ANNUAL REPORT 2020 2021

OUR MISSION

TO BE THE AUTHORITATIVE, PRIMARY SOURCE OF ACCESSIBLE, CURRENT, AND RELIABLE INFORMATION ON THE DISTRIBUTION AND ABUNDANCE OF CANADA'S NATURAL DIVERSITY— ESPECIALLY SPECIES AND ECOSYSTEMS OF CONSERVATION CONCERN.

NatureServe Canada

A Network Connecting Science with Conservation
Un Réseau pour la science et la conservation

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Cover photo: Parry's Townsend-daisy (*Townsendia parryi*) and other wildflowers in high-elevation grasslands in British Columbia. Photo credit: Emily Cameron, BCCDC.

From the Chair and Executive Director

Fiscal 2020-21 was a unique year owing to the pandemic. On behalf of NatureServe Canada, we wish good health to you and your families, friends, and colleagues.

There were silver linings amongst the dark clouds of COVID-19. Though the pandemic caused cancellation of many field work projects, we saw continued growth in citizen science submission of important species observations records, through platforms such as iNaturalist.ca. The international NatureServe Network's online Biotics database, adopted by eight of 10 Canadian Conservation Data Centres, and 48 other member programs in the Network, allowed personnel to work efficiently from home, and so continue to develop and share biodiversity information across the Network and through public-facing platforms such as NatureServe Explorer. In such challenging times, it is satisfying to see the impact of our ongoing investments in Network information technology systems.

NatureServe Canada also continued to expand our suite of biodiversity science projects that leverage the resources, capacity, and expertise of our membership. We made impressive advances on our National Data information assets, the NatureServe Explorer Open Data platform, our Ecosystem-based Automated Range (EBAR) mapping, our Secure and Open Data Policies and Procedures, and the General Status of Wild Species program (3424 new species records added this fiscal to the Biotics database) to name a few. Some of these projects are featured in this Annual Report and, as always, we encourage you to contact us to learn more.

Thank you to our members, partners, and funders for your ongoing work and support towards our shared goal of ensuring that conservation decision-making is informed by accurate, comprehensive, current, and publicly available biodiversity information. And, please note our new logo, depicting a Wood Frog (a species found in all provinces and territories), atop a maple leaf, within a hexagon which represents NatureServe Network advances in displaying spatial biodiversity information!

Bruce Bennett
Chair

Patrick Henry
Executive Director

About Us

Canada is home to about 80,000 known species, with thousands more species to be scientifically identified or first discovered. These organisms belong to a vast organic tapestry—the diversity of life at genetic, species, and ecosystem levels, vital for environmental, economic, and social health.

At NatureServe Canada, our vision is for the natural heritage of Canada to be thoroughly documented, for that information to be readily available to the public, and for the conservation of biodiversity and resource decision-making to be guided by high quality scientific data and information. Our mission is to be the authoritative, primary source of accessible, current, and reliable information on the distribution and abundance of Canada's natural diversity—especially species and ecosystems of conservation concern.

NatureServe Canada and its network of provincial and territorial Conservation Data Centres (CDCs) work together and with other government and non-government organizations to develop, manage, and distribute authoritative knowledge regarding Canada's plants, animals, and ecosystems. NatureServe Canada and the Canadian CDCs are members of the international NatureServe Network, spanning over 100 government and non-government organizations in Canada, the U.S., and Latin America.[1]

NatureServe Canada is the Canadian affiliate of NatureServe, based in Arlington, Virginia that provides scientific and technical support to the international network. NatureServe Canada is based in Ottawa, Ontario and is governed by a Board of Directors comprised of representatives of its member provincial and territorial CDCs. Canada's CDCs are located in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Québec, Atlantic Canada, Yukon, Northwest Territories, and Nunavut.

A Yukon Conservation Data Centre field survey team, 2020. Photo credit: Yukon Government.

Each CDC adheres to NatureServe's rigorous scientific methods and standards developed since the 1970s. Together, NatureServe Canada and the Canadian CDCs strive to answer questions such as: What species and ecosystems exist in each province or territory? What is the condition and conservation status of their populations? Which species or ecosystems are at risk of extinction (global) or extirpation (from Canada or a province or territory)? Where precisely are species at risk and rare ecosystems found?

In discovering an alvar in Saskatchewan in 2020, Michael Rudy, Acting Botanist at the Saskatchewan Conservation Data Centre, documented numerous plant records, including of what might be the most northwesterly North American population of Upland Goldenrod (*Solidago ptarmicoides*), a species considered Vulnerable in Saskatchewan. Photo credit: Michael Rudy, SKCDC.

We presently maintain information on 59,246 species and 3845 ecological communities. Our Network steadily adds new knowledge about biodiversity—including about species newly documented for Canada or species newly described to science. The Network also helps document the most important places for biodiversity in Canada, to aid in management decisions concerning them.

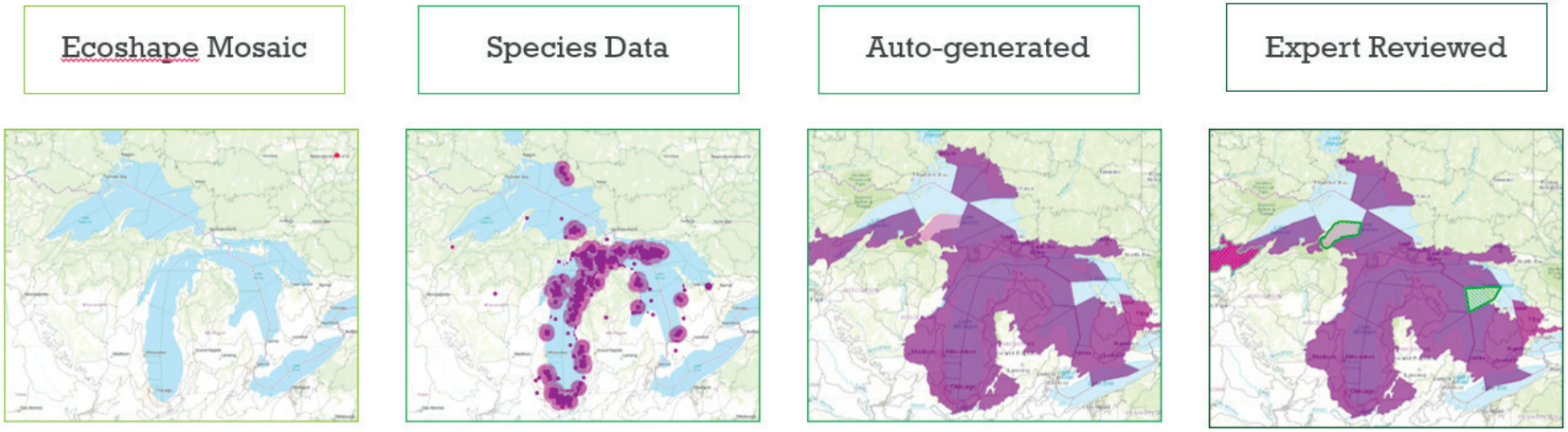
1 See: https://www.natureserve.org/natureserve-network.

Producing EBAR Maps for Key Biodiversity Area Identification

With input from hundreds of experts across Canada, the United States, and beyond, in 2020-21 NatureServe Canada developed 239 Ecosystem-based Automated Range (EBAR) maps in support of identifying Key Biodiversity Areas (KBAs) in Canada.[2] The maps were developed using a database of about 4.8 million species occurrences, collected from 163 data sources, including NatureServe Network Conservation Data Centres. The maps are now publicly available online on multiple platforms, at no cost, and are available in PDF or geodatabase format to enable a variety of end uses.[3]

EBAR maps combine biodiversity information with expert knowledge to populate ecoshapes (e.g., polygons of ecoregions) with species occurrence data. The novel mapping process eliminates the need to manually draw or edit species range boundaries, and results in range maps that can be refined efficiently as new data or expert review become available. These maps can be utilized for environmental impact assessments, land use planning, federal, provincial, and territorial species at risk programs, and more. Details on EBAR mapping, including its associated methods, are available at https://www.natureserve.org/natureserve-network/canada/biodiversity-data/ebar-range-mapping.

NatureServe Canada will continue to publish new species EBAR range maps as they are finalized. In 2021-22 we will focus our EBAR work on species that are of priority to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and *Species at Risk Act* (SARA) programs.



EBAR species range map development, from left to right (1) the ecoshape mosaic; (2) species data buffered by the uncertainty distance from the data provider; (3) auto-generated range with ecoshapes populated with presence values (present, presence excepted, or historical); and (4) expert review to refine the range.

2 For information on the Key Biodiversity Area program: http://www.kbacanada.org/

3 To access EBAR maps produced by NatureServe Canada, see: https://www.natureserve.org/natureserve-network/canada/biodiversity-data/ebar-range-mapping/ebar-maps-downloads-page. Maps are also available via: NatureServe Explorer (https://explorer.natureserve.org/), Esri Living Atlas (https://livingatlas.arcgis.com/en/browse/#d=2&q=ebar), and the online app https://www.arcgis.com/apps/webappviewer/index.html?id=1027bc16ec2f48419c8029ffea5ee3b1

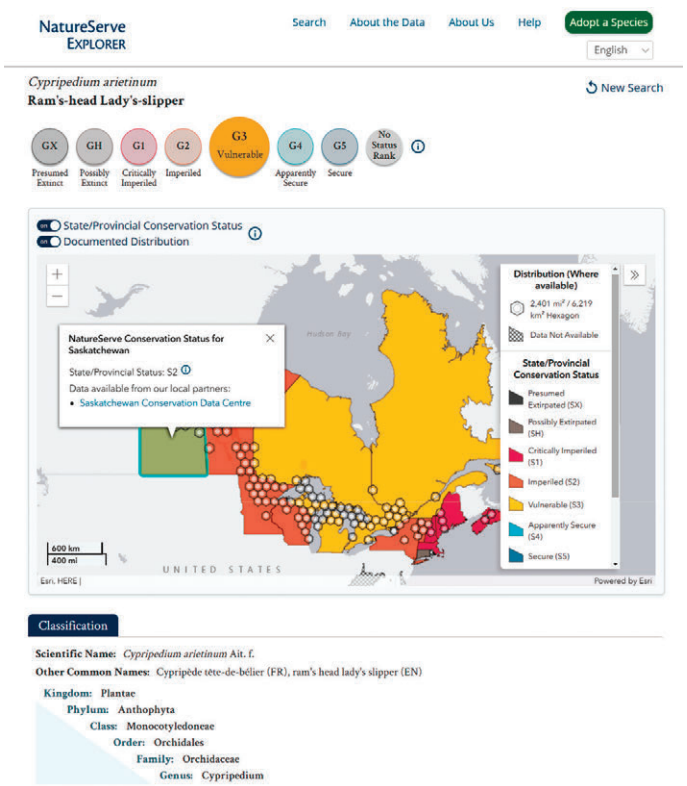
NatureServe Explorer 2.0 Supports Conservation Data Centres in Providing Data to the Public at No Cost

Ever wonder which species in a province or a territory are most imperilled? Curious to learn more about a favorite plant or animal? Finding information on the plants, animals, and ecosystems in Canada is easier than ever before using the new NatureServe Explorer. Twenty years after the debut of the NatureServe Network's flagship information delivery tool, this free online platform has been rebuilt with a completely new interface—supported by a transboundary, global database and a powerful search engine that delivers detailed data from every Conservation Data Centre (CDC) in a simple, easy-to-use format. Funding from Environment and Climate Change Canada—an Associate Member of NatureServe Canada—has helped make the evolution of NatureServe Explorer possible.

New features in NatureServe Explorer 2.0 include a simplified quick search bar, and detailed distribution maps like the example shown on this page for the Ram's-head Lady's-slipper (*Cypripedium arietinum*), a globally Vulnerable orchid that occurs in five provinces and nine American states. Earlier versions of NatureServe Explorer provided only static map images depicting coarse range maps that were infrequently updated. The new site's interactive maps allow users to zoom in and explore the places where CDCs have documented species occurrences in the field, and to download search results.

The NatureServe Explorer documented distribution maps are published at various scales down to about 2.5 square kilometres (one square mile), determined in consultation with the CDCs. This flexible data publishing framework allows the map precision shared for each species to be adjusted to the scale that is appropriate for its risk of persecution or harm.

Who is using NatureServe Explorer? Since its launch in March 2020, the new site is attracting six times the usage of the previous version. In searching for authoritative and current biodiversity information with which to make scientifically robust decisions, the tool is a go-to resource for researchers, conservationists, wildlife managers, and the business community. By helping to make biodiversity information more readily available than ever before, NatureServe Explorer also supports open data principles (e.g., that data should be machine-readable, freely available, easy to access, and simple to use). Start exploring now at https://explorer.natureserve.org/



A screen shot of the distribution map in NatureServe Explorer for the globally Vulnerable Ram's-head Lady's-slipper (*Cypripedium arietinum*). By clicking on the hexagons in the map, online users are directed to the Conservation Data Centre or Natural Heritage Program where more detailed species locational information may be available.

Documenting a Rare, Nationally Threatened Lichen in and near Fundy National Park

Eastern waterfan *(Peltigera hydrothyria)* is a lichen endemic to eastern North America where it is known only from New Brunswick, Nova Scotia, Québec, and 11 American states. One of only a few leafy lichens that grow at or below water level, this lichen affixes to rocks in cool, clear, and deeply shaded streams. Sensitive to stream siltation, microclimatic changes, water quality degradation, and water level fluctuations, the naturally rare Eastern Waterfan is listed as Threatened under the federal *Species at Risk Act*. According to a 2013 status report, "[c]limate change in the medium term is a serious threat to most of the Eastern Waterfan locations." [4]

In 2019, biologists with the Atlantic Canada Conservation Data Centre (ACCDC), in partnership with Fundy National Park (FNP), discovered Eastern Waterfan populations in 20 streams inside the park. This doubled the known Canadian population, roughly half of which is protected within FNP.

In 2020, the ACCDC and FNP again collaborated on Eastern Waterfan field searches. Surveys conducted in September resulted in the lichen being discovered in 21 new locations, nine of them inside FNP and 12 of them outside (the furthest being up to about 20 kilometres distant from the park boundary). The new records demonstrate that Eastern Waterfan is somewhat widespread in the Fundy highlands between FNP and, to the east, Shepody Mountain. However, new occurrences found in the greater park ecosystem (i.e., outside FNP) were very restricted in numbers, with many consisting of a single thallus. Many of these occurrences are highly threatened by habitat degradation, including increased sediment and material turnover from upstream or adjacent disturbances. Statistical analysis and modeling are ongoing, but there is now further evidence of the importance of FNP to the persistence of Eastern Waterfan in eastern North America.

Eastern Waterfan (*Peltigera hydrothyria*). Photo credit: Colin Chapman-Lam, ACCDC.

Parks Canada Agency biologist, Neil Vinson, surveying for Eastern Waterfan along Rattail Brook in Fundy National Park. Photo credit: Colin Chapman-Lam, ACCDC.

4 COSEWIC. 2013. COSEWIC assessment and status report on the Eastern Waterfan *Peltigera hydrothyria* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 46 pp.

Discovering Pristine Alvars in Ontario

Recent assessments of Crown land in Ontario, along the south shore of Prince Edward County, revealed provincially rare, treed, alvar grasslands in near pristine condition. The discovery was by Natural Heritage Information Centre (NHIC) biologists while they were surveying Ostrander Point Crown Land Block and Point Petre Provincial Wildlife Area, to inform a Ministry of Environment, Conservation and Parks' land use amendment proposal to designate these lands as Conservation Reserves. Conservation Reserves protect significant natural and cultural features, but permit traditional activities such as hunting and fishing.

The Prince Edward County alvars have a thin layer of soil combined with limestone fragments. The underlying bedrock has fissures known as grykes. This image reveals the presence of an underlying gryke. The area is flooded in the spring, and over time, water draining into the gryke has washed away the finer soil component, exposing the coarser limestone fragments. Photo credit: Wasyl Bakowsky, NHIC.

Stunted Bur Oak *(Quercus macrocarpa)* in Prince Edward County alvar grassland. Photo credit: Wasyl Bakowsky, NHIC.

Alvars occur on flat areas of limestone with little to no soil, and usually support sparse grasslands. The alvars found in Prince Edward Country are dominated by scattered Eastern Red-cedar (*Juniperus virginiana*), with Crawe's Sedge (*Carex crawei*), Flat-stem Spikerush (*Eleocharis compressa*), and provincially rare Ozark Dropseed (*Sporobolus vaginiflorus* var. *ozarkanus*). This vegetation contrasts with that along the rest of the south shore, which, due to human disturbance, has abundant invasive species such as Dog-strangling Vine and Common Buckthorn. These alvars are quite wet in spring, and seasonal flooding may have prevented introduced species from establishing in this habitat.

In the late 1990s, the NHIC was involved in the International Alvar Initiative (IAI), along with other jurisdictions that had alvar vegetation, such as New York and Michigan. Over the course of a number of years, field surveys were conducted to document the composition, extent, and condition of alvars within each jurisdiction. In Ontario, the best examples were determined to be on Manitoulin Island, upper Bruce Peninsula, the Carden plain, and the Burnt Lands southwest of Ottawa. Other diverse alvars were surveyed on Pelee Island, the Napanee plain, and the Smiths Falls plain. At the time, no quality alvars were found in Prince Edward County, despite numerous searches.

The IAI fieldwork led to a provincial alvar classification based on the dominant herbaceous, shrub, and tree species across the range of this vegetation in southern Ontario. It turns out that these recently discovered alvars in Prince Edward County are distinct, with no known analogues in terms of dominant species composition anywhere else in southern Ontario. Following NHIC's discovery, the alvars will be added to the provincially tracked rare plant community layer maintained by the Centre.

Improving Knowledge of Salamander Ranges in Manitoba

There are four salamander species in Manitoba: Common Mudpuppy (*Necturus maculosus*), of the family Proteidae, and Blue-spotted Salamander (*Ambystoma laterale*), Western Tiger Salamander (*Ambystoma mavortium*), and Eastern Tiger Salamander (*Ambystoma tigrinum*), all of the family Ambystomatidae.

Although each of these species are considered globally Secure (G5), at the national level the Eastern Tiger Salamander, which is uncommon and Vulnerable (S3) in Manitoba, is listed as Endangered under the federal *Species at Risk Act* (SARA). The Western Tiger Salamander is Apparently Secure (S4S5) but is nonetheless listed as Special Concern under SARA.

A tiger salamander captured for tissue collection. Photo credit: Kathryn Yarchuk, MBCDC.

The distributions of Manitoba's salamanders are not well defined. Further, complicating understandings of their ranges is the fact that the Eastern and Western tiger salamanders are closely related: they share many biological and morphological attributes and, until recently, were considered to be subspecies of *A. tigrinum*. As well, it is also unclear whether there is an overlap and/or hybridization occurring between the species.

Eastern Tiger Salamander (*Ambystoma tigrinum*). Photo credit: Doug Collicutt, Nature North.

Eastern tiger salamanders are thought to occur in a small region of southeastern Manitoba, from the Red River eastward to the edge of the boreal forest, and northward to the south end of Lake Winnipeg. By contrast, the Western Tiger Salamander has a broader range from the Saskatchewan border eastward to the Red River, and is especially common in the Prairie Pothole region.

The Manitoba Conservation Data Centre (MBCDC) has been surveying Eastern and Western tiger salamanders since 2012. From 2014-2020 the MBCDC collected tissue and egg samples to be analyzed for DNA. With assistance from Dr. Jim Bogart at the University of Guelph, initial results showed individuals previously identified as Eastern Tiger Salamander to be Western Tiger Salamander, based on mtDNA.

Further in-depth genetic analysis of collected tissue was needed to accurately identify the ranges of the two salamanders, and the potential for hybridization. Partnering with the Canadian Wildlife Service, the MBCDC collected 100 tissue samples and sent them to Dr. Brad Shaffer at the University of California, Los Angeles. Genetic analysis of the DNA to be extracted from the samples will identify tiger salamander species, or in the case of hybridization, the hybridization percentage for a given sample. These results should improve knowledge of the range extent of Eastern and Western tiger salamanders in Manitoba, assist in future survey efforts, and aid in species recovery planning.

Discovering Alvar in Northeastern Saskatchewan

Alvar is a globally imperilled calcareous habitat characterised by shallow mineral soils over limestone or dolomite bedrock, a natural lack of trees, and an unusual prairie-like flora. Few people familiar with alvar would envision it in Saskatchewan's northern boreal forest, as it occurs in only five countries worldwide, and in Canada most of it is found in the Great Lakes basin. However, in 2020 Michael Rudy, working as the Acting Botanist for the Saskatchewan Conservation Data Centre (SKCDC), confirmed it between Cumberland and Limestone lakes, in the northeastern part of the province.

Michael's surveys at the alvars yielded many notable species records, and confirmed extraordinarily high levels of rare species diversity. Given that only approximately three days of surveys were conducted, the results suggest that further work could reveal many more exciting findings.

Indeed, of the species Michael identified, nearly 45% of them are rare and/or species newly documented for Saskatchewan. For example, Showy Lady's-slipper (*Cypripedium reginae*) represents only the third known record for the province, and an apparent rediscovery of the species in Saskatchewan. Green Spleenwort (*Asplenium viride*) represents the first records of the genus for Saskatchewan, and apparently the first records of the species between the Alberta Rockies and the Great Lakes. Fissured Stippleback Lichen (*Dermatocarpon dolomiticum*), an unobtrusive but unusual lichen species in Canada known only from Ontario, and Critically Imperilled nationally, is a newly discovered Saskatchewan population severely disjunct from the closest sites in the Great Lakes basin. And Swamp Moonwort (*Botrychium tenebrosum*) is a new species of these enigmatic and rare ferns for Saskatchewan.

An aerial view of the Limestone Lake alvar in northeastern Saskatchewan. Photo credit: Michael Rudy.

Although the total area of alvar in Saskatchewan is small (less than 100 hectares), the biodiversity there is spectacular. Michael's findings prompt questions such as: How should these sites be protected? How much more alvar remains to be found in Canada's remote boreal? Does Alberta also host alvars? What role are these remote boreal alvars playing in the dispersal and population genetics of the rare species they host? For now, such questions will remain mostly unanswered, but one thing is clear: a predictive model of alvar distribution in the boreal region is needed. If Saskatchewan's alvars have been overlooked for so many decades, where else might they await discovery?[5]

Pink Prairie Onion (*Allium stellatum*), known from the three Prairie provinces and 19 American states, and globally Secure, is one of the many plants documented within the alvar complex in northeastern Saskatchewan. Photo credit: Michael Rudy.

5 For more information and photos from the Saskatchewan alvar story, see Michael Rudy's website: https://www.meanderphotography.ca/Alvar

Assessing High-Value, High-Elevation Grasslands in British Columbia

The Elk Valley in southeastern BC contains a comparatively healthy population of Bighorn Sheep (*Ovis canadensis*), though the species is Vulnerable (S3) province-wide. Photo Credit: Emily Cameron, BCCDC.

Biologist Kristi Iverson in high-elevation grasslands on Castle Mountain in the Elk Valley. Photo Credit: Emily Cameron, BCCDC.

Tucked into southeastern British Columbia (BC), in the Kootenay region of the Canadian Rockies, is the Elk Valley. The Elk Valley contains the largest producing coal field in BC. Tourism and outdoor recreation are also significant economic contributors to a half dozen towns such as Fernie and Sparwood.

The Elk Valley is also associated with multiple conservation values, such as supporting a comparatively healthy population (600-700 animals) of Bighorn Sheep (*Ovis canadensis*). The Bighorn Sheep is, however, listed as Vulnerable (S3) by the BC Conservation Data Centre (BCCDC). Loss or degradation of sheep habitat, especially of key wintering forage sites, is a major threat to this species.

The Elk Valley is further notable for containing several at-risk, mid- to high-elevation ecological communities to which Bighorn Sheep and many other at-risk species are or may be closely associated (e.g., Whitebark Pine, *Pinus albicaulis*, listed as Endangered under the federal *Species at Risk Act*).

For example, *Festuca campestris—Eriogonum umbellatum—Eremogone capillaris* (Rough Fescue—Sulphur Buckwheat—Thread-leaved Sandwort) is a Critically Imperilled (S1), high-elevation grassland community with limited distribution in BC. In the Elk Valley, these grasslands are co-located with key winter forage sites for Bighorn Sheep. According to a 2018 BCCDC Conservation Status Report, though relatively abundant in the Valley, this community is highly threatened by mining and associated roads. Further, "decreases in available grasslands increases degradation of remaining grasslands by concentrating grazing by ungulates, and recovery is anticipated to be slow in high-elevation environments."[6]

In 2020 the BCCDC began a two-year project to reassess the condition of high-elevation grasslands in the Valley, following the last assessment in 2009. As well, the quality of habitat at remediated mining exploration roads and at undisturbed sites is being compared. New data on vegetation community composition, measures of grassland condition, maps of grassland occurrence, lists of vascular plant and bryophyte species observed, and analysis of Bighorn Sheep pellets are among the outputs of the fieldwork.

Following the 2021 fieldwork, deliverables from this project will support land use planners, stakeholders, and First Nations by providing publicly available data and information to inform future management of Bighorn Sheep, of high-value ungulate wintering habitat/high-elevation grasslands, and of land use and land reclamation activities.

6 Source: https://a100.gov.bc.ca/pub/eswp/esr.do;jsessionid=1A89C9466D68F2F5CFAC02736232EBD7?id=312267

Surveying Alpine At-Risk Species in Yukon

The Dawson and Nisling mountain ranges of west-central Yukon are special—they have never been glaciated. During the ice ages of the Pleistocene, they were connected to Asia by the Bering land bridge to the west and separated from the rest of North America by the big ice sheets to the south. Consequently, an entire "Beringian" biota evolved in isolation there.

In 2020, the Yukon CDC (YTCDC), with support from Canada's Polar Continental Shelf Program, coordinated a project to study the abundance, distribution, and habitat associations of alpine at-risk species in this region. Two target species were chosen for special focus: Yukon Podistera (*Podistera yukonensis*) and Collared Pika (*Ochotona collaris*). Both species are listed as Special Concern under the federal *Species at Risk Act*, and both are threatened by shrub encroachment and habitat shifting caused by the climate emergency.

Prior to the 2020 fieldwork, there were few site-specific data for either of these species, and so three alpine areas in west-central Yukon were selected that had overlapping occurrences of the two species. At each survey site, Yukon Podistera populations were censused and mapped in detail, and the location and height of shrubs were recorded. This work provides baseline data from which future trends can be evaluated.

The biologists also visited 34 Collared Pika sites and documented habitat quality. The mountains surveyed had some of the highest pika occupancy numbers known for Yukon; indeed, almost all (97%) of the suitable habitat contained pika. Ongoing monitoring at various locations throughout the range of the Collared Pika is necessary to assess changes in occupancy due to the effects of a warming climate.

Besides the two target species, the team censused and accurately mapped previously unknown populations of several other plant species of concern. These included six occurrences of Ogilvie Mountains Spring Beauty (*Claytonia ogilviensis*)—a Canadian endemic—and the Beringian Porsild's Smelowskia (*Smelowskia porsildii*). Ogilvie Mountains Spring Beauty is now known globally from 16 sites spread among the unglaciated mountains of Yukon, and Porsild's Smelowskia is now known from 11 sites in Canada.

The Collared Pika (*Ochotona collaris*) is a small, alpine-dwelling lagomorph (rabbit family) that survived the last glaciation. Photo credit: Syd Cannings.

Yukon Podistera (*Podistera yukonensis*) is known from fewer than 30 sites in the world, 90% of which are found in Yukon and the remainder in Alaska. Photo credit: Syd Cannings.

Lessons in Northern Research from the 2020 Field Season in the Northwest Territories

Laura Kaupas and Johanna Stewart handling a Little Brown Myotis (*Myotis lucifugus*), screening for signs of the presence of white-nose syndrome in the Northwest Territories in 2018. Although visual bat monitoring was conducted, this hands-on portion was cancelled in 2020 to protect bats from potential COVID exposure. Photo credit: Michele Grabke, ENR.

The Northwest Territories Conservation Data Centre (NTCDC) works in a co-management setting, where all organizations with legislated responsibilities for biodiversity in the Northwest Territories (NWT) work together towards a common goal. These organizations include territorial and federal departments and wildlife co-management boards set up under land claim settlement agreements, such as the Wildlife Management Advisory Council (NWT) and the Gwich'in Renewable Resources Board, Sahtú Renewable Resources Board, and Wek'èezhìi Renewable Resources Board.

The year 2020 started normally, and then the COVID-19 pandemic quickly interrupted almost everything. In March, northern-based conservation practitioners and researchers learned that all partners based in southern Canada would not be allowed to come north, and all federal research and monitoring programs "north of 60" were cancelled until at least September 2020. The NWT's Aurora Research Institute, which issues research permits and provides logistical services to "outside researchers" in normal times, was closed. Regions within the NWT and Nunavut reduced travel to and from smaller communities.

Meanwhile, the Government of the Northwest Territories (GNWT) and the NTCDC declared wildlife research, monitoring, and management an essential service. This resulted in one of the busiest field seasons for northern-based researchers in recent history. New or revised health and safety plans had to be quickly developed for each field trip. As many monitoring programs as possible, of various partner organizations, were assumed. That said, the NTCDC still had to cancel annual invitations to experts to explore and monitor species in the NWT, and it also postponed a field trip to a remote area of the Inuvialuit Settlement Region, to the only known site of the globally Imperilled (G2) plant, Hairy Braya (*Braya pilosa*).

The GNWT and the NTCDC are developing a climate change adaptation strategy for wildlife management. In 2020 virtual interviews were conducted with our partners to gain insights on the goals and actions people in the NWT would like to see in this strategy. Both COVID and these interviews are providing lessons: a key lesson learned is that northerners should increase their own capacities to conduct ecosystem and species monitoring, and to rely less on outside researchers. In fact, despite the pandemic, much biodiversity data for many northern research programs was collected in 2020. The GNWT promoted a "return to the land" approach to reduce COVID exposure of NWT residents, and the NTCDC enthusiastically promoted the iNaturalist.ca citizen science platform to advance documentation of rare, new, or unusual species in the NWT. The GNWT and NTCDC are also continuing to invest in new technology to document species, and citizen scientists are installing automated devices such as cameras, bird recorders, and bat detectors.

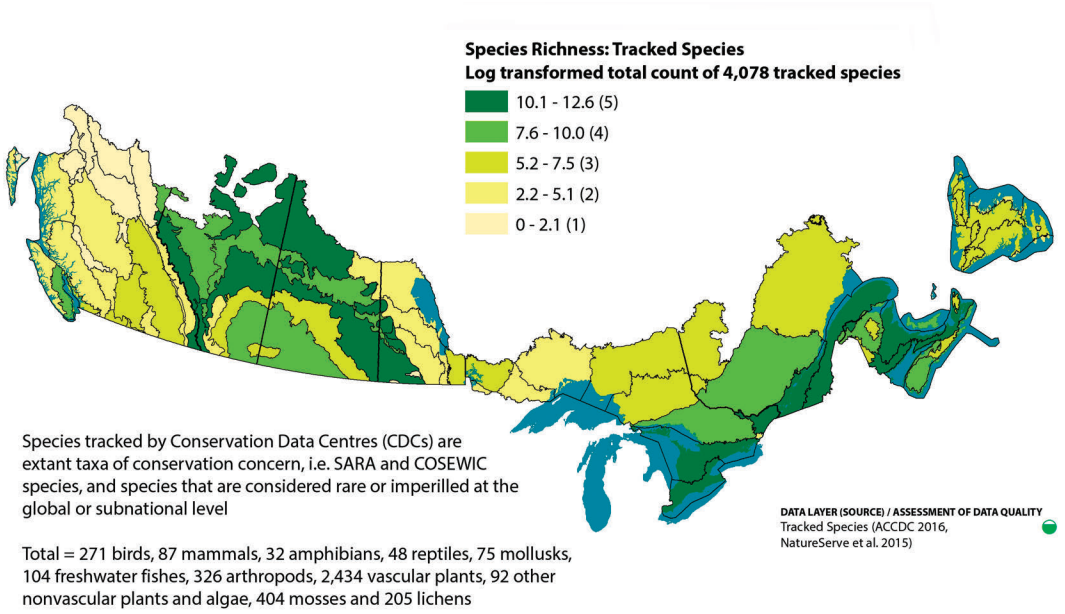
A Conservation Assessment for Southern Canada

The Nature Conservancy of Canada (NCC), NatureServe Canada (NSC) and Canadian Conservation Data Centers (CDCs) have a long history of conservation planning partnerships. From the first ecoregional assessments in the 1990s to a 2020 report on nationally endemic species, data from NSC and CDCs have been the foundation of new information tools to help prioritize and direct conservation to Canada's most important and imperilled biodiversity.

The results of NCC's most ambitious conservation assessment that is based on NSC data from across the country were released in 2020. The NCC assessed the 77 ecoregions that make up southern Canada using 34 measures of biodiversity, threat, and conservation response. These measures included the number of tracked species, globally Imperilled species, and area of protected lands. Ecoregions were then categorized based on their overall scores. The results of the study were published in the journal *Biodiversity and Conservation*[7] and made further available through the project website.[8]

The good news is that there are ecoregions in southern Canada, such as the Cape Breton Highlands and Eastern Continental Ranges, which are very important for biodiversity and which also have lower-level threats. However, the study also identified nine "crisis ecoregions" with the highest biodiversity and threat scores. Over 60% of Canada's species at risk are found in these nine ecoregions, which span from Eastern Vancouver Island and the Lower Mainland of British Columbia, through the prairies and into the fertile farmlands of southern Ontario, the St. Lawrence Valley, and Prince Edward Island. In most of these ecoregions there are only a few scattered protected areas, and loss of habitat is continuing.

The NCC is continuing to analyze the NSC data used in this study to pinpoint key hotspots for globally Imperilled, nationally Endangered, and endemic species. This will help direct NCC's place-based conservation plans, and build greater public awareness about these critical areas. The results from the assessment of ecoregions and hotspots will be used by NCC and partners to focus actions on the places in Canada that are most critical for biodiversity—and where conservation is most urgent.



7 Kraus, D., Hebb, A. Southern Canada's crisis ecoregions: identifying the most significant and threatened places for biodiversity conservation. *Biodivers Conserv* **29**, 3573-3590 (2020). https://doi.org/10.1007/s10531-020-02038-x

8 See: https://storymaps.arcgis.com/stories/9ca69385ffc54cf6b9fdae925449d15d

Tributes to Michael Oldham, Don Sutherland, and David Bradley—Thank You All!

Fiscal 2020-21 saw the retirements of three long-standing employees of Ontario's Natural Heritage Information Centre (NHIC): **Mike Oldham, Don Sutherland,** and **David Bradley**. Each leaves an impressive legacy of commitment to biodiversity science and conservation in Ontario, and each will be greatly missed by NHIC staff, the Ministry of Natural Resources and Forestry (MNRF) within which NHIC is housed, and colleagues from the NatureServe and NatureServe Canada networks.

Mike Oldham retired after spending 28 years, since NHIC's inception, as Provincial Botanist or Botanist/Herpetologist. Mike has botanized throughout Ontario, and his geographic breadth expanded considerably once he joined the NHIC. From 1996 to 2008 he made yearly forays into northwestern Ontario with his colleague Wasyl Bakowsky, travelling as far west as Lake of the Woods and the Manitoba border. More recently and for six years, Mike travelled to Ontario's Far North, including to sites along the Hudson and James Bay coasts, to survey remote locations (often by helicopter). During his time with NHIC, Mike amassed more than 20,000 plant collections, made many other collections of lichens, molluscs, dragonflies and damselflies, and other taxa, and discovered more than 50 plant species new to Ontario, many of which were also new to Canada. Further, Mike sat on numerous provincial, national, and international committees, was involved in numerous review committees in the MNRF relating to rare plant and species conservation, and published extensively on the flora and fauna of Ontario.

Don Sutherland was with the NHIC since its inception in 1993. Don has been passionate about biology his entire life, and the NHIC and its partners have long benefitted from his near encyclopedic knowledge about plants, animals, plant communities, and research history in Ontario. During his career he provided his expertise in countless ways, including to the development of Ontario's *Endangered Species Act*, the *Fish and Wildlife Conservation Act*, the *Invasive Species Act*, and Ontario's Biodiversity Strategy. He also played key roles in significant natural history atlas initiatives, including establishing the Ontario Odonata Atlas database, the Ontario Herpetofaunal Summary, and the 2nd Ontario Breeding Bird Atlas. Don's true passion is fieldwork, and he is regarded as one of the top naturalists in Ontario. With NHIC he travelled throughout Ontario, documenting plants and animals and making many significant discoveries in the process. In particular, he spent a lot of time in the Far North, assisting for example with Polar Bear surveys, breeding bird atlas work, and James Bay shorebird surveys.

David Bradley began his Ontario Public Service career in London, Ontario in 1994, as a Botanist with the Ecological Land Classification (ELC) program. For eight years David's expertise supported the delivery of ELC training courses, maintenance of vascular plant lists, and sampling an impressive 1144 vegetation plots in southern Ontario. In 2004 David moved to Peterborough to support the Vegetation Sampling Protocol program. Over the next 10 years he contributed to field sampling activities and the delivery of training courses for that program. In 2014 David brought his expertise to the NHIC. There, David focused on bryophytes (liverworts, hornworts, and mosses) by reviewing location records, making significant updates to the provincial database, and responding to requests for information.

Summary Financial Data

The summary financial data on this page is drawn from NatureServe Canada's audited financial statements for 2020-21. To access the full statements, please visit www.natureserve.ca.

STATEMENT OF FINANCIAL POSITION		
Year ending March 31	**2021**	**2020**
ASSETS		
Current		
Cash	254,563	563,168
Accounts receivable	667,109	318,340
Prepaid expense	668	669
Capital Assets	—	—
Total Assets	**932,340**	**882,177**
LIABILITIES AND NET ASSETS		
Current Liabilities		
Accounts payable and accrued liabilities	755,382	682,607
Deferred revenue	25,593	61,900
Net Assets	**151,365**	**137,670**
Total Liabilities and Net Assets	**932,340**	**882,177**

STATEMENT OF OPERATIONS		
Year ending March 31	**2021**	**2020**
REVENUE		
Charitable organization/foundation funding	344,169	433,772
Dues	16,500	16,500
Government funding	1,628,550	1,569,655
Other	15,783	7,254
Total Revenue	**2,005,002**	**2,027,181**
EXPENDITURES		
Contracts	1,963,754	1,957,507
Office costs	8,386	5,572
Other	2,241	2,163
Professional fees	16,926	16,926
Sponsorship	—	10,000
Travel, annual meeting, workshops	—	13,203
Total Expenditures	**1,991,307**	**2,005,371**
Excess (Deficiency) Revenue Over Expenditures	**13,695**	**21,810**

An Invitation to Contribute to Conservation Science

A financial investment in conservation science is an investment in knowledge about nature, upon which depends the health of the environment, the economy, and our society. NatureServe Canada is a registered Canadian charity (#862330529RR0001). We welcome financial gifts in support of our business—conservation science. As well, membership in NatureServe Canada is available to organizations that support our mission, which manage data of conservation value, and/or are active in promoting science-based conservation action nationally or sub-nationally.

Online donations can be processed through our website (www.natureserve.ca) and inquiries can be directed to Patrick Henry, Executive Director, phenry@natureserve.ca; 613-986-1535.

Northern Saw-whet Owl brooksi subspecies *(Aegolius acadicus brooksi)* is a small owl endemic to Haida Gwaii, in British Columbia. It is listed as Threatened under the federal *Species at Risk Act*. Photo credit: anonymous.

In Gratitude to Our Members in 2020-21

NatureServe Canada is deeply grateful for the contribution and collaboration of our Constituent and Associate members—Thank You!

CONSTITUENT MEMBERS

Alberta Conservation Information Management System
Atlantic Canada Conservation Data Centre
British Columbia Conservation Data Centre
Manitoba Conservation Data Centre
Northwest Territories Conservation Data Centre
Nunavut Conservation Data Centre
Ontario Natural Heritage Information Centre
Saskatchewan Conservation Data Centre
Yukon Conservation Data Centre

ASSOCIATE MEMBERS

Environment and Climate Change Canada—Canadian Wildlife Service
Fisheries and Oceans Canada
Nature Conservancy of Canada
NatureServe
Parks Canada Agency

NatureServe Canada
A Network Connecting Science with Conservation
Un Réseau pour la science et la conservation

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