THE ARBORETUM
UNIVERSITY OF GUELPH

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Report to the Physical Resources and Property Committee of the University of Guelph Board of Governors
February 3, 2020 through April 20, 2021

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of the

University of Guelph Board of Governors

Submitted by Justine Richardson
Director of The Arboretum
April 27th, 2021

The land where The Arboretum now grows has been home to plants and animals for thousands of years. It was home to Indigenous peoples before settlers arrived. We recognize the Dish with One Spoon territory, the treaty lands of the Mississaugas of the Credit, and the Between the Lakes Treaty 3 lands on which the University of Guelph and The Arboretum now sit.
We are honoured to work on and care for this land.

I am excited to submit this report to the Physical Resources and Property Committee of the Board of Governors of the University of Guelph. In February 2021, I completed one full year as full-time professional Director of The Arboretum. This first year has been filled with all the unprecedented challenges of the ongoing COVID-19 pandemic and demonstrated the vital relevance of The Arboretum.

Throughout the challenges of COVID-19, essential operational work and time-sensitive research on living collections continued, even as buildings have been closed to the public. Most administrative functions, educators and nature interpreters shifted their work online. Trails and grounds remained open to the public for walk through access, serving as a vital connection to nature for our community. This year we have seen a significant increase in the number of people accessing our trails. Many students, faculty, staff, and community members were able to use the Arboretum grounds to go outside, safely, for physical exercise and mental well-being, and reconnect with nature.

O.A.C.'s commitment to the Director position represents dedication to The Arboretum and toward achieving the full potential for the scope and scale of this unique, vital part of campus to serve the university's outreach, teaching, and research mission.

The University of Guelph Arboretum is an internationally accredited Level IV arboretum, a museum of trees, and a living laboratory. It is recognized throughout the world as well as here at the University of Guelph and among our local community. In 2021, our accreditation with ArbNet and Botanic Garden Conservation International was upgraded to Level IV, the highest rank, which recognizes the long-standing efforts of professionalization, outreach, conservation, and curatorial merit.

More than fifty years ago, during an era of great change on campus, The Arboretum became a unique part of the vision for how Guelph would fully become a comprehensive university. Growing from early efforts in the Ontario Agricultural College, the Arboretum Planning Committee struck by the Board of Governors was led by Dr. R. J. Hilton and included faculty from departments across campus. They developed an extraordinary plan to create an arboretum at the eastern edge of campus, on sheep fields and a gravel pit between two old growth forest woodlots.

Today, the open farm fields have grown into maturing groves of trees. The boundaries of The Arboretum now encompass more than 400 acres, including formal gardens, recreational trails, demonstration collections of woody plants, genetic banks creating seed orchards for ex situ conservation of 28 rare and endangered Ontario tree species, and reforestation efforts with native trees producing wildlife corridors and trails that connect to nearby natural areas.

Students have been an important part of this special place since the beginning. Every semester, students learn from the plant collections, waters, trails, and grounds. They conduct research as part of classes, co-ops, independent studies, and experiential learning projects, even during the COVID-19 pandemic with distancing safety protocols in place. The access to greenspace is a key aspect of student wellness, and we have partnered with the Wellness Education and Promotion Centre on student wellness training with our Arboretum staff.

Research conducted in The Arboretum by U of G faculty and staff, as well as researchers from across the province and internationally, has resulted in more than 100 peer-reviewed publications, discovery of novel species, and many more books, articles, and stories.

The Arboretum provides an inspiring model of environmental sustainability, biodiversity conservation, and the many benefits of urban greenspace right here on campus. We are currently operating under our 2004 Master Plan, which largely provides continuity and the framework for the fundamental land uses for plant collections, demonstration areas, public access, and research tracts set forth in the Board's founding vision.

Highlights of the past year include:

- Celebration of the Arboretum's 50th Anniversary -- including a virtual talk "Local Leadership and Global Impact: Botanic Gardens Advancing Food security" by Dr. Saharah

Moon Chapotin, Executive Director of the U.S. Botanic Garden and a year-long social media campaign “The Arb @ 50”.

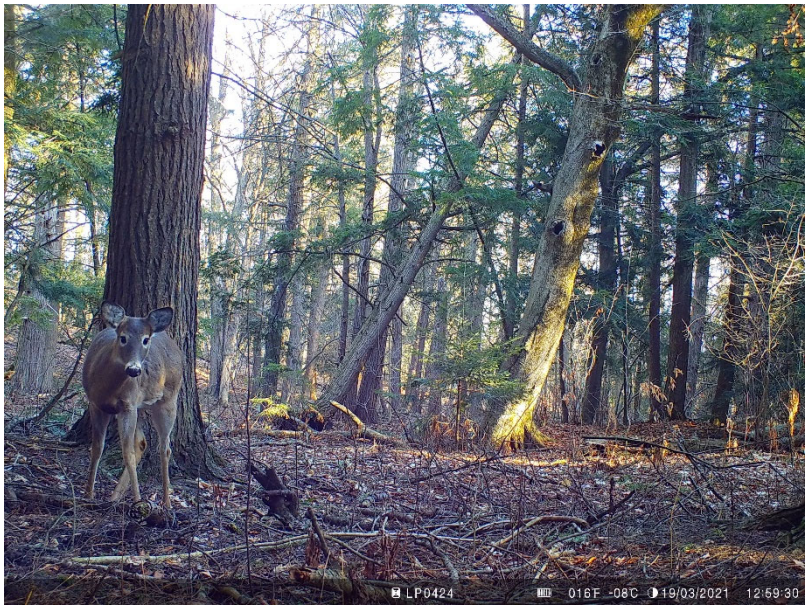
- Completion of the R. J. Hilton Centre renovation in April 2021 (as part of the new Guelph Turfgrass Institute project). The centre includes an accessibility ramp and numerous sustainability features, including a grey water system supplied by rainwater harvested from the roof into a new cistern. The newly renovated space allows the essential horticultural staff managing grounds, trails, and research areas to function from the same location and restores access to the greenhouse, nursery, and elm recovery project stands on the North side of College Avenue. *(The family of founding director Dr. Hilton shared a family anecdote that the original building was constructed at “the exorbitant cost of $100,000!”)*
- The Arboretum Centre (designed by Raymond Moriyama and built in 1974) is undergoing accessibility and lighting upgrades. All 50 year old fluorescent tubes are being replaced by energy efficient LED fixtures. Parking lot lamps are also being upgraded to wildlife-friendly LEDs, based on nature interpretation research. An accessibility grant secured by Physical Resources will facilitate much-needed wheelchair access in the two-level building -- including automatic doors and a ramp between levels.
- The Boardwalk Phase 3 through the wetlands of Wild Goose Woods was completed in April 2021.
- The Arboretum Recreational Side Trail, a new trail implemented in partnership with the Guelph Hiking Trail Club, now connects the Arboretum trails with the entire city and regional trail system.

- New dual stream recycling bins throughout the grounds were implemented in partnership with the Sustainability Office and partly underwritten by a grant from the World Wildlife Foundation.

- A rainwater harvesting demonstration site was installed at the J. C. Taylor Nature Centre this spring, in partnership with the Arboretum, the City of Guelph, and WaterFarmers.
- New virtual programs to connect people to nature were developed, including partnerships with local and regional school boards. The virtual programming has increased awareness of the Arboretum in the community and beyond, broadened the audience (participants from coast to coast and internationally have registered), and revenue this year above the previous annual income from in-person workshops and Arboretum-led programs.

- Nature Throughout the Seasons for International Students and New Canadians, a new program developed in partnership with the Guelph International Student Office and Immigrant Services Guelph Wellington, aims to connect international students to Ontario through increased knowledge about local plants and animals. This program also directly supports the university's internationalization efforts.

- All faculty and external research were able to continue under approved Research Management Plans with COVID procedures in place. Research conducted in the Arboretum can be led by Arboretum staff, U of G Faculty, external researchers or organizations, and student initiatives through coursework or experiential learning.
    - A specific research example: An international longitudinal biodiversity monitoring project, including researchers from U of G's Centre for Biodiversity Genomics, began research sampling at The Arboretum's Nature Reserve as part of a LIFEPLAN, led by the University of Helsinki. The massive global effort involves researchers and citizens worldwide collecting biodiversity data on the mammals, birds, fungi, and insects to better understand factors affecting biodiversity and how species communities are changing due to factors such as climate change and land-use practices.



- Four other major construction initiatives in various stages of development are located inside or near the boundaries of the Arboretum: Turfgrass Institute (nearly completed), Bedrock Aquifer research facility, Honeybee Research Centre, and Nokom's House.
- We worked closely over this year with the Nokom's house research team, O.A.C. and university leadership, Arboretum management group and staff with land-based knowledge of plants and animals, and Physical Resources representatives to find an satisfactory site for the newly funded indigenous research infrastructure. The selected location is near existing utilities tucked in a secluded location amidst a completed research tract of hybrid poplar. This site offers privacy for the research team as well as synergies with nearby gene banks -- research seed orchards of native rare and endangered species including Cucumber magnolia, Blue ash, Eastern flowering dogwood, and tulip trees, and planned creation of an endangered butternut orchard, a traditional food source for indigenous peoples.
- The Nature Reserve, south of Stone Road, is bordered on two sides by housing developments (the new Victoria Road homes to the south and the Village by the Arboretum to the west). Arboretum horticultural and interpretation staff engage with the developers and consultants to provide educational materials and to ensure appropriate plantings that will not invade the conservation area or wetland.
- Funding from Ontario's Species at Risk Stewardship Fund ($39,468) was awarded to support three years of partnered work on endangered red mulberry *(Morus rubra).*
- One area of ecological restoration is the former Gravel Pit, which was rehabilitated in 1977-78 and left to naturalize. Thanks to student funding ($18,700) from The Ontario Aggregate Resources Corporation, we are reassessing the biodiversity and success of that 40-year old site and developing a plan for the site's future.
- Philanthropic highlights include:
    - A major gift from the Gosling Foundation ($100,000), which is supporting a multi-year revitalization project in the Gosling Wildlife Gardens.
    - A summer studentship and gift toward ecological restoration by Dorothy Wilkie ($20,000) in memory of her husband Dr. Bruce Wilkie.
- Bench and tree dedications were begun again in The Arboretum, with designated number of trees and bench locations becoming available each year.
- A detailed report on botanical collections follows.

Emerging from the pandemic, there is a resurgence of pride of place for this Arboretum and the role it played in lifting people's physical and mental well-being during COVID . This pride will bring a renewed commitment among staff, colleges, stakeholders, and faculty in units across campus to advance the Arboretum's research, teaching, and outreach mission for the next fifty years. I am enormously excited and energized to work with this community on a strategic plan to make our collective vision for the future a dynamic reality.

Justine Richardson, MA
April 27th, 2021

Arboretum Collections Overview: April 2020-2021 (Listed alphabetically)

By Polly Samland, Horticulturalist and Plant Records

This year, due to COVID and the accompanying restrictions to what was considered essential (only partial summer staff at part time and no volunteer support in the grounds or nursery) we had to limit the scope of work to basic maintenance of existing collections, meaning that fewer new projects or improvements were possible. Water access was cut off for our nursery due to adjacent construction issues with the Turfgrass Institute, so we did continue to plant out as many specimens as feasible into collections in order to limit water needs, which were entirely dependent on rain-water collection at the Henry Kock Propagation facility. Removal of ash trees killed by Emerald Ash Borer, and of invasive species such as garlic mustard and phragmites, is an ongoing activity across the grounds by our small staff team.

Celastraceae (Bittersweet Family Collection)

- A rare *Euonymus americanus* (Eastern Strawberry Bush) native to eastern U.S. was added. Light pruning throughout the collection specimens helped to reduce weight at the ends of limbs, which are aging and prone to failure.

Conifer Collections

- Two pines, *Pinus densiflora* 'Burke's Red Variegated' and the lacebark pine (*Pinus bungeana)* were added to the pine section of the conifers. An unusual fir cultivar *Abies koreana* 'Silver Show' was planted in the fir section.

Dwarf Conifer Collections

- Two new *Chamaecyparis* were planted out into the false-cypress bed, and the bald cypress *Taxodium distichum* 'Cody's Feathers' included in what has shifted from the dawn redwood to the bald cypress bed.
- A *Ginkgo biloba* 'Obelisk', a dwarf cultivar with an upright, pillar shape, was planted beside a gnarled and failing maple accent in one of the hemlock beds as an eventual replacement. In the Canada Yew (*Taxus canadensis*) bed, maple accents that were damaged by storms and were also very invasive (their seed spreading into the nearby rose family collection) were removed in early winter 2020. A fast-growing river birch cultivar *Betula nigra* 'Cully' was planted to replace the maple accent and provide quick protection for the sensitive yews. Another unique Japanese maple was added as an accent to one of the dwarf spruce beds, where the vivid leaf colour contrasts nicely with the evergreen tones.

Fagaceae (Beech Family) Collection:

- Fourteen new species of oak were added in the Fagaceae collections, some with supplemental iron to increase their chances of surviving in our alkaline soils. These include species and hybrids entirely new to the arboretum, such as overcup oak *Quercus lyrata* and *Quercus x humidicola* (a hybrid between overcup oak and swamp white oak).

Family Collections:

- Inventory and editing of invasive species from the dormant family collections (*Cornaceae, Sapindaceae, Oleaceae, Fabaceae, Bignoniaceae*) tucked between the Native Trees of Ontario West Loop and the Maple collection began with the *Cornaceae* or Dogwood family collection, where many dead ash and overgrown shrubs were removed to identify and isolate living collections specimens. This was a primary duty of the Horticultural Intern.

Gosling Wildlife Gardens:

- Rejuvenation of the Gosling Wildlife Gardens remained a priority in 2020-2021, moving forward with the plans that were approved for funding by the Gosling Foundation. A mulch trail was added linking the Native Plant Garden and the newly designed Permaculture Garden through a woodland area, to better integrate with the easily accessible sections of garden. A new stone dust path was constructed, with a round patio-stone area at the centre of the Permaculture Garden to the Collector's Garden. The new paths are part of the re-designed flow between and through gardens. Over the winter, raised planter boxes were built in the nursery compound, and these will be added into the garden in the spring of 2021. A contractor was hired to rebuild the pond in the Pollinator Garden starting in May 2021. Beds along the fence were amended with compost and filled in with over 20 new plant species, adding diversity and increasing the range of flower-times, thereby providing more continuous access to pollen.

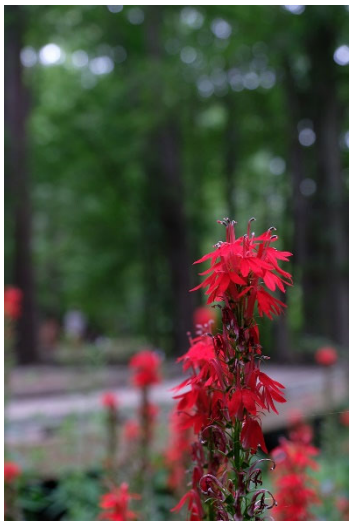
Hort Oak Grove:

- The young oak copse is growing well, and each year new trees are dedicated to past OHA presidents. Our efforts continue to keep the space free of garlic mustard and buckthorn, and to protect the young forest.

Lilac Collection

- The collection inventory was updated over the winter. Work began to re-establish the edge of the Lilac collection, where Japanese silk lilac have started to form a colony, spreading into the nearby meadow.

Memorial Forest Grove and Trail:



- In the Memorial Forest Grove, *Lobelia cardinalis* was again the star of the show, blooming in vivid swathes along the boardwalk. We continued to introduce pockets of plants suited to niche habitats. 50 Virginia Bluebells (*Mertensia virginica*) were planted among the Ilex in the entrance bed with the Memorial Forest sign. Ferns such as Christmas and maidenhair fern were added in clumps near the boardwalk. Additional plants of species that are doing well -such as marsh marigold, blue lobelia, gentian and joe-pye weed- were planted to fill in the gaps made by species that didn't survive. Groups of shrubs that may fit the wet site and deep shade were introduced, including spicebush (*Lindera benzoin*) and mountain maple (*Acer spicatum*).
- Ash were removed to assist in re-aligning the eastern addition of the memorial forest trail. Yellow birch, rough-leaf dogwood, and more mountain maple were added into the previous years' trail-side planting.

Native Trees of Ontario:

- New species were added to both the East and West loops including small groupings of tupelo (*Nyssa sylvatica)*, wild crab-apple (*Malus coronaria*) and conifers with different provenance (genetics collected from different parts of Ontario). Dead ash, wiped out by Emerald Ash Borer, continue to require removal mostly focused on the West Loop along trail edges. Specimens not near trails that pose less of a risk are left.

Nursery:

- Greenhouse plants were systematically inventoried, accessioned and tagged over the winter of 2020/2021.
- The winter involved a great degree of detailed planning for Greenhouse improvements that will be necessary to propagate material as arranged in conservation agreements and supported by Species at Risk Stewardship funding. This includes alarm systems, added capacity for rainwater harvesting, and updated misting system.
- 58 trees in the nursery rows will be transplanted by tree spade in the coming week (end of April 2021) into their destined spots along the service roads and new Hilton Centre landscape, to fulfil tree caliper compensation requirements for the Turfgrass Institute for trees that were cut down.
- A row of serviceberry (*Amelanchier*) were planted into the nursery as a holding ground for Rose Collection development.

Park in the Garden:

- The 'ocean' of wooly thyme fronting the Japanese Fence was re-planted in the summer of 2020, after the ground was carefully re-sculpted by the gardener, Cael Wishart. A short, protective fence of charred cedar (matching the style of the barrier around the dry-stone garden) was installed to enclose the new planting.

Perimeter and Natural Lands:

- The Nature Reserve was utilized for multiple research projects coordinated by Dr. Aron Fazekas.
- Naturalized areas throughout The Arboretum are an ongoing site of invasive species removal. Woodland edges and trails are increasingly -with the death of ash and maturing of weak-wooded species- hazardous and the site of targeted tree removal.
- New signage was added to woodland entrances, noting hazards and guidelines of use.
- The second portion of the Wild Goose Woods boardwalk was built over the winter (completed March 2021), making the entire trail passable again, and establishing a beloved connection from campus entrance through the woods into the plant collections.
- A side-trail was built in partnership with the Guelph Hiking Trail Club. The trail leaves our Acorn Loop (the main trail/service road through The Arboretum collections north of College Ave.) to twist through the dormant *Robinia* (Black Locust) collection, where our property stops. It continues through the old forest edge of the Cutten Club and connects to the City of Guelph trails that edge the Eramosa River.

Robinia:

- Long dormant, the *Robinia* collection was given a quick winter inventory to identify original, planted specimens amidst the new saplings that have filled in over the past 30 years.

Rosaceae:

- The rose garden and rose family collections were maintained as-is throughout the summer season. A preliminary inventory of the existing dormant tree collections (*Sorbus, Pyrus, Prunus*) was undertaken over the winter of 2020-21. Verifying and marking existing species and editing out remaining colonizing species will be a priority for the Horticultural Intern in the coming year. Planning and development will resume in the 2021.

World of Trees:

- This central collection features plants of similar species from different continents planted together.
- A new interpretive sign featuring a detailed map and information on the labels and plant arrangements will be installed in May 2021.
- Clearing and expansion of the south-west edge of the world of trees began, to isolate existing willow specimens enclosed with buckthorn and red-stemmed dogwood. Currently in the nursery, many willows are ready to plant out into this cleared area.
- Turf was removed under the grove of Katsura (*Cercidiphyllum japonicum*) which is the site of an annual memorial by the Student Association. In place of grass, a layer of composted bark mulch was spread out, and some trout lily bulbs were planted. Each year, more trout lily will be planted as part of the memorial service, so that eventually a colony will be established, to bloom in a carpet each spring.
- New specimens were added to the collection. A root-rot had killed off the *Dirca palustris* (Leatherwood) specimens. The bed location was moved to the understory of a nearby Sugar Maple, and new specimens (grown from wild-collected seed from local Wellington County populations) were planted in spring 2020. Ten additional specimens were planted into the World of Trees, such as red buckeye *Aesculus pavia* and three different species of Viburnum not previously in the synoptic collection.
- A new bed for Hypericum was begun in the south World of Trees. Different provenance of Kalm's St. John's-wort (*H. kalmianum*) and shrubby St. John's-wort (*H. prolificum*) were planted.