

Item for the Information of the Regional Watershed Alliance

TO: Chair and Members of the Regional Watershed Alliance
Wednesday, May 31, 2023 Meeting

FROM: Sameer Dhalla, Director, Development and Engineering Services

RE: **TERRESTRIAL INVENTORIES AND MONITORING UPDATE**

KEY ISSUE

Update regarding Terrestrial Inventories and Monitoring data collection and planned next steps.

RECOMMENDATION:

WHEREAS Toronto and Region Conservation Authority (TRCA), in partnership and collaboration with TRCA's partner municipalities, continues to conduct field inventories and long-term environmental monitoring tracking the health of its watersheds through the Regional Watershed Monitoring Program;

AND WHEREAS the inventory and monitoring science-based data supports many internal and external initiatives, including mandatory programs and services;

IT IS RECOMMENDED THAT the staff report and presentation on the Terrestrial Inventories and Monitoring be received.

BACKGROUND

Terrestrial inventory and monitoring provide a comprehensive approach to tracking terrestrial biodiversity throughout TRCA's watersheds as part of the Regional Watershed Monitoring Program. The data collected as part of this program are important for informing natural heritage and watershed planning, conservation land management, restoration planning, and other critical and mandatory work of TRCA and its partners.

There are two main survey types of Terrestrial Inventories and Monitoring data collected, including biological inventories, and long-term monitoring. Data sets generated complement one another and the data can be used to answer different types of questions about the terrestrial ecosystem within the Toronto region.

Biological Inventories

The biological inventory data provides a "snapshot" in time, where vegetation community, flora (plants), fauna (bird, frog, and in some cases bat) data are collected across a site with a detailed description at the site level of the current conditions. This data type is well suited to address questions related to appropriate land management use, determining trail alignments, or setting restoration priorities. An example is the identification of areas that would be highly sensitive to recreational pressures, such as wetlands. For reliability, data would need to be updated every 10-15 years.

Item 9.1

Terrestrial biological inventory data are collected by trained biologists in the field during the months of May through to September. Standardized protocols are followed to document vegetation communities, flora species of conservation concern, breeding birds, frogs, and bats. Data sets go back to the 1980s when inventories were undertaken in support of TRCA's Environmentally Significant Areas Program.

Today, data sets continue to be updated annually in support of new or updated initiatives such as the Natural Heritage Strategy, which was completed in 2022. The data collected describe and support current conditions site level reporting and, in some cases, document changes in terrestrial biodiversity.

Long-term Monitoring

The monitoring data describes the trends in species (plants, birds, and frogs) over the long-term across the Toronto region. The response of the terrestrial ecosystem to various landscape changes can be quantitatively documented and differences in rural and urban land use can be compared.

The terrestrial long-term monitoring program was developed in 2007 and implementation began in 2008/2009 to answer questions at the regional scale. The number of monitoring plots were subsequently determined based on the monitoring questions, the selected monitoring indicators, the anticipated reporting frequency, and the level of statistical confidence required (e.g., not missing a signal in the data that represents species decline).

Data collection follows standardized protocols to ensure the data collected are scientifically defensible. Monitoring plots are in forest, wetland, and meadow ecosystems to document vegetation (including tree health, pests and diseases, and invasive species), breeding birds, and frogs/toads to document the trends over time and space (urban versus rural land use gradient).

Benefits of the Data

The amount of data compiled over the past two decades through the two data collection methods, inventories and monitoring, have allowed TRCA to gather one of the most comprehensive and effective terrestrial datasets of its kind across Ontario. In the inventory databases alone, there are approximately 75,000 fauna records, 115,000 flora records, and 50,000 vegetation community polygons delineated. These data sets are used extensively not only for internal TRCA projects and programs, but also by external partners and consultants to inform development and infrastructure planning.

RATIONALE

It is well understood that healthy natural ecosystems support biodiversity and a variety of ecosystem functions that are imperative to human health. From the air we breathe and the water we drink to protection from natural hazards and the provision of important spaces for recreational and spiritual opportunities, the importance of the role biodiversity plays cannot be overstated. Despite biodiversity providing life sustaining ecological services, the Ontario Biodiversity Council has stated that our efforts to protect these systems is not keeping pace with the rate of loss. A more focused and determined effort is needed to curb this trend to conserve biodiversity in Ontario.

Item 9.1

The terrestrial data collection support mandated initiatives as outlined in the Conservation Authorities Act along with other internal and external partner programs and projects.

Two key applications of this data support the development of technical current condition reports that form the basis of watershed plans and land management plans for TRCA's parks.

Under the Conservation Authorities Act and Regulations, the TRCA is mandated to develop a Watershed-based Resource Management Strategy and Conservation Area Strategy. These strategies provide the framework to support our partner municipalities, through Memoranda of Understanding, to undertake watershed plans to protect, conserve, and manage natural heritage within TRCA's watersheds and to inform management of natural heritage on TRCA-owned lands, respectively. The detailed terrestrial field data will support the development and future updates to these strategies.

Internal TRCA projects and programs have regularly relied on the terrestrial data to inform initiatives, such as the recent update to the Natural Heritage Strategy, setting restoration priorities, the development of an invasive species strategy, and the identification of Significant Wildlife Habitat. External partners have requested the data to help inform their own Natural Heritage Strategies, to inform Species at Risk planning, and help to inform land use planning.

Terrestrial Inventory and Monitoring staff provide support services to other internal teams to collect field data related to their projects. In some instances, species at risk monitoring is required as part of the project planning to ensure no harm to habitat or the species (e.g., identification of possible bat tree roosts before trees are removed). In other instances, data are collected to demonstrate the outcome of a project, such as pre- and post-restoration habitat monitoring (e.g., monitoring at The Meadoway and barn swallow nesting cups).

Key data findings:

A 10-year report on the long-term monitoring data was released in 2021 that documented the trends in terrestrial biodiversity from 2011 to 2020. While some indicators showed a downward trend, others were stable. The broad impacts of urbanization are easily observed as there is a clear difference in the type of species that can be found in the urban versus the more rural land use areas.

The amount of meadow habitat across TRCA's watersheds has declined along with the associated meadow dependent bird species. This is a trend that has not unique to the TRCA region as meadow habitat has often been converted to other land uses (e.g., agriculture or residential development) across southern Ontario. Many of the meadow dependent bird species have now been listed as Species at Risk in Ontario.

Species that are habitat specialists as they require larger natural areas that are not repeatedly or intensely disturbed for instance, are generally not found in the urbanized areas of the watersheds (e.g., ground-nesting forest birds). Whereas species that have adapted to human settlements and even in some cases thrive in them, are most found in the urbanized areas (e.g., such as raccoons).

Item 9.1

Within all structural layers of the forest, native species continue to be the most abundant in both the rural and urban land use zones, with the ground layer showing the highest incidence of invasive species making up a quarter of all species (25.1%). However, the trend over time indicates that invasive species continue to spread, species such as garlic mustard (*Alliaria petiolata*) and European buckthorn (*Rhamnus cathartica*) are of particular concern. European buckthorn has also continued to increase in the wetland communities.

Other indicators are showing a stable trend. Frog species richness (# of different species) and species of conservation concern for instance were stable in both the rural and urban land use zones although there are clear differences in the type of species found. Species of conservation concern are no longer found in the urban land use zones as they require connected, higher quality forest and wetland habitat for their different life stages, which are generally not found in urban areas.

In 2007 Emerald Ash Borer (EAB), an invasive insect that kills ash trees, was first identified in our watersheds. In 2013, an intense ice storm that lasted for 3 days damaged many trees across the region. The timing of these events lines up with our monitoring data that shows a decline in the forest canopy across the region with a subsequent increase of invasive plant species.

Invasive plants are opportunistic and with the increased sunlight hitting the forest floor, they were able to proliferate. However, some bird species that specialize in gleaning insects from the bark of trees (e.g., woodpeckers and nuthatches) were able to capitalize on this increase (not only EAB itself but the host of other insects found in dead or dying trees) and their populations greatly increased.

Relationship to TRCA's 2022-2034 Strategic Plan

This report supports the following Pillar(s) and Outcome(s) set forth in TRCA's 2023-2034 Strategic Plan:

Pillar 1 Environmental Protection and Hazard Management:

1.2 Leadership in greenspace conservation

Pillar 1 Environmental Protection and Hazard Management:

1.3 Maintain health and resilient watershed ecosystems in the face of a changing climate

Pillar 2 Knowledge Economy:

2.1 Research and development that drives innovation and climate-based solutions

FINANCIAL DETAILS

Funding for the Terrestrial Inventories and Monitoring is made available from the following partners: City of Toronto, Region of Peel, Region of York, and Region of Durham through capital accounts 104-22 (Terrestrial Natural Heritage Field Inventories Program) and 124-10 (Terrestrial Regional Monitoring Program).

DETAILS OF WORK TO BE DONE

Terrestrial Inventories and Monitoring data will continue to be collected annually throughout TRCA's watersheds. The following data will be collected in 2023:

- Approximately 1300 ha of natural cover will be surveyed to document and map vegetation communities, and flora and fauna species of conservation concern. Data collection will be focused on the Highland Creek and Rouge River watersheds to support upcoming watershed plans and at several TRCA owned properties to support land management initiatives.
- Regional monitoring data to be collected in forest, wetland, and meadows for vegetation, birds, and frogs (164 total monitoring stations).
- Various project monitoring to support internal programs and projects, such as bat monitoring at 80 bat rocket boxes and using bat acoustics to determine presence of Species at Risk for planned tree removal projects and pre- and post-restoration monitoring at several locations, including The Meadoway.

Inventory and Monitoring Program Review:

Following the completion of 20 years of data collection through the RWMP, the Watershed Planning and Ecosystem Science business unit will be undertaking a review of the program to critically analyze the data and determine if adjustments are needed to better meet watershed planning needs. Since municipalities are required to undertake watershed planning to inform land use and infrastructure planning, this is an important project to undertake.

The Terrestrial Inventories and Monitoring data will assist the Watershed Planning and Ecosystem Science business unit with the review of the monitoring and inventory programs to evaluate on-the-ground changes to the natural environment and ecosystems in the face of land use and climate change.

To inform part of this review, the Terrestrial Inventories and Monitoring team initiated a pilot project in 2022 whereby passive monitoring recording devices (Wildlife Acoustics Song Meter) were placed at 4 wetland monitoring stations to record the calling period of the different frog and toad species found in the watersheds. As the calling periods of frogs/toads are driven by temperatures and precipitation, it is anticipated that early breeding frogs may begin calling earlier in the season corresponding to the changing climate.

This pilot project will continue in 2023 with data collection and analysis, and an assessment as to whether this type of data collection could be rolled out at additional monitoring stations in subsequent years as part of a set of monitoring indicators for climate change.

Data Management:

Terrestrial data are stored internally on TRCA servers in multiple databases following procedures for quality assurance and quality control measures. Datasets are shared annually to support external initiatives and programs, such as those led by Birds Canada, Natural Heritage Information Centre, and Ministry of the Environment,

Item 9.1

Conservation and Parks. Data sets can be obtained through direct request to the TRCA or in some cases through TRCA's Open Data Portal.

Terrestrial biological inventory and monitoring reports can be directly downloaded from the TRCA website. The [Watershed and Ecosystems Reporting Hub](#) allows users to view current conditions, trends, and targets, for each of the environmental indicators at various scales using the best available data and science.

TRCA is currently undertaking a review of all databases to ensure the appropriate structures are in place to manage the data over the long term as part of a data management strategy.

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