



# OTF GROW GRANT EVALUATION

Ontario  
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Foundation



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Completed June 2019  
By Elisabeth Graham, Executive Director

# **STEWARDSHIP PLAN**

## **ACKNOWLEDGEMENTS**

Financial assistance was provided by the Ontario Trillium Foundation

## **FOREWORD**

Heartland Forest Nature Experience is located on 38 hectares (93 acres) of Provincially Significant Wetland in a relatively remote area of west Niagara Falls. It is well known for numerous natural features including: a Carolinian forest, frog and turtle ponds, a stream, vernal pools and a rich inventory of unique species of birds, trees, and amphibians.

Heartland Forest Nature Experience has many complementary facilities such as: trails, fishing pond (must provide own gear), picnic shelters, informative signs, butterfly garden, observation and rest stations, playground, larger than life animal carvings, mini-putt and one of Canada's largest tree-houses that offers a panoramic view of the forest.

Heartland Forest property is managed to preserve its ecological integrity and biodiversity; to undertake restoration activities where necessary to overcome degraded conditions; and to provide appropriate access for passive recreation by program participants and the general public. Ecological research may be undertaken from time to time, upon approval.

## **EXECUTIVE SUMMARY**

Heartland Forest maintains a Carolinian forest comprised mature deciduous upland and 93 acres of slough forest designated as Provincially Significant Wetland, and a newly restored wetland meadow. Heartland Forest is developing a stewardship plan for its natural area in order to have comprehensive background information for the property, and to guide management activities. As part of this process comprehensive biological and species at risk inventories were undertaken. The biological inventory followed the Ecological Land Classification (ELC) protocol.

Management activities on the property have included trail construction and maintenance, garbage removal, and invasive species removal and plantings of native species. Restoration initiatives include constructing an open wetland buffering our slough forest and enhancement of a 25-acre wet meadow adding pit and mound formations, vernal pools and plantings reclaiming an old agricultural field. A recent prescribed burn was implemented to ratify encroaching invasive species. Future management activities will include studying and monitoring the health of species at risk and removing invasive species. Heartland Forest will also undertake educational activities to promote good stewardship.

## BACKGROUND INFORMATION & CONTEXT

### Purpose of the Plan

This Stewardship Plan has been prepared to assess the conservation values and stewardship needs of the natural areas owned by Heartland Forest. This document provides background information about the property, identifies key features to be conserved, and recommends stewardship activities to help maintain its conservation values. A suggested yearly monitoring program is included to determine the success of the stewardship activities and to help ensure the significant ecological features on the property are not being impacted.

### Location and Legal Description of Property

Heartland Forest is located in the southwest portion of Niagara Falls, within the urban boundary. Rapidly expanding development has created new environmental stresses on Heartland Forest including introduction of invasive species, micro-climatic stresses and potential impacts to ground water flows due to loss of surrounding woodlots, and new drainage works. Table 1 provides a summary of key property location and legal information.

### Locations and Legal Information

Date of Acquisition	1999
Area (hectares/ acre)	169.8 + 93.4
Lot and Concession	Roll #2725-110-002-007 and #2725-011-002-009
Municipality/Town/City	Niagara Falls
County/Region	Niagara Region
Nearest Major Centre	Niagara Falls
Access Directions	8215 Heartland Forest rd. (formerly Kalar Rd.) Niagara Falls Ontario exit #27 on McLeod rd.
MNR District	Guelph
Ecodistrict	7E-5
Conservation Authority	Niagara Peninsula Conservation Authority
Watershed	Welland River Watershed
Road Frontages	Northern – Brown Road (approx. m) East – Heartland Forest Road (approx. m)

## **Heartland Forest History and Acquisition**

Heartland Forest started with Dan Bouwman and his beautiful granddaughter, Sydney Burciul. The daughter of Jacqueline and Ken Burciul, Sydney was born with a rare brain disorder, Lissencephaly. As result of her adversities, Dan was determined to provide a peaceful, accessible and inclusive place to enjoy nature. With a mandate of preservation, education and accessibility, Heartland Forest opened in 2004. Founder Dan Bouwman, purchased the land in 1999, rescuing it from industrial development. Over the years, Dan's dedication has led to the Heartland Forest of today and the beauty that it reveals to its guests. The largest accessible tree house in all of Canada was built by many dedicated volunteers in 2010. One year after the tree house was completed, educational camps had begun. The Nature Centre had its grand opening in July of 2013 the largest building on the property.

## **Heartland Forest Description**

Heartland Forest's slough forest, mature upland forest, wet meadow, and open wetland areas are rich in biodiversity including species at risk, such as common green briar, snapping turtles, barn swallows, monarch butterflies, wood thrush, little brown bat. The property has a high diversity of trees dominated by maple, oaks and ash. Tributary to Thomsons Creek runs through the upland area of the forest and the property is part of the Welland River water shed.

Blue spotted salamanders, wood frogs and chorus frogs depend on the vernal pools throughout the 93 acre Provincially Significant Wetland (PSW). The majority of the PSW is made up of slough forest.

## **Land Use Planning Context**

See Environmental Conservation Area ECA and Environmental Protection Area (EPA) in the Niagara Falls Official Plan for specific zoning protections.

## **METHODOLOGY**

Preparation of this Stewardship Plan involved a detailed review of background information and consultation with conservation experts. Once compiled, all data was reviewed to identify the management goals and opportunities for the sanctuary.

## **Field Studies**

Field studies were conducted on the property to provide a detailed inventory of ecological features, and to provide an assessment of local landscape context and land uses. This work included botanical inventories, Ecological Land Classification (ELC), breeding bird and other wildlife surveys.

The vegetation unit boundaries were characterized based on the Ecological Land Classification for Southern Ontario (Lee et. al, 1998). This system classifies ecological

communities according to soil, vegetation and landform characteristics. Soils were sampled within each polygon using a 120 cm steel auger. For each soil core, texture of each horizon was determined by hand, and depth to mottles (irregular arrangement of patches of colour) and gley (greenish-blue-gray coloured soil found in wet conditions) was measured using a metric measuring tape. The moisture regime for each polygon was then determined using the key included in Lee et al. (1998). As well, a complete list of all vascular plant species found within each polygon was compiled and the abundance of each species within defined height classes was noted. The current ELC standard (Lee et al., 1998), divides vegetation into four height classes: 1) the canopy (highest layer in each community, regardless of absolute height), 2) the sub-canopy, 3) the understorey and 4) the ground layer. For each layer, absolute height and percent cover were noted, and dominant species were listed in order of abundance. Finally, each polygon was assigned a standard ELC vegetation type using the keys contained in Lee et al. (1998). Three vegetation communities, four complex vegetation communities and 2 inclusions were documented in the Heartland Forest study site..

All vascular plant observations from the polygons surveyed were compiled to generate species lists. The field study was supplemented with information from plant lists developed by past experts.

Wildlife species were surveyed by traversing the representative habitats on the property, identifying all species detected by sight and sound. Amphibian and reptile boards were placed around the property and checked periodically. The boards did not produce many species but it is anticipated that results will improve with monitoring in subsequent years. The results of the Breeding Bird Atlas, 2001 - 2005 were added to the survey. Data was also supplemented by previous observations of wildlife sightings, calls and signs, submitted by volunteers.

## Rarity Rankings

Rarity rankings referenced in this stewardship plan (for both plants and animals) are from Ontario's Natural Heritage Information Centre (NHIC, 2003), as well as the species designated under the federal Species at Risk Act, as recommended by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and Ontario's Endangered Species Act, as recommended by the Committee on the Status of Species at Risk in Ontario (COSSARO). Each species is assigned a rarity ranking that reflects its status provincially (S-rank). Criteria for these rankings are explained in below.

### Provincial and regional rarity rankings

RANK	DEFINITION
<b>COSEWIC RANKING (listed under Canada's <i>Species at Risk Act</i>)</b>	
<b>E</b>	<b>Endangered</b> - A wildlife species facing imminent extirpation or extinction.
<b>T</b>	<b>Threatened</b> - A wildlife species likely to become endangered if limiting factors are not reversed.
<b>SC</b>	<b>Special Concern</b> - A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

<b>COSSARO RANKING (listed under Ontario's Endangered Species Act)</b>	
<b>END</b>	<b>Endangered</b> – a native species facing extinction or extirpation
<b>THR</b>	<b>Threatened</b> – a native species at risk of becoming endangered in Ontario
<b>SC</b>	<b>Special Concern</b> – a native species that is sensitive to human activities or natural events which may cause it to become threatened or endangered
<b>NHIC RANKING</b>	
<b>S1</b>	<b>Critically Imperiled</b> —Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.
<b>S2</b>	<b>Imperiled</b> —Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.
<b>S3</b>	<b>Vulnerable</b> —Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
<b>S4</b>	<b>Apparently Secure</b> —Uncommon but not rare; some cause for long-term concern due to declines or other factors.
<b>S5</b>	<b>Secure</b> —Common, widespread, and abundant in the nation or state/province.
<b>SNR</b>	<b>Unranked</b> —Nation or state/province conservation status not yet assessed.
<b>SU</b>	<b>Unrankable</b> —Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
<b>SNA</b>	<b>Not Applicable</b> —A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
<b>S#S#</b>	<b>Range Rank</b> —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).
<b>SE</b>	<b>Exotic</b> ; not believed to be a native component of Ontario's flora.
<b>SZ</b>	<b>Not of practical conservation concern</b> inasmuch as there are no clearly definable occurrences; applies to long distance migrants, winter vagrants, and eruptive species, which are too transitory and/or dispersed in their occurrence(s) to be reliably mapped; most such species are non-breeders, however, some may occasionally breed.
<b>SZB</b>	Rank as applied to a breeding migratory species.
<b>SZN</b>	Rank as applied to a non-breeding migratory species.

## ECOLOGICAL FEATURES

### **Geology, Physiographic Region and Soils**

Heartland Forest is situated just north of the Welland River corridor on the flat, poorly drained clay and silty clay soils of the Haldimand Clay Plain. It is underlain by the dolostone of the Guelph Formation. The north/west section of this study site drains to Thompson's Creek.

### **Landscape Ecology & Conservation Context**

Heartland Forest falls within the Carolinian life zone, a region that runs across southern Ontario approximately from Grand Bend to Toronto. It makes up less than one percent of Canada's land base and its temperate climate boasts the fewest frost days and warmer temperatures than anywhere else in Canada. The region is often called the 'banana belt' and this accommodating climate allows the region to host more plants and animals than any other region in the country, including 65 percent of Canada's endangered species, many of which are found on the property.

Carolinian Canada (a non-profit coalition of over 40 government and non-government conservation groups and many individuals working to conserve the ecological diversity of the Carolinian region) estimates that 2,200 species of herbaceous plants are found in the region, including 64 species of ferns, at least 110 species of grasses, over 130 different sedge species and 70 species of trees. Many of the species found in this region are found no where else in Canada including the Eastern Spiny Softshell Turtle, the Eastern Fox Snake, the Eastern Hog-nosed Snake, the Queen Snake, and Fowler's Toad. Over 400 bird species have been recorded in the Carolinian region, many of which can be found at the sanctuary.

The Carolinian region is under intense development pressure with over 25 percent of Canada's population residing in it and over 75 percent of it being used for agriculture. The region has lost 80 percent of its natural forest cover and more than 85 percent of its wetlands. Less than one percent of the original tallgrass prairie and oak savannah ecosystems remain. Fortunately, Heartland Forest has retained a high percentage of forest cover. Heartland forest is an important part of a patchwork of natural areas left in the Niagara Region.

### **Vegetation Communities (ELC)(for each community)**

The Niagara Peninsula Conservation Authority Natural Areas Inventory for this study site and vicinity noted that the area supported 406 species. Many of these species are also found in Heartland Forest and form three vegetation communities, four complex vegetation communities and 2 inclusions as noted below.

**Swamp Maple Mineral Deciduous Swamp (SWD3-3)** - The undulating topography of the site creates a ridge and hollow pattern allowing a community that is sometimes described as a slough forest. Due to the poorly drained clay soils the low areas hold water for most of the year supporting a swamp community. The mature canopy is dominated by Swamp Maple with lesser amounts of Pin Oak, Shagbark Hickory and Green Ash. The sub-canopy is also dominated by Swamp Maple followed by American Elm, Shagbark Hickory and Green Ash. The shrub layer is sometimes thick and

dominated by Spicebush with lesser amounts of Green Ash, American Elm and Blue-beech. The ground layer is well covered and dominated by Spotted Jewelweed with lesser amounts of Rice Cutgrass, Spicebush and Virginia Smartweed. This variable community also supports a complex of **Fresh-Moist Oak-Sugar Maple Deciduous Forest (FOD9-1)** and **Pin Oak Mineral Deciduous Swamp (SWD1-3)**.

**Fresh-Moist Oak-Sugar Maple Deciduous Forest (FOD9-1)** - The slightly rolling topography of this site helps improve drainage of the clay soils supporting an upland community. The mature canopy is dominated by Red Oak with lesser amounts of Sugar Maple, Shagbark Hickory and Basswood. The sub-canopy is dominated by Sugar Maple followed by Shagbark Hickory, Basswood and Ironwood. The sparse shrub layer has the occasional Green Ash with lesser amounts of Spicebush. The sparse ground layer has Green Ash with Sugar Maple, Shagbark Hickory and the occasional sedge. This variable community also supports a complex of **Fresh-Moist Shagbark Hickory Deciduous Forest (FOD9-4)** towards the southern boundary. This community is drained by a small tributary of Thompson Creek.

**Fresh-Moist Hawthorn / Apple Deciduous Woodland (WODM5-4)** – The slightly rolling topography of this site helps improve drainage of the clay soils supporting an upland community. This community has a sparse population of taller Green Ash and Pear trees, but the community is dominated by a lower thick canopy of Hawthorn, Common Buckthorn followed by the occasional Pear and Apple. The ground layer is somewhat dense in places with large amounts of Common Buckthorn, followed by variable amounts of Green Ash, Garlic Mustard, Goldenrods and Raspberries. This variable community also supports a complex of **Green Ash Mineral Deciduous Swamp (SWD2-2)**, inclusion of **Catail Mineral Shallow Marsh (MAS2-1)** and an inclusion of **Reed-canary Grass Mineral Meadow Marsh (MAM2-2)**. This community is drained by a small tributary of Thompson Creek.



### Non-native invasive species

Non-native plant species recorded from the Heartland Forest study site are shown in the checklist of vascular plant species included in the Appendix. Of the 22 non-native species recorded in the Heartland Forest study site, 7 are considered aggressive invasive exotic species (UFA. 2002). Some concerning locations have been noted below with GPS co-ordinates.

Multiflora Rose		European Buckthorn		Garlic Mustard	Common Reed
061070	4768600	along brown road		occasional in FOD/SWD	Brown Road at Kalar
0651427	4768666	along Heartland Forest Road		evident along trails	Heartland Forest Road and Thompson Creek near sign
0651280	4768678	0651540	4768565		0651743 4768370
0651540	4768565	0651821	4768610		
0651468	4768643	0651865	4768592		
0651796	4768661	0651892	4768559		
0651730	4768999				
0651763	4768986				

European buckthorn, phragmites, garlic mustard, loosestrife are abundant and problematic in some areas of the property. Controls used have included prescribed burn, herbicide application by a licensed specialist and hand pulling. Also found on the property is tree of heaven.

Where non-native species occur in the vicinity of rare species immediate action should be taken to remove the threat according to current best practices. Efforts to manage the non-native species should be addressed in detail in an invasive species management plan for the property.

### Amphibians and Reptiles

Frogs and Toads were monitored at 4 wetland sites at Heartland Forest. Species observed by survey station, along with the abundance code and approximate number of individuals estimated, is provided in **Appendix B**. A total of 4 species of frogs were detected on nocturnal breeding amphibian surveys including:

- American Bullfrog (*Rana catesbeiana*)
- Green Frog (*Rana clamitans*)
- Gray Treefrog (*Hyla versicolor*)
- Northern Leopard Frog (*Rana pipiens*).

Four (4) additional species of frogs and toad were observed or heard calling during field investigations including:

- American Toad (*Bufo americanus*)
- Western Chorus Frog (*Pseudacris triseriata*)
- Spring Peeper (*Pseudacris crucifer*)
- Wood Frog (*Rana sylvatica*)

These additional observations bring the total to 8 frog and toad species documented at Heartland Forest.

Four (4) cover boards placed along the main long trail a Heartland Forest to monitor salamanders and snakes during the course of field investigations. Salamanders and snakes were not found using the cover boards, however incidental observations and opportunistic searches revealed 6 species of salamanders, snakes and turtles:

- Eastern Gartersnake (*Thamnophis sirtalis sirtalis*)
- Northern Watersnake (*Nerodia sipedon sipedon*)
- Eastern Red-backed Salamander (*Plethodon cinereus*)
- Blue-spotted Salamander (*Ambystoma laterale*)
- Midland Painted Turtle (*Chrysemys picta marginata*)
- Snapping Turtle (*Chelydra serpentina*)

### **Incidental Wildlife**

The following incidental wildlife observations including signs were recorded throughout the 2016 field surveys at Heartland Forest including observations made by knowledgeable Heartland Forest staff members. Opportunistic searches were also completed when suitable habitat or site conditions were observed.

- Bat species
- Coyote
- Eastern Chipmunk
- Eastern Cottontail
- Grey Squirrel
- Muskrat
- Opossum
- Raccoon
- Red Fox
- Red Squirrel
- White-tailed Deer

## **Species at Risk**

Heartland Forest has been visited by professional ecologists and amateur naturalists for decades resulting in lists of mammals, birds, reptiles and amphibians that have been spotted on the property. Complete lists of wildlife species recorded from the property are included in the Appendix. The diversity and type of species present are typical of the area.

Nine **Species at Risk** were observed within the Heartland Forest study site during field investigations and are listed below.

The **Round-leaved Greenbrier (*Smilax rotundifolia*)** is considered **Threatened** both federally and provincially.

The **Black Ash (*Fraxinus nigra*)** is considered **Threatened** federally.

The **Snapping Turtle (*Chelydra serpentina*)** is considered a species of **Special Concern** both federally and provincially.

The **Midland Painted Turtle (*Chrysemys picta marginata*)** is considered a species of **Special Concern** federally.

The **Monarch Butterfly (*Danaus plexippus*)** is considered **Endangered** federally and a species of **Special Concern** provincially.

The **Grass Pickerel (*Esox americanus vermiculatus*)** is considered a species of **Special Concern** both federally and provincially.

The **Wood Thrush (*Hylocichla mustelina*)** is considered **Threatened** federally and a species of **Special Concern** provincially.

The **Easter Wood-pewee (*Contopus virens*)** is considered a species of **Special Concern** both federally and provincially.

The **Barn Swallow (*Hirundo rustica*)** is considered **Threatened** both federally and provincially

## **CULTURAL FEATURES**

Heartland Forest at time of purchase had been zoned for industrial development and has industries bordering property to the west and across Heartland Forest Rd to the east. A portion along the south has been sold to Solvay but with land use easement help by Heartland Forest. Housing development runs along most of the northern boundary across Brown Rd. The Heartland Forest Nature Centre was built in 2013 and public use of the property has been continuing to rise.

The permitted uses on the property include: educational programs, camps, events, rentals, picnicking, hiking and ecological research approved by the Heartland Forest. A system of walking trails, picnic pavilions, 2 portable structures for program use and storage a treehouse, observation tower and low ropes course. Vandalism has been an issue in the past and security cameras and gates have been added.

## **THREATS ASSESSMENT**

Non-native, invasive species, disturbance from unauthorized uses, change in disturbance patterns and climate change are all real threats to Heartland Forest's natural areas

Continued invasive species monitoring and controls are needed especially in areas with at risk flora or fauna

Non-native, invasive species have the potential to drastically alter woodland species composition without strict management. There are several invasive plant species Heartland Forest that need ongoing control measures to ensure the species do not spread too rapidly. For example, it is important to avoid wherever possible the removal of leaf litter through trail clearing or construction to limit the spread of Garlic Mustard. An overall, coordinated invasive species work plan is needed. Experts with on-the-ground experience managing invasive species should be consulted to determine the best control method (ex. manual removal, using herbicides). The species of greatest concern are European buckthorn, garlic mustard, Phragmites, and loosestrife.

Recreational use of natural areas is a cause of damage to soils and vegetation in Spooky Hollow. Compaction leads to the breakdown of soil structure, kills beneficial soil fungi, and diminishes soil nutrient and moisture holding capabilities. Like pavement, compacted soils repel rainwater, which leads to increased runoff, soil erosion and sedimentation. Even low levels of trampling are sufficient to negatively affect forest understory communities. The loss of native vegetation encourages the establishment of non-native plants that are better able to withstand soil compaction, erosion and habitat fragmentation. Monitoring is needed to assess degradation due to increased visitor traffic flow to deter traffic from areas requiring regeneration. Wetland water level and quality should be monitored for pollution and impacts from surrounding development. There are several ways to address these concerns, including better signage about authorized and unauthorized uses of the property, fencing and dog ways at access points.

Changes in disturbance patterns post human settlement include lack of natural occurring fires. Early spring burning increases the vigor of many meadow species, resulting in larger plants and increased seed production. This effect is partially due to the combustion of litter, which releases nutrients and allows sunlight to reach the soil surface earlier in spring. The deposition of a thin layer of darkened ash also contributes to soil warming, as heat is absorbed by dark surfaces. Heartland forest conducted a prescribed burn in spring 2019 and follow up surveying of the area should note any species previously unlisted as well as any decrease in invasive species including buckthorn. . Continued restoration efforts of areas buffering forest edge are needed to ensure the ongoing successful regeneration and mitigation of invasives in these areas. Global climate change is expected to cause a dramatic northward shift in regional vegetation communities over the next 50 to 100 years. Changes in the distributions of individual species may already be occurring. The overall impact of climate change will depend on the rate and magnitude of change, and the vulnerability of individual species and communities to climate variation. Degraded ecosystems, which are already under considerable stress, may be particularly sensitive to climate change impacts

### **Management goal**

The goal is to conserve Heartland Forest's natural areas in order to continue to fulfill our mission.

**Heartland Forest Mission:** To provide an interactive nature experience for all, building lifelong connections with nature through dynamic and inspiring programs. With a goal of preservation and sustainability we engage the hearts and minds of our staff, volunteers and visitors.

Objectives as of 2019:

1. Protect rare species and vegetation communities
2. Efficiently manage and track property risks and liabilities.
3. Control invasive species and ensure construction practices avoid the spread of invasive species
4. Increase baseline data and further monitoring of newly restored areas
5. Enhance habitat for species at risk
6. Monitor slough forest through vernal pool survey to mitigate any potential degradation from neighboring developments.

## REFERENCES

Natural Areas Inventory Niagara Peninsula Conservation Authority  
[https://npca.ca/images/uploads/board\\_files/NAI-Vol-1.pdf](https://npca.ca/images/uploads/board_files/NAI-Vol-1.pdf)

Flora and Fauna survey for Heartland Forest in the City of Niagara Falls  
 T E Staton 2016 updated 2019

Spooky Hollow Nature Sanctuary STEWARDSHIP PLAN draft  
 Hamilton Naturalist Club 2009

## APPENDIX

HEARTLAND FOREST ENVIRONMENTAL PROJECTS SURVEYS AND PLANTINGS		
Date	Work completed	author
2012 April	plant survey	Niagara Frontier Botanical Society (NFBS) members Jim Pisaczyk and Joanne Schlegel plus guest Pat Rogers
2015 Dec	Invoice for plant material -76 cedar plugs	sassafras farms
2015 April	Trail maintenance	Heartland staff
2012 July	Natural Heritage Assessment and Species at Risk Survey of buffer around proposed nature centre	LCA Environmental Consultants L. Campbell
2015 Sept/Oct	Aerial Insect survey	School Malaise Trap Program results
2016 April	Trail maintenance	Heartland staff
2016 Oct	Map trails with GIS	Heartland forest & Niagara college
2016 may	Reconstruction of wetland (buffering existing forest)	Heartland forest & volunteers
2016 July	Accessible trail from fire pit to new wetland constructed	Heartland Forest wood shop
2016 spring	Bird inventory OPIF species	Nadine Litwin Invoice breeding bird surveys Aug 2016
2016 fall	Bridge from accessible trail to new wetland started construction	Heartland Forest
2016 may -sept	Vascular plant inventory	Tom Staton
2016- July/Aug	Constructed and installed in meadow Nesting boxes –eastern bluebirds with children’s camp	Heartland Forest
2016 May	Nut trees (2-Heartnut, 3-Pecan, 8-10 ft)	Amy Brunning invoice
2016 June	Bioblitz	Citizen science Heartland Forest event
2016	Botanical survey 3 seasons with ELC re: Flora and Fauna surveys for Heartland Forest in the City of Niagara Falls	Tom Staton Invoice 1037B

2016 Oct	Amphibian reptile survey Spring summer fall surveys including existing cover boards re: Flora and Fauna surveys for Heartland Forest in the City of Niagara Falls	Tom Staton Invoice 1037B
2016 Oct	Species at risk surveys re: Flora and Fauna surveys for Heartland Forest in the City of Niagara Falls	Tom Staton Invoice 1037B
2016 Oct	Invasive species surveys re: Flora and Fauna surveys for Heartland Forest in the City of Niagara Falls	Tom Staton Invoice 1037B
2016 Sept	Informal Odonate Survey (pond watch)	Paul Philp & volunteers
2016 Sept	flowering perennials plantings(pollinator garden)	Invoice sassafras farms
2016 Feb	Winter Back yard bird count	Nadine Litwin led this event – citizen science
2016 Apr	Plants and shrubs plantings(dragonfly pond)	Invoice sassafras farms
2016 June	Live stakes plantings during bioblitz dogwood & willow (wetland project)	T E Staton invoice
2016 Sept	Benthic sampling with school program	Heartland Forest – citizen science
2016 Dec	Christmas bird count for kids	Nadine Litwin led this event – citizen science
2017 Mar	Forest Health Heartland BBD EAB - Health Assessment for American Beech and Ashes	Niagara college – Andrea Sinclair
2017 Feb	Winter back yard bird count	Nadine Litwin led this during Winterfest event – citizen science
2017 spring	Frog presence/absence by sight and sound as part of visiting school group program	Heartland forest
2017 June/July	Vernal pools and pit and mounds constructed in wet meadow restoration	TE Staton and Heartland
2017 Sept	Benthic sampling as part of visiting school group program	Heartland Forest
2017 Sept	Odonate survey citizen science project during Bug day event	Heartland forest and volunteers
2017 Dec	Christmas bird count for kids	Nadine Litwin led this
2017 April	Trail maintenance	Heartland staff
2017 June	Completed a trail loop with elevated boardwalk joining existing forest trail to newly constructed wetland area trail (2016)	Heartland staff and volunteers NPCA permitted
2017 June & Oct	Wet meadow and buffer plantings	T E Staton / Sassafras Farms
2017 May/June	Completed Pollinator trail through wet meadow including accessible loop	Heartland staff
2017 June/July	Malaise trap insect survey and collection	Heartland summer staff
2017 June	Bioblitz and live staking community workshop –dogwood and willows	TE Staton / heartland forest/volunteers
2017 Oct	Herbicide of invasive – Phragmites near wetland	Contracted Lawrence lawn Care ltd.

2017 July	Nesting boxes native bees and eastern bluebird /tree swallows constructed and installed in wet meadow	Heartland Forest
2017 Oct	Seeding restored wetland	TE Staton/ Sassafras farm
2017 Oct	Maple, aspen and pine plantings	TE Staton/Gaulds
2017 June	Barn swallow nesting structure initial structure completed	TE Staton plan revisions Heartland Forest
2017 may	Honey bees Niagara college apiary placed in wet meadow	Niagara college
2018 April	Trail maintenance	Heartland staff
2018 April	Live staking workshop earthday event	T E Staton
2018 Oct	OTF Outback tree maintenance	TE Staton
2018 July	Butterfly garden, pollinator trail & Employee entrance plantings	Sassafrass farm invoice 1293
2018 June/July	Invasive plant removal	Heartland Forest staff
2018 ongoing	Photo inventory for stewardship plan	TE Staton
2018 may	Eastern blue bird nest boxes and native bee nesting material installation	Heartland forest
2018 may	Owl boxes installed in forest	T E Staton and Heartland Forest
2018 June	Barn swallow structure finished weather proofing & asthetic features	Heartland forest
2018 apr / Oct	Seeding restored wetland	TE Staton/ Sassafras farm
2018 June/Aug	Bat monitoring	Colville consulting
2018 Sept	Bat monitoring	TE Staton
2018 Apr	Persimmon, Pawpaw, Hazelnut trees planted along wetland	Grimo nuts invoice
2018 Oct	Blue bird box maintenance	T E Staton invoice
2019 April	Trail maintenance	Heartland staff
2019 May	Forest buffer planting and Garlic mustard removal	T E Staton invoice 2044 Owen Bjorgan & volunteers
Updated 2019 Apr	Flora and Fauna survey for Heartland Forest in the City of Niagara Falls	T.E. Staton



Heartland Forest OTF Grow Grant Evaluation

Vascular Plant list – Heartland Forest 2016										
T E Staton										
SCIENTIFIC_NAME	AUTHOR	ENGLISH_COMMON_NAME	PROVINCIALY_TRACKED	S_RANK	COSEWIC_STATUS	SARO_STATUS	G_RANK	N_RANK	EXOTIC_STATUS	RESTRICTED_SPECIES
Acalypha rhomboidea	Raf.	Common Three-seeded Mercury	N	S5			G5	N5		N
Acer nigrum	Michx. f.	Black Maple	N	S4 ?			G5	NNR		N
Acer rubrum	L.	Red Maple	N	S5			G5	N5		N
Acer saccharum	Marsh.	Sugar Maple	N	S5			G5	N5		N
Acer x freemanii	E. Murr.	(Acer rubrum X Acer saccharinum)	N	SN A			GN A	NN A		N
Agrimonia gryposepala	Wallr.	Hooked Agrimony	N	S5			G5	N5		N
Agrostis Sp.										
Alisma triviale	Pursh	Northern Water-plantain	N	S5			G5	N5		N
Alliaria petiolata	(Bieb.) Cavara & Grande	Garlic Mustard	N	SN A			GN R	NN A	SE5	N
Allium tricoccum var. tricoccum		Wild Leek	N	S4			G5	N5		N
Amelanchier Sp.										
Anemone quinquefolia	L.	Wood Anemone	N	S5			G5	N5		N
Arisaema triphyllum	(L.) Schott	Jack-in-the-pulpit	N	S5			G5	N5		N
Asclepias incarnata	L.	Swamp Milkweed	N	S5			G5	N5		N
Asclepias syriaca	L.	Common Milkweed	N	S5			G5	N5		N
Aster Sp.										
Athyrium filix-femina var. angustum	(Willd.) Lawson	Northeastern Lady Fern	N	S5			G5 T5	N5		N
Bidens sp.										
Boehmeria cylindrica	(L.) Sw.	False Nettle	N	S5			G5	N5		N
Carex comosa	Boott	Bristly Sedge	N	S5			G5	N5		N
Carex crinita	Lam.	Fringed Sedge	N	S5			G5	N5		N
Carex intumescens	Rudge	Bladder Sedge	N	S5			G5	N5		N

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Carex lupulina	Muhl. ex Willd.	Hop Sedge	N	S5			G5	N5		N
Carex pensylvanica	Lam.	Pennsylvania Sedge	N	S5			G5	N5		N
Carex seorsa	Howe	Weak Stellate Sedge	Y	S2			G5	N2		N
Carex sp										
Carex sp										
Carex tuckermanii	Dewey	Tuckerman's Sedge	N	S5			G4	NNR		N
Carpinus caroliniana	Walt.	Blue-beech	N	S5			G5	N5		N
Carya cordiformis	(Wangenh.) K. Koch	Bitternut Hickory	N	S5			G5	N5		N
Carya ovata	(P. Mill.) K. Koch	Shagbark Hickory	N	S5			G5	N5		N
Centaurea jacea	L.	Brown Knapweed	N	SN A			GNR	NNA	SE5	N
Cephalanthus occidentalis	L.	Eastern Buttonbush	N	S5			G5	NNR		N
Chelone glabra	L.	White Turtlehead	N	S5			G5	N5		N
Cicuta maculata var. maculata		Spotted Water-hemlock	N	S5			G5 T5	N5		N
Cinna arundinacea	L.	Stout Woodreed	N	S4			G5	N4		N
Circaea canadensis	(Linnaeus) Hill 	Broad-leaved Enchanter's Nightshade	N	S5			G5 T5	N5		N
Cirsium arvense	(L.) Scop.	Canada Thistle	N	SN A			GNR	NNA	SE5	N
Cornus obliqua	Raf.	Pale Dogwood	N	S5			G5 T5	N5		N
Cornus racemosa	Lam.	Gray Dogwood	N	S5			G5 ?	N5		N
Crataegus Sp										
Dactylis glomerata	L.	Orchard Grass	N	SN A			GNR	NNA	SE5	N
Daucus carota	L.	Wild Carrot	N	SN A			GNR	NNA	SE5	N
Dipsacus fullonum	L.	Common Teasel	N	SN A			GNR	NNA	SE5	N
Dryopteris carthusiana	(Vill.) H.P. Fuchs	Spinulose Wood Fern	N	S5			G5	N5		N

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Erechtites hieraciifolius	(Linnaeus) Rafinesque de Candoille	Eastern Burnweed	N	S5			G5	N5		N
Euonymus europaeus	L.	European Euonymus	N	SN A			GN R	NN A	SE2	N
Euonymus obovatus	Nutt.	Running Strawberry Bush	N	S4			G5	N5		N
Eupatorium perfoliatum	L.	Common Boneset	N	S5			G5	N5		N
Eurybia macrophylla	(L.) Cass.	Large-leaved Aster	N	S5			G5	N5		N
Fagus grandifolia	Ehrh.	American Beech	N	S4			G5	N5		N
Festuca Sp.										
Fragaria virginiana ssp. virginiana		Wild Strawberry	N	SU			G5 T5	N5		N
Fraxinus americana	L.	White Ash	N	S4			G5	N5		N
Fraxinus nigra	Marsh.	Black Ash	N	S4			G5	N5		N
Fraxinus pennsylvanica	Marsh.	Green Ash	N	S4			G5	N5		N
Galium aparine	L.	Cleavers	N	S5			G5	N5		N
Galium asprellum	Michx.	Rough Bedstraw	N	S5			G5	NN R		N
Galium sp										
Geranium maculatum	L.	Spotted Geranium	N	S5			G5	N5		N
Geum canadense	Jacq.	White Avens	N	S5			G5	N5		N
Geum Sp.										
Glyceria septentrionalis	A.S. Hitchc.	Eastern Mannagrass	N	S4			G5	NN R		N
Glyceria striata	(Lam.) A.S. Hitchc.	Fowl Mannagrass	N	S5			G5	N5		N
Grass sp.										
Impatiens capensis	Meerb.	Spotted Jewelweed	N	S5			G5	N5		N
Iris versicolor	L.	Harlequin Blue Flag	N	S5			G5	N5		N
Juncus effusus var. solutus	Fern. & Wieg.	Soft Rush	N	S5 ?			G5 T5	N5		N
Juncus sp										
Laportea canadensis	(L.) Weddell	Wood Nettle	N	S5			G5	N5		N

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Leersia oryzoides	(L.) Sw.	Rice Cutgrass	N	S5			G5	N5		N
Leersia virginica	Willd.	Virginia Cutgrass	N	S4			G5	N4 N5		N
Leucanthemum vulgare	Lam.	Oxeye Daisy	N	SN A			GN R	NN A	SE5	N
Ligustrum vulgare	L.	European Privet	N	SN A			GN R	NN A	SE5	N
Lindera benzoin	(L.) Blume	Spicebush	N	S4			G5	N5		N
Lindernia dubia	(L.) Penne ll	Yellow-seeded False Pimpernel	N	S4			G5	N5		N
Lobelia cardinalis	L.	Cardinalflower	N	S5			G5	NN R		N
Lobelia inflata	L.	Indian-tobacco	N	S5			G5	N5		N
Lonicera tatarica	L.	Tartarian Honeysuckle	N	SN A			GN R	NN A	SE5	N
Ludwigia palustris	(L.) Ell.	Marsh Seedbox	N	S5			G5	N5		N
Lycopus uniflorus	Michx.	Northern Water- horehound	N	S5			G5	N5		N
Lysimachia borealis	(Raf.) U. Mann s &Amp; Ander b.	Northern Starflower	N	S5			G5	NN R		N
Lysimachia ciliata	L.	Fringed Loosestrife	N	S5			G5	N5		N
Lysimachia nummularia	L.	Creeping Jennie	N	SN A			GN R	NN A	SE5	N
Lythrum salicaria	L.	Purple Loosestrife	N	SN A			G5	NN A	SE5	N
Maianthemum canadense ssp. canadense		Wild Lily-of-the- valley	N	S5			G5 T5	N5		N
Maianthemum racemosum	(L.) Link	False Solomon's-seal	N	S5			G5	N5		N
Malus pumila	P. Mill.	Common Apple	N	SN A			G5	NN A	SE4	N
Mimulus ringens	L.	Square- stemmed Monkeyflower	N	S5			G5	N5		N
Myosotis laxa	Lehm.	Small Forget- me-not	N	S5			G5	N5		N
Nyssa sylvatica	Marsh .	Black Gum	Y	S3			G5	N3		N
Onoclea sensibilis	L.	Sensitive Fern	N	S5			G5	N5		N
Osmorhiza claytonii	(Michx ) C.B. Clarke	Hairy Sweet Cicely	N	S5			G5	N5		N

Osmunda regalis	L.	Royal Fern	N	S5			G5	N5		N
Ostrya virginiana	(P. Mill.) K. Koch	Eastern Hop-hornbeam	N	S5			G5	N5		N
Oxalis Sp.										
Oxalis stricta	L.	European Wood-sorrel	N	S5			G5	N5		N
Parthenocissus quinquefolia	(L.) Planch.	Virginia Creeper	N	S4 ?			G5	N4 N5		N
Parthenocissus vitacea	(Knerr) A.S. Hitchc.	Thicket Creeper	N	S5			G5	N5		N
Persicaria hydropiper	(L.) Delarbre	Marshpepper Smartweed	N	SN A			GN R	NN R	SE5	N
Persicaria Sp.										
Persicaria virginiana	Gaertn.	Virginia Smartweed	N	S4			G5	N4		N
Phalaris arundinacea var. arundinacea		Reed Canary Grass	N	S5			GN R	NN R		N
Phleum pratense	L.	Common Timothy	N	SN A			GN R	NN A	SE5	N
Phragmites australis ssp. australis		European Reed	N	SN A			G5 T5	NN A	SE5	N
Pilea pumila	(L.) Gray	Canada Clearweed	N	S5			G5	N5		N
Plantago major	L.	Common Plantain	N	SN A			G5	NN A		N
Poa pratensis ssp. pratensis		Kentucky Bluegrass	N	SN A			G5 T5	N5	SE5	N
Podophyllum peltatum	L.	May-apple	N	S5			G5	N5		N
Polystichum acrostichoides	(Michx.) Schott	Christmas Fern	N	S5			G5	N5		N
Populus deltoides ssp. deltoides		Eastern Cottonwood	N	S5			G5 T5	NN R		N
Potentilla simplex	Michx.	Old-field Cinquefoil	N	S5			G5	N5		N
Prunella vulgaris ssp. lanceolata	(W. Bart.) Hulten	Self-heal	N	S5			G5 T5	N5		N
Prunus serotina	Ehrh.	Black Cherry	N	S5			G5	N5		N

Pycnanthemum virginianum	(L.) T. Dur. & B.D. Jacks on ex B.L. Robins. & Fern.	Virginia Mountain-mint	N	S4			G5	NN R		N
Pyrus communis	L.	Common Pear	N	SN A			G5	NN A	SE4	N
Quercus alba	L.	White Oak	N	S5			G5	N5		N
Quercus bicolor	Willd.	Swamp White Oak	N	S4			G5	N4		N
Quercus macrocarpa	Michx.	Bur Oak	N	S5			G5	N5		N
Quercus palustris	Muench.	Pin Oak	N	S4			G5	N4		N
Quercus rubra	L.	Northern Red Oak	N	S5			G5	N5		N
Ranunculus sp.										
Rhamnus cathartica	L.	Common Buckthorn	N	SN A			GN R	NN A	SE5	N
Ribes sp.										
Rosa multiflora	Thunberg ex Murr.	Multiflora Rose	N	SN A			GN R	NN A	SE5	N
Rubus allegheniensis	Porter	Allegheny Blackberry	N	S5			G5	N5		N
Rubus hispidus	L.	Bristly Dewberry	N	S4			G5	NN R		N
Rubus idaeus ssp. strigosus	(Michx.) Focke	Wild Red Raspberry	N	S5			G5 T5	N5		N
Rubus occidentalis	L.	Black Raspberry	N	S5			G5	N5		N
Rubus pubescens	Raf.	Dewberry	N	S5			G5	NN R		N
Rubus sp.										
Sambucus canadensis	L.	Common Elderberry	N	S5			G5 T5	NN R		N
Sanicula sp.										
Sium suave	Walt.	Hemlock Water-parsnip	N	S5			G5	N5		N
Smilax rotundifolia	L.	Round-leaved Greenbrier	Y	S2	THR	THR	G5	N3		N
Smilax tamnoides	L.	Hispid Greenbrier	N	S5			G5	N4		N
Solanum dulcamara	L.	Climbing Nightshade	N	SN A			GN R	NN A	SE5	N
Solidago altissima var. altissima		Eastern Tall Goldenrod	N	S5			GN R	NN R		N

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Solidago nemoralis ssp. nemoralis		Gray-stemmed Goldenrod	N	S5			G5 T5	N5		N
Solidago rugosa ssp. aspera	(Ait.) Cronq .	Southern Rough-stemmed Goldenrod	N	SU			G5 T5	N5		N
Solidago rugosa ssp. rugosa		Northern Rough-stemmed Goldenrod	N	S5			G5 T5	N5		N
Sparganium sp		Burreed sp								
Stellaria longifolia	Muhl. ex Willd.	Long-leaved Starwort	N	S5			G5	N5		N
Symphytichum lanceolatum var. lanceolatum		White Panicked Aster	N	S5			G5 T5	N5		N
Symphytichum lateriflorum var. lateriflorum		Calico Aster	N	S5			G5 T5	N5		N
Symphytichum novae-angliae	(L.) Nesom	New England Aster	N	S5			G5	N5		N
Symphytichum pilosum var. pilosum		Old Field Aster	N	S5			G5 T5	N5		N
Thelypteris noveboracensis	(L.) Nieuw I.	New York Fern	N	S4 S5			G5	N5		N
Thelypteris palustris	Schott	Marsh Fern	N	S5			G5	N5		N
Tiarella cordifolia	L.	Heart-leaved Foam-flower	N	S5			G5	N5		N
Tilia americana	L.	American Basswood	N	S5			G5	N5		N
Toxicodendron radicans var. radicans		Eastern Poison Ivy	N	S5			GN R	NN R		N
Trifolium pratense	L.	Red Clover	N	SN A			GN R	NN A	SE5	N
Typha latifolia	L.	Broad-leaved Cattail	N	S5			G5	N5		N
Ulmus americana	L.	American Elm	N	S5			G5	N5		N
Urtica dioica ssp. gracilis	(Ait.) Seland.	Slender Stinging Nettle	N	S5			G5 T5	N5		N

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Uvularia sessilifolia	L.	Sessile-leaved Bellwort	N	S4			G5	N5		N
Vaccinium corymbosum	L.	Highbush Blueberry	N	S4			G5	N4 ?		N
Verbena hastata	L.	Blue Vervain	N	S5			G5	NN R		N
Veronica officinalis	L.	Common Speedwell	N	SN A			G5	NN R	SE5	N
Viola sp										
Vitis riparia	Michx.	Riverbank Grape	N	S5			G5	N5		N
Xanthium strumarium	L.	Rough Cocklebur	N	S5			G5	N5		N