004).” MacRae et al. report (2013: 938) that according to another study (Weber and Matthews (2008) food comprises 12,000 tonnes/kilometer traveled of emissions if inputs to agricultural production are included.

However, some comparative environmental effects are not obvious. MacRae et al (2013: 942) found that field crops (from California) were lower in emissions than the same crops grown in a greenhouse. Even if the field crops are in California, and the greenhouses are in Ontario, the field crops are four times better in greenhouse gas emissions. Thus the environmental impact is not necessarily in transportation from farms, as is often assumed (see the food miles approach) but must be assessed across the supply chain. These calculations apply to standard commercial greenhouses, rather than the innovations that use passive solar (Cookstown Greens) or wood-fired heat (southwestern Ontario Mennonite facilities).

Several studies of the environmental benefits of key land uses in the area, particularly the Greenbelt, have been undertaken by the David Suzuki Foundation. Tomalty's 2012 study found that the carbon storage in agricultural lands in the Greenbelt was valued at \$330/ hectare, based on an estimate of 80 tonnes per hectare. Sequestration brings an additional \$26/ agricultural hectare, with another .5 tonnes per hectare of carbon. The total value for the Greenbelt is show in the table below from Tomalty 2012.

Table 3: Carbon storage and sequestration in the Greenbelt

| (Units) | Price | Amount (tonnes) |
|---------------|------------------|-----------------|
| Storage | \$509,810,303.31 | 123,590,376.56 |
| Sequestration | \$40,166,872.38 | 772,439.85 |

Source: Tomalty 2012

Wilson (2008: 2) found that in the Greenbelt ecosystem services alone the “agricultural lands total value is also substantial at an estimated \$329 million per year including cropland, idle land, hedgerows, and orchards. Key values include the pollination value of idle land and hedgerows, the storage of carbon in soils, and the cultural value of agricultural lands.”

Agriculture and regulations

Some people have argued that agriculture is the most regulated sector in Ontario, with overlapping and sometimes contradictory rules and jurisdictions. A recent Greenbelt review (Caldwell 2013: 33) showed that “While there was general support from both the planners and the farmers for the purpose and objectives of the Greenbelt, there was also a sense that the layers of regulation (i.e. multiple approvals required from different agencies) were frustrating and time consuming.” The legislation and plans can range from specific municipal food charters like the Toronto Food Charter, to requirements for nutrient management. These measures effect numerous aspects of farming as Walton shows (2014: 5.6). Even internationally, research found 15 import and trade regulations⁴. Public Health units and municipalities have also made important commitments and launched initiatives to support agriculture and healthy food consumption in their jurisdictions. These include a variety of Agricultural Advisory Committees, good food box programs, charters, promotional and educational events for the agricultural sector, food handling training and certification and many other initiatives (see Walton 2012 Appendices).

⁴ (<http://www.international.gc.ca/trade-agreements-accords-commerciaux/ressources/fcm/summary-guide-sommaire.aspx?lang=eng>).

Processing

General terms

Food processing encompasses three stages and levels of preparation. Primary processing involves basic preparation for market such as washing carrots or trimming leeks. Secondary processing is more generally what is considered “value-added”, that is, manipulating the harvested product in some way to make it more valuable for sale. This can mean dicing and bagging or basic canning.

Processing at a glance

- 36.9 billion revenue (Ontario)
- 50% of food processing jobs in ON
- 200,000+ jobs
- \$15 billion revenue Toronto only
- 14.8 m+ tonnes CO2 emissions
- 38 food + safety legislations
- 200 network associations

Tertiary processing is more complex, with fully evolved recipes and multiple ingredients: pre-prepared meals, croissant, pasta sauces. Although the higher level of processing often comes with unhealthy ingredients that increase shelf stability or shelf life, along with added high fructose corn syrup to sweeten, or added salt, it is not essential. Organic and natural processors have found substitute ingredients and processes that achieve many of the same effects. Nature’s Path, for instance, has reduced the sugar in their cereal by only putting it on the outside of the flakes or puffs. The experience for the corn flake eater is the same taste on the tongue, but the sugar is less than if it was also in the flake itself. Primary processing is often done on the farm, though large scale operations or groups of farmers may arrange for off-site facilities. Statistics Canada and other databases generally include all three types, and do not necessarily distinguish them from each other, nor are there finer distinctions for different processes or ingredient choices.

Number of operations

Food processing and manufacturing is concentrated in the study area; JRG Consulting (2014: 2) notes that the Greenbelt alone can be credited with 60% of Ontario’s food processing and manufacturing jobs. The recent GHFFA 2016 report finds over 50% of these jobs situated in the GGH (the discrepancy probably mostly due to counting differences, although the processing sector has also lost jobs over the last decade). Ontario overall has almost 40% of Canada’s food manufacturing (Walton 2014). Facilities in the province total around 3200 (Industry Canada 2016⁵; Synthesis 2010: 2). In 2003, MacRae et al. (2009: 127) estimated that about 2% of these firms were organic processors and handlers.

Employment

Food processing accounts for over 200,000 jobs in the GGH, or 13% of all food related jobs (GHFFA 2016: 14). In Toronto alone, the City of Toronto (Canadian Business Patterns Census

⁵ Industry Canada at:

<https://www.ic.gc.ca/app/scr/sbms/sbb/cis/establishments.html?code=311&lang=eng>

Tract Aggregation Tool, December 2013⁶) houses over 21,615 food manufacturing jobs, and almost 17% of food-related jobs (Zizys 2015: 6). Except for labourers, pay levels in food manufacturing are high relative to other food sectors (Zizys 2015: 9). One study reported that, based on company surveys, 7-10,000 new hourly employees would be needed over the following ten years in Toronto (WCM Consulting 2002: 22). The estimate seems optimistic given the downturn of the sector and associated infrastructure, but the survey results show promising optimism on the part of the processing companies. Growth estimates were for 5-10% with a focus for growth on small and medium businesses (Ibid.: 31). New training for food processing was launched at Loyola College, Conestoga College and other places to respond to this identified need.

Economics

OMAFRA reports (2012; omafra.gov.on.ca/english/stats/food/index.html; see also Cummings 2014: 11) that the value of the sector for Ontario is about \$40 billion. For Toronto alone, WCM consulting (2002: 4, 17) estimates the value of food processing at around \$15 billion, with approximately 400 operations. WCM also reports a relatively affordable start-up cost at the low end of the spectrum, citing only \$50,000 for initial investment in some cases, and up to \$6-8 million for larger facilities (2002: 24).

Infrastructure

Ontario has steadily lost processing and other supply chain infrastructure over the last few decades. The Advisory Panel for the Growth Plan found (2015: 95) that “The agricultural sector is experiencing a loss of supportive infrastructure and farm services (e.g., processing facilities) as the number of farm operations in the GGH declines.” Recognizing the importance of sectoral supports for successful farming sectors, OMAFRA is exploring “regional agri-food strategies, a potential approach for combining protection of the land base with economic incentives and infrastructure development to create conditions for sustainable agriculture” (Ibid).

The recent GHFFA 2016 report created an online asset map database for the agri-food sector in the GGH which shows a significant gap in fruit and vegetable preserving and meat product manufacturing (2016: 35). For instance, the Cummings report (2014: 117) found key barriers to development of regional strawberry production in the processing infrastructure: “The key barriers to expanding local production would appear to be the lack of good post-harvest handling, the challenges of local supply being integrated into long-distance supply chains, and insufficient freezing operations to create a viable frozen berry market.” The GHFFA study (2016: 7) identifies a major restructuring in the North American food industry that has created opportunity for all categories of processing: “As the North American industry goes through a major restructuring, there is a need to retain existing large processing operations (business retention and expansion) as well as some opportunities for new investment attraction in various sectors. In addition, economic development efforts to support smaller, niche operations (small to medium enterprises and on-farm processing) will greatly benefit the GGH region.”

⁶ See census tract maps at:

<http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=e8aae5318bfd3410VgnVCM10000071d60f89RCRD&vgnextchannel=e71032d0b6d1e310VgnVCM10000071d60f89RCRD&vgnextfmt=default>

As the beef prices collapsed and new regulations resulted in the closure of many small abattoirs, the industry has developed locally identified brands with regional and provincial distribution while continuing to export from federally inspected plants. New opportunities for large, export-oriented manufacturing are also in evidence. The GHFFA reports the launch of new processing plants in the GGH as well; a new agri-food shipping terminal in Hamilton, and a new tetra-pak facility (2015: foodandfarming.ca).

Environment

Cummings found that the food processing sector in southern Ontario was responsible for the use of 249,271 terajoules of energy annually, and produces almost 15 million tonnes of carbon annually (2014: 18). Compared to agriculture, water intake is higher (total use around 9.3 billion cubic metres, net 115 million cubic metres) and air emissions are higher. The total cost is around \$1.1 billion (Ibid.) for southern Ontario food manufacturing. Uzea et. al. (2013: 6) found that food processing accounted for around 18% of waste across the supply chain. Specific measures for the Greater Golden Horseshoe were not available in the secondary research. The statistics might be higher per square foot in the GGH due to the concentration of food processing in the area.

The emissions vary by type of facility and by category of manufacturing system. Contrary to popular notions of the importance of food miles and reducing long-distance transportation, there may be other points on the supply chain that are more polluting and/ or more conducive to change (See for instance Weber and Mathews 2008). MacRae et al (2013: 948) quote Pimentel's work in the U.S. that shows packaging alone is responsible for 7% of food system energy use. The study found that cooling and storage was a significant source of energy use that was under-emphasized in popular reports, accounting for as much as 16% of energy used (Ibid.: 949): "In the U.K., refrigeration accounts for at least half of the energy used by food retail outlets, and CO2 emissions from cold storage at retail and food service account for nearly 1% of all emissions from these subsectors (Garnett 2006)." MacRae's study notes that the Canadian fruit and vegetable processing sector has been found to be worse than others in both emissions and energy consumption (Ibid.: 957).

Another study shows that the full energy costs of imported product outweighs the costs of local storage and production. MacRae reports (Ibid) that "In their study contrasting California lettuce exported to New York with locally produced cabbage, Pimentel et al. (2008) argue that the production, irrigation, and transport energy costs of the lettuce so exceed the production and storage costs of local produce that such localization scenarios should generally be positive in energy terms." The findings recommend regional production combined with just-in-time inventory, so that the requirement for long-term refrigerated storage of fruits and vegetables is reduced. However, the methodology for measurement of local and global food systems impact on the environment is still under development, as are the systems themselves. The development of regional food hubs, mid-scale processing and urban agriculture projects may lead to significant change in the landscape of the environmental impact of regional food.

Other less energy intensive storage options include the traditional root cellars, where harvest is stored at a household level, and the new Mennonite ice houses which use snowpack in Ontario's north to maintain even cooling all summer. The cost in the north is about \$15,000 for the insulation, materials and requires about 50 person-hours to construct (Miller, unpublished report, 2015, for the LOFC Network). These latter solutions would result in systemic change to

more seasonal diets and less bulk buying. MacRae finds that box programs providing local food achieve some of the best results, as storage is minimal and the need for individual car-dependent shopping trips and widespread retail cooling and storage would be reduced (Ibid.: 954). Pimentel argues for a reduction in consumption of secondary and tertiary processed products “that require large energy inputs.” (MacRae 2013: 951).

Legislation and networks

The food processing sector in Ontario is thoroughly regulated and monitored, with 38 pieces of legislation listed on the OMAFRA website⁷. Carter-Whitney and Miller 2010 found that the regulations are shaped towards the practices of large facilities and can create challenges for smaller facilities (see also the OMAFRA *Guide to Fruit and Vegetable Processing*). Some jurisdictions have a separate advocacy group for small scale fruit and vegetable processing, as in British Columbia⁸. Walton (2012: Appendix 2) found over 200 value chain associations related to food, including commodity and sub-sector (such as grocery) associations. Nourishing Communities engaged in significant value chain review in their food hub research including a broad survey of existing food hubs for Ontario in 2012; the case studies from that research are available online (<http://nourishingontario.ca>).

⁷ See <http://www.omafra.gov.on.ca/english/food/foodsafety/compliance/allleg.htm>.

⁸ See ssfrpa.net.

Case: Martin's Family Fruit Farm

Martin's Family Fruit Farm is an orchard and packing operation in the region of Waterloo. The farm has been in the family since 1820 when the current managers' great grandfather purchased it. A Yugoslavian exchange student persuaded Leighton Martin to try apples, judging that the particular conditions there would be ideal. They began with 100 trees, and now have 700 acres. Leighton still helps run the place, along with sons and several grandchildren.

Martin's is in a sub-sector that has faced tremendous pressure from apples grown from elsewhere, either BC or from beyond Canada where labour costs were lower. Many orchards have folded in the last 10-15 years. Volatile weather made the situation worse; in 2012, almost all the apples were lost through a late frost on the blossoms. In 2015, about 50% of the crop was also lost to frost damage. Martin's was able to remain in the business, and is now seeing a surge in demand based on the interest in local foods. By mid-winter they will have run out of most varieties. They have made shifts and new investments, including changing the way they manage the orchard. The trees are now planted close together, grown on wires, and trimmed tightly; new varieties have been brought in. Over the last ten years the high density planting has helped them survive.

They pack according to orders as they come in, ensuring a better quality product. The packing facility is on the farm, so the apples are stored right off the tree with minimal travel, ensuring less bruising than orchards that must ship to packing facilities. They do also contract with other growers, mostly within a couple of hours of the farm. They work with 16-20 other growers, including some Mennonite growers. The contract growers range from 20-500 acres in size. They have worked with some of them for 30 years.

The packing line is complex, allowing for a range of types of packing. The pre-sort line moves the apples with rolling brushes out of the bins past human workers who sort for decay. Then they will be sized for today's market needs; some will be sent back to storage to await demand for that size. At that point, they might enter the line the next time as presorted and go straight to the next step. The apples go through additional cleaning and drying, then waxing. The waxing makes up for the removal of the natural coating that occurs during washing. They are weighed and loaded into polybags or boxes by size. There are human labourers along the line at many of the stations; 65% of the cost is in labour.

(continued on next page)



(Case: Martin's Family Fruit Farm continued)

Their market is almost entirely in Ontario; export markets are used as back up for them, only for products (sizes or varieties) that are not selling locally. Steve Martin told the tour "we see local as all the growth we need for years to come." Although organic apples are hard to do in southwestern Ontario, they use IPM, and avoid pesticides that might be an issue in the EU. They maintain a fairly large on-farm store as well.

Martin's recently built a processing plant for dried apple chips; unlike most apple chips which are deep fried or freeze-dried, these are just plain dehydrated apple slices with no additives. The new value-added product has turned out to be a successful addition to the product offering that has been welcomed by large retailers. The chip line also reduces waste on the farm by providing another potential stream for surplus product. As for the growers they contract with, they have been able to offer them more returns. Steve's father worked with the Mennonite growers to set up their own high density orchards and grow new varieties. Now there are 18 of them participating, mostly with around 10 acres.

Distribution

Number of operators and volume

The distribution sector has been under-emphasized in research on Ontario food systems. The operators have a low profile; they are not open to the public so they do not market widely. Nor are there network associations of distributors. Around 42,000 wholesalers are reported for all of Ontario (Statistics Canada; GHFFA 2016). The total value for the sector in the Golden Horseshoe (excluding several counties in the GGH) is estimates at over \$1.5 billion (Walton 2012: 1.1). However, according to Statistics Canada, the value of the sector for Ontario is almost \$56 billion, suggesting that these numbers are difficult to assess with any accuracy. Although distribution would be more costly outside southern Ontario, given the concentration of agriculture and retail activity, Walton's estimate of less than 3% of provincial costs of food distribution seems low.

Distribution at a glance

- \$1.5 billion revenue (Golden Horseshoe)
- 35,794 jobs
- 831,903 tonnes CO2 emissions (southern Ontario)
- 15+ trade deals

Employment

The recent GHFFA report (2016: 23) found that food merchant wholesalers in the GGH employ 35,794 people. If part-time and seasonal workers have been left out as in the agricultural assessment, this number would be higher. In fresh fruits and vegetables the employment tends to increase during the local production season. Farm product and beverage wholesalers add another 5000 jobs to the total.

Environment

A 2014 report (Cummings et al.: 29) estimated emissions by food commodity transported (weight and volume will affect the emissions per commodity type). The estimate was based on an ideal efficient distribution system in which products were delivered to the closest demand first. Distributors determine routes by many other considerations, mostly subjective, but also for pickups or to reach large volume customers. For instance, one important local food distributor based in Kingston and serving eastern Ontario picks up product for delivery later in the run, warehousing very little of the marketed product at the main location. This adds both some efficiencies in storage costs and additional distance traveled. The actual emissions for distribution are probably considerably higher than this study estimates.

For the top foods for the CRFS research, in southern Ontario for 2011, carbon emissions were almost 12,000 tonnes for apples, almost 2000 tonnes for carrots and beef, and over 5000 tonnes for eggs. Overall, the movement of fruits and vegetables was calculated at almost 50,000 tonnes annually based on the 2011 numbers, with 831,903 CO2 emission for the food system overall in southern Ontario (Cummings 2014b: 29). The sector accounts for about 3% of waste in the food system (Uzea 2013: 6). The loss may have been higher in the past; MacRae (in review: 12) reports that "An interview with a senior executive at a major Canadian retailer revealed that in the late 2000s the company was rejecting 75 truckloads of produce / week at the distribution centres across Canada that amounted to about 2,722.5 tonnes a week or

141,570 tonnes a year. This did not include what the retail stores rejected from the DCs [Distribution Centres].”

Legislation and networks

Distribution must respond to a range of trade deals based on the dependence on and access to export. The large-scale deals total at least fifteen, from twelve Free Trade Areas to the more recent Trans-Pacific Partnership agreement⁹. Many of these effect regional production and markets (MacRae 2014), though it is possible that local sustainable or organic products would be able to present the case for representing a non-competitive niche market. The wholesale sector likewise must be compliant with the range of food safety legislations totaling almost forty different regulations¹⁰. The Canadian Food Inspection Agency includes wholesalers in their purview for oversight.

Case: 100 km Foods

Paul Sawtell and Grace Mandano left their pharmaceutical careers in 2007 and founded 100 km Foods in 2007; they purchase from local producers with a focus on the region, and distribute to customers, mostly chefs, in the Toronto area. The majority of their 80 suppliers are within 100 km of the warehouse. Paul told the tour “you could drive yourself out of business if you went too far.” They organize the supply into four clusters with different pickup runs for each. The product focus is fresh, but they offer some basic value added products as well. Their mandate is for local, sustainable product.

They built their distribution business with the goal of making urban to rural linkages. The work began with a series of cold calls to chefs and producers; the latter were more skeptical, while the chefs were enthusiastic. They got their first truck in 2008. Like many local food businesses, they were “incubated” at FoodShare, sharing space and getting support from the vibrant and creative atmosphere at the FoodShare warehouse. Later, they got their own space, grew out of it, and in 2014 moved to their current location in north Toronto. They share the space with Fresh City Farms, another entrepreneurial business that trains people in intensive food growing for urban agriculture plots and supplies food through online ordering and home delivery.

⁹ See <http://www.international.gc.ca/trade-agreements-accords-commerciaux/ressources/fcm/summary-guide-sommaire.aspx?lang=eng>.

¹⁰ See <http://www.omafra.gov.on.ca/english/food/foodsafety/compliance/allleg.htm>.

(Case: 100 km Foods continued)

Sharing the space has meant reductions in cost and efficiencies for each. They received a grant that paid for 50% of their shared cooler. 100 km Foods now has ten trucks, 12 staff, and will have another 8 staff by June 2016. They store very little product in the warehouse beyond a day or two; they receive orders on Tuesday for Thursday/ Friday delivery, and Sunday for a Tuesday delivery, and purchase only what has been ordered. They strive to tighten the schedule, since they are competing with same day pick up options from the Ontario Food Terminal (though the advantage for 100 km Foods is that they harvest to order rather than on speculation). They plan to go to a four day delivery model in 2016.

100 km Foods currently supplies about 250 active customers, including retailers, hotels, universities, colleges, and restaurants. They hold events for the chefs to meet the farmers. They have found that even when a chef moves on, the restaurant will retain them as a supplier, indicating well-developed relations of trust that go beyond just the buyer. They offer product with the producer name, and marketing is tied to the individual farmers.

Retail, food service, restaurants, institutions

The food service sector is the largest and fastest growing of the food system sectors. In Ontario the sector is valued at almost \$41 billion (Statistics Canada 2015). In Toronto, the figures show that grocery stores command a high percentage of the sales, with convenience and specialty stores at around less than 5% of grocery and food store sales.

Retail at a glance

- \$40+ billion revenues in Ontario
- 130,792 jobs in food retail
- 345,924 jobs in food service
- 4 "less healthy" retail stores for every 1 "healthier" food retail in Toronto

Table 4: Ontario food retail sales (dollars)

| | |
|--|----------------|
| Food and beverage stores [445] | 16,836,184,000 |
| Grocery stores [4451] | 12,709,054,000 |
| Supermarkets and other grocery (except convenience) stores [44511] | 11,924,109,000 |
| Convenience stores [44512] | 784,946,000 |
| Specialty food stores [4452] | 1,065,347,000 |
| Beer, wine and liquor stores [4453] | 3,061,781,000 |

Source Statistics Canada Table 080-0020 Retail trade (2016)

A recent study of Toronto community agencies (providing food at no charge for people living with food insecurity) shows expenditures of about \$29 million annually (Miller 2013: 5). An additional \$17 million is spent annually for the Student Nutrition Programs at schools, ensuring fresh healthy food for students to improve health and educational outcomes. Growing networks of farmers' markets, including at least 38 markets in Toronto, provide food direct from the farm (or sometimes aggregated or even purchased from the food terminal). The Organic Council of Ontario has reported that (GHFFA 2016: 42) that organic direct-to-consumer markets (including CSAs) have been estimated at \$192 million, while the organic retail market in Ontario is estimated at 1.13 billion. Altogether the amount spent on food in Toronto is estimated around \$7 billion (TPH Cultivating Connections report 2010: 7).

Although the aggregated numbers are large, Canada spends a disproportionately low percentage of household income on food, only 10% in the 1990s (Toronto Public Health 2010: 11). For 2013 in Ontario, OMAFRA reports that only 9.5% of household income was spent on food¹¹. Since farmers income per unit has not risen in real dollars since the 1970s, the increased profit must be accumulating elsewhere on the supply chain. Although retail is sometimes identified as profit-driven, the grocery sector operates on very thin margins and has largely plateaued recently, garnering growth from acquisitions rather than increasing sales. Consolidation among the top three controlled 87% of the industry a few short years ago (Toronto Public Health 2010: 10), but encroachments from Walmart and Costco have whittled away at that control. The competition for the retail dollar has become increasingly cut-throat. MacRae argues that (MacRae et al. 2009: 120) the main growth opportunity now is probably in the organic market at 15-25% growth per year rather than conventional goods.

Employment and Economic Impact

68% of agri-food jobs are in the food service sector, with retail only accounting for 3% and the majority in food service (hotels, restaurants, institutions) (GHFFA 2016: 14). The number of jobs in the GGH for food retail total 130,972 for retail and 345,924 for food service (hotels, restaurants, institutions) (GHFFA 2016). Wages in this sub-sector are low, ranging from \$21,000 to \$35,000. As noted in the GHFFA report (2016: 4), the contribution of these jobs to the local economy is probably lower than other sectors, as corporate food outlets are owned by foreign or transnational companies in many cases. Even for large domestic corporations, the revenues most likely do not remain in the community. Likewise, large retail grocery annually widens their private label offerings, many of which are manufactured elsewhere and imported into Canada (GHFFA 2016: 56).

Health

The links between food and health are essential parts of assessing the retail food landscape. The City of Toronto has engaged in asset mapping for healthy food retail, identifying areas of the city where low income neighbourhoods correspond to low availability of healthy food. The research found that “there are four less healthy food stores for every healthier food retail outlet” (Toronto Public Health 2015: 5). Altogether, mapping by the Toronto Food Strategy team has identified 1653 healthier food retail outlets in Toronto (Food by Ward 2016).

As in some U.S. cities, Toronto has begun to pilot healthy corner stores programs, offering some fresh and healthy choices at convenience stores that are often the nearest source of food in low income neighbourhoods. They have also launched a healthy choice option through the small convenience stores in the various subway stations, providing good food on the go for commuters.

MacRae found 24 local procurement policies for institutions (which can increase the fresh food percentage) across Canada (2014: 108) from a 2009 survey, but notes that the number is low due to subsequent expansion of such program as well as difficulties in accessing the information.

¹¹ <http://www.omafra.gov.on.ca/english/stats/economy/index.html>

Environment

Frequent shopping trips by one person in their car are one of the primary sources of food system-related emissions. MacRae et al. report that “About 25% of transport emissions in the food supply chain are associated with final delivery [that is, consumer shopping trips]” (2013: 938). Although reports on emissions for the specific sub-sector have not been identified, the sector accounts for 11% of waste through retail, and 8% of waste through food service (Uzea 2013: 6). Cooling and storage account for a significant portion of food system energy use and emissions. One study (quoted in MacRae et. al. 2013: 949) found that “In the U.K., refrigeration accounts for at least half of the energy used by food retail outlets, and CO₂ emissions from cold storage at retail and food service account for nearly 1% of all emissions from these subsectors (Garnett 2006).” Shrink at retail varies by category, with the highest percentages in the perishable produce and bakery sections (MacRae, in review: 13).

Consumption

Availability

Food is not available equitably or evenly across Canada. While excellent food from a wide diversity of sources and cuisines is available for those who can pay, others who live on limited incomes or in under-served parts of municipalities face food access and food insecurity challenges. In Ontario 11.9% of people face varying levels of food insecurity, while the number rises to 12.6% in the Greater Toronto Area (GTA) (Tarasuk 2014: 28 Appendix F).

Consumption at a glance

- 10-17.6% households are food insecure
- 350+ agencies provide 6.5 million+ meals (Toronto)
- 116 community kitchens (Toronto)
- 3,459,410 people self-

The study (Tarasuk 2014: 28 Appendix F) shows that hunger varies between 10 and 17.6% in the Greater Golden Horseshoe. Food Banks Canada (2015: 3) reports that 358,963 individuals accessed food banks in Ontario in March 2015. A recent study (Miller 2013) found that at least 350 Toronto agencies were providing meals and food, generally at no charge, to people in need, totaling millions of meals annually through the non-profit and charitable sectors (2013: 11). The recent Food by Ward asset maps show 116 community kitchens in the city, and 160,257 students served daily by the Student Nutrition Programs¹². Across Canada, Food Banks Canada reported 500 food banks and 3000 food provision programs in 2016¹³. Food insecurity disproportionately affects children (approximately 1 in 6) and single parent households with female heads of household (Tarasuk 2011: 8, 10).

Of the top foods identified for the CRFS project, the following are average amounts available for Canadians by kilogram/ person/ year (Statistics Canada 2015).

¹² See <http://tfpc.to/food-by-ward>.

¹³ Food Banks Canada 2016 website: <https://www.foodbankscanada.ca/Hunger-in-Canada/Food-Banking-in-Canada.aspx>

Table 5: Amount of key foods available in Canada

| ITEM | Amount available, adjusted for losses (kg/ person/ year) |
|---------------------------|--|
| apples | 6.88 |
| carrots | 3.92 |
| beef (boneless weight) | 11.2 |
| chicken (boneless weight) | 10.39 |
| dairy: whole milk | 7.15 lt/ person/ yr |
| eggs | 10.55 |

Source: Statistics Canada, Table 002-0011, Food available in Canada

Current intake however is different, and further differs from optimal intake for a healthy diet.

Table 6: Current and optimal intake of key foods

| ITEM | Current intake | Optimal Amount |
|---------------------|----------------|--|
| apples | 8.0 | 20.8 kg/ person/ yr |
| carrots | 6.5 | 22.8 kg/ person/ year |
| beef, chicken, eggs | sufficient | 1.5 servings (half cup each ¹⁴) / day) |
| dairy | sufficient | 3 servings (1cup each) |

Source: Desjardins 2010: 131, 135

In an analysis of availability and optimal consumption in southern Ontario, Cummings (2014: 112 ff) reports that oats, cabbage, green and wax beans, carrot, strawberries, white beans, apples, sweet corn and potato and carrot production could all be increased in Ontario if an optimal diet was consumed (based on Desjardins et al 2010). At current consumption rates, additional production in cabbage, beans, strawberries, apples and potatoes would be needed for all Ontario consumption to be met through Ontario production. If the assessment focuses only on southern Ontario, then cabbages, beans and apples are also sufficient for southern current consumption levels, leaving only strawberries and potatoes in short supply to cover regional demands.

If Ontario diets shifted to an optimal diet (based on Desjardins et al 2010), only tomatoes are produced in sufficient quantities to provide for optimal consumption in Ontario. Of course, not all of these products are produced in sufficient quantity within the Greater Golden Horseshoe to serve that area's population. For instance, greenhouse production for tomatoes tends to cluster in the Leamington/ Essex County area and has not been widely introduced in the GGH. In fact, the Cummings (2014: 116) report shows that the GGH area would be short over 150,000 tonnes of tomatoes if forced to rely on regional production for an optimal diet consumption.

¹⁴ <http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/basics-base/serving-portion-eng.php>

Economics

As noted above, less than 10% of household income is spent on food in Ontario, despite its impact on short and long-term health, education outcomes and other markers of well-being. The following shows the amount by household spent on the top foods identified in the CRFS project.

Table 7: Household expenditures on key foods in Ontario

| 2014 | amount spent ON Household | price; Oct 2014 | Notes |
|---------|---------------------------|------------------|-------------|
| apples | 66 | 3.90/ kg | |
| carrots | 25 | 1.66/ kg | |
| beef | 276 | 11.74/ kg | ground beef |
| chicken | 259 | 7.49/ kg | |
| dairy | 776 | 2.49/ 1 lt whole | |
| eggs | 84 | 3.22/ dozen | |

Statistics Canada 2014, Table 203-0038, Survey of household spending (SHS), detailed food expenditures, Canada, regions and provinces

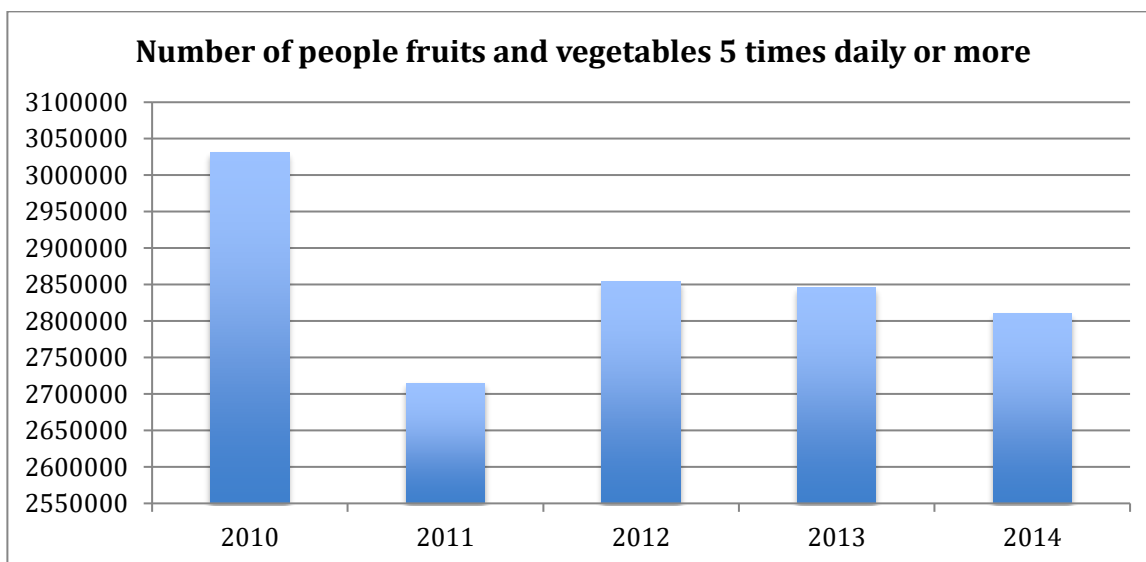
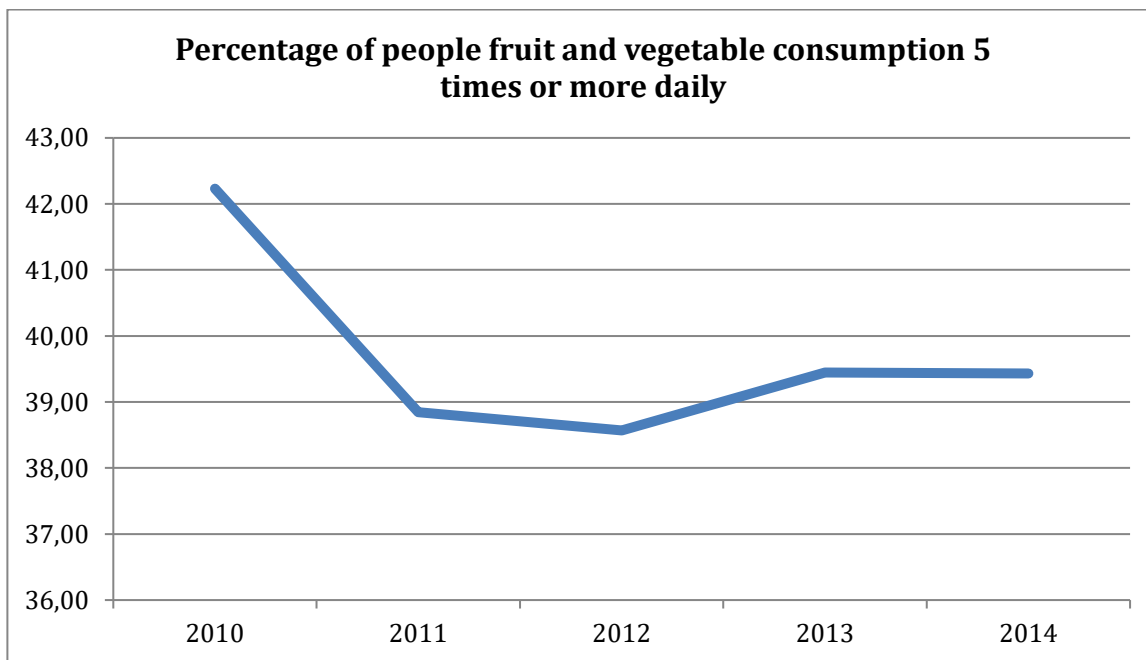
The Consumer Price Index (Statistics Canada, Table 326-0021 Consumer Price Index, annual (2002=100) shows an increase of over 10% in the cost of food in Ontario from 2011 to 2015 (based on a set of basic food items tracked over time). However, household expenditure on food in Canada dropped slightly (less than 1%) between 2010 and 2014, despite rising food prices (Statistics Canada, Table 203-0023 Survey of household spending (SHS), household spending, by household type, annual (dollars).

Health

Toronto Public Health has found that “Alongside hunger, approximately one in three Toronto children (age 2-11) is either overweight or obese³. According to a 2010 report from Statistics Canada, children as a group are “taller, heavier, fatter and weaker than in 1981”, which may lead to accelerated “non-communicable disease development, increased health care costs, and loss of future productivity” (2010: 3). According to a recent Community Healthy Survey (2014), only about 2.8 million people report consuming the recommended five servings of fruit and vegetables per day, despite the fact that the number is probably over-reported, as people will tend to over-estimate what they perceive as good behavior.

Recent Community Health Survey show a slight drop in consumption, with fewer people in the Greater Golden Horseshoe reporting that they consume at least five servings of fruits and vegetables daily. The following charts are drawn from public health unit reports from 2010-2014 for the counties that generally correspond to the study area. However, the geographical boundaries may be different in some cases, so these numbers give a general idea of trends in the Greater Golden Horseshow while the numbers are not exact.

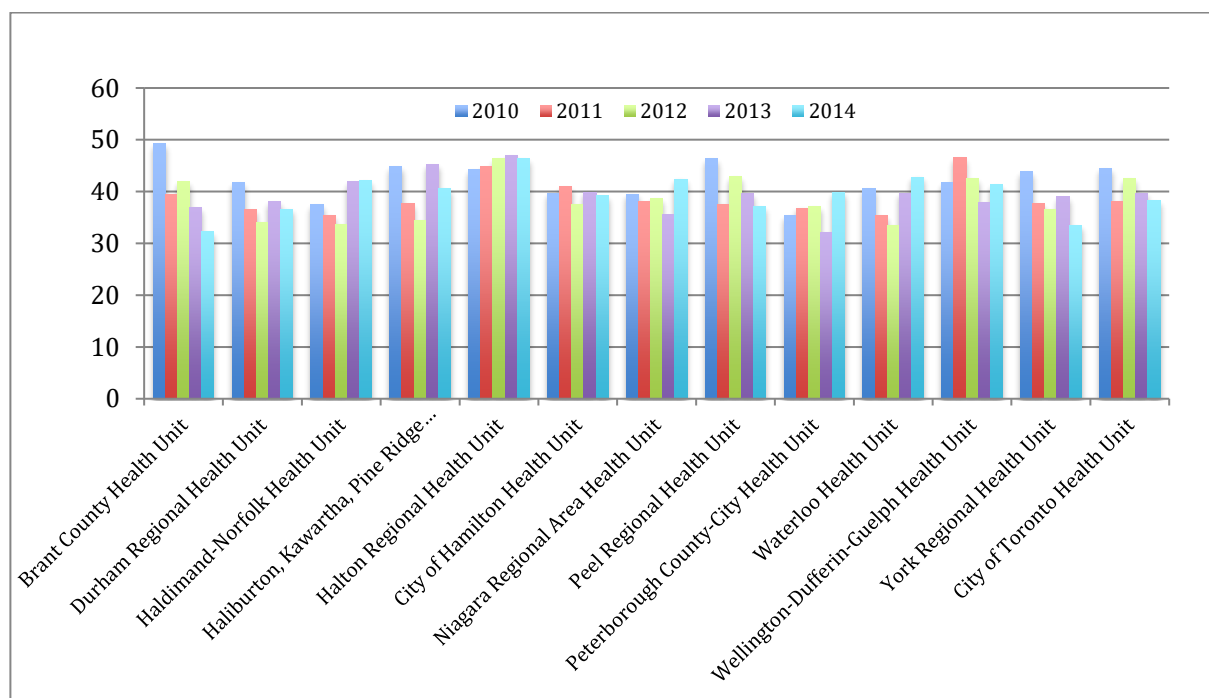
Charts 1, 2: Percentage and number of people in study area who consume at least five servings of fruits and vegetables daily



Statistics Canada, Table 105-0501, Canadian Community Health Survey, Health indicator profile, annual estimates, by age group and sex, Canada, provinces, territories, health regions (2013 boundaries) and peer groups, occasional

These results vary somewhat across the study area. The following chart shows trends by health unit reporting.

Chart 3: Change between 2010 and 2014 of fruit and vegetable consumption as reported by study area public health units



Statistics Canada, Table 105-0501, Canadian Community Health Survey, Health indicator profile, annual estimates, by age group and sex, Canada, provinces, territories, health regions (2013 boundaries) and peer groups, occasional

Nonetheless, some polls do show an increasing tendency towards fresher and more healthy foods: “An Angus Reid poll in February 2011 showed that 76% of Canadians are making healthier food choices compared to three years ago. Eating more fresh food was cited as the most common way people are improving their dietary habits; 42% of respondents were taking that approach as compared to 38% who said they had reduced their salt intake and 36% who have cut down on fat” (Cummings et. al. 2014: 78). The shift to healthier food may also be a result of aging demographics (Walton 2014: 3.6).

A shift towards ethnocultural cuisine, which is often higher in vegetable ingredients, is predicted for the GGH, as 40% of Golden Horseshoe population are currently newcomers. However, one study shows that newcomer health tends to decrease in their first few years in Canada as they switch to their new home’s diet (Access Alliance/ TPH 2011: 38). Some increase in interest in ethnocultural foods may in fact come from urban people enjoying the diversity their city has to offer, although an estimate of that market has not been done. The World Crops Project through Toronto Food Policy Council, Toronto Food Strategy and the Toronto Urban Growers, as well as the Vineland Research and Innovation Centre in Niagara, have worked to develop varieties and markets for ethnocultural foods in the region.

The uneven availability, access and distribution of healthy food, as well as culture-bound unhealthy eating habits, has led to a range of food related health problems shown in the table below for some of the GGH counties. Although this data was aggregated from some counties in

the GGH, seven counties did not supply this information for the Community Health Survey, so the actual figures are likely to be quite a bit higher.

Table 8: Incidence of some food-related health issues

| Health issue | Persons | Source |
|-------------------------------------|--------------------|--|
| Overweight, Obesity Adult (self) | 3459410 | Statistics Canada Canadian Community Health Survey 2014 |
| Overweight, Obesity Youth (self) | 82438 | Statistics Canada Canadian Community Health Survey 2014 |
| Malnutrition | 168 deaths in 2012 | Tarasuk 2014: 6 |
| Diabetes | 545182 | Statistics Canada Canadian Community Health Survey 2014 |
| High blood pressure | 1342191 | Statistics Canada Canadian Community Health Survey 2014 |

Sources: Statistics Canada, Table 105-0501; Tarasuk 2014: 6

Public health and nutrition programs

Ontario public health units, along with various non-profits and charitable foundations, are able to offer a range of support programs, from diabetes education to healthy cooking workshops. Recently, the Food by Ward reports from the City of Toronto show the availability of programs and organizations for healthy eating for all (<http://tfpc.to/food-by-ward>). Toronto Public Health is also working to link access to urban agriculture and locally grown food to health, in a Health Impact Assessment undertaken at the Black Creek Community Farm, which operates and engages people from a nearby low income and priority neighbourhood (TPH 2015: 21).

Environment

Households rank higher than any other link in the food supply chain for waste, approximately 51% (Uzea 2013: 6). The level of waste stems from a variety of problems. Lack of convenient access to stores (and available time to shop) means that people stock up, buying in bulk based on predictions of future need. Sales for volume purchases (part of supermarket culture in general) also encourage people to buy more than they need. The surplus in both cases may end up not being used. Considerable waste is involved in the high proportion of pre-packaged food people purchase (one estimate is that the prepared meal market has reached \$2.4 billion in Canada (GHFFA 2016: 40).

Cooking practices in North America often are wasteful, with preparing too much, buying food that is not used before rotting or expiration dates, and “a lack of confidence to use leftovers” (Gooch et al. 2010: 4). Many recipes call for using only certain parts of the raw ingredients (as in recipes that call for the white parts only of leeks, or that require removal of skin or fat from meat or fish). Unless the household cook is unusually good at planning ahead, these discarded portions are often thrown out rather than repurposed in another recipe. It also seems likely that the variety of cuisines and diets that households enjoy, especially in urban areas, may lead to further waste, as it is hard to maintain the basic ingredient list for several cuisines without having some go to waste before they are used. As diets change and new regimes are prescribed or experimented with, the food that was adequate for previous diets may have to be thrown out. MacRae et al. (working paper: 34), notes that “Food advertisements do increase consumption (Harris et al., 2009) and restricting what can be shown and when results in less. Chou et al. (2008) estimate a ban on fast food ads would reduce overweight in children 3-11 by 18% and adolescents 12-18 by 14%.”

Case: Sheldon Creek Dairy

The De Haan family (parents) emigrated from Holland in 1950 and in 1953 they launched the Sheldon Creek Dairy farm. The farm began with 300 acres just east of Shelburne and west of the Holland Marsh, and a few cows. Maggie was one of the first, and her genes have continued into the present milking herd of 55 cows. The farm is now operated by a multi-generational team with 11 workers and 6 full-time employees. With loans through the Farm Credit Bureau, they were able to buy nearby farms and expand to the current 450 acres. They have learned to live with high debt in order to install the processing equipment, and told the tour that they have “too much pride to give it up”.

They built the processing facility right on the farm, processing only their milk. Under supply management, this is the only way besides certified organic to maintain complete traceability, since milk otherwise goes into a common pool. 60% of their milk is processed right on the farm, while 40% goes to the Dairy Farmers of Ontario to enter the common pool.

They believe in minimal processing to preserve the nutrients as much as possible. Since they control the processing, they are able to pasteurize (as required) at a low enough temperature (73 degrees for 16 seconds) to maintain the valuable enzymes. They do not homogenize, leaving the fat globules to float to the surface with their valuable vitamins. They pack in glass to avoid leaching from the standard carton. They also have a grant to install a heat reclaimer to recover heat from the system.

(continued next page)



(Case: Sheldon Creek Dairy continued)

They report that people who have not been able to digest other milk are able to drink the Sheldon Creek milk. They found a new market in the growing Muslim community as well, since the minimal processing works better for their home cuisines. For sales they rely on a distributor (although they also have an on farm store). They find that stores are selective, and will only carry some of the products rather than the whole line. Sheldon Creek products include milk (regular and dark chocolate), and yogurt including plain, flavoured, and Greek-style. They even have a delightfully pink “Strawberry Milk” for the summer season.

Waste

Volume

Although the original research framework identified waste as a separate food system area, it is in fact a thread that weaves throughout the food system, and has been reported in each section above. The table below summarizes the percentage of waste from each food system area.

Waste at a glance

- 207,326.5 tonnes annually
- \$12 billion in value wasted (ON)
- 9% agriculture
- 18% packaging/ processing
- 3% transportation/ distribution
- 11% retail
- 8% food service
- 51% consumers

Table 9: Waste by supply chain sub-sector

| Supply chain sector | Percentage waste | Tonnes |
|---|------------------|--------|
| Field | 9% | 18659 |
| Packaging / Processing 18% | 18% | 37319 |
| Transportation /Distribution 3% | 3% | 6220 |
| Retail Stores 11% | 11% | 22806 |
| Food Service / HRI (Institutions) 8% | 8% | 16586 |
| Home 51% | 51% | 105737 |

Source: Uzea 2013: 13; Cummings 2014b: extrapolated from tables

According to Uzea (2013: 11), the Recycling Council of Ontario estimates that 30% of the non-hazardous waste stream in landfills is organic, and could have been composted or redirected. Although Toronto's green bin program has rerouted some organic waste away from landfills, there are many other steps that municipalities can take. Vidoni (2011: 1) notes that "other jurisdictions in Canada, the US and the UK have more flexible regulations for the production of compost, and... this has allowed community-scaled programs to play a much more engaged role in the management of municipal waste." Composting in the backyard, probably the easiest and cheapest approach (MacRae in review: 26), is not generally practiced or supported. A Master Composter program offered by the city has been discontinued (Vidoni 2011: 37).

Economics

The total tonnes of waste annually for the Greater Golden Horseshoe food system is estimated to be 207,326.5 tonnes (Cummings 2014: extrapolated from tables). The value of discarded food in Ontario is estimated at \$12 billion by the Ontario Waste Management Association 2016, and \$27 billion for all of Canada (Uzea 2013: 5). As Uzea notes, (2013: 27), few Canadian businesses realize the savings that could be generated from reducing (rather than disposing of or recycling) waste. One Tim Horton's reports almost ½ million in annual savings from various energy and waste management tactics (Ibid.: 20). Even on a relatively small scale, diverting waste into composting as FoodShare does has been shown to save thousands annually in the city's processing costs (Vidoni 2011: 29). MacRae (in review: 49) reports on another study based on eight case studies that found a 7 to 1 benefit to cost ratio in coordinated efforts across the supply chain.

Employment

Statistics Canada shows 15747 jobs associated with waste management in Ontario.

Environment

MacRae has aggregated the information from several studies on the impact and cost of food waste. He writes (in review: 3) "Food that is wasted is responsible for the release of 3.3 billion tonnes of greenhouse gases into the atmosphere and a global water loss of 675 trillion litres per year (Miller, 2012). In the US alone, the energy contained in wasted food represents approximately 2% of national annual energy consumption (Cuellar and Webber, 2010). Additionally, 1.4 billion hectares of land, or 28% of the world's agricultural area, is used annually to produce food that is wasted (FAO, 2013)." Following the study by Abdulla et al. 2013, he writes (Ibid." 5) that, at a conservative estimate, "44% of food available for

consumption is wasted / person / year, with fruits, vegetables the most wasted and pulses and nuts the least.” As this study points out, given the level of water used for irrigation and other aspects of food production, the waste of food means that the water used to produce the food has also been wasted. Likewise, the associated emissions and pollutions represent unnecessary and negative environmental impacts. “The amount of water used each year to grow and produced lost and wasted food would fill 70 million Olympic-sized swimming pools (UNEP 2013a)” (MacRae, in review” 10).

As a general principle, since each link in the supply chain uses valuable water and energy resources, and contributes to emissions, shorter supply chains should reduce the negative environmental impacts of the food system: “As energy is always lost the more consumption stages it passes through, eating closer to the sun definitely helps with overall system energy efficiency” (MacRae, Ibid.: 10).

Legislation

Although legislation and regulation of waste management is extensive, jurisdictional authority can be overlapping and contradictory. As Vidoni notes (2011: 9), the daily operation of waste management is at the municipal level, while the rules for hauling, processing and storing are regulated at the provincial level. For compost alone, he found five provincial acts regulating compost production and use in Ontario (Ibid.).

Education

Education for food and agriculture also is a thread that connects the food system from field to waste. There is no aggregated information for food related programming, curriculum or training. It is likely that the number is increasing; a review by the Toronto Urban Growers found 93 school gardens in Toronto alone. The Food by Ward study identified 116 community kitchens, most of which host a range of programs from healthy eating to cooking from harvest to newcomer groups gathering over a meal of food from home. For agricultural education, OMAFRA and the Agricultural Management Institute (AMI) offers a range of trainings focused particularly on business development, agricultural practices, and food safety. Zizys found three programs in Toronto linked to employment that provided training in various food sectors (2015: 16).

Zizys’ research showed that the Community Food Works program found that 39% of participants had found employment after the course (Ibid.: 19). VG Meats just outside the GGH area initiated their own training programs for their workers at the retail store, and for skilled meat-cutters. The lack of skilled meat-cutters may mean that their trainees end up employed elsewhere, a problem that sectoral training can circumvent. A sector specific training centre may achieve more concrete results through the partnership between the hospitality workers union and major hotels in Toronto at the Hospitality Workers Training Centre (Ibid.: 21).

Other programs for food and education training exist, for instance there are important training opportunities at the George Brown Chef School, Durham College’s Food and Farming Program, Loyola’s program focused on food technology, the Sandford Fleming Sustainable Agriculture program, and the Food and Nutrition Management program at Humber College.

Democratic engagement

Although individual agencies may track participants in consultations and planning sessions, these numbers have not been aggregated. Toronto has included voter participation information in their open data set, but levels of engagement beyond voting is not available in the secondary research sources. As studies of food citizenship have shown, this is an important part of making change. To the extent that the research team can access input from municipalities, public health units and others that aggregate participation numbers, engagement may be calculated in the course of the next phase of research. Member-based organizations like Sustain Ontario and Food Secure Canada may have useful information.

Case: Mapleton's Organic Dairy

Mapleton's Dairy is owned and operated by Martin de Groot, Ineke Booy and family. The farm was an early pioneer in organic dairy in Ontario. The farmers emigrated from Holland in 1980. The milk goes to on-farm processing of organic ice cream which is sold across Canada. They have about 70 dairy cows, mostly Holsteins, and a variety of other animals. The farm has 600 acres of certified organic land.

They are committed to the health of their animals, the land and the people they feed. Their philosophy has meant that further innovations have been added to the basic requirements of certified organic dairy husbandry. Now the barn has semi-transparent sides, filling the space with diffuse light. Their milking machinery is self-milking; that is, the cows can choose to enter when they are ready.



The sophisticated machine can milk the animal, keep track of production by individual cow, and even open the gates to send the cow out because she has been by too recently (they receive some food in the milking lane, so some of them will enter even when they do not need to be milked).

The barn is likewise automated to allow the cows to go outside when they want to. They could spend all day outside, but they don't. The farmers have found that the bovine preference is for the cool air and westerly light in late afternoon and early evening. The cows also have gentle back-rubbers in the barn that they can activate by standing under them. The barn is softened with many feet of composting manure which must be turned regularly. The heat it gives off, even in winter, is palpable; because it is composting rapidly, there is very little smell. The composted manure from the barn is largely sufficient to feed the fields.



Mapleton's goes beyond the barn in their environmental commitment; they have a large array of solar panels feeding renewable energy onto the grid and generating income. They use wastewater from the dairy to heat the on-farm store and office. The farm is an expression of the beauty, elegance and comfort that can come from elements that are also good for planet and people.

Critical Issues and the Current Situation

The CRFS diagnostics process identified certain critical indicators and issues that shape the food system and can indicate the potential for change towards the vision of healthy food for all sourced as locally as possible. These include food flows (measures of regional production going to regional markets), multiplier labour indicators for job quality, and recurring themes of waste, education and democratic engagement. Sustainability in the food system clearly depends on robust economies, strong social linkages and healthy environments. Many critical indicators measure the resilience of the agricultural community in terms of integration of functions and support networks, while the integration and longevity of the ecosystems embedded in the GGH food system has also been identified as critical and occurring across all food system areas. Environmental considerations are linked across the supply chain by the waste issue, but also by water use and management, soil management, energy use, and emissions from each human endeavour at each phase of the food system¹⁵.

Labour can also be seen as a linking thread for all food system areas. As MacRae (working paper: 3) argues, “Rather than forecasting where new jobs will come from as do many reports addressing the current environment, we need to look at the food system goals above and translate them into the activities and associated jobs that will bring them to fruition.”

Change that can persist and create a new robust agriculture and farming system would likewise weave together all parts of the food system; change in one area can fail if it is not well integrated with other changes. For instance, the market and demand for local food has been increasing, according to polls. If it is not accompanied by behavior changes in consumer shopping habits, the system cannot move to regional production. Likewise, if the farmers have no way to get their goods to local markets, or to store crops like potatoes for a longer-term, or to process surplus, the local food demand will not solidify into a market worth the investment for farmers. If the solution to the demand for local food creates more greenhouse gas emissions and waste from inefficient water use, as in the case of some greenhouse operations, then the system design needs a rethink. MacRae (N.D.: 15) argues that the best solutions for waste address the whole supply chain.

Efficiency elements can be built in to season extension even at commercial scale, as in the Mennonites elegant new greenhouse operations in the Huron County area. MacRae’s review of environmental impacts and the food system found that integrated solutions such as food hubs and box schemes reduce emissions at critical nodes of the system and can have the most impact overall by reducing emissions from multiple points: storage, distribution, retail, and production. The ideal scenario, the report points out, is for people to eat organic, minimally processed food in a plant-based diet, walk to the store and shop daily using minimal cold storage (MacRae et al 2013: 954). MacRae et al. (2013: 956) notes, following Garnett’s (2011) argument, that food miles can represent all the other impacts associated with a food system that is dependent on long distance transportation, including: “land use changes internationally, infrastructure investments (roads, terminals, refrigeration, and cooling), and heightened consumer expectations for availability, variety, and quality, all of which have associated GHG emissions.” They conclude that “shortening supply chains may have indirect positive effects on these other dimensions.” (Ibid).

¹⁵ An excellent list of indicators for a Canadian resilient food system produced by Graves et al. 2015 matches many of the indicators chosen in this project, confirming the direction of this CRFS research.

Many studies show that protecting ecosystems can have positive effects on the bottom line for farmers. Wilson (2008: 27) cites one study that shows for canola that “optimum yield and profit would be attained if 30 per cent of the field areas were set aside for wild pollinator habitat.” However, farmers who do not have control of their land are less likely to invest in ecosystem protection, which tends to pay off on a longer scale than the short term leases of rental tenure. The National Farmers Union (2015: 4) reports that “Local farmer control of land and livelihoods not only allows farmers to make a decent living, but also provides wide societal benefits. When farmers are in a position to make long-term decisions, they can put the sustainability of their farm ecosystems ahead of immediate revenues.” Creating tenure security (protecting farmland, providing longer rolling leases on public farmland, or even ensuring sufficient income for farmers to feel secure in continuing in their profession) has multiplier effects on the environment and eventually on public funds, reducing the need to redress negative effects such as soil and water run off or flooding problems, air pollution, and even pollinator reduction.

As Cummings (2014: 165-6) and other import substitution reports show, even with the bare minimum of indicators like jobs, support services and gross income, shifting imported products to local production can have a significant impact on the local economy. “The re-direction of \$97.1 million of imports to the local economies of Ontario is significant. Estimating the impacts associated with the \$97.1 million worth of new local production translates into \$112.5 million in value added, 1,590 FTE jobs and \$32.8 million in taxes to all levels of government (using the multipliers in Table 40).” Other analyses use higher or different multiplier numbers and may arrive at different predictions (see also Econometrics 2012; MacRae et al. 2013; Walton 2014).

As noted in previous reports, many of the indicators identified as critical are also coded as not assessed in the existing secondary research. For instance, the central question of the amount of food that is produced locally that is also sold locally (food flows) is almost unanswerable at this point. Not only is the same product imported and exported (redundant trade) but products or ingredients may be exported for one level of processing, and then cross the border again for sale. While the product has “local” ingredients, the effect on jobs and environment are negative.

An early attempt to assess food flows in the Region of Waterloo ran into numerous challenges; even company executives struggled to report on the source of their ingredients outside general provincial or southern Ontario statements (Cummings 2005: v). Cummings report (Ibid.: 75) found overall that products sold in the Waterloo region had, except for apples, very low regional content, though Ontario content was moderate to high. They found the problem to be increasing: “While agricultural production in the Region of Waterloo is substantial, ongoing consolidation in the food processing and distribution sector is making it more difficult for commodities to retain their unique local identity as they make their way to the marketplace” (Ibid.).

Trade regulations have exacerbated the problem. The identification of food by origin or to promote local as better than imported food may contradict international trade rules. However, MacRae’s review of the impact of trade barriers suggests that they may have less negative impact in the case of organic or sustainable products: “Regarding market access, much of the focus of the agreement is on import quota and tariff reduction, which could affect supply managed commodities, but many currently proposed supports for local/sustainable food systems would likely be considered NTBs [non-tariff barriers]. However, the structure of the

AoA appears to offer numerous opportunities to exempt such supports or position them as non-distorting.” (MacRae 2014: 113).

Solutions to food security are likewise sought across the food system as well as the economic system. Since people go hungry generally because their limited incomes only cover shelter and are not sufficient to also buy food, strategies like guaranteed incomes and increased wage levels are proposed by activists. Scharf et al (2010: 17) notes that

“Activists view food as an entitlement and focus on the failing social safety net, unemployment, low wages, the high cost of rent, unequal distribution of wealth, and the state’s increasing inability to provide for its citizens... The concept of *community food security* (CFS) was developed in the early 1990s, in an attempt to create broad-based and systemic approaches to reconnect food production and consumption (specifically for low-income people) and ensure an adequate and accessible food supply (Toronto Food Policy Council 1994; Winne, Joseph, and Fisher 1997).”

Solutions are proposed that integrate all aspects of the food system, creating impacts on indicator measurements across the food system; “Rather than focusing solely on the state to meet food security needs, community food security advocates called for local food systems in which the sustainability of “food production, processing, distribution, and consumption is integrated to enhance the economic, environmental and social health of a particular place” (Feenstra 2002, 100).” (Scharf et al. 2010: 18). Zizys (2015: 27) makes a similar argument for labour in food systems, citing the need for good jobs that produce good food: “poorly-prepared food has both “bad food” (lacking nutrition) and “bad jobs” (low-skilled, low pay) consequences. By addressing the demand-side of the equation (the nature of the work and the level of skills required), one tackles two problems simultaneously.”

Conclusion: a moving target

The term “food flow”, identified as a critical issue for this project, captures the dynamic attributes of the food system as well as the interlinking among elements that must be addressed to achieve any long-lasting and resilient change. Systemic change can be an unappealing strategy for those who feel the system is largely working in their favour. Yet, although the Canadian food system has both winners and losers, the losers are multiplying: hunger levels are increasing every year, new farmers cannot get a purchase in the market, other farmers are abandoning the project for other career paths with regular hours and more secure income (or retirement). In between, even retail food giants are feeling the pinch as foreign conglomerates like Walmart’s move into their territory.

There are many sustainable and positive elements at work already in the GGH food system. Sometimes they are working in the interstices of larger, more established systems. Sometimes they are integrated into existing modes of production, distribution or marketing. Even housing, so often imagined at loggerheads with food system resilience, can be used to create more food growing areas. “The Daniels Corporation [a housing developer in the Greater Toronto Area] now includes natural features and community gardens in all its projects, including higher density housing” (Advisory Panel on Growth Plan 2015: 63). The use of community benefit clauses in developer contracts to create mixed use urban neighbourhoods is a growing and important trend which is only just taking hold in the GGH area.

As Vidoni (2011: 36) points out for strategies to develop robust composting systems in Toronto, food system elements can engage multiple jurisdictions and regulations, requiring a range of stakeholders to have a voice in decision-making and planning. The city region approach seeks to stimulate and identify shared values and measurements for such a process. Currently, local food goals may be stated in specific jurisdictions but are not uniform commitments across interlocking jurisdictions: “The PPS [Provincial Policy Statement] includes a policy to support opportunities for local food, and promotes the sustainability of the agri-food and agri-product businesses by protecting agricultural resources and minimizing land use conflicts. However, there are no similar policies in the four plans” which includes the overlapping Growth Plan for the Greater Golden Horseshoe, the Greenbelt Plan, the Oak Ridges Moraine Conservation Plan and the Niagara Escarpment Plan.

Questions of resilience and adaptation to climate change cannot be considered secondarily to the economic work of farming; for the GGH research, climate change adaptability and ecosystem impacts are considered throughout the supply chain assessment. The recent report from the Advisory Panel on the Growth Plan (2015: 44) states that “We view climate change as a critical driver for many of the policies in the four plans, one that needs to be brought into the mainstream of all our planning and development activities.”

The Phase 2 research will examine dynamic change: the trends, initiatives and strategies that effect the food system at multiple levels and for multiple actors, creating more winners than losers. The research will examine the strategies, partnerships and relations that make supply chains flow smoothly and with the best outcomes possible from producers to eaters to the planet they share.

The terms “value chain” and “trust networks” have become common and are recognized as crucial parts of functioning food systems. But what is the value that holds these chains together and allows the flow of goods and capital? What sustains existing networks? How are new ones built? Who is excluded when food flows follow the lines of the dominant shared values? Can trust be built across actors cast as heterogeneous or even opposed, like food insecure people who want lower prices, and the farmers who struggle to survive?

The dynamic system can engage all actors and interests in change towards a more resilient system with more winners and fewer losers. As MacRae and others have noted, a transition to a more just food system with benefits more evenly allocated can probably not happen without the intervention of state support, subsidies and incentives, just as the transition towards commodified food for export required state support, subsidies, and infrastructure for long distance transportation.

The next phase of the CRFS research will examine the primary strategies, initiatives and indicators of change towards the vision of “Healthy food for all, sourced as regionally as possible, and as sustainably produced, processed, packaged, and distributed as possible”. What makes the existing sustainable supply chains work? What are the activities already occurring across the GGH that mark progress towards the vision? How can more be supported, encouraged, built? Who are the key drivers of this change? Initiatives will be assessed and explored with both long and short-term or immediate impacts, building a vision of action to inform the policy development work in the final phase of the CRFS project.

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