

2022 Ecological Monitoring Summary

Founded in 2001, the **rare Charitable Research Reserve** is a community-driven urban land trust, nature reserve and environmental institute with its headquarters and first three locations comprising over 900 acres. We acknowledge and are grateful to all of the original stewards of the land where this monitoring took place, within the Haldimand Tract, which spans six miles on either side of the Grand River and is the territory of the Onkwehon:we Peoples of the Six Nations of the Grand River. It is also territory of the Anishinaabe Peoples Mississaugas of the Credit First Nation. In addition, monitoring projects took place on stewarded land at the border of the Upper Canada Treaty No. 3 and Treaty 19 from 1818 which is also territory of the Anishinaabe Peoples Mississaugas of the Credit First Nation. We honour and respect the sovereignty of these First Nations and their ancestors. The lands we steward are home to many other First Nations, Métis and Inuit who have moved to the area from across Turtle Island.

The following is a summary of highlights from 2022 monitoring programs.

Butterfly Monitoring

Prepared by: Jade Anderson

Ecological Monitoring of butterflies has continued at **rare** since 2006. Currently, four transects are monitored across various ecotypes. Monitoring occurred from May 24th to August 25th over 14 weeks in 2022. No monitoring took place week 6 (June 26 to July 2) due to a staff injury and therefore the total number of weeks recorded was 13. The total number of individual butterfly observations made this monitoring season was 5739. This is a 31% increase from the total number of individuals recorded in 2021. Since 2010 the average number of individual observations in a season is 4896. This year, there was a 17% increase above the annual average. Additionally, 2022 saw a total of 46 species observed during the monitoring season. This is slightly lower than the annual average of 50 species per season since 2010. Overall, species abundance increased compared to previous years while species richness fell below the annual averages.

Similar to previous years, Cabbage White was the most abundant species making up 54% of the total number of individuals observed. This marks the fourth consecutive year as the most abundant species and the fourteenth year as one of the top two most abundant species observed. Additionally, there was a much greater percentage of Cabbage White individuals in 2022 compared to 31% in 2021 and 34% in 2020. Following Cabbage White, the top 5 abundant species were Inornate Ringlet (14%), Clouded Sulphur (8%), Little Wood-Satyr (4%) and Monarch (3%).

During the monitoring season 164 Monarch observations were recorded, making up 3% of the total individuals observed. This is much lower than the average number of monarchs observed in the last five years which was 227 individuals annually.

Some of the interesting species recorded this season include the Baltimore Checkerspot (rare), Leonard's Skipper (no status), Dion Skipper (rare), Eastern Pine Elfin (rare), Peck's Skipper (very common) and Spicebush Swallowtail (no status). This is the third consecutive year Baltimore Checkerspot and Dion Skipper have been sighted. Peck's Skipper has not been recorded since 2019 and this is the fourth year Leonard's skipper has been recorded at **rare**. This is only the fourth sighting of the Spicebush Swallowtail. This species was recorded at Thompson Track (transect three) and has been recorded in the same transect all four times it has been sighted. One of the newer species recorded in 2022 was the Red-Spotted purple x White Admiral hybrid. This is the first time the hybrid has been recorded during monitoring;

however it is possible previous observations were recorded as either Red-Spotted Purple or White Admiral.

There are several species that have become common over the last five years that were not seen during monitoring this year. This includes several hairstreak species (Coral and Striped Hairstreak), skippers (Black Dash, Long Dash and Northern Skipper) and Tawny Emperor. Other species, such as the Eastern Comma, were sighted only once during monitoring. This is low compared to the average thirteen individuals seen over the last five years. Many other Angelwing species had similar trends of the lowest number of individuals observed since 2017. Species such as American Lady, Painted Lady, Red Admiral, Question Mark, Compton Tortoiseshell and Milbert's Tortoiseshell.

Crescent species (Pearl and Northern) were lower in 2022 compared to the last five years with a decline of 81%. The average number of crescents during monitoring was 391 while in 2022 there were only 74 crescents sighted during the entire monitoring season.

Finally, the annual butterfly count took place on July 16, 2022. There was a total of 29 species and 508 individuals recorded. These numbers are similar to previous years recorded data.

Salamander Monitoring

Prepared by: Sara DeWeerd

Salamander monitoring occurs every fall at **rare** for 9 weeks; this year monitoring occurred from August 30th to October 26th. Because individual salamanders are not tagged, there are likely repeat observations of specific individuals over the course of monitoring. There were 93 total salamander observations between two sites: Ancient Woods and Hogsback. This is a 57.5% decrease from 2021, when there were 219 total salamander observations, and the lowest number of salamanders found in all monitoring years with equal effort. There were only 2 species found this year: the Eastern Red-backed Salamander and its lead-backed colour morph (*Plethodon cinereus*), and the Spotted Salamander (*Ambystoma maculatum*). In Hogsback, Red-backed Salamanders were the only species encountered, and both colour morphs were present. As usual, Red-backed Salamanders were the most abundant species observed in both sites, however, this year saw an increase of Spotted Salamanders in Ancient Woods compared to previous years. Spotted Salamanders were observed 16 times this year, accounting for 34% of observations, which is the highest amount and proportion for all monitoring years. The next highest was in 2020 when they were recorded 13 times, making up 15.7% of salamander observations. In all other monitoring years, Spotted Salamanders were recorded between 1 and 8 times, and last year only 4 times.

Each week, soil moisture is measured at each cover board. This year, the soil was especially dry in both sites for the duration of monitoring, until the last two weeks. Soil moisture (recorded on a scale of 1-10 where 1= dry and 10=completely submerged) was 2 or below at all boards with an occasional 3 or 4 at isolated boards, until October 19th, when 16 boards in the Hogsback were recorded at 3 and above. In the final week of monitoring, soil moisture was 3 or higher at one third of Ancient Woods boards and three quarters of Hogsback boards. Previous years regularly saw moisture levels above 3 throughout the monitoring period. These dry conditions may explain the low number of observations this season.

Incidental observations of non-target reptiles and amphibians (herptiles) during salamander monitoring included Garter Snake, DeKay's Brownsnake, Green Frog, Leopard Frog, Wood Frog, and Spring Peeper sightings.

Vegetation Monitoring

Prepared by: Sara DeWeerd and Nash Patton

Vegetation Monitoring using Vegetation Sampling Protocol (VSP) began at *rare* in 2018 at the Blair Property. VSP 2022 monitoring work began on June 13, 2022, at Edgewood and concluded on September 29, 2022, at Property 2. In total, sixty-two plots were surveyed and staked between two of the three Eramosa Corridor properties. Twenty-nine VSP monitoring plots were completed at Edgewood, thirty-three VSP monitoring plots were completed at Property 2, with fourteen remaining at that location. Property 1 was not started and contains forty-one predefined monitoring sites (excluding six in the farm field within property, which may be used in the future should the field become naturalized).

VSP utilizes randomly selected geo-referenced fixed area 400m² circular plots (11.28m radius) combined with a modular data collection approach to collect qualitative and quantitative data effectively, efficiently, and robustly on vegetation and ecosystem characteristics. VSP on *rare* properties during summer 2022 season included the identification of vascular plant species and the estimation of their coverage within the plot, measurements of tree diameter and representative height, assessments of tree health, measurements of forest regeneration, measurements of coarse woody debris, and descriptions of plot surface components, hydrological features, and natural and anthropogenic disturbances. The collection of this information will provide high-quality and comprehensive data on the status of vegetation communities on *rare* properties and will help inform future management and land use decisions, with particular focus on invasive species management.

Plots at Edgewood were staked at the beginning of monitoring and notes were taken about site conditions. They were then completed according to what was most appropriate for weather conditions and time available, for example a cedar forest with little vegetation in the understory would be selected as a day's second plot because it could be quickly completed. Plots at Property 2 were not staked beforehand because it was unknown how many could be completed, the distance to plots was greater, and stakes were likely to become hidden in vegetation. Instead, plots were completed in order of priority. Very high priority sites were completed first and were located within delineated wetlands along the Eramosa River, including five plots on the south side, which were accessed by the Radial Line Trail. Monitoring in late August and September allowed for the identification of asters and goldenrods in meadow and wet meadow habitats. These sites were selected to be surveyed last based on aerial photos to take advantage of the season. The plots left to complete at this property are upland and generally close to the path, to make it more likely that all remaining plots at Properties 1 and 2 can be completed in one season.

Priority invasive species found at Eramosa Corridor properties include European and glossy buckthorn (*Rhamnus cathartica*, *R. frangula*), garlic mustard (*Alliaria petiolata*), and Tatarian honeysuckle (*Lonicera tatarica*); other notable invasives include coltsfoot (*Tussilago farfara*), reed canary grass (*Phalaris arundinacea*), and common privet (*Ligustrum vulgare*). In Edgewood, invasive species were present near paths as well as in pockets of light in the forests. Wherever there was an opening in the forest canopy, European buckthorn and, to a lesser extent, garlic mustard had invaded. The dogwood and alder shrub thickets were dominated by glossy buckthorn. Property 2 has areas that are intact and less impacted by invasive species. European buckthorn dominated forest edges along the path, but the wet cedar forest stands near the river, far from the path, were less disturbed. On the south side of the Eramosa, large stands of black ash (*Fraxinus nigra*) had died, exposing the understory to full sun. This allowed glossy buckthorn and coltsfoot to dominate these areas.

Edgewood consisted primarily of forests dominated by either sugar maple (*Acer saccharum*) or white cedar (*Thuja occidentalis*), and shrub thickets in low-lying wet areas characterized by dogwoods (*Cornus sp.*) and speckled alder (*Alnus incana*). Property Two had a larger proportion of delineated wetland, which consisted of mature wet cedar forest and swamp, as well as previous black ash swamps which have died back. Upland areas consist of cedar stands which are partially invaded by non-native buckthorns, as well as open meadow areas. At the west end of the property are wet meadows characterized by reed canary grass, common cattail (*Typha latifolia*), spotted Joe-Pye weed (*Eutrochium maculatum*) and asters (*Symphotrichum sp.*), as well as dogwood and buckthorn shrub thickets.



Maps of VSP plots completed in 2022. 29 Plots were completed at Edgewood (left) and 33 were completed in Property 2 (right), with 14 remaining to complete at Property 2 (not shown). Red areas are very high priority, and consist of wetland corridors, and yellow areas are high priority.

Soil Humus Decay Rate Monitoring

Prepared by: Jenna Quinn

Changes in decay rates may indicate changes in temperature, moisture, substrate type, nutrient concentrations and availability, litter type and size, and soil organisms. Importantly, increased decay rates over decades can be an indication of climate change, as increased soil temperatures increase decay rates and release of stored carbon. Decay rate monitoring occurred in early November around one of the permanent forest canopy plots in each of the three main forest stands at *rare*. Decay rates are determined by burying wooden tongue depressors below the soil surface and comparing their mass lost over a period of a year to those left on the soil surface. Quantitative analysis was completed in 2020 and is scheduled to be repeated in 2025.