Headwater Hikes

THE VALUE OF THE GREENBELT'S HEADWATERS

Project Description

Funded by the Friends of the Greenbelt Foundation and supported by the numerous organizations listed in Hikes Map and List of Partners, Headwater Hikes encourages people to get out onto the Greenbelt, get some fresh air, and visit some of the Greenbelt's most important natural resources - our headwater areas. Many people understand that the Greenbelt identifies and affords protection to 730,000 hectares for agriculture, natural spaces, plants and animals, and water.

Many also know that the Greenbelt consists for the most part of the Niagara Escarpment, the backbone of the province that runs from the falls through Manitoulin Island, and the Oak Ridges Moraine.

Contents

Please see "Hikes Map and List of Partners" for a larger map and complete list of organizations that supported the development of this project.

Within these areas, there is celebration of the natural and agricultural bounty; pride in the designation of the Escarpment as a UNESCO World Biosphere Reserve; and broad public understanding that the Oak Ridges Moraine serves as the "rain barrel" of southern Ontario.

These over-arching strengths are not uniform across the Greenbelt, however, but augmented tremendous variety.

The Niagara Escarpment, for example, is mostly limestone, while the Oak Ridges Moraine has large, glacial deposits of sand and gravel. And stretching hundreds of kilometres from both east to west and north to south, the Greenbelt contains highly varied areas of climate, soil, vegetation, and socio-economic activity.

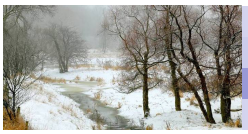
Even within these varied landscapes, there are different types of headwater areas – forested uplands, wetlands, and small streams. Together, headwater areas provide the base flow to and harbor the bio-diversity that forms the foundation of our watersheds.

Headwater Hikes has been developed to provide background information on the roles played by the Greenbelt's headwaters, and to encourage people to explore them.

Headwater Hikes is an OHI project sponsored by The Friends of the Greenbelt Foundation.

GREEN BELT

Possibility grows here.

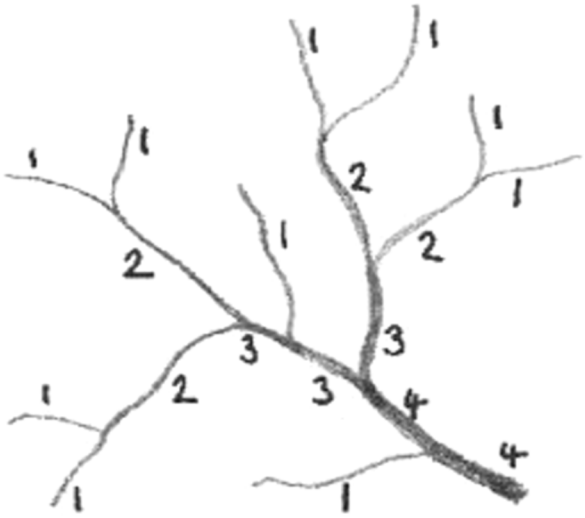


What Are Headwaters?

By taking one or more of the Headwater Hikes, you can experience first-hand the valuable roles that headwaters perform in the Greenbelt while enjoying what the OHI calls our landscape of water.

The OHI defines headwaters as:

- Surface drainage features, including ephemeral and intermittent streams;
- Groundwater recharge areas and aquifers;
- Areas of groundwater discharge and upwelling;
- Vernal pools, spring-fed ponds, off-line wetlands; and,
- First and second-order streams.



A first order stream is one with no tributaries, as per the drawing, while a second-order stream starts where two first-order streams converge. First and second-order streams can be permanent, ephemeral (where flow is based on precipitation), or intermittent (where flow occurs when the water table rises).

While most scientific literature includes third order streams in the definition of headwaters, the OHI has selected a tighter area of focus due to the extent of development, the predominance of private ownership, the lack of current data on the condition of headwaters, and our perceived need for enhanced stewardship for headwater health across southern Ontario.

The areas chosen for the Hikes represent a wide spectrum of headwater types, in highly varied regional climates and geology. Even where there are commonalities, such as Hikes occurring in on the Moraine or the Escarpment, each Hike is different. For example, the four mainly wetland areas – at Pigeon River, Alton Grange, Terra Cotta, and Fletcher's Creek – demonstrate varied amounts of surface water, volumes of flow, and water chemistry.

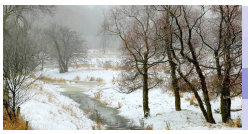
The Fletcher Creek Ecological Preserve includes the site of a limestone quarry being naturalized to become a pond and wetland.

Meanwhile, the five highly-forested Hikes – at Fleetwood, Glen Manor, Thornton Bales, Britton, and Short Hills, with the first three on the Moraine and the last two on the Escarpment – present an array of landscapes ranging from relatively flat to steeply sloped, with varying degrees of intermittent or ephemeral streams and vegetation ranging from scrubby through mixed conifers and hardwoods to the gigantic trees at Thornton Bales.

The tenth Hike, near the McMichael Gallery, offers another different perspective: that of a second-order stream, with pools and riffles, carving its way across a relatively wide floodplain containing its own small streams and wetlands.

Each headwater area shapes the diversity of the plants and animals within it. Vegetation ranges from water lilies and cattails through mosses, sedges, and partridgeberry to evergreen thickets, oak and black walnut savannahs, and towering hardwood forests.

Animals find their niches in these areas, from few aquatic species in low-nutrient or lime-rich groundwater up-wellings such as at Fletcher Creek through the thriving communities of benthic invertebrates, crustaceans, small fish, swarming insects, amphibians, mammals, and the staggering array of nesting, foraging and migrating birds at Terra Cotta.



The Role of Headwaters in the Greenbelt

The Greenbelt stirs wondrous images in the public mind. These include the undulating hues of the Oak Ridges Moraine, the dramatic relief of the Niagara Escarpment, the whisper of lush forests, the bounty of agricultural lands, and the veins of our life-sustaining wetlands, streams, and lakes.

And while large lakes and rivers often capture the headlines, for their trophy fish, boating and shipping, and electricity at the flick of a switch, the foundation of both regional water quantity and quality, as well as our biodiversity, resides in our tens of thousands of headwater areas—our wetlands, small streams, and their catchments.

In fact, our headwater areas:

- Perform key ecological roles in the Greenbelt and beyond;
- Consist of and provide significant returns to our region's natural capital; and,
- Inform much of the socio-economic activity in south-central Ontario.

Ecological Integrity

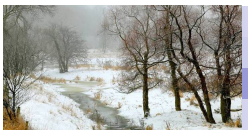
As described above, headwaters come in many forms - with varied climate, topography, soil type, and surficial geology - and help shape the diversity of the plants and animals within their footprints.

Wherever they are found, headwaters and their catchments - the areas drained by small streams - form the basis of our watersheds and regional biodiversity, as they:

- Comprise the majority of both the total surface area and total stream length in most watercourses;
- Contribute the majority of flow to most watercourses;
- Help regulate that flow - through natural cover, soil type, and geology - to both surface and groundwater, thereby reducing both flooding and erosion;
- Furnish key habitat types for the breeding, feeding, and sheltering of upstream species, thereby habouring a large portion and in many ways the base of a watershed's biodiversity; and,
- Nurture downstream ecosystems by providing significant portions of a watersheds nutrients, organic material, and sediment.

In addition, headwater streams and their catchments:

- Are as important to terrestrial insects, a key element of the food chain, as they are to aquatic species;
- Protect small streams from thermal heating where their streambanks include forest cover; and,
- May become both less resilient and increasingly important to watershed integrity in a changing climate.



Natural Capital

Natural Capital, according to the Winnipeg-based International Institute for Sustainable Development, is "the land, air, water, living organisms and all formations of the Earth's biosphere that provide us with ecosystem goods and services imperative for survival and well-being. Furthermore, it is the basis for all human economic activity."

Two different calculations of the Greenbelt's natural capital offer insight.

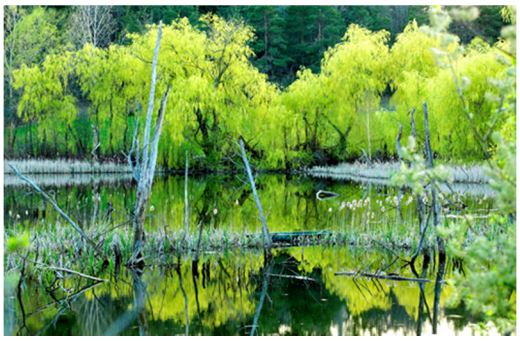
First, efforts led by the Friends of the Greenbelt Foundation estimate that total Greenbelt economic activity, as described on the next page, supports 161,000 permanent jobs and generates $9.1B of annual revenue.

Second, the David Suzuki Foundation has estimated that the value of the natural capital of the Greenbelt – the estimated cost if humans had to replicate the work performed by nature – at $2.6B per year.

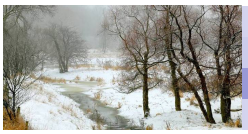
It is an impressive but somewhat illusory figure. Even if society had the technical, financial, and human resources available to replicate nature's services, having to do so—or amending our ways to avoid doing it forever—would require significant shifts in human behavior, or could even become meaningless in a continuing downward cascade.

Leaving such apocalyptic visions aside, the benefits that the Greenbelt and its headwaters – which comprise the majority of watershed lands, stream length, and base flow - bring to Southern Ontario include:

- Habitat for people and all other species;
- Bio-diversity (food-chain and other interactions between species);
- Forests and other natural cover that sequester carbon and influence regional air quality and climate;
- Forests, other natural cover, and wetlands that retain and purify water, reduce erosion and flooding;
- Surface and groundwater available for drinking, agriculture, industry, and baseflow to streams and lakes;
- Food, wood & wood products, aggregates;
- Active (skiing) and passive recreation (hiking), artistic inspiration; and,
- Public health.



Photos on pages 2 and 5 from the OHI.
Photos on pages 3, 4, and 6 courtesy of David McCammon Photography, Kitchener



Rural Socio-economic Activity

While headwaters come in many forms that help shape the diversity of the plants and animals within their catchment areas, and while a reliable supply of clean water is required for human survival and a vibrant economy, it is the combination of climate, topography, soil type, and surficial geology that informs regional social-economic activity. These four conditions vary widely across the Greenbelt, best demonstrated by comparing three of the areas that will host Headwater Hikes.

Short Hills, our southernmost Hike, is located in the Niagara Escarpment, just below St Catharines. Less than 150 kilometres above the northern border of California, it has a climate moderated by its location between two of the Great Lakes, with an annual average temperature of 8.8° Celsius. Much of this area consists of the Ontario Plain, characterized by flat or gently rolling lands, fertile sandy soils, and excellent drainage provided by the fractured dolomite of the Escarpment.

One result is the Niagara Fruit Belt, where much of Canada's soft fruits and grapes for wine are grown, and which was a strong reason for the establishment of the Niagara Escarpment Planning and Development Act (1973) and the inclusion of the escarpment in the Greenbelt. The rural economy here consists of direct agricultural work in fruits and wines, with ancillary support in food and beverage processing and transportation as well as agricultural equipment, supplies, and services. More recently, the Niagara Fruit Belt has fermented activities in greenhouses and agri-tourism.

In contrast, **Pigeon River** is at the northern limit of our ten Headwater Hikes. While relatively close to Lake Ontario, and only about 100 kilometres north of Short Hills, it has a higher elevation, receives a lot of lake effect snow rather than Short Hills' moderating influences, and has an annual average temperature of 6.0° Celsius.

Geology in this region varies widely, from the Canadian Shield and a renowned predominance of surface water to areas of limestone bedrock covered with surface materials whose distribution and depth were shaped by the movement of glaciers. As a result, areas close to Pigeon are characterized by aggregate deposits, a thin layer of soil supporting forests or pasture, and thicker deposits of sandy soil capable of supporting other crops. The rural economy here is composed of agriculture, aggregates, recreation, and pockets of forestry.

Terra Cotta, for its part, lies half-way between the two areas described above and straddles both the Oak Ridges Moraine and the Niagara Escarpment.

Located at about the same distance from Lake Ontario, at a similar latitude, and with a similar elevation as Pigeon River, Terra Cotta has the same annual average temperature but a very different topography, soil types, and a wide variety of wetlands.

In fact, the vegetation community here is so unique that Terra Cotta has being identified as one of ten Nodal Parks within Ontario's Parks and Open Space System.

Outside of this oasis of diversity, the rural economy is dominated by aggregate extraction, consisting of both sand and gravel on the Moraine and limestone on the Escarpment. Other sectors include pockets of agriculture, forestry, recreation including an active trout fishery, and a burgeoning trade in artistic tourism.

Moving Forward

In southern Ontario, the Greenbelt serves as an important counter-weight to extensive development that can both reduce and fragment our regional reservoir of natural capital, ecosystem and public health, and local agriculture and other socio-economic activity.

Outside of the Greenbelt, our cities and infrastructure have significantly impacted the region's natural capital. These impacts include deforestation, the draining of wetlands, stream alteration, increased sediment deposition and erosion, flooding, reduced natural habitat and biodiversity, and air, soil, and water pollution.

How Much Habitat is Enough, an Environment Canada document that provides non-regulatory guidelines for healthy lands and waters, has suggested the following criteria for healthy watersheds:

- A minimum of 30% natural cover as a high-risk threshold for species diversity and healthy aquatic systems, 40% as a medium-risk threshold, and 50% as a low-risk threshold;
- The protection and/or restoration of the greater of (a) 10% of each major watershed and 6% of each sub-watershed, or (b) 40% of the historic watershed wetland coverage; and,
- That both sides of streams should have a minimum 30-metre-wide vegetated area to protect aquatic habitat.

In response to the tensions amongst a growing population, urban sprawl, and the need to protect both local agriculture and the natural capital required to help sustain future generations, the Province established the Greenbelt, while numerous agencies have embraced regional targets such as having 30% of their jurisdiction in forested lands.

In a region with huge municipalities such as Hamilton, Burlington, Mississauga, Barrie, Markham, Toronto, and Oshawa, the OHI believes that we will not meet those targets in most of our cities but that we may be able to do so in a regional context that includes the Greenbelt.

As South-central Ontario's population, urban areas, and economies grow, the OHI considers it important to enhance existing protections for the Greenbelt and to expand its footprint in terms of protective policy, implementation, and size.

We also believe that sustainable farming and forest operations need to be supported with progressive provincial initiatives, especially those related to the tax regime.

In addition, we believe that what we refer to as Contiguous Upland Headwater Areas – fingers where headwater streams and wetlands touch each other and form larger pockets of natural heritage - should be identified, monitored and afforded special status, as described in other OHI publications.

In short, the future ecological integrity of South-central Ontario needs the Greenbelt, and the Greenbelt needs to protect our headwater areas for the special roles they play in the foundation of our watersheds, regional biodiversity, and the health and stability of society.

The Ontario Headwaters Institute thanks both the Friends of the Greenbelt Foundation for the grant enabling this project and our partners for their support and participation in developing the Hikes.
For further information, please contact us via Andrew@ontarioheadwaters.ca or at 416 231 9484