Working Title

Agwaamtoon Mshkiikii (protecting the medicines)

A Conservation strategy for The Land Between bioregion

The Land Between Charity
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A Living Document

This is a living document. What we have included so far is merely a baseline, founded upon the enormity of the work done by recovery science, and also utilizing tenants of behaviour change science. There is much more work to be done to animate the strategy in ensure it is inclusive and meaningful as we seek a collaborative regional strategy that is grounded in Traditional Knowledge, lived experience, and scientific research. We seek to embrace and integrate a model of Two-Eyed Seeing. We aim for this strategy to reflect the wisdom of those working and living in this region, especially from the Indigenous Knowledge Holders and Elders. As we pursue reconciliation, our intent is to ensure the consistent respectful inclusion of Indigenous leadership and experience, and as treaty partners, to take our responsibilities seriously and sincerely care for these relationships.

We hope that this document will evolve and to reflect the efforts of cooperative collaboration as we listen, and learn from each other.

Key Terms

According to the *Open Standards for the Practice of Conservation*, Version 4.0 (CMP, 2020).

Term	**Explanation**
Vision	A description of the desired state or ultimate condition that a project is working to achieve. A complete vision can include a description of the biodiversity of the site and/or a map of the project area, as well as a summary vision statement
Target	An element of a project site upon which a project has chosen to focus. All targets should collectively represent the concerns at the site.
Goal	A formal statement detailing a project's desires, such as the desired future status of a target. A good goal meets the criteria of being specific, measurable, achievable, results oriented, and time-limited (SMART).
Objective	A formal statement detailing a desired outcome of a project, such as reducing a critical threat. A good objective meets the criteria of being specific, measurable, achievable, results-oriented, and time-limited (SMART). If the project is well-conceptualized and -designed, the realization of a project's objectives should lead to the fulfillment of the project's goals and ultimately its vision. Compare to vision and goal.
Strategy	A set of activities with a common focus that work together to achieve specific goals and objectives by targeting key intervention points, optimizing opportunities, and limiting constraints. A good strategy meets the criteria of being: linked, focused, feasible, and appropriate.
Activity	A specific action or set of tasks undertaken by project staff and/or partners to reach one or more objectives. Sometimes called an action, response, or strategic action.

Executive Summary

This document is the conservation strategy for The Land Between bioregion, the unique ecotone positioned between the Canadian Shield and St. Lawrence Lowlands, and stretching across the province from Georgian Bay Coast to the Ottawa Valley, and the region from which The Land Between charity takes its name. The bioregion represents the headwaters of the Michii Saagiig Traditional Territory. The region serves as a vital refuge for wildlife in the southern half of the province Ontario, and as such, the conservation of this landscape is critical to the survival of the Species at Risk occuring in the region, as well as the countless other declining species and related ecosystem services which support neighbouring communities including much of the settled and urban landscapes to the south.

This conservation strategy aims to highlight actions to conserve the Species at Risk occurring in The Land Between bioregion, their habitats, and all other disappearing wildlife. A complete list of the Species at Risk included in this conservation strategy can be found in Appendix 2.

The strategy is rooted in behavior change science, deliberately targeting specific behaviours, increasing an intrinsic motivation for conservation, and fostering a connection with nature to inspire change to human behaviours that continue to contribute to climate change and environmental destruction.

Traditional Knowledge shared by local Indigenous Nation communities and Knowledge Holders is gratefully and respectfully included throughout this conservation strategy with permissions, to support more grounded and comprehensive perspectives, which lead to meaningful understandings. We recognize that western colonial perspectives are limited, tend to commodify Nature, and also do not embrace or address the emotional relationships or spirit of connectedness that exist between humankind and our wildlife-kin. We also recognize that western science provides guidelines for trends and priorities in the modern context where actions are urgently needed across entire taxa, however also that science tends to prove the original Teachings shared by Indigenous peoples, and therefore that instead Traditional Teachings are the touchstones in conservation efforts. Any references to Traditional Knowledge that is shared within the strategy will be noted in *italics*.

It is hoped that this strategy serves as a foundation for action by The Land Between charity for the next 10 to 20 years and for partners to draw from and use as a blueprint.

The strategy is a living document, as it highlights priority actions, actions underway, and strategic steps to take.

It is patent that achieving goals and objectives herein depends on partnership, cooperation, and open communication between Indigenous leaders, all levels of government, other conservation organizations in the region, industry stakeholders, and the members of the community.

1.0 Document Explanation

This conservation strategy was written according to the *Open Standards for the Practice of Conservation*, Version 4.0, 2020 (CMP, 2020). As such, the strategy follows the structure and uses the terminology laid out therein. The *Open Standards* were designed to help improve and enhance conservation work around the world, and consist of five broad steps: Assess, Plan, Implement, Analyze, Adapt and Share (*ibid.*). The Assess and Plan steps of the Open Standards were adopted for the creation of this strategy.

In accordance with the *Open Standards*, conservation targets have been identified, and purposes, a scope, a vision, targets, goals, objectives, strategies and activities have been set. These and other relevant terms are defined in the document glossary, which can be found in Appendix 1.

Two sets of purposes, visions, targets, goals, objectives, strategies and activities are laid out in this document: one set for the conservation strategy itself (hereinafter referred to as **The Strategy Document**), and one set for The Land Between bioregion, the area and species therein in to be served by the strategy (hereinafter referred to as **The Project**). These pieces were identified for The Strategy Document so the impact of the document could be monitored and tracked, and the intent behind it made clear. Further, the purposes, visions, targets, goals, objectives, strategies and activities identified for The Project form the structure and roadmap by which the necessary conservation actions in the region will be executed.

Many of the goals and objectives made under The Project and The Strategy Document may seem aspirational and overly ambitious given the short timelines, amount of work required, size of the region, and the number of at-risk species addressed in the strategy. However, the goals and objects reflect what, in the opinion of The Land Between Charity (hereinafter referred to as **The Charity**), must be done. The Charity acknowledges the goals and objectives will not be met through our efforts alone, but instead will require the support and collaboration of partners and other stakeholders in the region. The Charity further acknowledges the planned efforts of other groups in the region will also contribute to the goals and objectives we have set for the region, its species and its habitats.

1.1 Document Structure

Following the structure laid out in the *Open Standards for the Practice of Conservation*, the purpose, scope and vision of The Strategy Document and The Project are provided first. Next, the conservation and human well-being targets for The Project are laid out, followed by each target's corresponding goals, objectives, strategies and activities. Subsequently, the goals, objectives, strategies and activities made for each conservation target identified for the Strategy Document are laid out and explained. Finally, the Next Steps section explains where The Charity will go from here, and how this strategy will be utilized and implemented.

1.2 Treaties and UNDRIP

The landscape is part of the Traditional Territory of the Mississauga Anishinaabek. During American settlement, the Haudenesaunee –whose Territory was found south of Lake Ontario– as well as the Wendat were pushed north. Aaniishinaabek Mississauga shared this land with their cousins under special Treaties. Further Treaties were launched, one after the other, and some arguably in haste without due consultation or informed consent, by the British government to enable further expansion of European settlement across more northern reaches in Ontario. The Land Between is therefore, not covered by one Treaty, but by many. These Treaties include: Robinson-Huron Treaty, John Collins Purchase, Williams Treaty, Treaty 20, Treaty 27, Treaty 3 ⅛, and the Crawford Purchase.

We recognize the Original Treaties of Canada, including the Great Wampum and those agreements embedded in the British North America Act and the Canadian Constitution including the Duty to Consult; and because Settler governments have not integrated this responsibility at all levels and in all facets, we will look to UNRIP to inform our treaty obligations:

We recognize the United Nations Declaration of Rights of Indigenous Peoples Act, and in particular the Articles most relevant to the development of a regional conservation strategy:

- Article 29:
    - 1. Indigenous peoples have the right to the conservation and protection of the environment and the productive capacity of their lands or territories and resources. States shall establish and implement assistance programmes for indigenous peoples for such conservation and protection, without discrimination.
- Article 31:
    - 1. Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge, and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions.
    - 2. In conjunction with indigenous peoples, States shall take effective measures to recognize and protect the exercise of these rights.
- Article 32:
    - 1. Indigenous peoples have the right to determine and develop priorities and strategies for the development or use of their lands or territories and other resources.
    - 2. States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free and informed consent prior to the approval of any project affecting their lands or territories and other resources, particularly in connection with the development, utilization or exploitation of mineral, water or other resources.

1.3 Species Included in Strategy

Species listed on Schedule 1 of the Federal Species at Risk Act and/or Schedule 1 of the Ontario Endangered Species Act make up the majority of the species included as conservation targets in this strategy, and are included in Appendix 2a. However, not all of the federally and provincially listed Species at Risk (SAR) are included in this strategy. This was done to be realistic regarding the capacity and capability of The Charity, as well as to ensure that efforts and resources are directed to the places where they are most needed.

Species that are vulnerable to some of the most pressing threats to The Project, some of which are still considered common, have also been addressed in this document, and are included in Appendix 2b. This was done to support the overarching purpose of The Strategy Document to not only conserve and protect SAR within The Project, but also to keep common species common.

1.4 Federal and Provincial Recovery Strategies

This Strategy Document was directly informed by the federal, and where not available, provincial, recovery strategies for each of the species included in this strategy. The primary threats to each species were pulled directly from these documents, wherever available. In the case where neither federal nor provincial recovery strategies were available (unlisted species, species listed as Special Concern, etc.), federal or provincial management plans, COSEWIC (Committee on the Status of Endangered Wildlife in Canada) and COSSARO (Committee on the Status of Species at Risk in Ontario) reports, and lastly, federal or provincial webpages on the species and their threats, were consulted.

The Strategy Document also incorporates many of the strategies and activities listed in each of the individual species recovery strategies (where applicable), and has adapted them to suit the regional and unique nature of The Project. Of course, many new, regionally and context specific strategies and activities have also been proposed in this strategy.

Please note, while the species or suite of species-specific strategies and activities in this recovery strategy were directly informed by the federal and provincial recovery strategies, for the most part, strategies and activities involving law and policy were not included in this strategy. As is explained in Section 4.0: Guiding Principles, it is the opinion of The Charity that law and policy alone are not enough to foster sustainable conservation efforts, and have in the past been relied upon too heavily. For this reason, the strategy of law and policy has, for the most part, not been included in this strategy. Further, many of the strategies and activities involving scientific research and monitoring have also not been included in the strategy, as much of this work is beyond the scope of The Charity.

1.5 Threats

Two categories of threat will be addressed in this conservation strategy: general threats to The Project as a whole, and habitat, species, or suite of species-specific threats. The general threats that pose a threat to the region as a whole, as well as the individual species that inhabit it, will be addressed through the conservation targets of The Project. Examples of these broad threats

include increasing exurban development, natural resource extraction, and lack of nature-connectedness by residents of and visitors to the region. The habitat, species, or suite of species-specific threats will be addressed through each species or suite of species-specific sub conservation targets. A summary of the threats posed to each habitat, species or suite of species will be provided in advance of the goals and objectives made for each target.

1.6 Target Audience

As separate purposes, goals and objectives for The Project and The Strategy Document have been set, the target audiences for each of these pieces are also unique.

The following have been identified as the target audience for The Project:

- Municipalities
- Private landowners
- Youth
- General public

The above have been identified as the target audience for The Project, as they are the source or root drivers/influencers of the majority of the threats this strategy sets out to tackle. As you will read throughout the strategy, different goals, strategies/interventions and activities have been set to address the threats posed by each of the unique target audience groups.

The target audience for The Strategy Document has been identified as the following, both within and across The Land Between, as well as more broadly across the province of Ontario:

- Conservation Groups
- Provincial and Federal Governments
- Indigenous Groups and Nations
- Research/educational institutions

It is the hope of the writers of this strategy that it be used and referenced by members of each of the above groups, so that our efforts may complement and not duplicate, and so that the ambitious goals and objectives for The Project may be met.

1.7 Mind Map

In addition to The Strategy Document, an accompanying Mind Map of the activities of conservation and other relevant organizations has been created. The Mind Map demonstrates the activities, programs and initiatives underway by other organizations in The Land Between that are supporting SAR and SAR habitat recovery. The purpose of the document is to demonstrate the work already being done by other regional organizations, so that other organizations can not only attempt to avoid effort duplication, but also easily find potential partnership, collaboration, and support opportunities.

The Mind Map is broken down according to suites of species, and in some cases, by individual species. The species groupings in the Mind Map roughly mirror the groupings in this document, though they are not identical. The Mind Map can be found in Appendix 4.

1.8 Limitations

As with any conservation strategy, there are limitations. First, though every effort was made to be as comprehensive and thorough as possible in terms of the threats to be addressed (within the scope of operations of a grass-roots organization), this strategy is by no means exhaustive. There is always room for expansion and improvement.

Second, not every species and habitat type (at-risk or otherwise) occurring in The Land Between has been included in this strategy. This was done to be realistic regarding the capacity and capability of The Charity, as well as to ensure that efforts and resources are directed where they are most needed. It is further for this reason that the goals, objectives and strategies for some habitats, species or suites of species are more comprehensive than others; it is not possible for The Charity to provide the same level of effort to every species. Some species require conservation efforts beyond the scope and operational power of The Charity.

Lastly, the successful execution of the goals, objectives, strategies and activities set under this strategy are subject to available funding and continued community, partner and governmental support. The Charity is a grassroots, non-governmental organization and, as such, its work is limited to that which is funded by public and private grants, and the support of its patrons and supporters.

2.0 The Land Between

2.1 Charity

The Charity is a grassroots, non-governmental organization dedicated to the protection and conservation of the species, habitats, culture, and socioeconomic features that collectively make up the region known as The Land Between. The Charity strives to honour the original treaties of Canada and therefore to embrace and animate reconciliation in all of its programs and operations as well as in its governance. The Charity is perhaps one of the first organizations in Canada to officialize equal voice and representation between Indigenous Nations and Settlers in its constitution by ensuring the charity Board of Directors (Council) is made up of at least 50% Indigenous individuals and where an official delegate is appointed by the Nation(s) whose majority traditional territory(ies) The Charity works in. The Charity also works to embrace and integrate a two-eyed seeing approach of honoring western science alongside and equal to Indigenous and local traditional knowledge to inform its efforts.

The Charity works towards behaviour change and stewardship of the landscape by the landbase, and chooses strategic multi-sectoral projects to have meaningful and lasting impacts. Projects are community-based with multiple and diverse partners.

2.2 Bioregion

The Land Between Bioregion is the last wildlife refuge in southern Ontario, and an important landscape for the future health of southern Ontario. It is an ecotone positioned between the Canadian Shield and St. Lawrence Lowlands, and stretching across the province from Georgian Bay Coast to the Ottawa Valley. The region is therefore a meeting ground for species from the south and north whose ranges terminate or begin in The Land Between, such as the moose and deer, river otter and woodchuck, cardinal and osprey, jack pine and white oak.

The region is also relatively intact and therefore represents a final and significant wildlife refuge for a majority of species from bordering ecoregions. The Land Between also has species whose ranges strongly correlate to, and therefore who rely on, the region. These species include the Five-Lined Skink, Golden-Winged Warbler, Red-Shouldered Hawk and others. The region is also a stronghold for 7 of Ontario's turtles, as roughly 30% of their entire populations are found in The Land Between; and 25% of Ontario's snake populations with Eastern Hognose, Northern Ribbon, and Watersnake being dominant. Not surprisingly many of these regional species are listed as being at risk. In total, The Land Between supports approximately 59 listed SARs, and countless other common and disappearing species.

The Land Between also has valuable physiographic features; here the majority of rock barrens in Ontario are found, and also the highest percentage of shoreline representing the density of small lakes, wetlands and rivers. In fact there are over 24,000 lakes in the region and possibly over 100,000 wetlands. The water in the region is not only interconnected above and below ground, with little soil to absorb contaminants and to assist in regrowth or nutrient cycling. The

water also represents recharge areas/headwaters, but also attenuation and discharge sites, that regulate but also feed aquifers and rivers for large cities and a large part of southern Ontario.

Finally, The Land Between is a mosaic of undulating elevations and interspersed habitats; it has the highest beta diversity in the province. Within this patchwork of species and spaces are found Nature's potential for Climate Change adaptation: ecotones within ecotones that also supply biodiversity and resilience; natural edges to limit the spread of invasives; and accessible adjacent microhabitats to accommodate minor shifts in species ranges.

The Land Between is therefore a storehouse of ecosystem services and nature's products that benefit the communities within the region, but which also support vast areas of the settled landscapes to the south and also areas to the north. In the Land Between can be found pollinators, agents of biodiversity and seed dispersal, other features that facilitate pest control- and this bounty is inextricably linked to the health and vitality of the St. Lawrence Lowlands as well.

The Land Between is indeed important to Ontario, and it may seem to be a resilient landscape, but the region is surprisingly fragile as changes are transmitted far and fast across the interconnected landscape.

3.0 Explanation of Behaviour Change Strategies

"Managing human behavior is essential for biodiversity conservation."
- Selinske et al. (2018, p. 1464)

It is generally acknowledged that most conservation problems are caused by human behaviour; some of the primary drivers of biodiversity loss, for example: habitat loss and fragmentation, introduced invasive species, and overexploitation, are the consequences of human activities (Díaz et al. 2019; Schultz, 2011). Federal and provincial protection legislation for Species at Risk and their habitats is insufficient, and cannot be relied upon to protect and/or recover SARs and their habitats; similarly, public education and outreach alone are not enough to achieve effective conservation. It is therefore crucial for effective conservation plans to understand which factors and evidence-based strategies can influence human behaviour and promote behaviour change.

In 2019, the United Nation's first ever global assessment of environmental rule of law found that environmental laws have grown dramatically across the globe over the past three decades. Despite a 38-fold increase in environmental laws and agencies since the early 1970s, environmental problems such as climate change and biodiversity loss have continued to persist. The report notes that the laws too often "exist mostly on paper because government implementation and enforcement is irregular, incomplete, and ineffective" (United Nations, 2019). In Ontario, the ability of provincial and federal governments to enforce protection measures for SAR and their habitats is limited, particularly on private land. Moreover, while legislation is beneficial when effectively implemented and enforced, it is still subject to change in political leadership (*ibid.*). As long as there exist governments who favour development and big business over well thought-out, sustainable land-use planning, there will always be the potential for government work-arounds and exemptions. For example, the United States saw a rollback of 125 environmental protections throughout the four years of the Trump administration (Eilperin et al., 2020); in Ontario, the Ford government has introduced amendments to the Conservation Authorities Act that aim to strip powers from conservation authorities, allowing permits to be issued for land development projects even when these projects violate environmental rules (McClearn & Gray, 2020). Legislation is therefore not enough to protect the environment, and unless they are designed with behaviour change theories in mind, nor will conservation policies actually lead to changes in behaviour (Marselle et al., 2020).

"Over 50 years of environmental policies have failed to prevent biodiversity loss and to safeguard ecosystem functions and services."
- Maynard et al. (2020)

A common misconception with behaviour change strategies is that if people had the right information, they would change their behaviour (Toomey et al., 2017). While education is important, alone it is often not enough to change people's behaviour. Typically, there are barriers between information and action that block pathways to change (Kollmuss & Agyeman, 2002; Gifford, 2011). A lakefront property owner might be aware of the importance of a natural shoreline for the health of their lake, for example, but time, financial constraints, or the influence of neighbours' shoreline management practices may act as barriers to their better shoreline management. As well, since individual stakeholders rarely see the impact of their actions, they may not know if or how their actions are effective (e.g. wash your boat signs are not as effective as a demonstration). Another barrier is that since factors such as people's values, beliefs, and experiences influence their perceptions, "facts" presented in information campaigns can also be debatable in different social groups (Nisbet & Scheulefe 2009; Newell et al. 2014). In some cases, scientific information can sow more discord between groups rather than bring people together to address conservation problems (Toomey et al., 2017). Beyond education, or "having the facts," behaviour change strategies should be based on improving individuals' sense of stewardship or nature connection in order to enact lasting change.

Economic incentives for engaging in conservation practices can be effective when motivation is low (Rare et al., 2019). Extrinsic motivators can be in the form of rewards (e.g., financial rewards, public praise) or punishments (e.g., fines, fees). However, rewards are generally preferred because punishments have negative side effects (Bolderdijk et al., 2012) – to avoid paying a fee at the garbage dump, for example, some people may opt for illegal dumping. Punishments can also result in negative attitudes towards the punishers, such as negative attitudes towards conservation authorities. In general, it can be more effective to reward the desirable behaviour rather than punish than undesirable behaviour. The type of reward matters as well: there is evidence that recognition or public praise is more effective in encouraging desirable behaviours than monetary rewards (Handgraaf et al., 2013). However, when people are already intrinsically motivated to engage in conservation practices (driven by an inherent interest or enjoyment, for example), these incentives can be counterproductive because they can diminish people's internal drive to engage in the behaviour or communicate that participation is undesirable. Intrinsically motivated people are more likely to persist in engagement with conservation practices (*ibid.*). The use of economic incentives generally assumes a lack of motivation; but it is also possible that people are already interested and motivated to engage in conservation practices, but there are barriers preventing them from adopting these practices (e.g., lack skills or resources).

Behaviour change theories describe factors that predict people's behaviour. These factors can be both internal (e.g., knowledge, attitudes) and external (e.g., rewards, social norms), vary by individual, and can interact with each other to influence people's behaviour (Ardoin et al., 2013). The relatively recent and quickly growing fields of environmental and conservation psychology have further contributed to a better understanding of the factors that influence pro-environmental and pro-conservation behaviours. As resources become increasingly available, behaviour change theories are more accessible to conservation efforts (for examples, see Ardoin et al., 2013; McKenzie-Mohr, 211; Rare et al., 2019).

It is now widely accepted that environmental conservation is much more about managing human actions and activities, or especially human-nature interactions, rather than the natural world itself. Public outreach and education is an important component of managing behaviours and activities as it broadens public awareness of issues, but it is not enough alone to change behaviour.

> ". . . conservation is a goal that can *only* be achieved by changing behavior."
> - Schultz (2011, p. 1080)

<u>Our approaches to increasing conservation behaviours throughout The Project:</u>

• Targeting specific behaviours:
  - To increase their effectiveness, behaviour change strategies must be tailored to meet the context, the target audience, and the target behaviour (Ardoin et al., 2013). We are using community-based social marketing practices as a framework for identifying the most appropriate target behaviours and audiences to succeed in our conservation initiatives (see McKenzie-Mohr, 2011 for community-based social marketing strategies). We are selecting target behaviours that: will have the greatest impact on conservation efforts; have a high probability that people will engage in the behaviour(s); and where few people are already engaging in the behaviour.
  - We used an expert ranked list of pro-conservation behaviours (see Barbett et al., 2019) as one method of identifying behaviours that will have the greatest impact. The list includes three separate categories: behaviours that people engage in at home or in nature; gardening or land management behaviours; civil actions. After selecting our target behaviour we identified the barriers and benefits to engaging in the target behaviours. We then matched the barriers and benefits of the behaviour(s), with the most appropriate and evidence-based behavioural change strategies.
• Increasing intrinsic motivation for conservation:
  - Supporting people's need for autonomy, competence, and relatedness (Ryan & Deci, 2000): people need to feel they're capable or that they know what to do and how to do it
• Fostering a connection with Nature:
  - More people are disconnected with nature than ever before (Pergams & Zaradic, 2008) – urbanization and less access to nature, coupled with an increased use of digital media has resulted in a disconnection with nature, which can lead some people to undervalue the natural world and be less motivated to protect it (Soga & Gaston, 2016).
  - Fostering a conservation ethic is critical, because people higher in nature connectedness consistently engage in a wide range of environmentally-friendly behaviours (Whitburn et al., 2019); there is an associated improvement on mental healthy as they tend to be happier (Capaldi et al., 2014, 2015)
  - Nature connectedness can be fostered through:

- spending more time in nature (Richardson et al., 2016)
- participating in environmental education or citizen science programs, especially when programs are outdoors, and local (Braun & Dierkes, 2017; Nisbet & Treinish, 2013)
- combining nature experiences with mindfulness (Passmore & Holder, 2017; Unsworth et al., 2016)

4.0 General Principles

General Principles are the concepts, approaches and values on which a conservation strategy is based (CMP, 2020). They are not included as a component of the conservation standards process, but provide an important background and foundation for a conservation strategy, including a statement of the point from which the efforts outlined in the conservation strategy will begin. For this reason, we have elected to include General Principles in this document. The General Principles of The Strategy Document are as follows:

A. Nature Connectedness: desire and need to reconnect people with nature

We understand that 70% of humankind now lives in the city, with approximately 90% of their time spent indoors (Matz et al., 2014). We further understand that the prevailing inherent cultural narrative and social norms relate to urbanized or terraformed landscapes. Furthermore, mainstream interpretations of religious teachings relegate nature to a subservient/lower level than humans. However, evidence still suggests that humans are awestruck, inspired, and humbled by nature; and ongoing research shows that Nature has an innate ability to inform and to heal. Therefore, reconnecting all individuals to nature will result in increased caring and stewardship for the earth, our shared inheritance.

B. The Importance of Community Efforts in species' protection, and execution of provincial and federal recovery strategies

Grassroots community efforts are the base that supports the pyramid of the conservation sector. Landowner and community engagement are the foundation of any change, and there is strength in numbers. Through social networks and social connection, change can happen surprisingly quickly once it reaches a threshold of the population or community. Also the change that does occur is deep and therefore more lasting because, although it may at first be externally motivated through social pressures, it shifts to become intrinsic as new understandings evolve and new personal identities are formed, eventually establishing new social norms.

The environmental sector has experienced drastic and continuing reductions in funding support and resources are dwindling resulting in diminishing capacities. Scientific research and conservation efforts are increasingly reliant upon or fortified by Citizen (Community) Science and/or volunteerism.

Federal and provincial recovery strategies are the bedrock of this community pyramid - they are a framework, in most cases well informed by western science, from which community action is springboarded and directed. These documents provide the outline, and grassroots community efforts complete the picture.

C. The Importance of Two-Eyed Seeing: honouring Traditional Ecological Knowledge and incorporating with scientific and local knowledge

Indigenous peoples are the natural and inherent stewards of North America. Their oral tradition is engendered across generations which necessitates a deep practice of memory and transmission and therefore which begets a prevalent practice and way of being that integrates mental acuity, attention to detail and observation of nature- and which, collectively, is remarkable. Furthermore, their entire identities and subsequent beliefs are inextricably tied to the Land (and animals). Not only are their Clans (Dodems) and Teachings related to wildlife, but also their language is imbued with life or the living. Anishinaabemowin is a language with remarkably few nouns that suggest the inanimate, but instead is dominated by verbs to express living nature- “being a rock; being a lake; being water, etc.” This connection to nature is intrinsic and almost absolute – despite modern mainstream and urban influences – and therefore knowledge holders have an attention to nature that is notable, with resulting understandings that are informative across many foci; from supporting trend analyses, to expressing current interrelationships and functions, and also for simple observations. The spiritual and emotional value of nature for humankind is also brought into the frontlines, where religious and economic interpretations have often relegated these to the backseat. Therefore, the embracing of these systems of knowledge and ways of knowing are complementary to science but also essential to conservation.

In the same vein, it is important to honour local and outdoor knowledge from harvesters and naturalists or even community members alike who have nature-based traditions and practices.

D. The Importance of Cross-Sector Collaboration

Cross-sector collaboration – the sharing of funds, resources, knowledge, perspectives and expertise; complementing organizational and individual strengths and weaknesses; filling gaps – all are essential to maximize limited resources of time, energy and funds. Collaboration allows for the minimization of effort duplication, and ensures challenges to effective conservation are being considered from as many angles as possible. It further makes an effort to include all stakeholders in the regions and the issues, from either side of the line, a part of the planning and solution-finding efforts to shared problems, threats and issues. By including as many diverse voices in the conservation process as possible from the beginning, more effective plans and solutions are brought forward.

E. The Importance of Kindness and Understanding

In this modern era, especially in the aftermath of the COVID pandemic, many people are grappling with fractured connections on all scales. It is therefore necessary to meet people where they are, and not jump to conclusions or pass judgment upon them. In order to foster relationships, and move forward collectively, common ground must be found. Seeking common ground is a form of kindness; active listening is a form of kindness. These acts are only possible through humility.

In an increasingly polarized world, diplomacy is the only way forward.

F. Respect for Nature's innate Intelligence and Interconnectedness

Western science and society has a tendency to compartmentalize elements, and assumes an inanimacy of nature. This is in contradiction to Indigenous original teachings, and the findings of current scientific research which show that there is an innate intelligence, even sentience, in nature. Examples such as fungal mycelium network, or ancient Mother Trees indicate the capacity of ecosystems to support each other.

Continuing research reinforces what may seem already evident: that there is a reason and role for everything in nature, and all members of food webs have inherent value and an equally important presence.

G. Humility and Positive Ignorance

We seek to acknowledge that humans do not know everything, and ought therefore to have a sense of humility when acting to promote environmental health. Humans tend to leap before looking: acting before taking the time to observe. As a result of this, we have brought species from one continent to another, resulting in invasive non-natives. The precautionary principle is a policy that emphasizes caution and review before pursuing new scientific innovations.

This is an important policy in regards to Species at Risk conservation: as so many SARs are at a critical level, there is an associated feeling of urgency, or need to act, that may surpass patience or thoughtfulness. However, it remains important to test and observe before enacting projects that have the possibility to impact the entire food web – since ecosystems are so intertwined, attempting to predict cascading effects without monitoring can be impractical. Piloting actions on a small scale before promoting their execution elsewhere is critical.

H. Economic Value of Nature across (human / species) generations

Nature, and natural capital, has more impact and benefit than any one industry. However, the holistic and interconnectedness of nature makes it difficult to quantitatively assess. What is the value of a fishery, a spawning area, or a turtle hibernation site? Moreover, what is the value of these to humans, as well as to the species that use them? What is the value (to humans) of maintaining the environmental capability for angling for a hundred generations to come, vs the establishment of a subdivision now?

Humans tend to evaluate consequences or successes in a snapshot of time instead of across (forward) to generations. Indigenous teaching instructs on the importance of considering how actions will impact seven generations ahead; but we must also consider how actions will impact

further generations of species. There is an associated value loss when major aspects of species lifestyles are damaged or removed; this is compounded for entire food webs due to the intertwined nature of ecosystems.

An economic balance can only be achieved by measuring and comparing the value and needs of future populations, ecosystem services and functions.

I. Holistic Approach across sectors

As previously noted, ecosystems are incredibly and uniquely intertwined. To reflect this holism, new programs / projects, or new behaviours must indicate a comprehensive approach across sectors in order to be integrated.

Any solutions / actions should be measured on 7 pillars: mental health, economic health (long term, immediate and far), ecological health, community (societal) health, cultural identity / vitality, (human) physical health, and support for future generations.

5.0 Project Purpose

As stated above, Purposes have been identified for both The Strategy document itself, as well as for The Project.

The Purposes of The Strategy are as follows:

1. Inspire, inform and streamline future conservation initiatives within The Project for Species at Risk and their habitats, as well as for disappearing common species across the region.
2. Foster effective communications and partnerships between agencies and organizations working to conserve and effectively manage SARs and their habitats across The Land Between bioregion.
3. Demonstrate the need for the inclusion of behaviour change science in conservation planning and encourage the adoption of the behavior change model by other organizations across the region and beyond to ensure effective future conservation efforts.
4. Provide benchmarks for measuring success, and update tracking models.

The Purposes of The Project are as follows:

1. Reverse or halt the population declines of Species at Risk in the region.
2. Ensure common species remain common.
3. Ensure the capacity for nature to renew itself is intact (complete trophic/food webs; connected intact habitats; sustained capability for ecosystem services).
4. Affect behaviours of landowners, municipalities and the general public across the region towards greater and ongoing stewardship and conservation of the natural assets that they are responsible for.

6.0 Scope

The *Open Standards for the Practice of Conservation* defines a project **scope** as a statement of what a project intends to affect (CMP, 2020). The *Open Standards for the Practice of Conservation* further qualifies or classifies a project scope into three different categories: Place-based scopes, Thematic-based scopes and Target-based scopes. Given the size and breadth of the region this conservation strategy is attempting to cover, one or more of each of these scope types have been chosen. Each of the scopes outlined below apply to both the The Strategy Document and The Project.

6.1 Place-based Scope

A **place-based scope** is one which is focused on a particular geographic area (*ibid.*). The place-based scope of this initiative is The Land Between Bioregion, the ecotone positioned between the Canadian Shield and St. Lawrence Lowlands, and stretching across the province from Georgian Bay Coast to the Ottawa Valley. The bioregion is roughly bound by the Trent Severn Waterway in the South, and by the boundary between the Lake Temagami Region and the Georgian Bay Region in the North (Crins, 2000). A map of The Land Between Bioregion can be found in Appendix 3.

6.2 Target-based Scope

A **target-based scope** if one which focuses on a specific conservation target (species, habitat, ecosystem, etc.) (CMP, 2020). The *Open Standards for the Practice of Conservation* defines a **conservation target** as the specific species, habitat or “thing” that a project is aiming to conserve (*ibid.*). In other words, conservation targets are the entities being targeted for conservation efforts. The target-based scope of this initiative are the Species at Risk occurring in The Land Between, their habitats, and declining common species.

6.3 Thematic-based Scope

A **thematic-based scope** is one which is focused on a specific item such as an issue, threat, ecosystem feature or ecosystem service related to or supplied by a given conservation target (*ibid.*). The thematic-based scope of this initiative is private landowners / public and private land managers involved in land conversions from natural to primarily residential and/or anthropogenic areas, as well as exurban road networks. This scope secondarily encompasses natural resource operations such as aggregate, mining, and forestry.

7.0 Vision

The *Open Standards for the Practice of Conservation* defines a project **vision** as an aspirational statement of what a project is ultimately aspiring to achieve (*ibid.*). A vision has been stated for both The Strategy Document and The Project.

Our vision for The Strategy Document is two-fold. First, as a result of the publication of this conservation strategy, we aspire to see a coordinated approach to species conservation in The Land Between by conservation groups, landowners, municipalities and other stakeholders, across all sectors and government levels and jurisdictions. We further aspire to see future conservation efforts by conservation groups and other stakeholders utilize approaches that are rooted in behaviour change science, where actions and programs work to affect change in the behaviours of individuals, so that, ultimately, new social norms and conservation can be realized on a greater scale.

For The Project, our vision is a healthy, sustainable, intact and connected natural landscape across the region that is appropriately valued, respected, managed and stewarded by all its human residents to support the species, at risk or otherwise, that depend on it.

8.0 Conservation Targets

As stated above, conservation targets are specific, tangible elements of biodiversity (ie. species, habitat, or ecological system) at the project's chosen site, that the project is working to conserve, and which represent and encompass the ultimate aims of the project. They form the basis for setting goals, selecting actions, and measuring effectiveness (*ibid.)*.

8.1 The Project Conservation Targets

Habitat types, suites of species and individual species, as well as, broadly, The Land Between Bioregion overall, have been included as conservation targets and sub-targets under The Project. A complete list of the conservation targets and sub-targets of The Project can be found in Appendix 5.

For organizational purposes, the conservation targets and sub-targets of The Strategy Document have been broken down into five broad categories: The Land Between Bioregion, upland habitats and species, stand alone suites/individual upland species, aquatic habitats and species, and stand alone suites/individual aquatic species.

The Land Between Bioregion category is set up differently to the other four categories. Here, the only conservation target identified in this section is The Land Between bioregion overall. The goals, objectives, strategies and activities listed under this target are broad and sweeping, and will impact many other conservation targets identified in this strategy. Further, many of the goals, objectives, strategies and activities listed under this target will be repeated under other conservation targets. The Land Between bioregion category differs further in that rather than being further broken down by habitat type, suite of species or individual species, the goals and objectives for The Land Between bioregion conservation target are organized according to threat. The threats listed in this category are those that have been identified by The Charity as the most pressing to the integrity of the region as a whole, as well as the species that live in and depend on it.

Within each of the remaining four categories (upland habitats and species, stand alone suites/individual upland species, aquatic habitats and species, and stand alone suites/individual aquatic species), habitat types (i.e. forests, wetlands, etc.) are identified as targets, and individual or suites of species occurring in those habitat types are included as sub-targets. Individual, or suites of species, that could not be simply placed into one broad habitat type are included in the stand alone upland or aquatic categories.

Species were grouped into suites either based on habitat requirements (i.e. grassland birds) or, more broadly, based on genre of species (i.e. turtles). In both instances however, suites of species are grouped according to threats (i.e. many of the threats facing grassland birds are similar, just as the primary threats to most of Ontario's turtles are similar). This was done primarily in an effort to add flow and organization to the document and avoid duplication of goals, objectives, strategies and activities. Some species however are not grouped into a suite and instead are listed on their own. This was done for one of three reasons:

1. The species is a species of responsibility for The Project (meaning the majority or all of the population occurs in The Land Between bioregion, and therefore the charity is putting higher priority to its conservation;
2. The species faces a unique set of threats and therefore requires unique goals, objectives, strategies and activities;
3. The species has been identified as a priority for The Charity.

Please note, because conservation targets were first separated into either the upland or aquatic category, some suites of species contain individuals that do not align with the broad category in which they were placed. For example, the Eastern Ribbon Snake and Northern Watersnake are included in the “All Other Snakes in The Land Between Bioregion" sub-target. All other snakes were grouped into this one sub-target in an effort to avoid duplication and repetition, as our the strategies and activities for all other snakes in The Land Between, aside from the Eastern Foxsnake, the Eastern Hognose Snake and the Massasauga Rattlesnake, are the same and are not tailored specifically to the more aquatic snakes occurring in the region.

You will also notice that some species or suites of species have a more comprehensive strategy than others. This is for one of two reasons:

1. The core or primary actions required for effective recovery of the species are beyond the scope of The Charity. In this case, goals, objectives, strategies and activities that are within the scope of The Charity have been included, but they are minimal so that the efforts of The Charity may be directed to areas where our efforts will have more of an impact;
2. The range of the species is almost entirely outside of The Land Between Bioregion.

Further, you will also notice that the list of federally and provincially listed at-risk species is not exhaustive. The listed species included in this recovery strategy are those that were included in the Charity’s application to the Community Nominated Priority Places funding program in 2018; any listed species not included in this document were also not included in the funding proposal.

A complete list of the conservation targets identified for The Project can be found in Appendix 5.

8.1.1 The Project Human Well-being Targets

Human well-being targets are elements of human well-being that are directly impacted by the state of a given conservation target such as mental, physical or economic health (CMP 2020). As humans are a part of the natural world too, this conservation strategy will also include efforts to conserve and enhance the important elements of human well-being that are directly related or impacted to the state of the natural world. A complete list of the human-well being targets identified for The Project can be found in Appendix 6.

8.2 The Strategy Document Conservation Targets

As explained in Section 1.0, a separate set of conservation targets and corresponding goals, objectives, strategies and activities have been identified for The Strategy Document itself. A complete list of these targets can be found in Appendix 7.

9.0 Goals and Objectives

The *Open Standards for the Practice of Conservation* defines a goal as a statement of the desired state of a given conservation target at a specified time (CMP 2020). The document further defines objectives as the steps that are required to be taken in order to meet a goal (*ibid.*). That is, objectives are set “under” goals.

Goals and objectives are a way of not only holding an organization accountable to the work it aspires to accomplish, but it also provides a tool for the organization to track its progress towards the ultimate goal of conservation and sustainable management of the landscape it represents. Goals and objectives were set for each conservation target named in The Strategy document.

As is required for any effective planning, the goals and objectives in this strategy are S.M.A.R.T. This means that the goals and objectives are:

- **S**pecific, to the given conservation target for which they have been made
- **M**easurable, meaning that each goal and objective has a metric associated with it (i.e. percent forest cover, number of individuals, etc.)
- **A**chievable, to a reasonable extent, meaning that the goals and objectives that have been set in this strategy are reasonable and not far fetched.
- **R**esults-oriented, targeting some aspect of the conservation target or its threats.
- **T**ime-limited, meaning the statement is time-bound and has an estimated and reasonable end-date associated with it.

On the note of time, the *Open Standards for the Practice of Conservation* provide the approximate timelines of 1-10 years for the completion of an objective, and 10-20 years for the completion of a goal (*ibid.*). With this in mind an approximate formula was followed for setting timelines for the goals and objectives made in this strategy.

- Goals or objectives involving a mapping component have been given a 2 year timeline. This is because much of the data to do the required mapping is already readily available or possessed by The Charity, and because much of the required mapping has already been started.
- Goals or objectives specifying capacity building, adoption of a practice or transferring of a skill to a given target audience were given a 10 year timeline, to allow adequate time to develop the required resources (where required), advertise the offerings, determine the baseline level of adoption/skill/capacity and provide the required training/education.
- Goals or objectives specifying instilling or increasing knowledge, awareness, value or appreciation of a given target or sub-target, were afforded a 5 year timeline, as these pieces are in theory easier to achieve than capacity and skill building.
- Goals or objectives with the focus of stopping and/or reversing declines of species or habitat loss were given a 10 year timeline. This is because, while it may seem aspirational, no more time can be afforded to meet these goals and objectives. Species

loss has already been too great, thus aggressive timelines are required for effective conservation.
- Lastly, goals or objectives specifying determining the baseline level of a given target or aspect of a target were given a 4 year timeline, so that the effectiveness of the efforts of this Strategy can be properly assessed.

This Strategy was created in early 2020; an extra 5 years has been added to the timeline of The Strategy to compensate for time lost and reduced capacity due to the effects of the COVID pandemic.

10.0 Strategies and Activities

The *Open Standards for the Practice of Conservation* define **strategies** as a group of activities with a common focus that together will work towards the completion of a goal and/or objective (CMP 2020). Strategies target specific intervention points, or items that need to be addressed in order to achieve the desired change in status of human behavior (*ibid.*). In behaviour change science, strategies are also known as interventions, and are also referred to as such by the CMP (2020).

Some of the recurring strategies that are used across many targets and sub targets are the following:

- Research and Monitoring
- Mapping and Modeling
- Outreach, Communication and Education
- Skills Development and Capacity Building
- Citizen (Community) Science
- Habitat Restoration
- Services (provided by the charity to landowners, municipalities, the general public, etc.)

Activities are the specific actions that will be taken to achieve a given goal or objective (*ibid.*). Many of the activities listed throughout The Strategy Document are things that The Charity has already, or will shortly, start, and many of the activities have yet to be started. It is the latter where the elements of collaboration and teamwork in the execution of the strategy will become extremely important, as many of the planned endeavors will only be possible and successful through the help of partners and other stakeholders.

Please note, we will be incorporating pre and post-intervention (strategy) surveys for each of the goals and objectives outlined in this strategy. That is, we will collect baseline (pre-intervention) data wherever possible, so that the effects of our interventions and actions can be tracked and measured. Further, as many of the objectives, strategies and actions involve increasing the knowledge, appreciation, value, etc. around a certain target, sub-target, or aspect thereof, we will be designing and utilizing surveys wherever possible to assess levels of these aspects pre and post-intervention. As pre and post-monitoring will be at the core of most strategies and activities in this conservation strategy, we will not be repeating them as a strategy/activity under each target. However, the surveys will be used widely and often, to address and measure progress towards all relevant goals and objectives.

11.0 The Project: Goals, Objectives, Strategies and Activities by Conservation Target

11.1 Target Category: The Land Between Bioregion

As previously explained, The Land Between is an ecotone positioned between the Canadian Shield and St. Lawrence Lowlands, and stretching across the province from Georgian Bay Coast to the Ottawa Valley. The region is therefore a meeting ground for species from the south and north whose ranges terminate or begin in The Land Between, such as the moose and deer, river otter and woodchuck, cardinal and osprey, jack pine and white oak.

There are several threats to this region. Those which have been identified as both most pressing, and those which can be effectively addressed by The Charity, are included as targets in this category of The Strategy. These threats include:

- Invasive Plants (aquatic and terrestrial)
- Residential Development (primarily residential shoreland development)
- Road Use, Management and Maintenance
- Land Use Planning
- Primary Resource Extraction
- Lack of Understanding (of the value and fundamental importance of nature)

An explanation of each of these threats, as well as the goals, objectives, strategies and activities that have been set to address each threat, can be found below.

The following goals, objectives, strategies and activities have been set under the broad umbrella target of The Land Between bioregion. As such, the goals themselves are quite broad, and the strategies and activities will not only support the conservation of the region as a whole, but also the conservation of the individual habitats and species that live in it. **All subsequent goals, objectives, strategies and activities outlined in this document (i.e. those set to under subsequent, more specific targets) will serve to support the high level goals set out in this section.**

<u>Target: Invasive Plants</u>

Invasive species are one of the leading causes of biodiversity loss globally. Invasive plants have been identified as a primary threat to The Project so that their spread, and therefore impact, can be limited in The Land Between region as much as possible.

Given both the size of The Land Between bioregion, and the number of invasive plant species that are already or have the potential to become established in the region, one of the goals of the Strategy Document is to develop a regional invasive plant management plan. That management plan will complement the goals, objectives, strategies and activities identified in this section of The Strategy Document, and expand on the ideas presented here.

Some of the most pervasive upland invasive plant species in The Land Between are the following:

- Invasive Phragmites (*Phragmites australis australis*)
- Japanese Knotweed (*Reynoutria japonica*)
- Wild Parsnip (*Pastinaca sativa*)
- Common Periwinkle (*Vinca minor*) (and other invasive groundcovers)
- Garlic Mustard (*Alliaria petiolata*)
- Dog-strangling Vine (*Vincetoxicum rossicum*)
- Common Buckthorn (*Rhamnus cathartica*)

Some of the most pervasive aquatic invasive plant species in The Land Between are as follows:

- Invasive Phragmites or European Common Reed (*Phragmites australis subsp. australis*)
- Reed Canary Grass (*Phalaris arundinacea subsp. arundinacea*)
- Rough Mannagrass (*Glyceria maxima*)
- Japanese Knotweed (*Reynoutria japonica*)
- Yellow Iris (*Iris pseudacorus*)
- Purple Loosestrife (Lythrum salicaria)
- Starry Stonewort (Nitellopsis obtusa)
- Water soldier (*Stratiotes aloides*)
- Carolina Fanwort (*Cabomba caroliniana*)
- European Frog-bit (*Hydrocharis morsus-ranae*)
- Eurasian Water-Milfoil (*Myriophyllum spicatum*)
- Flowering Rush (*Butomus umbellatus*)

Invasive plant species are identified as a threat to many of the SARs addressed in this strategy. The goals, objectives, strategies and activities outlined in this section will serve to address the threats posed to these species by invasive upland plants, to the best of the charity's ability.

Goal:

- Stop the spread of invasive plants in The Land Between by 2031.

Objectives:

- Determine the approximate baseline distribution and locations of the most aggressive and worrying invasive plant species in The Land Between by 2028.
- Prevent the introduction of any invasives that are not currently in the region.
- Continue to assist in and contribute to efforts to reduce or eliminate invasive plant populations in The Land Between.
- By 2031, an invasive plant species management plan is developed for The Land Between bioregion and/or for each of the nine municipalities in the region.
- Increase the knowledge and awareness of the general public, municipalities and private landowners of the threats posed by invasive plant species by 2026.

- Increase the capacity of the general public, municipalities and private landowners to prevent or limit their spread of invasive plant species by 2031.
- Increase the capacity of private landowners and municipalities to properly remove and properly dispose of invasive species on private and public land by 2031.
- Increase the number of invasive species observation reports made to EDDMapS Ontario and iNaturalist in The Land Between by 15% by 2026.
- Eliminate the sale of invasive plant species at nurseries and greenhouses in The Land Between by 2031.
- Increase the awareness and knowledge of recreational boater/aquatic activity participants of the presence of aquatic invasive species in lakes and rivers, and the impacts that these species can have on the waterbody by 2026.
- Increase the capacity of recreational boater/aquatic activity participants to do their part to limit the spread of invasive aquatic plants by 2031.

Strategy: Research and Monitoring

Activities:

- Gather available population data on invasive plant species distribution in The Land Between from sources such as EDDMapS Ontario and iNaturalist.
- Connect with and support researchers and other conservation groups monitoring invasive plant distribution in and around the region
- Determine the approximate number of greenhouses/nurseries selling invasive plant species in The Land Between. Target these establishments for educational information dissemination.

Strategy: Mapping and Modeling

Activities:

- Generate distribution maps with available data
- Monitor trends in distribution over time

Strategy: Outreach, Communication and Education

Activities:

- Educate private landowners, municipalities and the general public on the threats posed by invasive species, and the costs (economic and otherwise) associated with both their presence and removal through website content, blogs, social media posts and information sheets.

Strategy: Skills Development and Capacity Building

Activities:

- Train municipal road crews and other professionals working along roads or other right of ways (utility) on how to minimize the spread of invasive plant species through targeted workshops/presentations.

- Educate municipalities, private landowners and the general public on the proper disposal methods of invasive species through training workshops/presentations, the Habitat Health Check program, information sheets, social media posts and website content.
- Increase the capacity of landowners, municipalities and the general public to identify invasive plant species by developing an easy to use guide to invasive plants in The Land Between.
- Increase the awareness of municipalities, private landowners and the general public of the sale of invasive species at local nurseries, and increase their capacity to avoid purchasing and planting them through the "What not to plant list" and the Design-your-own Shoreline Garden Workshops Guidebook.
- Increase the capacity of recreational boaters and other motorized aquatic craft users to limit their spread of invasive aquatic plants through website content, blog and social media posts, as well as through the installation of informational signage in shallow areas/areas with invasive aquatic plant infestations.

Strategy: Citizen Science

Activities:

- Continue to recruit, train and deploy 'Phrag Fighters' across The Land Between to map and remove (where feasible) stands of invasive Phragmites.
- Develop and or promote training materials on how to identify some of the most common invasive species in The Land Between.
- Create an invasive plant species monitoring and mapping citizen science program. In this program, volunteers will drive set roadways and report the location, species and size of an invasive plant species infestation, year over year.
- Develop a volunteer removal program for invasive species other than invasive Phragmites.
- Promote and solicit reports of invasive species to EDDMapS Ontario and iNaturalist by the general public through social media posts, website content, citizen science training webinars, etc.

Strategy: Services

Activities:

- Conduct a literature review of all of invasive species removal methods and standards
- Create a 'steering committee' of municipal officials, experts, conservation organizations and other relevant stakeholders to contribute to the Invasive Species Management plan for each municipality.
- Work with stakeholders from each municipality in The Land Between to develop a Management Plan that fits the needs of the municipality.
- Develop management plans that incorporate all aspects required for invasive species management including spread minimization, removal and citizen science.
- Work with each of the municipalities to establish an invasive plant species disposal area that meets the proper requirements for containment.

Target: Residential (Shoreland) Development

Habitat loss and fragmentation as a result of development and human footprint expansion is listed as a threat to almost every Species at Risk addressed in this conservation strategy. In The Land Between, one of the leading factors contributing to habitat loss and fragmentation is residential development. What's more, this development is increasingly expanding in sensitive waterfront areas, as a result of increased demand for waterfront cottages/residences. In 2020 for example, the number of vacant waterfront lot sales in Haliburton County increased by 52% compared to 2019 (Hodgson, 2020). Further, a 23% increase in vacant upland lots was observed compared to 2019 (*ibid.*). This indicates an increase in the number of individuals coming to the area with the intention of building a customized property (*ibid.*). This sharp rise in vacant lot sales poses a significant threat to the degree of habitat health and connectivity in the area.

The goal identified under this threat is much more broad and aggressive than other goals made in this strategy. As a result, the deadline by which this goal will be completed has been set for 2041, 20 years from now. The objectives, strategies and activities listed under this goal are a compilation of objectives and strategies set for various targets (species, habitats, etc.), throughout the strategy, as well as new strategies and activities, reflecting the multi-faceted nature of this threat and the goal that has been set under it.

Goal:

- By 2041, 70% natural cover of each individual property lot in The Land Between is achieved and maintained.

Objectives:

- Where feasible, by 2027, determine the approximate baseline levels of natural cover and habitat connectivity The Land Between bioregion. Where this information is already known, integrate it into conservation planning efforts.
- By 2041, all new development in The Land Between is conducted in a way that honours and values the landscape and ecosystem in which it is being built, and that minimizes impacts to the surrounding environment and the species that live in it.
- By 2027, increase landowner valuation, understanding and appreciation of the nature in their backyards.
- By 2027, reduce the degree of plant blindness by private landowners and the general public.
- By 2031, increase the amount of ecosystem and species-based stewardship being conducted on privately owned and municipal lands.
- By 2026, increase the awareness and understanding of private landowners, municipalities and the general public of all the factors and actions that contribute to an individual's ecological footprint.
- By 2031, nature and natural features are valued to a greater or equal degree as the manicured and "clean" outdoor aesthetic currently favored by many landowners.

- Increase appropriate enforcement of existing municipal shoreland development controls 2031.
- By 2031, increased cooperation and partnership by municipal councils and departments (roads, parks, etc.) with conservation groups and other stakeholder groups on matters of development is achieved.
- By 2028, increase the understanding, knowledge and capacity of key stakeholder groups in the development sector (developers, municipalities, landscapers, real estate agents, etc.) of the importance of, and need to maintain native vegetation, natural landscape features and habitat connectivity.
- By 2041, a change in the collective mindset that favours growth and sprawl is achieved in favour of a sustainable and responsible growth and development
- By 2028, all development in The Land Between is conducted, where feasible, with locally sourced, environmentally sustainable building design and materials

Strategy: Mapping and Modeling

Activities:

- Gather required and available data (where gaps exist) and expert knowledge related to human footprint, percent natural cover and habitat connectivity in The Land Between bioregion.
- Generate maps to depict baseline levels of habitat connectivity and percent natural cover
- Monitor trends in habitat availability, connectivity and natural cover over time

Strategy: Outreach, Communication and Education

Activities:

- Publicise and promote the resources created and offered by The Land Between, as well as those created by partner/other organizations through website content, and blog and social media posts.
- Educate private landowners on the Ontario Managed Forest Tax Incentive Program (MFTIP) and other land stewardship incentive programs through the Habitat Health Check program, website content, blog posts and social media posts.
- Develop a month-long, annual communication and activity campaign to combat ‘plant blindness’. Communications and activities will focus on the fundamental role plants play in terrestrial and aquatic environments, their biological complexity, their beauty and some of the more ‘impressive’ or ‘awe inspiring’ plants that occur in The Land Between.
- Increase the understanding of private landowners, the general public and municipalities of what an ecological footprint is, and what factors (beyond Greenhouse Gas emissions and house size) contribute to it through the Habitat Health Check program, website content, blog posts and social media posts.
- Ensure the presence and habitat needs of all SAR are taken into account and addressed in any future development actions by working collaboratively with municipal planners and all others involved in municipal planning activities

- Continue to cultivate cooperative relationships with municipal officials to maintain an open dialogue and teamwork around threat mitigation to habitats and SARs.

Strategy: Skills Development and Capacity Building

Activities:

- Increase the understanding of private landowners of the value and importance of sustainable land stewardship, and increase their capacity to properly maintain and steward their properties through the Habitat Health Check program, and the Design-your-own Shoreline Garden workshops, site visits and Guidebook.
- Increase landowner valuation, understanding and appreciation of the nature in their own backyards through backyard-based engagement and stewardship programs such as Birding 101 and Bird ID workshops, Backyard Snake Supervisors, Habitat Health Checks and Design-your-own Shoreline Garden programs.
- Promote the integration of conservation blueprint models in official municipal plans and provincial guidelines to municipal officials as well as the general public
- Publicise and make readily accessible information regarding factors that contribute to an individual's ecological footprint through information sheets and website content/databases.
- Promote and publicize suppliers of local and/or sustainably sourced building materials and services through website content, information sheets, blog and social media posts.

Strategy: Services

Activities:

- Target large and primarily intact privately owned lands for participation in the Habitat Health Check program. Offer this program free to landowners of these properties, so as to encourage participation, and achieve the greatest impact on the more valuable privately owned lands.
- Create a 'Welcome Wagon' program to be delivered to landowners when they purchase a waterfront property, property with a wetland on it, or a large (100 acres or more) property with a high degree of habitat connectivity and/or natural cover. The Welcome Wagon will include information on the habitat type(s) present on the property as well as general habitat stewardship, and resources about The Land Between and other local conservation organizations where they can obtain more relevant information and/or support.
- With the help of partners, registered professionals, and information experts, develop a curricula and associated certification program for professionals whose work directly, or has the potential to, impacts/informs shoreland health and management including landscapers, real estate agents, municipal officials, and other relevant stakeholder groups. The certification program will cover the science, function and importance of natural shorelands, as well as industry specific information tailored to each professional group (i.e. native plant alternatives for landscapers, etc.).

- Deliver and continue to develop outreach, education and training material for municipal officials related to sustainable development including invasive species spread mitigation, reptile road mortality mitigation structures, etc.
- Evaluate the potential for private-public partnerships to mitigate threats to species and spaces at risk posed by development. If deemed feasible, develop associated partnerships and programs.
- Create a directory of bylaws (regarding shoreline, lake and river issues) by topic, along with who and where to contact (municipal office, municipal official, conservation authority, etc.) for further information/guidance on the issue/bylaw.
- In partnership with Watersheds Canada and other steering committee members and partner organizations, create a Best-Management Practices resource and online forum related to lakeshore and land-use planning and development to inform and unify rural municipalities in their efforts to conserve critical socio-economic and ecological resources.
- Work with municipal planners and other officials to come up with viable alternatives to development in known species or habitat at risk areas through data sharing agreements, education and other services.

<u>Target: Road Use, Management and Maintenance</u>

Southern Ontario has the highest concentration of roads, and this infrastructure is expanding as people gravitate ever more northward. We are therefore seeing increased roads and habitat fragmentation, as well as increasing road traffic.

Habitat fragmentation can increase the numbers of large species on roads such as deer (because they are unable to travel freely between regions without crossing the road), as well as smaller species such as turtles (who need to travel memorized routes between annual nesting, hibernation or feeding grounds within a dedicated territory). To reach parts of their native habitat, these species must now cross roads.

In Ontario alone there are ~14,000-15,000 wildlife collisions reported per year, almost all of which involve large mammals - like deer. Collisions with large mammals have significant impacts on our biodiversity affecting wildlife populations, as well as economic impacts costing the province and insurance companies tens of millions of dollars a year and of course, collisions also result in preventable injuries and deaths to humans. However, the numbers of *actual* wildlife road strikes are grossly underestimated, because people do not tend to report collisions with the numerous smaller animals. Turtles, raccoons, porcupines, amphibians, birds and other small mammals are also hit! All incidents have similar implications for wildlife populations, and for human health and safety.

Habitats, especially wetlands and aquatic habitats, are also negatively affected by pollution runoff from roads. The Project contains numerous watersheds – areas containing a multitude of small streams, rivers, wetlands, and lakes, that all drain into a larger receiving water body (typically a larger lake). Because of this interconnectedness between land and water, what we

do on the land can have drastic effects on the health and integrity of our water. Road management and maintenance can effectively reduce the entry of pollutants – like erosion sediment, heavy metals, oils, other toxic substances and debris from construction; pesticides and fertilizers used along roadway rights-of-way; road dirt and salt, rubber and metal deposits from tire wear, antifreeze and engine oil residue; discarded cups, plastic bags, cigarette butts, pet waste, and other litter – from surface waters and groundwaters, and protect water quality, aquatic habitats, and public health (EPA, 2022).

Goals:

- By 2031, reduce the threat of road mortality to all species in The Land Between by 25%.
- By 2031, all road construction and maintenance in The Land Between is performed in a way that minimizes impacts to SAR species and their habitats, and with input from biologists or other relevant experts.

Objectives:

- Identify areas of high road mortality across The Land Between by 2031.
- Increase awareness of municipal road crews and the general public of the presence of SAR and declining wildlife, particular reptiles, on roads by 2028.
- Increase the capacity of municipal road crews, development crews, and other industry stakeholders to minimize the impact of their work on SAR, declining species, and their habitats by 2033.
- Increase capacity of the general public to mitigate and/or avoid road mortality of SAR and declining wildlife by 2031.
- By 2031, a 25% increase in road permeability for wildlife in The Land Between is achieved.
- By 2035, 70% road permeability for all herptiles in the region is achieved.
- By 2031, increase cooperation and partnership by municipal councils and departments (roads, parks, etc.) with conservation groups, the OPP and other stakeholders in road maintenance and safety.
- By 2031, increase the capacity of municipalities to limit the spread of invasive plant species through their work (or the work of their contractors) on the sides of the road.

Strategy: Research and Monitoring

Activities:

- Gather available data related to road mortality of all species in The Land Between.
- Connect with and support researchers and other conservation groups monitoring animal road morality in and around the region
- Use best available data and knowledge to estimate baseline road mortality levels by species.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge
- Generate hotspot mortality maps for SARs and non-SARs occurring in The Land Between.
- Monitor trends in road mortality over time

Strategy: Outreach, Communication and Education

Activities:

- Increase the awareness of municipal officials and the general public of the presence of SAR and non-SAR species on roads through targeted outreach, strategic road sign placement, information sheets, website content, social media and blog posts.

Target: Land Use Planning

At its base, land use planning is about development. While it doesn't cover tangential topics such as environmental assessment, waste management or source water protection, land use planning nevertheless has a crucial role in shaping both communities and the natural landscape (ECO, 2011).

Land use is frequently planned around the protection of environmental conditions (ie. flood control), but land use planning is also meant to protect humans. Land use planning offers a way to order the landscape, to order the world in which we live, and to keep noxious spaces away from humans: it is about regulating the relationships between humans and nature (Damian, 2020).

Biodiversity conservation can be a positive outcome of land use planning, because land use planning can entail creating safe zones for certain processes through which natural relations and socio-natural relations are preserved (*ibid.*).

Goal:

- By 2041, all future land use planning in The Land Between is conducted in a way that honours and values the landscape and its ecosystems, and that minimizes impacts to the surrounding environment and the species that live in it.

Objectives:

- By 2031, increase the integration of data and expert information into municipal planning processes and controls.
- By 2028, a measurable and continued increase in cooperation, dialogue and positive exchange between municipalities and other stakeholder groups is achieved.
- By 2028, increase the awareness of and degree to which the Duty to Consult is honoured by municipalities in The Land Between.

- By 2031, increase cooperation and partnership by municipal councils and departments (roads, parks, etc.) with conservation groups and others
- By 2031, increase the adoption of an integrated watershed management approach to planning and review by municipalities.
- By 2041, the province of Ontario issues provincial planning guidance to municipalities to protect the natural capital of The Land Between bioregion.
- By 2031, a change in the collective mindset that favours growth and sprawl is achieved in favour of a sustainable and responsible growth and development.
- By 2031, municipalities in The Land Between Bioregion recognize that the identity, cultural practices and economic longevity of the region is directly dependent on biodiversity and the other natural capital of the region.

Strategy: Research and Monitoring

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Gather available data relevant to sustainable land use planning.
- Generate maps to depict baseline levels of habitat connectivity, percent natural cover and land use.
- Monitor trends in habitat availability, connectivity, natural cover and land use over time.

Strategy: Skills Development and Capacity Building

Activities:

- Ensure the presence and habitat needs of all SAR are taken into account and addressed in any future development actions by working collaboratively with municipal planners and all others involved in municipal planning activities.
- Continue to cultivate cooperative relationships with municipal officials so an open dialogue and teamwork around threat mitigation to at-risk habitats and species can be maintained.
- Promote the integration of conservation blueprint models in official municipal plans and provincial guidelines to municipal officials, as well as the general public.
- Publicize and promote the Duty to Consult across all levels of government in The Land Between on all channels and platforms including through website content, social media posts and information sheets.
- Publicize and promote the need for and benefit of an Integrated Watershed Management Approach to planning and review by municipalities through website content and information sheets.
- Advocate for the administration of provincial planning guidance to municipalities to protect the natural capital of The Land Between through website content, social media posts.

Strategy: Services

Activities:

- Evaluate the potential for private-public partnerships to mitigate threats to species and spaces at risk posed by development. If deemed feasible, develop associated partnerships and programs.
- Create a directory of bylaws regarding shoreline, lake and river issues by topic, along with who and where to contact (municipal office, municipal official, conservation authority, etc.) for further information/guidance on the issue/bylaw.
- In partnership with Watersheds Canada and other steering committee members and partner organizations, create a Best-Management Practices resource and online forum related to lakeshore and land-use planning to inform and unify rural Municipalities in their efforts to conserve critical socio-economic and ecological resources.
- Work with municipal planners and other officials to come up with viable alternatives to development in known species or habitat at risk areas through data sharing agreements, education and other services.
- Work with municipal planners and industry officials to provide the necessary data (where feasible), information and knowledge to allow for sustainable land use planning.
- Work with municipal planners, providing support from and access to relevant experts and tools, so municipalities may more readily and smoothly adopt an integrated watershed management approach to planning and review.

<u>Target: Primary Resource Extraction</u>

Over-harvesting – the extraction of a resource from the natural environment at an unsustainable rate – is one of the predominant and severe causes of global species extinction. Any resource can be over-harvested, including plants, terrestrial animals, fish and marine invertebrates, as well as renewable natural elements, such as entire habitats like forests.

There is a great and real threat of over-harvesting Forests within The Project area; because forests provide considerable ecosystem services – like air and water filtration, climate stabilization, carbon capture / storage and oxygen production, and habitat for a rich diversity of animal, plant, and tree species – protecting this resource is regionally important.

Goals:

- Retain 90% of remaining forested habitat in The Land Between Bioregion in perpetuity.
- Maintain a representative mix of forest age classes across the region in perpetuity.

Objectives:

- By 2027, determine the amount of remaining forested habitat in The Land Between bioregion, and approximate the rate of decline. Where this information is already known, integrate it into conservation planning efforts.

- By 2029, complete an inventory of the forest types, sizes, ages classes and critical features in the Land Between Bioregion. Where this information is already known, integrate it into conservation planning efforts.
- By 2035, completely eliminate the application of glyphosate spray in The Land Between Bioregion.
- Increase public awareness of the dangers and effects of glyphosate spray on the natural environment, human health, and the economy by 2026.
- Continue to support research into the effects of glyphosate on human and environmental health.
- By 2026, conduct a survey of forestry operators and forest managers in The Land Between to determine the extent to which sensitive and appropriate forest management forests are being applied.
- Increase in the adoption of the sensitive and appropriate management of forests for biodiversity as well as economic value in the region, by both the forestry industry and private landowners, by 2031.
- Increase public and stakeholder respect and valuation of the ecological, economic and cultural value of living forest systems as a whole, as well as individual living trees, not just harvested trees, by 2026.
- Increase public and sector-specific respect, awareness and knowledge of mother/hub trees and mycorrhizal networks and their role in forest function by 2026.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge related to forest cover and deforestation, critical forest features and forest age classes in The Land Between
- Generate maps related to the above
- Monitor trends in forest habitat availability over time.

Strategy: Research and Monitoring

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge
- Connect with and support researchers and other conservation groups monitoring and inventorying forests and forest features, indicator species in and around the region
- Use best available data and knowledge to estimate baseline inventory and population levels

Strategy: Skills Development and Capacity Building

Activities:

- Continue to cultivate cooperative relationships with forestry professionals, private landowners, municipal officials and other relevant stakeholders in forest health and

management so that all stakeholders can work collaboratively towards sustainable forest management.

Target: Lack of understanding of the value and fundamental importance of nature

Renowned naturalist, writer, and biologist, E.O. Wilson theorized that humans have an innate connection to the environment, an evolutionary trait coined by Kellert & Wilson (1993) as *biophilia.* They argue that an intimate understanding of natural processes and ecosystem interactions were advantageous to humans through time to find necessities like food, water, and shelter. Thus, humans with a stronger connection to nature "would have a significant evolutionary advantage over those who were not connected" (Capaldi et al., 2014).

Due to factors including capitalism, the emergence of technology, and legal liability, children are spending less time interacting with their natural environments, leading to adults that do not have a strong connection with nature (Louv, 2005). Although we live in a world that is increasingly scientifically literate and aware of the global community, a lack of nature connection to one's local places can be detrimental to the future of humanity: humans need nature and nature needs humans. Capaldi et al. (2014) exclaim that "… a sustainable future and a happy future are compatible and symbiotic, not mutually exclusive." (p. 12). A strong connection to nature has positive effects on the mental and physical wellbeing of humans including the reduced risk of type 2 diabetes (Astell-Burt et al., 2014), obesity (Ghimire et al., 2017), hospitalization from asthma (Alcock et al., 2017), and cardiovascular disease (Seo et al., 2017), as well as benefits to mental and emotional health (Capaldi et al., 2014).

It is impossible to ignore the current climate crisis; grief, worry, and guilt are emotions that we face when thinking about the current and future state of our planet. The recent report published by the UN's Intergovernmental Panel on Climate Change (2021) writes that "human activities are indisputably causing climate change", however, just as human behaviour can be to blame for the current crisis, it can also be the solution. Connection to nature leads to an intimate relationship with one's place; a relationship of caring and keen observation. A body of research has demonstrated that human connection to nature leads to strong engagement in pro-environmental behaviours including "conservation of energy and water, anticonsumerism, pro-environmental political activism, and financial support of environmental organizations" thus indicating that the future of our sustainable environment is in the hands of humans (Whitburn et al., 2019).

Goals:

- By 2031, the value and fundamental importance of nature is acknowledged and realized by all major stakeholder groups in The Land Between.

Objectives:

- By 2031, increase understanding the value of ecosystem services to human and economic health by all levels of government.
- By 2026, increase the understanding of the general public of the civic process, the responsibilities and opportunities the process presents, and the role of the process and every community member in protecting nature.
- By 2026, youth in The Land Between increase their search for knowledge related to threats to nature in their own communities and the world as a whole.
- Continued and sustained youth leadership of their families and peers in conservation and stewardship initiatives in the region in perpetuity.

Strategy: Outreach, Communication and Education

Activities:

- Educate the municipal, provincial and federal governments on exactly what ecosystem services are through presentations, webinars, social media posts, website content, blog posts and information sheets.
- Educate municipal, provincial and federal governments of the economic value of ecosystem services through easy to interpret pictographs, information sheets, website content and social media posts.
- Educate the public of the civic process, the responsibilities and opportunities the process presents, and the role of the process and every community member in protecting nature through presentations, webinars, social media posts, website content, blog posts and information sheets.

Strategy: Citizen Science

Activities:

- Continue to advertise, promote and encourage youth participation in each of the citizen science programs offered by The Land Between, as well as those offered by partners and other conservation groups in The Land Between and elsewhere in Ontario and Canada.
- Continue to create and promote interactive education programs and events designed to support youth education and engagement.
- Continue to monitor year-over-year participation in The Charity's citizen science and other volunteer programs.

Strategy: Services

Activities:

- Increase the capacity of municipalities to steward, care for and maintain ecosystem services and their vectors through specialized training for road maintenance crews regarding invasive species management and removal and pollinator habitat protection,

as well as through the creation of resources and training programs regarding shoreline ecology and science.

11.2 Target Category: Upland Habitats and Species

The following targets and sub targets are included in this category:

- Target: Open habitats, including grasslands, rock barrens and alvars
    - Sub-target: Grassland Birds
- Target: Forests
    - Sub-targets:
        - Forest Interior Birds
        - Eastern Wolf

<u>Target: Open habitats</u>

Open habitats are those categorized by their lack of tree cover. The Land Between is home to three major kinds of open habitats: grasslands, rock barrens and alvars.

Grasslands are open habitats dominated by grasses, sedges and wildflowers (Solymár, 2005). They are successional habitats, and therefore require regular and repeated disturbance through mechanisms such as fire (wild or controlled) or agricultural operations to be maintained and prevent the establishment of more woody vegetation (*ibid.*). Grassland habitat can be both natural and anthropogenic, and includes agricultural fields, hydro line right-of-ways, prairies, meadows, and savannahs. They provide critical habitat for bird and insect species, conserve soil moisture, help control erosion, store carbon and are a beautiful part of the landscape (*ibid.*).

For the purposes of The Strategy Document, savanna habitat will be distinguished from other grassland habitat. This is because The Land Between is home to the few White Oak Savannas in the province. Savannas are grasslands with approximately 10 to 35% tree cover (*ibid.*).

Threats to grassland habitats, including savannas, include land use change and changing, expanding and intensifying agricultural operations.

Rock barrens are areas of naturally exposed bedrock with or without moss and/or lichen patches, and with scattered trees, grasses and other vegetation (Catling et al, 1999). In Ontario major granite rock barrens can only be found in The Land Between (*ibid.*). Rock barrens are not only striking in their appearance, they also support many Species at Risk including the Massasauga Rattlesnake, which uses the habitat for gestation, and the Five-lined Skink, which uses the table or cover rocks found on top of rock barrens, for cover and basking habitat (Georgian Bay Biosphere Reserve).

Finally, alvars are habitats occurring on a base of limestone or dolostone with either a thin discontinuous layer of soil, or no soil at all (Matheson, 2007). These habitats produce harsh

growing conditions, giving rise to sparse, but unique vegetation communities (*ibid.*). Alvars can be among the most species-rich areas in the world, and support many important and at risk species including birds, insects and plants (NCC). The majority of the alvars occurring in Ontario are found in The Land Between (Matheson, 2007).

Threats to alvars and rock barrens include quarrying, increasing development and human footprint expansion, invasive species, and recreational vehicle use such as ATVs (NCC).

The Land Between bioregion contains relatively few open habitats and the species they support. For this reason, open habitats are not a priority target of this strategy. However, The Charity is committed to the conservation of these spaces and species and will support efforts to conserve these targets within The Project and beyond, wherever possible.

Goals:

- Retain 75% of the existing grasslands in the region in perpetuity, with a representative mix of each grassland type and use maintained.
- Ensure actively-used grasslands including pasture lands, croplands and hydro corridors are sustainably managed and stewarded in perpetuity.
- Retain 75% of existing rock barrens in the region in perpetuity.
- Retain 90% of existing alvars and 100% of savannas in the region in perpetuity

Objectives:

- By 2027, define the location and size of all grassland habitat areas in The Land Between.
- By 2027, confirm the approximate baseline areas of all rock barrens, alvars and savannas in The Land Between bioregion.
- By 2027, identify the owners and neighbors of all the remaining grassland habitat in The Land Between.
- By 2031, increase landowner, municipal and other relevant stakeholder knowledge and capacity to manage grassland habitats in an ecologically-beneficial and sustainable way.
- By 2036, increase the percentage of relevant stakeholder groups adopting and/or continuing to support the ecologically-beneficial management of privately owned grassland habitats
- By 2031, increase private landowner, youth and public appreciation for open habitats.
- By 2031, increase the knowledge and understanding of municipal planners and decision makers, private landowners and the general public of the importance, function and fragility of open habitats.
- Increase public awareness and understanding on the impacts of atv and snowmobile use on fragile open landscapes by 2031.
- By 2036, conservation, environmental and research groups, as well as municipalities and other relevant stakeholders, adopt the continuous and regular inclusion of farm industry professionals in research and pilot projects surrounding the protection and enhancement of grassland bird populations and their habitats.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist)
- Generate grassland, rock barren, alvar and savanna distribution maps across The Land Between, and monitor trends in presence over time

Strategy: Outreach, Communication and Education

Activities:

- Create and/or publicize story lines around rock barrens and alvars to add a sense of mystery and awe to the landscapes, and foster an appreciation for them by the general public and private landowners.
- Work with partners to highlight grassland conservation and restoration efforts, and publicize these efforts.
- Communicate the environmental role and benefits of natural open spaces to all the species that depend on them including birds, insects, reptiles, and so on, as well as the natural heritage value of the landscapes to all stakeholder groups
- Work with partners to showcase examples of sustainable grassland agriculture.
- Offer Habitat Health Check services to properties identified as having significant (based on size) grassland habitat.
- Create or support and publicize existing awards programs recognizing grassland conservation or stewardship efforts by or with the help of private landowners.
- Promote known best practices regarding grassland habitat management
- Create a page dedicated to grassland bird habitat stewardship on The Land Between website
- Hold talking circles for farmers and other grassland habitat owners: survey the farmers/landowners on incentives or other things that would encourage them or make it easier for them to steward their properties in a way that is optimal for the species that depend on them; discuss what strategies they have tried in the past for sustainable grassland management; what has worked, what hasn't, etc.
- Communicate the rarity, distinctiveness and biodiversity of open habitats to the general public through blog posts, social media posts, website content and other creative avenues.
- Communicate the importance, function and fragility of open habitats to municipal planners and other decision makers through targeted outreach and the development and or promotion of relevant informational resources
- Communicate the importance, function and fragility of open habitats to private landowners and the general public through blog posts, social media posts, website content and other creative avenues.
- In collaboration with municipalities, use municipal roll numbers to obtain the contact information of the owners of the remaining grassland habitat in The Land Between.

Strategy: Skills Development and Capacity Building

Activities:

- Create a toolkit similar to the SAR Toolkit, but for at-risk and/or delicate habitat features and types.
- Develop communication materials to distribute to and connect with the landowners of grassland habitats in The Land Between. Materials should include information regarding The Land Between, and the services and education we can offer regarding proper land stewardship. Disseminate the materials to landowners.
- Develop outreach and learning materials to cultivate landowner knowledge and skills for sustainable grassland habitat management.

Strategy: Citizen Science

Activities:

- Design and host grassland bio blitzes, focussing on not just data collection, but also educating the public on the many unique and at-risk species that depend on grassland habitat.

Sub Target: Grassland birds

Grassland birds have had the second steepest population declines of all bird groups in Canada. Their numbers have dropped by about 57% since 1970, equating to approximately 300 million birds (North American Bird Conservation Initiative Canada, 2019).

Species at Risk birds that occur in The Land Between that are included in this category include:

- Bobolink (Federally and provincially Threatened)
- Eastern Meadowlark (Federally and provincially Threatened)
- Henslow's Sparrow (Federally and provincially Endangered)
- Grasshopper Sparrow (Federally and provincially Special Concern)
- Eastern Loggerhead Shrike (Federally and provincially Endangered)

Threats to grassland birds broadly include habitat loss and fragmentation and the expansion and intensification of agricultural activities.

Goal:

By 2031, stop or reverse declines in grassland bird populations in The Land Between.

Objectives:

- By 2027, determine the approximate baseline levels of grassland bird populations in The Land Between bioregion. Where this information is already known, integrate it into conservation planning efforts.

- Where possible and feasible, define the location and amount of available species-specific grassland habitat by 2026.
- By 2027, increase the awareness, knowledge and appreciation of landowners, municipalities and the general public on the existence, importance and fragility of grasslands and grassland birds.
- By 2031, increase the capacity for private landowners, farmers, municipalities and other relevant stakeholders to mitigate harm to grassland birds.

Strategy: Research and Monitoring

Activities:

- Gather available population data for SAR grassland bird species in The Land Between
- Connect with and support researchers and other conservation groups monitoring grassland bird populations in and around the region
- Use best available data and knowledge to estimate baseline population levels of SAR grassland bird species in The Land Between

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge
- Generate maps of locations and sizes of remaining species-specific grassland habitat in The Land Between bioregion
- Monitor trends in habitat availability over time

Strategy: Outreach, Communication and Education

Activities:

- With the direct input of key stakeholders (primarily farmers, but also other landowners and their neighbors (included in recovery strategy)) develop a communication strategy and supporting educational materials/programs on the existence, importance and fragility of grasslands and grassland birds, and ways to mitigate harm that is specifically tailored to private landowners and farmers.
- Hold talking circles for farmers and other grassland habitat owners: survey the farmers on the issues they have had with grassland birds in the past, things that they have found that work for them to mitigate mortality, and solutions/incentives they think would work to help them to mitigate harm
- Anthropomorphize some or all of these grassland birds to make them easier to relate to for people
- Educate private landowners and the general public on how to identify each of these SAR grassland birds, their habitat requirements, and what they can do to help support the species through the dissemination of the SAR Toolkit
- Target landowners with grassland habitat on their property for participation in the Habitat Health Check program.

- Communicate the existence, importance and fragility of grasslands and grassland birds to the general public through blog posts, social media posts, website content and other creative avenues.
- Design, plan and implement grassland birding walks, guiding participants through bird identification and general birding techniques
- Design, plan and implement a grassland bird bingo program to encourage people to look out for, and be excited to see, grassland birds.

Strategy: Skills Development and Capacity Building

Activities:

- Using up to date research and information, as well as input from farmers and rancher talking circles, identify the most economically viable and minimally disruptive options for modified agricultural practices that also minimize impacts to nesting grassland birds. Design or support the design and implementation of an incentive program to encourage the adoption of these practices.
- Provide extension services to farmers including: surveying farmer's fields during breeding season to look for breeding birds; Mark nests.
- Promote known best practices regarding farming techniques and minimizing impact to grassland birds.
- Create a page dedicated to grassland bird habitat stewardship on The Land Between website.

Target: Forests

The importance of forests to global, national and regional ecosystem function cannot be overstated. Forests produce oxygen, sequester and store carbon, naturally cool areas, and provide a home for countless species of mammals, birds, insects, and amphibians. The forests of The Land Between are no exception.

The Land Between is part of the Great Lakes-St. Lawrence Forest Region, one of the four main forest regions in Ontario. This forest region is dominated by hardwood forests with species such as maples, white and yellow birch, and oaks (OMNRF, 2019). Mixedwood forests of white and red pines, white cedar and hemlock mixed with maples, birches, red oaks and basswoods are also common (*ibid.*).

The threats to forests in The Land Between include residential and infrastructure development, unsustainable forestry operations and invasive species and disease.

Goals:

- Retain 90% of remaining forested habitat in The Land Between Bioregion in perpetuity.
- Retain 90% of critical forest features in The Land Between Bioregion (rare species, forest interior habitat, etc.) in perpetuity
- Maintain prey biomass and biodiversity levels at a minimum of 2020 levels in perpetuity.
- Maintain a representative mix of forest age classes across the region in perpetuity.

Objectives:

- By 2027, determine the amount of remaining forested habitat in The Land Between bioregion, and approximate the rate of decline. Where this information is already known, integrate it into conservation planning efforts.
- By 2029, complete an inventory of the forest types, sizes, ages classes and critical features in the Land Between Bioregion. Where this information is already known, integrate it into conservation planning efforts.
- By 2027, identify indicator species for key areas across The Land Between.
- By 2029, determine baseline population levels of each indicator species and their prey.
- By 2035, completely eliminate the application of glyphosate spray in The Land Between Bioregion.
- Increase public awareness of the dangers and effects of glyphosate spray on the natural environment, human health, and the economy by 2026.
- Continue to support research into the effects of glyphosate on human and environmental health.
- By 2026, conduct a survey of forestry operators and forest managers in The Land Between to determine the extent to which sensitive and appropriate forest management forests are being applied.
- Increase in the adoption of the sensitive and appropriate management of forests for biodiversity as well as economic value in the region, by both the forestry industry and private landowners, by 2031.
- Increase public and stakeholder respect and valuation of the ecological, economic and cultural value of living forest systems as a whole, as well as individual living trees, not just harvested trees, by 2026.
- Increase public and sector-specific respect, awareness and knowledge of mother/hub trees and mycorrhizal networks and their role in forest function by 2026.
- Increase awareness and knowledge of private landowners of the many components of a forest (beyond just trees) by 2026.
- Increase landowner awareness of the meaning of “intact forest”, “habitat connectivity” and “forest cover”, how these elements can be achieved, and how individual landowner actions affect these factors by 2026.
- Increase the awareness of landowners of the importance of leaving the forest floor natural and not “clean”, and increase the capacity to do so by 2026.
- Increase the awareness of private landowners and the general public of the link between forest fragmentation and loss to the spread of lyme disease, as well as the role of forests in controlling certain pathogens by 2026.
- Increase the awareness, knowledge and capacity of municipalities and private landowners to have and foster a smaller forest footprint by 2026.
- Increase in enforcement of municipal bylaws related to forest trees by 2031.
- By 2031, increase the amount of privately owned land stewarded by MFTIPs in The Land Between by 25%.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge related to forest cover and deforestation, critical forest features and forest age classes in The Land Between.
- Generate maps related to the above.
- Monitor trends in forest habitat availability over time.

Strategy: Research and Monitoring

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge
- Connect with and support researchers and other conservation groups monitoring and inventorying forests and forest features, indicator species in and around the region
- Use best available data and knowledge to estimate baseline inventory and population levels

Strategy: Outreach, Communication and Education

Activities:

- Bring the message of deforestation home by comparing deforestation in The Land Between, Ontario and Canada to other areas of the world that tend to receive more attention on the issue.
- Demonstrate the clear role of forests in maintaining air quality by comparing the smog or air quality levels in downtown Toronto/other urban places to various locations across The Land Between. Have this comparison posted on The Land Between website.
- Communicate the role of forests in pest management and disease control through all channels, platforms and media.
- Communicate the role of calcium in forests and lakes through all channels, platforms and media. Inform and educate landowners and municipalities in ways that they can add additional calcium to the ecosystem.
- Communicate the importance of leaving the forest floor natural and not “clean and tidy” through the publication of case studies, as well as by communicating and educating landowners and the general public about the many species that live in and on the forest floor, and the role they play in a functioning ecosystem through website content, social media posts, and the Habitat Health Check program.
- Promote and re-energize the anthropomorphization of forests as the lungs of The Land Between, Ontario, and the world.
- Communicate the many roles and functions a tree performs at various stages of its life, beyond the production of oxygen, through a series of short videos or other digital media.
- Highlight some of the SAR and common, though lesser known species in The Land Between that depend on an intact forest for survival through website content, blogs, information sheets and social media posts.

- Conduct guided walks through the forest at various times of the year, pointing out various plants, animals and features and educating participants on the role of each in forest function.
- Continue to cultivate cooperative relationships with forestry professionals, private landowners, municipal officials and other relevant stakeholders in forest health and management so that all stakeholders can work collaboratively towards sustainable forest management.
- Target private landowners with large (100 acres or more) for participation in the Habitat Health Check program.
- Communicate the economic value of an intact living forest as a whole, in addition to that of individual trees to forestry professionals, private landowners, and municipalities through all channels, platforms and media.
- Communicate to landowners the importance of seemingly small patches of forest on their properties through social media posts, as well as through the Habitat Health check program.
- Educate the public on the existence and importance of mother/hub trees and mycorrhizal networks through information sheets and website content.
- Create and publish an atlas of “cool”/interesting trees/ trees with a personal meaning or significance to an individual or individuals, across The Land Between to celebrate the amazing trees that private landowners and municipalities have cared for and stewarded, and to inspire visitors/newcomers to the region to appreciate the trees.
- Host quarterly webinars on various forest tracts across The Land Between, a different tract each time, sharing information about what makes a particular tract unique, what kinds of species it hosts, how the general public can visit/spend time in it, etc.
- Develop and run an annual information campaign on why deer should not be fed.

Strategy: Skills Development and Capacity Building

Activities:

- Promote existing forest best management practices through website content and information sheets.
- Promote, publicize and educate private landowners on the existence of and requirements for the MFTIP program through website content, information sheets and the Habitat Health Check program.
- Promote the services and expertise of The Land Between (Habitat Health Checks, mapping and data, etc.), as well as the ability of the organization to source information, skills, and resources and facilitate connections to forestry professionals, private landowners, municipalities and other stakeholders.

Strategy: Citizen Science

Activities:

- Develop and run a citizen science program for participants to walk through the same section of a forest once a week or so and record what they see (birds, plants, scat, etc.).

- Develop and promote a tree pest and disease identification program for landowners, youth and the general public.

Strategy: Services

Activities:

- Work with municipalities to publicize and enforce existing tree bylaws related to tree removable, and engage and work with them to develop new bylaws required to fill gaps.
- Develop and/or promote an existing award and recognition program for privately and/to commercially owned sustainably managed forests.

Sub Target: Forest Interior Birds

Forest interior birds are species that rely on sheltered forested habitat, free from the influence of naturally occurring or anthropogenically introduced open areas and forest edges. Forest interiors are more sheltered from environmental factors such as the sun and wind, as well as less easily accessible to contaminating influences such as invasive species and pollution (LRC, 2000). The sheltered nature of the forest interior allows for a more stable environment (*ibid.*). The larger the forested area, the greater the amount of interior habitat there is (*ibid.*). As human footprints expand and deforestation and forest fragmentation increases, the amount of available forest interior habitat continues to shrink, resulting in habitat loss for forest-interior birds, and other forest-interior dependent species.

The at-risk forest interior birds found in The Land Between are quite diverse. These species include:

- Acadian Flycatcher (Federally and provincially Endangered)
- Canada Warbler (Federally Threatened, Provincially Special Concern)
- Cerulean Warbler (Federally Endangered, Provincially Threatened)
- Wood Thrush (Federally Threatened, Provincially Special Concern)
- Red-headed Woodpecker (Federally Threatened, Provincially Special Concern)
- Evening Grosbeak (Federally and Provincially Special Concern)
- Louisiana Waterthrush (Federally and Provincially Threatened)
- Eastern Wood-pewee (Federally and Provincially Special Concern)

As a result of the diverse nature of this suite of species, the threats to the group also vary. In addition to the threat of forest interior habitat loss due to development in their breeding range (The Land Between and elsewhere in North America), threats to this suit of species include habitat loss in wintering grounds, reduced availability of insect prey, overbrowsing of understory species and invasive species, pests and diseases.

Goal:

- Maintain or increase population sizes of forest interior birds (both at risk and common) in The Land Between in perpetuity.

Objectives:

- Where feasible, by 2024, determine the approximate baseline population levels of at-risk forest interior bird populations in The Land Between bioregion. Where this information is already known, integrate it into conservation planning efforts.
- Increase public awareness, knowledge and appreciation of the ecological uniqueness of forest interiors and the birds that depend on them by 2026.
- Increase the number of decadent trees left standing on private and municipal land in the region by 2030.
- Increase the awareness of private landowners, municipalities and the general public of beech bark disease, its effects, and the ways to limit its spread by 2026.
- Increase public awareness and knowledge of the decline of insect populations, and the threats the declines pose to human, ecological and economic health by 2028.
- Increase the skills and capacity of landowners and municipalities to be able to lessen the impact of their activities on insect populations by 2031.
- Increase the awareness and knowledge of private landowners and forest managers of forest best management practices related to forest interior birds by 2026.
- Increase the uptake and integration of forest interior bird habitat best management practices by private landowners and forest managers by 2031.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data and expert (where gaps exist) and expert knowledge
- Generate maps
- Monitor trends in habitat availability over time

Strategy: Outreach, Communication and Education

Activities:

- Foster cooperative relationships with forestry professionals, private landowners, municipal officials and other relevant stakeholders.
- Promote the purchase of Forest Stewardship Certified Products.
- Conduct guided walks through the forest (and/or/call it forest bathing) at various times of the year, pointing out various plants, animals and features and educating participants on the role of each in forest function.
- Communicate and promote the role that all birds play in spreading biodiversity and maintaining forest health
- Promote the value of leaving dead standing trees in place through the habitat health check program
- Communicate the detrimental impacts that insecticides can have to insect populations, as well as the populations of their predators, and promote less environmentally impactful alternatives
- Publicize the importance of woodpeckers in controlling tree disease and pests.

- Encourage private landowners to retain dead standing trees through the Habitat Health Check program.
- Communicate the severity of the problem of insect declines to the general public by creating an infographic, clearly demonstrating the dramatic declines in population sizes in The Land Between, Ontario, Canada and the world, over time.

Strategy: Skills Development and Capacity Building

Activities:

- Promote and provide easy access to forest best management practices through The Land Between website.

Strategy: Citizen Science

Activities:

- Create and promote a tree pest and disease reporting citizen science program.

Sub-target: Eastern Wolf

Found only in small pockets throughout central Ontario and to a certain extent in western Quebec, the Eastern (Algonquin) Wolf is a species at risk with vulnerable populations. Although this cryptic species has been somewhat studied, we hope to refine the understanding and then the communications related to the Eastern Wolf in Ontario, and to provide new information, find enhanced solutions, and enlighten some public perceptions related to this icon.

The Eastern (Algonquin) Wolf is an apex predator – the top of the food chain – and its status and health relates to everything below it. All the wildlife and habitats that surround the wolf have an impact on the survival of the wolf, therefore, the wolf is an indicator of the health and vitality of the entirety of the wildlife within the forest ecosystem. This begins with the elements and characteristics of the soil in the forest. It includes the diversity and abundance of the plants, the herbivores, and then other middle-sized predators. A whole spectrum of wildlife is dependent on the wolf and the wolf depends on these habitats, ecosystems and animals too. Finally, the human footprint (development, travel-ways, noise, lighting) affects the habitats and wildlife of the forest and therefore ultimately affects the wolf.

Goal:

- By 2031, develop a better and more well-rounded understanding of the prey biomass and carrying capacity of existing suitable habitat, and the impacts of forestry, human footprint expansion and coyote/addmix activities on the recovery potential of the Eastern Wolf.
- By 2033, an updated recovery strategy for the Eastern Wolf in Ontario that includes advanced forest ecology science is published.

Objectives:

- Maintain and and continue to enhance cooperative relationships between harvesters, scientists and conservation organizations.
- Continue to increase the degree to which the knowledge of trappers is honoured and respected by other stakeholder groups.
- The buffer zones around protected areas (no take zones) continue to be monitored (FOR?)
- By 2029, municipalities and forestry stakeholders understand and acknowledge their role in the recovery of the Eastern Wolf and other at-risk species through their responsibility for the sustainable management of forested areas, and the control of human footprint expansion.
- By 2031, municipalities and forestry stakeholders adopt sustainable forest management policies and practices to limit the expansion of the human footprint in The Land Between, and lessen the impact of development to the Eastern Wolf and other SARs.

Strategy: Outreach, communication and education

Activities:

- Continue to broker and mediate conversations around the Eastern Wolf between various stakeholder groups including trappers, researchers and government officials.
- Continue to host talking circles throughout The Land Between and Ontario to gather testimonials and insight into what is happening on the landscape from trappers who spend a great deal of time on the landscape.

Strategy: Skills Development and Capacity Building

Activities:

- Continue to support researchers studying the Eastern Wolf, its habitat, and other relevant topics to the species (prey biomass, etc.)
- Develop cooperative relationships with municipalities, forestry stakeholders and private landowners to allow for dialogue surrounding human footprint expansion and forest management.

Strategy: Citizen Science

Activities:

- Develop a community science program for harvesters as well as youth to collect data on prey biomass levels on the landscape. Information collected will include wetland typing information, beaver activity information and canid DNA samples (where available and feasible).
- Promote and support efforts by all stakeholder groups to reduce human footprints.
- Educate landowners and the general public on what affects an individuals human footprint beyond the physical space occupied and amount of GHGs produced (nightlighting, habitat connectivity, etc.).

- Encourage and support efforts by private landowners to maintain healthy, intact forest habitat through the Habitat Health Check program.
- Promote and support reforestation efforts in The Land Between and Ontario. Communicate the importance of these efforts not just for carbon sequestration, but also for habitat restoration and creation.

11.3 Target Category: Stand alone suites of upland species

The following sub-targets are included in this category:

- All SAR/NON-SAR Birds
- Nightjars
- Aerial Insectivores
- Golden-winged Warbler
- Peregrine Falcon
- Wood Turtle
- Eastern Hog-nosed Snake
- Massasauga Rattlesnake and Eastern Foxsnake
- All Other Snakes found in The Land Between Bioregion
- Five-lined Skink
- SAR Bats
- Insect Pollinators
- SAR Lepidoptera of TLB (Mottled Duskywing, Monarch Butterfly)
- SAR Bumble Bees of TLB and all Native Bumblebees Bees
- SAR Plants
- SAR Lichen
- Disappearing common terrestrial species

Sub target: All SAR/NON-SAR Birds

All birds, both those listed as at-risk and those that are not, have been included as a target in this strategy. This is because there are many common threats faced by many or all bird species found throughout The Land Between. Some of these shared threats include predation by domestic cats, collisions with windows and other anthropogenic structures, habitat loss in their overwintering habitats (where applicable), and a general lack of knowledge and appreciation for the role birds play in a functioning ecosystem. As such, this section of the recovery strategy sets out goals and objectives related to addressing and mitigating these threats shared by many species of bird across The Land Between.

Goals:

- By 2026, increase public awareness, respect and appreciation for the role of birds, SAR or otherwise, in the environment, and how their individual actions impact bird populations in The Land Between, Canada, and elsewhere in the world.

- Reduce the number of bird deaths related to window strikes in The Land Between by 2031.
- Reduce the number of cat-related bird deaths in The Land Between by 2031.

Objectives:

- Increase public knowledge and awareness of how birds spread biodiversity by 2026.
- Increase public awareness on how individual product purchases have a direct effect on bird species in Canada, Ontario, and The Land Between by 2026.
- Increase implementation of municipal regulations and incentives to bird safe windows of private and municipal buildings by 2031.
- Increase awareness of private landowners and municipalities on the impact of predation by cats on birds, and increase in knowledge and skills of these stakeholders on how to address the issue by 2026.
- Increase uptake and implementation of measures to reduce the frequency of bird collisions with windows of private residences and municipal buildings by 2031.

Strategy: Research and Monitoring

Activities:

- Continue to erect MOTUS towers throughout The Land Between to allow for more and more complete data related to bird locations and migrations to be collected.

Strategy: Outreach, Communication, and Education

Activities:

- Promote the purchase of Forest Stewardship Certified Products.
- Communicate and promote the role that all birds play in spreading biodiversity and maintaining forest health through all platforms, channels and media.
- Educate private landowners on ways to mitigate bird deaths by domestic cats and window strikes through the Habitat Health Check program, as well as through other information sources on The Land Between website and various social media platforms.
- Develop cooperative relationships with municipalities to allow for dialogue regarding bird safing windows.
- Provide information, resources and support to municipalities on how to go about bird safing municipal building windows, and how to encourage residents of the municipalities to do the same.
- Host bird walks and owl prowls to provide a medium for the general public to connect with and learn about the birds of The Land Between.
- Create a birding bingo program for residents and visitors to The Land Between to connect with and learn about birds.
- Publicise and disseminate the many birding resources available through The Land Between including our Birding 101 webinar, various bird identification webinars, etc.
- Publicize the installation and operation of MOTUS towers across The Land Between as a way to inspire the general public and engage them in bird conservation.

Sub target: Nightjars

Nightjars are a family of birds characterized by their brownish plumage, ground nesting and nocturnal foraging (Canadian Nightjar Survey Protocol, 2018). Nightjars are also aerial insectivores, meaning they feed on flying insects.

Two species of Nightjar are listed as at risk in The Land Between, the Eastern Whip-poor-will (federally and provincially Threatened) and the Common Nighthawk (federally Threatened, provincially Special Concern).

Threats to the Eastern Whip-poor-will include and the Common Nighthawk include limited insect availability due to the use of pesticides and loss of insect-producing habitat, incompatible timing of the emergence of insects and breeding nightjars due to changing climates, and habitat loss and degradation in overwintering and breeding grounds.

Goal:

- Maintain or increase population sizes of Nightjars in The Land Between in perpetuity.

Objectives:

- Where feasible, by 2026, determine the approximate baseline population levels of Nightjars in The Land Between bioregion. Where this information is already known, integrate it into conservation planning efforts.
- Where possible and feasible, by 2026, determine the approximate amount and location of potential Nightjar habitat in The Land Between.
- Increase public awareness, knowledge and appreciation of the ecological uniqueness of Nightjars by 2028.
- Maintain or increase Nightjar prey populations in The Land Between Bioregion by 2031.
- Increase knowledge and skills of landowners and municipalities to be able to lessen the impact of their activities on insect populations by 2031.
- Ensure a constant supply of Nightjar habitat in The Land Between Bioregion in perpetuity.
- Increase enforcement by municipalities of bylaws and policies pertaining to light pollution by 2031.
- Continue to run Nightjar Citizen Science surveys in partnership with Birds Canada as long as viable and necessary.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate maps.
- Monitor trends in habitat availability over time.

Strategy: Research and Monitoring

Activities:

- Gather available population data for Nightjars in The Land Between.
- Connect with and support researchers and other conservation groups monitoring Nightjar populations in and around the region.
- Use best available data and knowledge to estimate baseline population levels.

Strategy: Outreach, Communication and Education

Activities:

- Host events in coordination with partner organizations or other stakeholder groups to share information about Nightjars, their habitat needs, and what threatens them.
- Educate the general public about the needs and threats to Nightjars and other aerial insectivores through the dissemination of education materials such as the SAR toolkit and aerial insectivore brochure.
- Communicate the detrimental impacts that insecticides can have to insect populations, as well as the populations of their predators, and promote less environmentally impactful alternatives.
- Demonstrate the link between interesting and beautiful moths to Nightjars.

Strategy: Skills Development and Capacity Building

Activities:

- Foster and encourage habitat stewardship by private landowners through the Habitat Health Check program.

Strategy: Services

Activities:

- Work with municipalities to communicate the impacts of artificial night lighting to human and ecological health, as well as simple alternatives and remedies to reduce these impacts.
- Create and/or promote existing best management practices for Nightjars, their habitat and their prey.

Strategy: Citizen Science

Activities:

- Continue to solicit reports of Nightjars in the backyards of private landowners through the Backyard Bird Survey.
- Create additional Nightjar citizen science surveying routes throughout The Land Between (in addition to those set by Birds Canada).
- Create a medium for reciprocity between citizen scientists and The Land Between by sharing with them what their work and data has contributed to.
- Share how any Nightjars each team has recorded throughout their surveys on the website.

- Create and distribute pins or patches to all citizen science program participants to encourage active participation and thank them for their work.
- Create a citizen science program for collection of data related to Nightjar prey abundance including moths and beetles.

Sub target: Aerial insectivores

Aerial insectivores – birds that feed on flying insects – have had the steepest population declines of all bird groups in Canada. Their numbers have dropped by an average of 60% since 1970 (North American Bird Conservation Initiative Canada, 2019) – a very concerning trend. The causes of population decline are not well understood, but researchers have proposed several drivers.

The species that occur in The Land Between include:

- Olive-sided Flycatcher (Federally Threatened, Provincially Special Concern)
- Bank Swallow (Federally and Provincially Threatened)
- Barn Swallow (Federally and Provincially Threatened)
- Chimney Swift (Federally and Provincially Threatened)

Threats to the survival of this suite of species vary but include decreased insect abundance, environmental contaminants, habitat loss (in both breeding and overwintering grounds), and mortality during migration.

Goal:

- Maintain or increase aerial insectivore populations in The Land Between bioregion by 2031.
- Ensure a constant supply of habitat for aerial insectivores in The Land Between Bioregion in perpetuity.

Objectives:

- Where feasible, by 2026, determine the approximate baseline levels of Aerial Insectivore populations in The Land Between bioregion. Where this information is already known, integrate it into conservation planning efforts.
- Increase public awareness, knowledge and appreciation of the ecological uniqueness of aerial insectivores and the role they play in a functioning ecosystem by 2027.
- Increase public and landowner awareness of the role of their property stewardship in maintaining aerial insectivore habitat by 2027.
- Increase landowner capacity to responsibly steward properties for these and other SAR species by 2028.
- By 2026, with the direct input of key stakeholders, develop a communication strategy and supporting educational materials/programs for landowners on the existence and importance of aerial insectivores, and ways to mitigate harm.

- By ___, disturbance and destruction of nests (persecution) of species for which this is a threat (Bank Swallow, Barn Swallow, Chimney Swift) is reduced by __%_.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate maps.
- Monitor trends in habitat availability over time.

Strategy: Research and Monitoring

Activities:

- Gather available population data for aerial insectivores in The Land Between.
- Connect with and support researchers and other conservation groups monitoring aerial insectivores populations in and around the region.
- Use best available data and knowledge to estimate baseline population levels.

Strategy: Outreach, Communication and Education

Activities:

- Host events in coordination with partner organizations or other stakeholder groups to share information about aerial insectivores, their habitat needs, and what threatens them.
- Educate the general public about the needs and threats to aerial insectivores through the dissemination of education materials such as the SAR toolkit and aerial insectivore brochure.
- Communicate the detrimental impacts that insecticides can have to insect populations, as well as the populations of their predators, and promote less environmentally impactful alternatives.
- Communicate the impact that aerial insectivores have on pest insect (ie. mosquito) populations.

Strategy: Skills Development and Capacity Building

Activities:

- Foster and encourage habitat stewardship by private landowners through the Habitat Health Check program.

<u>Sub target: Golden Winged Warbler</u>

The Golden-winged Warbler is a migratory species that breeds in Canada and the north eastern United States, and overwinters in Central America. In Canada, breeding occurs in southern Ontario, and the edges of Saskatchewan, Manitoba and Quebec. Roughly 79% of the Canadian population breeds within the Land Between. Golden-winged Warblers require habitats of new vigorous growth within close proximity to large mature forests, and an understory of weeds and

shrubs. This is typically found where cleared lands are regrowing into forests, as well as in wetlands. After fledging, these birds move into mature forests with dense cover to protect themselves from predators such as hawks.

This species is listed as Threatened federally and Special Concern provincially. In the Land Between, shoreline development is altering the treed wetland habitat in which the Golden-winged Warbler is most often found. As roughly 79% of the Canadian population breeds within the Land Between, this local threat could have substantial consequences for the Ontario population.

Additional threats to the Golden-winged warbler include loss of suitable habitat due to the clearing of mature forests and natural fire suppression, competition and hybridization with the Blue-Winged Warbler, invasive species in their breeding range including buckthorn and earthworms, and collisions with windows and powerlines (ECCC, 2016).

Goal:

- Maintain or increase Golden Winged Warbler populations in The Land Between by 2031.

Objectives:

- Where feasible, by 2027, determine the approximate baseline levels of Golden Winged Warbler populations in The Land Between bioregion. Where this information is already known, integrate it into conservation planning efforts.
- Where possible and feasible, by 2027, determine the approximate amount and location of potential Golden Winged Warbler habitat
- Increase public awareness, knowledge and appreciation of the ecological uniqueness of Golden Winged Warblers by 2028.
- Ensure a constant supply of Golden Winged Warbler Habitat in The Land Between Bioregion in perpetuity.

Strategy: Research and Monitoring

Activities:

- Gather available population data for Golden Winged Warblers in The Land Between.
- Connect with and support researchers and other conservation groups monitoring Golden Winged Warblers in and around the region.
- Use best available data and knowledge to estimate baseline population levels.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate maps.
- Monitor trends in habitat availability over time.

Strategy: Outreach, Communication and Education

Activities:

- Publicize the species as the “bird ambassador” of The Land Between, communicating the fact that it is a species of responsibility for the region, and what that means, to the public.

Strategy: Habitat Restoration and Management

Activities:

- Integrate Golden Winged Warbler breeding and foraging habitat needs into new or existing best management practices (BMPs) for utility right of ways and forestry operations.
- Create and/or restore breeding/foraging habitat in right of way (ROW) corridors.

Sub-target: Peregrine Falcon

The Peregrine Falcon breeds on every continent except for Antarctica. Within Ontario, they breed along the shores of Lake Superior, Lake Huron, along the Bruce Peninsula, and into Southern Ontario. Some Peregrine Falcons stay in their breeding range all year round while some migrate to South America to overwinter. They have a wide range of habitat types but typically nest on cliff ledges next to open landscapes, or close to large bodies of water. The Peregrine Falcon has also been successful integrating into large cities such as Toronto, nesting on top of large skyscrapers rather than cliffs. The Peregrine Falcon is the fastest species on the whole planet! They have been recorded diving at speeds of up to 380km/h!

In 1978, the Peregrine Falcon was listed as an Endangered Species in Canada (Ontario Peregrine Falcon Recovery Team, 2010). The initial decline of the Peregrine Falcon was a result of the use of dichlorodiphenyltrichloroethane (DDT) across the species’ range (*ibid.*). After the ban of DDT in North America, and with the help of a breeding program, their populations have been on the rise (*ibid.*). In 2017, the Peregrine Falcon was deemed not at risk in Canada by COSEWIC. It is currently still listed as Special Concern in Ontario.

Current threats to the survival of the Peregrine Falcon include biomagnification of environmental contaminants, disturbance while nesting or during other life processes by human recreation and/or development, pesticide use in overwintering grounds in Central and South America and habitat loss and degradation from industrial activities (*ibid.*).

Our primary strategy for the recovery of the Peregrine Falcon in The Land Between is minimal. This is because the populations of the species in Ontario have been steadily improving since the restrictions on DDT use in North America were introduced in the 1960s and 70s, and the institution of a captive rearing and release program 1977 (*ibid.*).

Goal:

- Peregrine Falcon populations in The Land Between and Ontario continue their steady path to recovery.

Objectives:

- Where possible and feasible, by 2025, determine the approximate amount and location of potential Peregrine Falcon habitat in The Land Between
- By 2026, increase the awareness of outdoor recreationists of the existence of Peregrine Falcons and the potential for recreational activities to disturb their nesting habitat, and increase their capacity to avoid such disturbances.
- By 2026, increase the awareness of natural resource managers, infrastructure managers and private landowners of the potential for their work to disturb the species and its habitat, and increase their capacity to avoid such disturbances

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate maps.
- Monitor trends in habitat availability over time.

Strategy: Outreach, Communication and Education

Activities:

- Encourage and build the capacity of people who participate in outdoor activities to report Peregrine Falcon sightings, as well as information regarding what they were doing (nesting, etc.).
- Educate the general public and landowners on the Peregrine Falcon through the SAR toolkit.
- Encourage outdoor recreationists to find other locations to recreate during Peregrine Falcon nesting season.

Strategy: Services

Activities:

- Create and/or publicize existing BMPs for natural resource developers, landowners and infrastructure managers to avoid impacts to Peregrine Falcon through their operational activities.

<u>Sub target: Wood Turtle</u>

The Wood Turtle occurs in small pockets in southern and central Ontario, southern Quebec, New Brunswick, and Nova Scotia. Wood Turtles are found near freshwater streams preferring meandering, clear waters with a moderate flow. Nearby forested areas are essential during the active season, as Wood Turtles spend most of their time foraging, nesting, and basking, often

only returning to the water at night. They nest in moist sand or gravel beaches and banks, as well as soft gravel and dirt road shoulders with full sun exposure. Wood Turtles typically overwinter in their home streams but some travel to hibernation sites several kilometers away.

The Wood Turtle is currently listed as federally Threatened and provincially Endangered. Threats to Wood Turtles include roads, as Wood Turtles spend large amounts of time on land, and are therefore at risk of impacts with vehicles when they cross nearby roads and railways; illegal collection for the food and pet trade; and loss of habitat connectivity due to residential and agricultural development.

For the purposes of this conservation strategy, the Wood Turtle has been distinguished from the six other Species at Risk turtles in The Land Between. This is because the Wood Turtle has considerably different habitat requirements and is much more terrestrial than the other at-risk turtles in the region.

Goals:

- By 2031, stop or reverse declines of Wood Turtle populations in The Land Between

Objectives:

- Where possible and feasible, determine the approximate amount of suitable Wood Turtle habitat in The Land Between by 2025.
- Where feasible, by 2026, determine the approximate baseline levels of Wood Turtle populations in The Land Between bioregion. Where this information is already known, integrate it into conservation planning efforts.
- Increase public awareness of the presence of reptiles on roads by 2026.
- By 2027, increase awareness of municipal planning officials of the need and merits of an integrated habitat management approach at the watershed scale.
- By 2027, increase the awareness of farmers of the potential presence of Wood Turtles, and increase their capacity to avoid or mitigate threats to the species.
- Increase capacity of municipal road crews to reduce the impact of their work on Wood Turtle populations by 2031.
- Increase capacity of developers (roads and private residences) and primary resource extractors to reduce the impact of their work on Wood Turtle populations by 2031.
- Increase public capacity to avoid accidentally killing these individuals on roads by 2028.
- Increase permeability of roads to reptiles in The Land Between by 2031.

Strategy: Research and Monitoring

Activities:

- Gather available population data for Wood Turtles in The Land Between.
- Connect with and support researchers and other conservation groups monitoring Wood Turtles in and around the region.
- Use best available data and knowledge to estimate baseline population levels.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate maps.
- Monitor trends in habitat availability over time.

Strategy: Outreach, Communication and Education

Activities:

- Educate landowners and the general public about the habitat needs and threats to Wood turtles with the SAR Toolkit.
- Continue to educate the general public about the presence of reptiles on roads through all channels, platforms and media.
- Continue to cultivate cooperative relationships with municipal officials, including road crews, so that an open dialogue and teamwork around threat mitigation to Wood Turtles can be maintained.

Strategy: Skills Development and Capacity Building

Activities:

- Continue to promote the installation of “Watch 4 Turtle Signs” on private driveways and mailboxes, particularly along busy roads or known high mortality areas.
- Encourage and foster habitat stewardship on private property through the Habitat Health Check program.
- Educate municipal road crews and other municipal public works officials on species identification and what to do in the event an individual is found on the road or on the side of the road (while work is being conducted or otherwise) through the delivery of educational and targeted presentations and/or webinars.
- Promote the use of best management practices to farmers in known or suitable Wood Turtle habitat.

Strategy: Citizen Science

Activities:

- Continue to run the Turtle Guardians Road Researcher Citizen Science program to collect data on occurrences, mortality hotspots, population levels, nesting locations, etc.
- Continue to report all observations made through citizen science to the appropriate authorities (ie. NHIC).

Strategy: Habitat Restoration

Activities:

- Continue to develop, test and pilot alternative exclusion fencing and tunnel designs.

- Continue to work with expert partners to install reptile exclusion fencing and underpasses in high priority areas.
- Continue to promote and assist private landowners in the renaturalization of their shoreline properties.

Sub target: Eastern Hog-nosed Snake

Within Canada, the Eastern Hog-nosed Snake occurs only in south-central Ontario and can be found in sandy soil environments like beaches, wooded areas, and meadows. They are active predators and highly mobile with a large home range. Threats to the Eastern Hog-nosed Snake include habitat conversion, road mortality, persecution, and illegal collection for the pet trade (Seburn, 2008).

The Eastern Hog-nosed Snake has been distinguished from the other at-risk snakes in The Project because The Charity has and will continue conservation work directed at this species specifically.

Goals:

- By 2031, stop or reverse declines of Eastern Hog-nosed Snake populations in The Land Between.

Objectives:

- Where feasible, by 2027, determine the approximate baseline levels of HOSN populations in The Land Between bioregion. Where this information is already known, integrate it into conservation planning efforts.
- Where possible and feasible, determine the approximate amount of suitable HOSN habitat in The Land Between by 2026.
- Identify high HOSN mortality areas on roads across The Land Between by 2028.
- Ensure a constant supply of HOSN habitat in The Land Between in perpetuity.
- Increase capacity of private landowners to steward their land to support HOSN by 2031.
- By 2027, where individuals occur or have been observed on private land, identify and establish contact with private landowners.
- Reduce the impact of illegal collection of HOSN on wild populations by 2031.
- Increase awareness of municipal road crews and the general public of the presence of snakes on roads by 2028.
- Increase the capacity of municipal road crews, development crews, and other industry stakeholders to minimize the impact of their work on HOSN by 2029.
- Increase the capacity of the general public to mitigate and/or avoid road mortality of HOSN by 2028.
- Increase road permeability for snakes in high priority areas by 2031.
- By 2028, develop a communication strategy directed at private landowners as well as the general public and visitors to protected areas (i.e. provincial parks) to increase their

knowledge and awareness of the species, emphasizing their harmlessness and the critical role they play in the environment, and that all sightings should be reported.
- By 2028, develop a strategy to tackle the persecution of snakes in The Land Between.

Strategy: Research and Monitoring

Activities:

- Gather available population data for Eastern Hog-nosed Snakes in The Land Between.
- Connect with and support researchers and other conservation groups monitoring Hog-nosed Snakes in and around the region.
- Use best available data and knowledge to estimate baseline population levels.
- Continue to record chance observations with Eastern Hog-nosed snakes during Turtle Road Research operations.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate maps.
- Monitor trends in habitat availability over time.
- Identify areas of high Eastern Hog-nosed snake road mortality (hot spot mapping).

Strategy: Outreach, Communication and Education

Activities:

- Based on population and potential habitat mapping, target specific landowners for participation in the Habitat Health Check program. Help guide these landowners on how best to steward their properties for Eastern Hog-nosed Snakes, as well as other SARs, and educate them on the benefits and merits of doing so.
- Develop and/or promote and distribute existing materials on the buying and selling of SARs tailored for the retail pet industry.

Strategy: Skills Development and Capacity Building

Activities:

- Educate and train municipal road crews on what to do in the event that they come across an Eastern Hog-nosed Snake through educational presentations and webinars designed specifically for them.
- Continue to encourage the general public and landowners to call the START hotline in the event of a chance encounter with an Eastern Hog-nosed Snake. This action is encouraged in the Snake Supervisors Citizen Science protocol and as part of the training “Reptiles on Roads” presentation for municipal road crews.
- Educate landowners on the needs and threats to HOSN through the SAR toolkit.

Strategy: Mitigation structures

Activities:

- Install “Brake for Snake” (and turtle) signs in known high mortality areas.
- Install snake and/or reptile exclusion fencing in high road mortality areas.
- Pilot new and experimental exclusion structure design.

Strategy: Citizen Science

Activities:

- Solicit chance observation of Eastern Hog-nosed Snakes through the “Have you seen the Drama Queen of The Land Between?” campaign.
- Solicit chance observations of Eastern Hog-nosed snakes through the Snake Supervisors Citizen Science program.

Sub target: Massasauga Rattlesnake and Eastern Foxsnake

The Canadian range of both the Massasauga Rattlesnake and the Eastern Foxsnake lie entirely within Ontario. In The Land Between, the ranges of both species are further confined to the western portion of the Municipality of Muskoka, along the east coast of the Georgian Bay. For this reason, the Eastern Massasauga Rattlesnake and Eastern Foxsnake have been distinguished from other at-risk snakes in the region in The Strategy Document.

Massasauga Snakes are habitat generalists but have very specific microhabitat requirements. They can be found in prairies, wetlands, forest edges and rock barrens habitats though they are typically found in close proximity to bodies of water. They also require a semi-open habitat to provide cover from predators as well as basking opportunities. Eastern Fox Snakes prefer open habitats such as rocky outcrops and forest edges, and are often found near shorelines. These snakes are excellent swimmers and commonly travel between land masses through open water.

Threats to these species include habitat loss and destruction due to residential and commercial development, road mortality, persecution and illegal collection for the pet trade (Parks Canada Agency, 2015; ECCC, 2020).

Goal:

- By 2031, stop or reverse declines of MASN and FOSN populations in The Land Between.

Objectives:

- Where feasible, by 2027, determine the approximate baseline levels of MASN and FOSN populations in The Land Between bioregion. Where this information is already known, integrate it into conservation planning efforts.
- Identify high mortality areas on roads across The Land Between by 2028.

- Where possible and feasible, determine the approximate amount of suitable MASN and FOSN habitat in The Land Between by 2027.
- Increase capacity of private landowners to steward their land to support MASN and FOSN populations by 2031.
- Ensure a constant supply of MASN and FOSN habitat in The Land Between in perpetuity.
- By 2029, develop a strategy to tackle the persecution of snakes in The Land Between.
- Increase awareness of municipal road crews and the general public of the presence of snakes on roads by 2028.
- Reduce the impact of illegal collection of MASN and FOSN on wild populations by 2031.
- Increase the capacity of municipal road crews, development crews, and other industry stakeholders to minimize the impact of their work on MASN and FOSN by 2028.
- Increase capacity of the general public to mitigate and/or avoid road mortality of MASN and FOSN by 2028.
- Increase road permeability for snakes in high priority areas by 2031.
- By 2026, develop a communication strategy directed at private landowners to increase their knowledge and awareness of the species, emphasizing the critical role they play in the environment, and that all sightings should be reported

Strategy: Research and Monitoring

Activities:

- Gather available population data for MASN and FOSN in The Land Between.
- Connect with and support researchers and other conservation groups monitoring MASN and FOSN in and around the region.
- Use best available data and knowledge to estimate baseline population levels.
- Continue to record chance observations with MASN and FOSN during Turtle Road Research operations.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate maps.
- Monitor trends in habitat availability over time.
- Identify areas of high MASN and FOSN road mortality (hot spot mapping).

Strategy: Outreach, Communication and Education

Activities:

- Evaluate all existing outreach and communication programs on the MASN and FOSN and identify areas for improvement and any gaps that may exist.
- Develop and/or promote and distribute existing materials on the buying and selling of Species at Risk tailored for the retail pet industry.

Strategy: Skills Development and Capacity Building

Activities:

- Educate and train municipal road crews on what to do in the event that they come across an MASN and FOSN through educational presentations and webinars designed specifically for them.
- Continue to encourage the general public and landowners to call the START hotline in the event of a chance encounter with an FOSN or MASN. This Action is encouraged in the Snake Supervisors Citizen Science protocol and as part of the training “Reptiles on Roads” presentation for municipal road crews.
- Educate landowners on the needs and threats to MASN and FOSN through the SAR toolkit.
- Encourage beneficial stewardship of private lands through the Habitat Health Check program.
- Support and publicize efforts by groups advocating for temporary road closures in areas of high mortality.
- Support and publicize efforts by groups advocating against the development of new roads in known MASN and FOSN habitat.

Strategy: Mitigation structures

Activities:

- Install “Brake for Snake” (and turtle) signs in known high mortality areas.
- Install snake and/or reptile exclusion fencing in high road mortality areas.
- Pilot new and experimental exclusion structure designs.

Strategy: Citizen Science

Activities:

- Solicit chance observations of MASN and FOSN snakes through the Snake Supervisors Citizen Science program.
- Create an addition to the Snake Supervisors citizen science program that would include and promote road mortality surveys.

Strategy: Services

Activities:

- Develop and/or publicize and promote existing BPMs related to development in MASN and FOSN habitat.
- Work with municipal planners and other officials to come up with viable alternatives to development in known MASN and FOSN habitat through data sharing agreements, education and other services.
- Promote the inclusion of FOSN, MASN and other at-risk species habitat in the Official Plans of each of the municipalities in The Land Between. Educate local municipalities on the benefits of doing so.

- Create an “Up side, Down side” infographic of considering species habitat, other species needs, and other ecological services in municipal Official Plans.

Sub target: All Other Snakes found in The Land Between Bioregion

The Land Between is home to approximately 25% of Ontario’s snake populations. Both SAR and non-SAR are included in this target. This is because, although many of the species of snakes included in this target are not currently listed as species-at-risk, there are still many threats posed to their survival. As the vision for this strategy is the conservation of all species and spaces, common and otherwise, “all other snakes” have been included as a target. Further, some of the snakes included in this target, are listed federally and/or provincially as SARs. They may have been include as part of this target because they have a very limited range in The Land Between (i.e. the Gray Ratsnake), and therefore they are not a priority target of this conservation strategy, or they are a species that faces many or all of the same threats faced by other snakes species in the region.

The species included in this amalgamated target are as follows:

- Eastern Milksnake (Federally Special Concern, Provincially Unlisted)
- Eastern Ribbonsnake (Federally Threatened, Provincially Special Concern)
- Gray Ratsnake (Federally and Provincially Threatened)
- Dekay’s Brown (Federally and Provincially Unlisted)
- Eastern Garter Snake (Federally and Provincially Unlisted)
- Northern Ring-necked Snake (Federally and Provincially Unlisted)
- Northern Watersnake (Federally and Provincially Unlisted)
- Red-bellied Snake (Federally and Provincially Unlisted)
- Smooth Greensnake (Federally and Provincially Unlisted)

As with other ‘general’ targets, the threats posed to species in this group vary, but some of the common threats include habitat degradation and fragmentation from various forms of development including residential, commercial and agricultural, road mortality, predation by both domestic and wild animals, persecution and pollution. Habitat loss due to waterfront development is a threat to the more aquatic or semi-aquatic snakes included in this target, including the Eastern Ribbonsnake and the Northern Watersnake. Lack of knowledge of baseline population levels of many of these species also poses a threat to their survival, as without information on population levels and distribution, effective conservation cannot be achieved.

Goal:

- Maintain or increase populations of these snake species in The Land Between in perpetuity.

Objectives:

- By 2027, gather available population data for snake species in The Land Between.
- Identify high mortality areas on roads across The Land Between by 2026.

- By 2028, develop a strategy to tackle the persecution of snakes in The Land Between
- By 2026, develop a communication strategy directed at private landowners to increase their knowledge and awareness of the species, emphasizing the critical role they play in the environment, and that all sightings should be reported
- Increase awareness of municipal road crews and the general public of the presence of snakes on roads by 2026.
- Increase the capacity of municipal road crews, development crews, and other industry stakeholders to minimize the impact of their work on snakes by 2031.
- Increase the capacity of the general public to mitigate and/or avoid road mortality of snakes by 2026.
- Increase capacity of private landowners to steward their land to support snake populations by 2031.
- Increase road permeability for snakes in high priority areas by 2031.

Strategy: Research and Monitoring

Activities:

- Connect with and support researchers and other conservation groups monitoring these species in and around the region.
- Continue to collect data to refine knowledge of species distribution and population sizes across the region.
- Continue to record chance observations of these species during Turtle Road Research operations.
- Continue efforts to designate wetlands as significant (and therefore protect species habitat) through wetland surveys for turtle and snake SAR.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate population distribution and potential habitat location maps.
- Identify areas of high snake road mortality (hot spot mapping).

Strategy: Outreach, Communication and Education

Activities:

- Develop and/or promote and distribute existing materials on the buying and selling of SARs tailored for the retail pet industry.
- Educate landowners on the needs and threats to at-risk snakes in The Land Between through the SAR toolkit.

Strategy: Skills Development and Capacity Building

Activities:

- Educate and train municipal road crews on what to do in the event that they come across a snake through educational presentations and webinars designed specifically for them.
- Encourage beneficial stewardship of private lands through the Habitat Health Check program.
- Support and publicize efforts by groups advocating for temporary road closures in areas of high mortality.

Strategy: Mitigation structures

Activities:

- Install “Brake for Snake” (and turtle) signs in known high mortality areas.
- Install snake and/or reptile exclusion fencing in high road mortality areas.
- Pilot new and experimental exclusion structure designs.

Strategy: Citizen Science

Activities:

- Solicit chance species observations through the Snake Supervisors Citizen Science program.
- Create an addition to the Snake Supervisors citizen science program that includes road mortality surveys.
- Obtain information on the state of beaver populations and ponds in the land between by developing a harvester citizen science program.

Sub target: Five-lined Skink

In Canada, the Five-lined Skink occurs only in Ontario on the southern Canadian Shield and in southwestern Ontario, with the entire Great Lakes / St. Lawrence population occurring in The Land Between (Environment Canada, 2013). Five-lined Skinks prefer habitat with a relatively open canopy, rocky outcrops, and new plant growth. They spend the majority of their time under the cover of rocks and logs. Five-lined Skinks have no defined home range and are not territorial.

The Five-lined Skink is Federally and Provincially listed as Special Concern. Threats to the Five-lined Skink include loss of suitable habitat and destruction of microhabitat due to residential development and recreational activities such as ATV use. Residential development in turn results in fire suppression in nearby areas, further impacting Five-lined Skink habitat. Other threats include road mortality, illegal collection for the pet trade, and predation by both wild and domestic animals.

Goals:

- Maintain or increase skink population in The Land Between by 2031.

Objectives:

- Where possible and feasible, determine the approximate amount of suitable skink habitat in The Land Between by 2028.
- Maintain the amount of skink habitat in The Land Between in perpetuity.
- Enhance landowner capacity to steward their property for the skink by 2031.
- Increase knowledge and awareness of landowners, municipalities and the general public of the existence, ecological uniqueness, and limited range of the skink.

Strategy: Research and Monitoring

Activities:

- Gather available population data for the Five-lined Skink in The Land Between.
- Continue to collect data to refine knowledge of species distribution across the region.
- Connect with and support researchers and other conservation groups monitoring the Five-lined Skink in and around the region.
- Continue to record chance observations of the Five-lined Skink during Turtle Road Research operations.
- Support ongoing research and data collection efforts related to the Five-lined Skink wherever possible.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate maps of population distribution and potential habitat location.

Strategy: Outreach, Communication and Education

Activities:

- Brand and publicize the Five-Lined Skink as a species of responsibility for The Land Between, making it the reptile “mascot” for the region and educating the general public about the species, its threats, and the role it plays in the environment.
- Educate landowners and the general public about the Five-lined Skink through the SAR toolkit.
- Conduct an awareness blitz on the Five-lined Skink on all channels, platforms and media, sharing fun and educational information through social media posts, fact sheets, etc.

<u>Sub target: SAR Bats</u>

There are three SAR bats occurring in The Land Between: the Little Brown Myotis, the Northern Myotis, and the Tri-coloured Bat, all of which are listed as Endangered both Provincially and Federally. Approximately 50%, 40% and 10% of the global ranges of the Little Brown Myotis, Northern Myotis, and Tri-coloured Bat occur in Canada (Environment Canada, 2015). These bats are non-migratory, meaning they overwinter in Canada.

The greatest threat to these species by far is White Nose Syndrome (WNS) (*ibid.*). WNS is a deadly fungal disease that grows on the skin of hibernating bats in cold, humid environments. The combined effects of severe tissue damage and torpor arousal, which depletes winter energy stores, eventually result in mortality (Humphrey and Fotherby, 2019). WNS spreads from bat-to-bat or from bat contact with a contaminated hibernacula (*ibid.*). New hibernacula can become contaminated by the WNS causing fungus through human (such as recreational cavers) or animal movement from contaminated areas to non-contaminated areas (*ibid.*). WNS was first detected in Canada in 2010 and is predicted to be spreading at a rate of 200 to 250 km per year. If this rate continues, it is predicted that all hibernacula in Canada will be affected by 2025 to 2028 (*ibid.*). As a result of the devastating effects of WNS, the populations of hibernating Little Brown Myotis and Northern Myotis in Eastern Canada (including Ontario) have declined by approximately 94%, while populations of hibernating Tri-coloured Bat have declined by approximately 75% (*ibid.*).

Other threats to these and other bat species include feral and free roaming cats, destruction and degradation of overwintering, roosting, and foraging habitat, collisions or barotrauma from wind turbines, intentional and accidental harm or disturbance, pollution and light pollution (Environment Canada, 2015). The impacts of these secondary threats are compounded by the impact of WNS, which can significantly impact population sizes (*ibid.*).

Given the nature of the work and the capacity of The Land Between, goals, objectives and strategies outlined in this section of the strategy will focus primarily on addressing the threats to the survival of these bat species other than WNS, as many of the points listed in the federal recovery strategy for these species are beyond the scope of the charity's work and abilities. However, as is outlined below, The Land Between is committed to helping mitigate the threat posed by WNS to the best of our abilities.

Goals:

- Maintain or increase populations of bats in The Land Between by 2031.

Objectives:

- Where possible and feasible, support and/or participate in determining approximate baseline population levels in The Land Between (where this information is not yet known).
- Ensure a continuous supply of habitat for bats in The Land Between in perpetuity.
- Contribute to efforts to stop the spread of WNS in The Land Between by 2031.
- Ensure a constant supply of prey species in The Land Between in perpetuity.
- Increase awareness and knowledge of the general public of the habitat requirements of bats by 2026.
- Increase landowner and municipal capacity to conserve and/or enhance bat habitat by 2031.

- Increase landowner and municipal awareness and capacity to address the threat of light pollution to bats as well as other species including humans by 2031.
- Increase the knowledge, awareness and appreciation of municipalities, landowners, and the general public on the role of bats in the ecosystem, specifically pest control by 2026.
- Decrease the threat of cats to bat populations in The Land Between by 2031.

Strategy: Research and Monitoring

Activities:

- Gather available population data for SAR bat species in The Land Between.
- Connect with and support researchers and other conservation groups monitoring SAR bat populations in and around the region.
- Use best available data and knowledge to estimate baseline population levels.
- Support WNS monitoring, prevention and treatment efforts in The Land Between in any way possible.
- Continue to advocate and access funds for the installation of additional MOTUS towers across The Land Between that may be used to track SAR and other bat populations.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate maps.
- Monitor trends in habitat availability over time.

Strategy: Outreach, Communication and Education

Activities:

- Increase awareness of private landowners on the impact of predation by cats on bats, and increase in knowledge and skills of these stakeholders on how to address the issue through the Habitat Health Check program, information on our website, informational sheets, and social media posts.
- Educate landowners, municipalities and the general public on how to identify SAR bat species in The Land Between, as well as their habitat needs and threats through the SAR toolkit, information sheets, social media posts and website content.
- Educate the general public, landowners and municipalities on the role of bats in a functioning ecosystem and economy through all channels, platforms and media including social media posts, information sheets, and the Habitat Health Check program.
- Publicise and educate the public on the link between birds, bats and insects and how they all fit together.
- Anthropomorphize bats, emphasizing how cute they look and some of their cute behaviours, in order to instill a sense of caring for the animals by the general public.
- Publicise and educate landowners, municipal officials and the general public of the threat of WNS, including what it is, the impacts it has on bats, and what the spread of the disease could mean for bat populations in Ontario.

Strategy: Skills Development and Capacity Building

Activities:

- Continue to sell and promote the installation of bat boxes on private property, as well as communicating the role of bat boxes in habitat creation.
- Increase landowner capacity to steward their property of SAR and other bats through the Habitat Health Check program.
- Conduct a “Clean Your Gear” media and educational campaign directed at cavers and other outdoor recreationists in The Land Between whose activities have the potential to contribute to the spread of WNS.
- Develop and/or promote existing decontamination protocols to relevant stakeholders including cavers.
- Develop information sheets for private landowners on the impacts of night lighting to human and environmental health, and include information on easy fixes to the problem.
- Develop/promote existing information sheets for private landowners on the impacts of pesticides to bats and other Species at Risk, and ways that they as landowners can address the problem.
- Implement all known precautionary measures to reduce the spread of WNS in The Land Between. Implement additional measures as they are developed.

Strategy: Citizen Science

Activities:

- Promote bat-related citizen science programs throughout the region.
- Promote and encourage bat sightings submissions to The Land Between’s iNaturalist project.
- Consider developing a loan-out program for bat monitoring equipment across The Land Between. Develop an associated citizen science program and/or develop the loan-out program in tandem with other organizations that already have a bat monitoring program in place.
- Develop an insect reporting and monitoring citizen science program to monitor bat prey populations in The Land Between.

<u>Sub target: Insect Pollinators</u>

Just as “All SAR and non-SAR birds" have been identified as a target, so too have we identified all declining insect pollinators as a target. This target will capture goals and strategies that apply to all at-risk pollinators in The Land Between, including those listed as at-risk for which an additional sub target has been set.

Insect pollinators include bees, wasps, butterflies, beetles, flies, ants, and moths. Declining insect pollinators are identified as a target in this strategy because they too face many of the same threats posed to all other species included in this strategy: habitat loss and fragmentation, pollution, pesticides, disease, and climate change. Declining insect pollinators are further

included as a target because so often the general public and decision makers overlook all other insect pollinators that are not bees. And while bees are incredibly important pollinators, so too are wasps, butterflies, beetles, flies, ants, and moths.

Goal:

- By 2035, completely eliminate the application of glyphosate spray and other insecticides in The Land Between Bioregion.
- Stop or slow the rate of declining native insect populations in The Land Between in perpetuity.

Objectives:

- Increase public awareness of the dangers and effects of glyphosate spray on the natural environment, human health, and the economy by 2026.
- Continue to support research into the effects of glyphosate on human and environmental health until the use of the substance is banned in The Land Between.
- Increase the knowledge, awareness and appreciation of the general public of these species, their importance in a functioning ecosystem, and the capacity of the general public to contribute to conservation efforts for the species by 2026.
- Increase the knowledge and capacity of municipalities in The Land Between to create butterfly/pollinator gardens on municipal property by 2031.
- Increase the amount of butterfly/pollinator gardens on private property in The Land Between by 2031.
- Increase the capacity of private landowners and municipalities to re-naturalize disturbed/degraded habitat areas by 2031.
- By 2026 , increase public awareness of the causes of declines in insect populations.
- By 2026, increase the awareness of municipalities, private landowners and the general public of the existence and role of insect pollinators other than bees and butterflies

Strategy: Research and Monitoring

Activities:

- Connect with and support researchers and other conservation groups monitoring insect populations in and around the region. Assist where necessary and possible.

Strategy: Outreach, Communication and Education

Activities:

- Educate the general public, landowners and municipalities on the role of native plants in the natural environment through Habitat Health Checks, Design-your-own Shoreline Garden workshops, and the Design-your-own Shoreline Garden Guidebook, information sheets, social media posts and website content.
- Increase public awareness of the decline of insect populations and the known causes through information sheets, social media posts and website content.

- Communicate linkages between insects and insectivores (nightjars, other aerial insectivores, amphibians, fish).

Strategy: Skills Development and Capacity Building

Activities:

- Educate and assist landowners in stewarding their properties and creating pollinator gardens for SAR and non-SAR insect pollinator species through Habitat Health Checks, Design-your-own Shoreline Garden workshops, and the Design-your-own Shoreline Garden Guidebook.
- Promote the use of natural, non-toxic pest control applications whenever possible to municipalities, private landowners and the general public by communicating the impacts of insecticides to SAR and non-SAR pollinators, even those that are marketed as 'natural' through information sheets, social media posts and website content.

Sub target: SAR Lepidoptera of TLB (Mottled Duskywing, Monarch Butterfly)

The lepidoptera species included in this target are the Mottled Duskywing (Federally unlisted, Provincially Endangered) and the Monarch Butterfly (Federally and Provincially Special Concern).

In Canada, Mottled Duskywings occur only in southern Manitoba and southern Ontario. They are non-migratory and do not appear to be able to travel large distances. Mottled Duskywings are found where New Jersey Tea and Prairie Redroot grow such as early successional habitats, tall grass prairies, and alvars with sandy soils. Mottled Duskywings mate and lay eggs exclusively on New Jersey Tea and Prairie Redroot from mid May to late June. The larvae hatch after a few days and construct leaf-nests by weaving together leaves with silk. Mottled Duskywings overwinter as mature larvae or in a cocoon, and emerge as butterflies from May to June. Threats to Mottled Duskywing include habitat fragmentation, loss of suitable habitat for hosts plants (New Jersey Team and Prairie Redroot) as a result of forest fire suppression and invasive species proliferation resulting in canopy closure and limiting the amount of light that can reach the forest floor, and heavy browsing by White-tailed Deer.

The Canadian breeding range of the Monarch butterfly extends through all 10 provinces and the Northwest Territories where milkweed is found. Milkweed grows in open, sunny, and periodically disturbed areas such as ditches, abandoned farmland, wetlands, prairies, and open forests. Monarchs lay their eggs on the underside of milkweed leaves where the resulting caterpillars eat continuously for up to two weeks before forming a chrysalis and later emerging as a butterfly. Threats to the Monarch Butterfly include habitat loss and degradation in their overwintering grounds, declines in milkweed populations due to the use of herbicides and insecticides, and direct or indirect exposure to harmful and lethal pesticides while foraging.

Goal:

- Assist in efforts to maintain or increase SAR lepidoptera species population levels in The Land Between in perpetuity.

Objectives:

- Increase the knowledge, awareness and appreciation of the general public of these species, their importance in a functioning ecosystem, and the capacity of the general public to contribute to conservation efforts for the species by 2026.
- Ensure a constant supply of breeding/nectaring habitat for lepidoptera species in The Land Between in perpetuity.
- Increase awareness and capacity of municipal road crews and other transportation corridor maintenance crews to minimize their disturbance of milkweed and other important plants to Monarch butterflies by 2031.
- Increase landowner capacity to create and steward butterfly habitat on their properties by 2031.
- Increase the amount of appropriate New Jersey Tea (*Ceanothus americanus*) and Prairie Redroot (*Ceanothus herbaceus*) planted on private/municipal land at or near locations where Mottled Duskywing has been known to occur by 2031.
- Promote participation in Moth Monitors Citizen Science program.

Strategy: Research and Monitoring

Activities:

- Connect with and support researchers and other conservation groups monitoring SAR Lepidoptera in and around the region. Assist where necessary and possible.
- Where possible and feasible, support and/or participate in determining approximate baseline population levels in The Land Between (where this information is not yet known).

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather existing data on the distribution of New Jersey Tea and Prairie Redroot
- Generate maps
- Monitor trends in species over time

Strategy: Outreach, Communication and Education

Activities:

- Educate landowners, municipalities and the general public on how to identify SAR lepidoptera species in The Land Between, as well as their habitat needs and threats through the SAR toolkit, information sheets, social media posts and website content.
- Create and promote a “Milky(weed) Way” campaign to promote the inclusion of native milkweed species in private and municipal gardens, as well as the benefits of the plants to Monarch Butterflies and other pollinators.

- Continue to promote existing conservation efforts centered around Monarch Butterflies and Mottled Duskywing in The Land Between and Ontario.
- Work with partners to highlight grassland conservation and restoration efforts, and publicize these efforts.
- Communicate the environmental role and benefits of natural open spaces to all the species that depend on them including birds, insects, reptiles, and so on, as well as the natural heritage value of the landscapes to all stakeholder groups.
- Communicate the rarity, distinctiveness and biodiversity of open habitats to the general public through blog posts, social media posts, website content and other creative avenues.
- Communicate the importance, function and fragility of open habitats to municipal planners and other decision makers through targeted outreach and the development and or promotion of relevant informational resources
- Communicate the importance, function and fragility of open habitats to private landowners and the general public through blog posts, social media posts, website content and other creative avenues.
- Educate landowners, municipalities and the general public on the various types of native milkweed found across The Land Between, where they grow, and where they can be planted in wildflower and pollinator gardens on private and municipal property through The Land Between's native plant online resources, information sheets, and social media posts.

Strategy: Skills Development and Capacity Building

Activities:

- Promote the planting of New Jersey Tea and Prairie Redroot by municipalities and private landowners across The Land Between, particularly in areas at or near where Mottled Duskywing has been known to occur, as well as the role the native plants play in the environment and to the survival of Mottled Duskywing specifically.
- Develop a SAR toolkit, for specific habitat types; to benefit the Monarch Butterfly, and grassland habitat.
- Develop outreach and learning materials to cultivate landowner knowledge and skills for sustainable grassland habitat management.

Strategy: Citizen Science

Activities:

- Promote Lepidoptera citizen science programs throughout the region.
- Promote and encourage Monarch Butterfly and Mottled Duskywing sightings submissions to The Land Between's iNaturalist project.
- Gather data on the status and distribution of Monarch Butterfly habitat in The Land Between by soliciting reports of milkweed stands on The Land Between's iNaturalist project page or to the Milkweed Watch program through Nature watch.

- Assist in potential Mottled Duskywing habitat monitoring by soliciting observation of New Jersey Tea and Prairie Redroot to The Land Between's iNaturalist project page. Use volunteer data to assist in the mapping of the plant species' distribution in the region.

Strategy: Services

Activities:

- Promote the use of best management practices for roadside maintenance that maintain and benefit SAR lepidoptera species.
- In partnership with experts, and where such plans have not yet been developed, create regionally and context specific best management practices for roadside, railway and powerline right of way maintenance to limit the impact of such activities SAR Lepidoptera and other pollinator habitat. Guidelines will incorporate "timing requirements, invasive species present, species of Milkweed native to that region, and the nature of activities."
- Offer Habitat Health Check services to properties identified as having significant grassland habitat.
- Create or support and publicize existing awards program recognizing grassland conservation or stewardship efforts by or with the help of private landowners.

<u>Sub target: SAR Bumble Bees of TLB and all Native Bumblebees Bees</u>

There are two species of bumble bee listed as at-risk in The Land Between, the Gypsy Cuckoo Bumble Bee (Federally and Provincially Endangered) and the Yellow-banded Bumble Bee (Federally and Provincially Special Concern). Unfortunately however, the Gypsy Cuckoo Bumble Bee has not been observed in Ontario since 2014 and is believed to be extirpated from The Land Between (Colla, 2017). The species has been included in this target in the hopes that it may one day return to the region.

All native bumblebees have also been included in this target, as they are facing many of the same threats posed to the two SARs in the region. There are 16 species of bumblebee native to the province of Ontario.

In Canada, the Gypsy Cuckoo Bumble Bee occurs in all provinces and territories except Nunavut. They are social parasites, meaning that a female takes over the colony of another Bumble Bee species. They follow the life cycle pattern and habitats of their hosts, and therefore live and forage in a diverse range of habitats such as forests, meadows, grasslands, roadsides, and urban areas. Gypsy Cuckoo Bumble Bees emerge in the early spring from overwintering sites in rotting logs, leaf litter, soil burrows, or garden compost and begin to search for a host nest. The decline of host species populations is believed to be the most significant threat to the Gypsy Cuckoo Bumble Bee. In Ontario, the most commonly selected hosts are Rusty-patched Bumble Bees and Yellow-banded Bumble Bees, which are themselves listed as Endangered and Special Concern, respectively, both federally and provincially. Other threats to the Gypsy Cuckoo include introduced disease from domestic or managed bee populations, habitat fragmentation and degradation and direct or indirect exposure to harmful and lethal pesticides while foraging.

Goals:

- Assist in efforts to maintain or increase native bee population levels in The Land Between in perpetuity.

Objectives:

- Increase the knowledge, awareness and appreciation of the general public of the ecological uniqueness of these SAR bumblebees, and all bumblebees in general by 2026.
- Increase the knowledge and awareness of municipalities, farmers and beekeepers of the threats (pathogen spillover, competition for flowering resources) posed by managed bees to native bee populations and enhance their capacity to address the problem by 2031.

Strategy: Research and Monitoring

Activities:

- Connect with and support researchers and other conservation groups monitoring bee populations in and around the region. Assist where necessary and possible.
- Support and promote efforts to monitor population levels and species distributions in The Land Between.
- Determine a baseline estimate of the number of managed bee operations operating in The Land Between. Obtain the contact information of these individuals.

Strategy: Outreach, Communication and Education

Activities:

- Educate landowners, municipalities and the general public on how to identify SAR bee species in The Land Between, as well as their habitat needs and threats through the SAR toolkit, information sheets, social media posts and website content.
- Communicate the unique biology and life history of the Gypsy Cuckoo Bumblebee, and the link between the Gypsy Cuckoo Bumble Bee, The Rusty-patch Bumblebee, and the Yellow-banded Bumblebee to the general public through information sheets, social media posts and website content.
- Educate the general public and municipalities of the impacts (pathogen spillover and competition) of managed bees to SAR bees in The Land Between.

Strategy: Skills Development and Capacity Building

Activities:

- Encourage and promote adoption of methods and practices that limit or eliminate the impacts of pathogen spillover and flower competition between managed and SAR/other bees to municipalities, the agricultural industry and managed bee operators.
- Promote the use of natural, non-toxic pest control applications whenever possible to municipalities, private landowners and the general public by communicating the impacts of insecticides to SAR and non-SAR pollinators through information sheets, social media posts and website content.

Strategy: Citizen Science

Activities:

- Promote the use of Bumblebee Watch.
- Develop and/or promote training programs for the general public to be able to accurately ID Bumblebees in The Land Between to the species level.

Sub target: SAR Plants

All plants (trees, shrubs and herbs) listed as at-risk occurring in The Project, with the exception of the aquatic plant Engelmann's Quillwort, have been included in this target. This is because, though many of these species occupy drastically different habitats (forests, wetlands, prairies, etc.), the capacity of The Charity to execute many of the actions identified in each species' recovery strategy, is limited, and as such the charity will play a supporting role in any efforts to conserve and recover these species, rather than one of primary leadership.

The plants that are listed as at-risk in The Land Between are:

- American Ginseng (Federally and Provincially Endangered)
- Black Ash (Federally and Provincially Unlisted, Threatened by COSEWIC)
- Branched Bartonia (Federally and Provincially Threatened)
- Broad Beech Fern (Federally Unlisted, Provincially Special Concern)
- Butternut (Federally and Provincially Endangered)
- Eastern Prairie Fringed-orchid (Federally and Provincially Endangered)
- Spotted Wintergreen (Federally and Provincially Endangered)

Threats to the survival of these plants vary by species, but some of the commonly shared threats include habitat loss, disease and pests, excessive browsing by animals and damage as a result of recreational activities such as hiking or ATV use. Some of these species have very specific threats including the following:

- American Ginseng: Illegal harvest of the roots for medicinal use
- Black Ash: Emerald Ash Borer - an invasive, wood-boring beetle whose larvae dig into the wood and cut off the flow of nutrients, thereby killing the tree
- Butternut: Butternut Canker, a fast-spreading, non-native fungus that chokes off the flow of water and nutrients between the roots and branches, eventually killing the tree and; removal from private property - some landowners remove Butternuts from their property in an effort to sell them before they are infected, which would reduce the quality of the wood

Unfortunately, many of these species have very few remaining individuals or populations in The Land Between and/or the province of Ontario. Even more unfortunately, Spotted Wintergreen is believed to be extirpated from The Land Between.

Goal:

- Assist in efforts to maintain or increase populations levels of these SAR plant species in The Land Between in perpetuity.

Objective:

- By 2031, determine baseline population sizes and distribution of SAR plants across The Land Between bioregion.
- Work with municipalities and other planning officials to take SAR species habitat into consideration by 2035.
- By 2031, decrease 'plant blindness' among private landowners, municipalities and the general public.
- Ensure there is sufficient habitat for these plant SAR in The Land Between in perpetuity.
- By 2026, increase the knowledge, awareness and appreciation of landowner, municipal and general public of plants (SAR and otherwise) and the role they play in the ecosystem.
- Increase landowner, municipal and public awareness, knowledge and appreciation of the individual SAR species included on this list, the threats to each of them, their ecological significance and the capacity for these groups to address some of these threats
- Increase awareness, knowledge and understanding of landowners, the general public and municipalities of the threats associated with invasive and non-native insect pests and plant diseases including Emerald Ash Borer and Butternut Canker by 2026.
- By 2031, increase the capacity of municipalities, private landowners and the general public to identify common tree pests and diseases, and take the appropriate action when they are detected.
- Increase in the adoption of the sensitive and appropriate management of forests for biodiversity as well as economic value in the region, by both the forestry industry and private landowners, by 2031.
- By 2031, increase the capacity of the general public and private landowners to limit the spread of Emerald Ash Borer
- By 2031, increase the capacity of municipalities and other planning officials to adopt habitat and SAR protection into their land use planning
- By 2031, increase the number of landowners that are participating in the Conservation Land Tax Incentive Program (CLTIP) and other land conservation incentives.
- Increase awareness and capacity of municipal road crews and other transportation corridor maintenance crews to minimize their disturbance of native plant species, SAR or otherwise, that occur on the sides of roads.

Strategy: Research and Monitoring

Activities:

- Establish partnerships with other researchers and conservation groups monitoring within the region.
- Support and participate in efforts to monitor existing populations (where required) for these SAR species.

- Report the observation of any of these species detected through the Habitat Health Check program.

Strategy: Mapping and Modeling

Activities:

- Provide mapping services where required.

Strategy: Outreach, Communication and Education

Activities:

- Develop a month-long, annual communication and activity campaign to combat ‘plant blindness’. Communications and activities will focus on the fundamental role plants play in terrestrial and aquatic environments, their biological complexity, their beauty and some of the more ‘impressive’ or ‘awe inspiring’ plants that occur in The Land Between.
- Educate municipalities, private landowners and the general public on the existence of these species, how to identify them, the role they play in the natural environment, and the threats they face to survival through the dissemination of the SAR toolkit, information sheets, website content, and social media posts.

Strategy: Skills Development and Capacity Building

Activities:

- Communicate to private landowners and municipalities the potential for disease resistance in Butternut trees and the importance of avoiding tree removal in anticipation of mortality through information sheets, website content, and social media posts.
- Communicate the importance of staying on designated trails when recreating outdoors in the summer so as to minimize impact and damage to these and other SAR species through information sheets, website content, and social media posts.
- Educate private landowners and the general public on how to minimize the spread of Emerald Ash Borer through information sheets, website content, and social media posts.
- Assist in the promotion of existing campaigns to burn firewood where you buy it so as to reduce the spread of Emerald Ash Borer, and other tree pests and disease.
- Promote the benefits of utilizing Emerald Ash Borer traps to municipalities in order to allow for early detection of the pest.

Strategy: Habitat restoration

Activities:

- Support and participate in efforts to restore critical habitat of these SAR species (where required).

Strategy: Citizen Science

Activities:

- Design a tree disease identification training program and associated tools for volunteer citizen scientists to be able to recognize, identify and report sightings of tree pests and disease.

Strategy: Services

Activities:

- Implement and/or support the implementation of best management practices at the local and landscape scales to mitigate threats to American Ginseng and other plant SARs.
- Where they do not already exist, and with the input of partners and experts, develop regional best management practices for the mitigation of threats to these species as required.
- Work with municipal officials to develop best management practices and adjust road maintenance schedules to minimize the impact of road maintenance activities to individuals occurring near the side of the road.
- Educate private landowners on the existence of the CLTIP and other land conservation incentives through the Habitat Health Check program, website content, information sheets and social media posts.
- Promote the use of best management practices for roadside maintenance that maintain and benefit native plant species, SAR or otherwise, that occur on roadsides and other corridors.

Sub target: SAR Lichen

There are two species of lichen listed as at-risk in The Land Between, the Flooded Jellyskin (Federally Special Concern, Provincially Endangered) and the Pale-bellied Frost Lichen (Federally and Provincially Endangered).

There are three Canadian subpopulations of Flooded Jellyskin ranging from Manitoba to eastern Quebec with the south-central Ontario population being the largest. In Ontario, Flooded Jellyskin is primarily found in forested areas of seasonal flooding with clean water, minimal sediment, and high availability of calcium. It is most frequently found growing on Green and Black Ash trees, but has also been found growing on Maple, Elm, and Willow. Threats to the Flooded Jellyskin include Emerald Ash Borer, an invasive beetle that threatens ash trees rendering them unsuitable for the growth of Flooded Jellyskin, changes in seasonal flooding due to climate change and damming, and habitat loss and degradation due to residential and agricultural development. Unfortunately, the Flooded Jellyskin is believed to be extirpated from The Land Between.

The Canadian range of Pale-bellied Frost Lichen is limited to southern Ontario. It grows on hardwood trees in humid environments with sufficient calcium in the soil. In Ontario, it grows almost exclusively on Ironwood tree trunks but has also been found on boulders and fence posts. Threats to this species include air pollution, as compounds such as sulfur dioxide suppresses photosynthesis and respiration in Pale-bellied Frost Lichen, and habitat loss due to forest harvesting and residential development.

Goal:

- Assist in efforts to maintain or increase populations levels of these species in The Land Between in perpetuity.

Objectives:

- By 2028, increase landowner, municipal and general public knowledge, awareness and appreciation of lichen, SAR and otherwise, and the role they play in the ecosystem.
- By 2026, increase awareness, knowledge and understanding of landowners, the general public and municipalities of the threats associated with invasive and non-native insect pests and plant diseases to lichen and other SAR and non-SAR species.
- By 2031, increase the capacity of municipalities, private landowners and the general public to identify Emerald Ash Borer and Emerald Ash Borer infested trees, and take the appropriate action when they are detected.
- By 2031, increase the capacity of the general public and private landowners to limit the spread of Emerald Ash Borer.

Strategy: Outreach, Communication and Education

Activities:

- Educate municipalities, private landowners and the general public on the existence of these species, how to identify them, the role they play in the natural environment, and the threats they face to survival through the dissemination of the SAR toolkit, information sheets, website content, and social media posts.

Strategy: Skills Development and Capacity Building

Activities:

- Promote the benefits of utilizing Emerald Ash Borer traps to municipalities in order to allow for early detection of the pest.
- Educate private landowners and the general public on how to minimize the spread of Emerald Ash Borer through information sheets, website content, and social media posts.
- Assist in the promotion of existing campaigns to burn firewood where you buy it so as to reduce the spread of Emerald Ash Borer, and other tree pests and disease.

Strategy: Citizen Science

Activities:

- Design a tree disease identification training program and associated tools for volunteer citizen scientists to be able to recognize, identify and report sightings of tree pests and disease.

Sub target: Disappearing common terrestrial species:

Black Bear and Moose are two species in The Project area that are commonly occurring. Their presence is expected throughout the region: embedded in the cultural history of this place.

Black bears are a native and integral component of healthy ecosystems. They are an example of an 'umbrella species:' protecting a habitat capable of supporting bears (one of the largest terrestrial carnivores) will protect the habitat of a variety of other species as well. There are direct and indirect positive ecosystem implications for over a hundred other species as a result of bears' presence (OMNR, 2009).
Moose are the largest ungulate species currently occupying the boreal and temperate regions of North America; as such, they hold a strong ecological role as food source for large predators such as wolves and bears (Popp, J.N., et al, 2019). In addition to their cultural and historic significance, moose continue to generate important socioeconomic value as a harvested species (*ibid.*).

In recent years, Ontario has seen a decrease in the provincial moose population due to factors such as climate change, parasites, or over-harvesting which may be putting more stress on moose (OMNRF, 2022). The stability of moose populations varies nationally with drastic declines occurring in certain regions, posing a potential threat to the livelihoods of those who rely on this species. Moose remain the primary source of protein for many Indigenous groups, so preserving this species is not only important in terms of food acquisition, but essential for securing traditional ways of life as well as cultural and spiritual values associated with this species (Popp, J.N., et al, 2019).

While these declines have not warranted adding moose or black bear to provincial or federal Species at Risk lists, they are significant nonetheless. Proactive work is necessary to protect these critical species from disappearing.

Goals:

- Assist in efforts to stop or reverse declines of populations of these common species in The Land Between in perpetuity.

Objectives:

- Where possible and feasible, determine the approximate baseline population levels of each of these species in The Land Between by 2025.
- Ensure a constant supply of habitat for these species in The Land Between in perpetuity
- Increase public awareness of the presence of these and other common, cornerstone species on The Land Between Landscape, and the threats they face by 2026.
- By 2031, increase the capacity of municipalities to build the needs of these and other species into their official plans.

- By 2031, the province of Ontario and/or the federal government issues appropriate and targeted direction for the sustainable management of The Land Between Bioregion and associated natural capital.
- By 2031, the amount of private land that is being effectively stewarded for wildlife, common and otherwise, is increased by 15%.

Strategy: Research and Monitoring

Activities:

- Gather available population data for each of these species in The Land Between.
- Connect with and support researchers and other conservation groups monitoring these species in and around the region. Support population monitoring efforts wherever possible.
- Use best available data and knowledge to estimate baseline population levels.
- Support and/or advocate for the continual monitoring of the status of the populations of these species in The Land Between.
- Support, wherever possible and feasible, efforts to monitor the carrying capacity of the landscape, through in-kind support and coordinated efforts.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate maps.
- Monitor trends in habitat availability over time.

Strategy: Outreach, Communication and Education

Activities:

- Increase public awareness of the presence of these and other common, cornerstone species of The Project, and the threats they face through website content, social media posts, information sheets, and the Habitat Health Check program.
- Continue to advocate for provincial and federal direction for the appropriate management of The Project, including the implementation of new/additional legislation where necessary.

Strategy: Skills Development and Capacity Building

Activities:

- Increase the amount of protected habitat on private land through stewardship through the Habitat Health Check program.
- Promote the integration of conservation blueprint models in official municipal plans and provincial guidelines to municipal officials as well as the general public.

11.4 Target Category: Aquatic Habitats and Species

The following targets and sub targets are included in this category:

- Target: Wetlands
    - Sub-target: Wetland Birds
- Target: Lakes and Shorelands
    - Sub-target: Lake Trout

Target: Wetlands

Wetlands, areas where the water table is near, at or above the ground for some or all of the year, are one of the most biodiverse habitat types in The Land Between, Ontario and the world. Wetlands can be broadly classified into one of four types: marshes, swamps, bogs and fens. They are often transitional zones between habitats and can be found along lakes and rivers (lacustrine and riparian wetlands, respectively), isolated on the landscape, or intermixed with terrestrial habitats such as forests and prairies.

The Land Between bioregion is home to approximately 100,000 wetlands, each of which plays a critical role in supporting species, both at-risk and common, humans, and the economy of Ontario. Not only do they provide critical habitat to birds, reptiles, amphibians, insects, mammals and fish, they also provide important spaces for human recreation and medicine gathering. Economically, the role of wetlands cannot be understated as they are estimated to generate approximately 14 billion dollars in benefits in southern Ontario each year (OMNRF, 2017). Wetlands filter water and provide a natural source of erosion and flood mitigation. Studies have found intact wetlands on a landscape can reduce the cost of a flood by up to 38% (*ibid.*). Further, they store massive amounts of carbon, preventing it from entering our atmosphere and contributing to climate change.

Sadly, the threats to these critical habitats in Ontario and The Land Between are numerous. Some of the most pressing threats in southern Ontario include land conversion for agricultural, urban and commercial development, pollution from both sedimentation (erosion) and chemical pollutants, invasive species proliferation and anthropogenic alteration of water levels (*ibid.*). Some of the threats identified to wetlands in Northern Ontario by the OMNRF's *Wetland Conservation Strategy* include urban and agricultural development, mining and transportation infrastructure (2017). These threats have been identified in The Strategy Document because they have been identified as threats to wetlands in parts of The Land Between Bioregion. Lastly, a threat to wetlands everywhere in The Land Between and throughout Ontario is climate change (*ibid.*).

The *Wetland Conservation Strategy* also identified the greatest challenge to wetland conservation as the lack of value placed on wetlands by society (2017). Many of the goals, objectives, strategies and activities layed out for this target work to directly address this challenge, as well as the other threats outlined above.

Goals:

- Retain 100% of all wetlands identified as significant in The Land Between in perpetuity.
- Retain 75% of the wetland habitat deemed suitable for SARs in The Land Between in perpetuity.
- Retain 75% of all remaining wetlands (riverine, palustrine, etc.) in the region in perpetuity.

Objectives:

- By 2027, identify all of the potentially significant wetlands in The Land Between.
- By 2031, increase municipal capacity to conserve the wetlands deemed significant in their regions.
- By 2031, identify all potentially suitable wetlands for SAR.
- By 2031, complete the mapping and typing of all of the wetlands in The Land Between.
- By 2031, correct all (as required) wetland boundaries in The Land Between
- By 2034, increase municipal capacity to allow for meaningful wetland conservation and land use planning
- Increase public and municipal awareness and understanding of the role of wetlands in water regulation, and their role in regional adaptation to climate change by 2026
- By 2029, increase the awareness of the general public of what exactly a significant wetland is, and why they require protection
- Increase the awareness, appreciation and valuation of wetlands as medicine places by the general public by 2029.
- By 2029, increase the awareness and understanding of municipalities, landowners and the general public of the function and importance of wetlands in our ecosystem
- By 2031, increase landowner capacity to properly steward the wetlands on their property.

Strategy: Research and Monitoring

Activities:

- Ground truth wetlands identified as potential SAR habitat.
- Correct wetland boundaries through field deployment, across The Land Between, where necessary.
- Ground truth necessary typed wetlands to confirm.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Identify all of potentially significant wetlands in The Land Between based on historical and current SAR occurrence data.
- Using expert and Traditional knowledge, identify all potential SAR wetland habitat (birds, turtles, snakes, etc) in The Land Between.

- Complete a quaternary watershed assessment of all the watersheds in The Land Between.
- Create infographics/maps of the water in various regions to be used by landowners and official planners in development decision making. The infographics/maps will highlight where water in the region is coming from, and where it is going, along with any other relevant information.

Strategy: Outreach, Communication and Education

Activities:

- Increase public awareness and knowledge of what a wetland is, their importance as medicine places, and the role wetlands play in the environment (habitat, flood control, climate change mitigation, etc.) through website content, social media posts, information sheets, the Blue Lakes website content, and the Wetland Watchers and Habitat Health Check programs.
- Publicize the economic value of wetlands through website content, social media posts, the Habitat Health Check program, and other avenues, using dollar values wherever possible.
- Publicize the link between wetlands and human health by depicting wetlands as kidneys, or another relevant and comparable body part.
- Highlight and publicize the value (other than economic) of wetlands to humans through a series of information sheets.
- Highlight and publicize the percentage of wildlife (flora and fauna) that depend on wetlands for at least some part of their life history.
- Institute once per season wetland webinars in which features of various wetlands throughout The Land Between are discussed, what is happening in wetlands and the species in wetlands in each season, etc.
- Depict the threats to wetland habitats as another equivalent to human anatomy (i.e if wetlands are kidneys, development and invasive species and other threats are kidney stones, tumors, etc.).
- Promote land trusts and other land securement avenues to landowners and municipalities with large and or significant wetlands on their properties.
- Increase valuation, appreciation, understanding and knowledge about wetlands of the general public through the Wetland Watchers program, webinars and training workshops.
- Publicise case studies of companies (such as OPG) that are partnering with NGOs (like DUC) and other organizations to create, protect and conserve wetlands (to the benefit of both the business and nature).
- Create blogs and other educational content explaining what wetland offsetting is and why it is not an alternative for leaving wetlands intact and in place.

Strategy: Skills Development and Capacity Building

Activities:

- Create a SAR toolkit, for SAR habitats.

- Increase landowner capacity to steward the wetlands on their property through the Wetland Watchers program and the Habitat Health Check program.

Strategy: Services

Activities:

- Create a 'Welcome Wagon' program to be delivered to landowners when they purchase a property with one or more wetlands on it. The Welcome Wagon will include information on wetlands (what they are, what they do, what they support, etc.), proper wetland stewardship, and resources about The Land Between and other local conservation organizations where they can learn more about wetlands and wetland stewardship.
- Establish a wetland evaluation service run through the charity, offering wetland evaluations at a discounted price to municipalities, to encourage their use of the service and to ensure wetlands are appropriately evaluated prior to development.
- Work with municipalities to integrate the conservation of significant wetlands (and as many other wetlands as possible) into their official plans by providing data (where possible and required) and access to expert knowledge.

Strategy: Citizen Science

Activities:

- To gain further baseline knowledge about the wetlands across The Land Between, create a waterfowler and fur harvester Citizen Science program in which participants collect basic information on the wetland (dominant vegetation type, amount of open water, presence/absence of peat moss, etc.), as well as record any species sightings/evidence of species presence (i.e. beaver lodge). Information gained through this program can further be used to inform the wetland typing exercise to be completed by 2031 (see above).
- Institute and host wetland bio blitzes to increase the knowledge, appreciation, awareness and valuation of wetlands and the species that live in them.

<u>Sub-target: Wetland Birds</u>

There are three species at-risk wetland birds occurring in The Land Between: Black Tern, Least Bittern and King Rail. Their federally and provincial listings are as follows:

- Black Tern: Federally Unlisted, Provincially Special Concern
- Least Bittern: Federally and Provincially Threatened
- King Rail: Federally and Provincially Endangered

The Black Tern is a migratory species that breeds across the northern United States, and from British Columbia to Quebec. They overwinter along the western coast of Central America and the northern parts of South America. In Ontario, Black Tern populations are scattered throughout the Great Lakes, across The Land Between, and throughout northern parts of the province where suitable nesting sites exist. The ideal breeding habitat is shallow, freshwater

marshes with emergent vegetation where nests can be built away from shore, sheltered from wind and waves. Threats to Black Terns include habitat destruction and degradation due to shoreline development, changes in wetland dynamics and reduction of suitable habitat due to invasive species, and mortality from boating and jet skiing.

The Least Bittern is a migrating species that overwinters in Central America, though some populations remain year-round in South America. Ontario has the highest concentration of the Canadian breeding population which can be found in the southern half of the Land Between and at the southwestern tip of the province near Lake St. Clair. They are commonly found in large, cattail-dominated marshes with lots of emergent vegetation, shallow water, and patches of open water. They use vegetation for building nest platforms, hunting platforms, and for protection against predators. Marshes greater than five hectares are more likely to be occupied. Threats to the Least Bittern include loss of suitable wetland habitat due to agriculture and other development, invasive species including European Common Reed (invasive phragmites) and invasive cattails which outcompete native vegetation and reduce the nesting substrate for Least Bitterns, and reduced availability of prey species due to environmental contaminants.

The King Rail is a migratory species that breeds in fresh or brackish water across the eastern United States, from the Gulf of Mexico to southern Ontario. They overwinter primarily in the coastal marshes and plains of the Gulf of Mexico. Their complete breeding range is unknown because the King Rail is notoriously secretive and difficult to detect in surveys. In Ontario, the King Rail primarily inhabits coastal wetlands connected to the Great Lakes in the southwestern region by Lake Erie, Lake St. Clair, and along Lake Ontario. There have been some sightings further inland, including select areas of the Land Between. King Rails require complex wetland habitats with both wet and dry areas, and a mix of both open water and densely vegetated areas. They tend to live in shallow water, though a range of depths is preferred, with lots of plants available for cover, nesting and stability while walking. Threats to the King Rail include loss of suitable wetland habitat due to agricultural, residential and commercial development, both in Southern Ontario and in the cottaging region of Central Ontario and increased development in southern Ontario, and cottage demand in Central Ontario, increased predation due to habitat fragmentation and feral cats, and invasive species, including Invasive Phragmites.

Goals:

- Assist in efforts to maintain or increase population sizes of wetland birds in The Land Between in perpetuity.

Objectives:

- Where feasible, by 2024, determine the approximate baseline population levels of wetland bird populations in The Land Between bioregion. Where this information is already known, integrate it into conservation planning efforts.
- Increase public awareness, knowledge and appreciation of the ecological uniqueness of wetland birds by 2029.

Strategy: Research and Monitoring

Activities:

- Gather available population data for SAR wetland bird species in The Land Between.
- Connect with and support researchers and other conservation groups monitoring wetland bird populations in and around the region.
- Use best available data and knowledge to estimate baseline population levels.
- Using expert, local and volunteer knowledge, identify areas that would benefit from “no wake zone” signs, to minimize the impact of boat wakes to SAR wetland birds and other species, at risk or otherwise.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Identify wetlands where the creation of supplemental nesting habitat would be beneficial to these species.

Strategy: Outreach, Communication and Education

Activities:

- Increase public awareness and knowledge of SAR wetland birds, the role wetlands play in the environment, and the threats they face through the SAR toolkit, website content, social media posts, information sheets, and the Wetland Watchers and Habitat Health Check programs.
- Host wetland birding walks to increase public awareness, knowledge and appreciation of wetland birds species and their habitats.
- Create a series of promotional and awareness building pieces that highlight how cryptic the birds can be. Pieces could include a cryptic bird blitz on social media, cryptic bird search in photos, etc.).
- Educate private landowners about the function and necessity of an intact, natural, native shoreline, and the benefits they bring to both humans and wildlife through the Design-your-own Shoreline Garden workshops and guidebook, shoreline renaturalization site visits, Blue Lakes website content, and the Habitat Health Check program.

Strategy: Skills Development and Capacity Building

Activities:

- Host workshops on floating nest construction and create accompanying “how-to” worksheets.
- Install “no wake zone” signs in hotspot areas identified (see above).

Strategy: Habitat Restoration

Activities:

- Work with partners and relevant stakeholder groups to create supplemental nesting habitat for these species in wetlands in areas where these actions have been identified as beneficial.

Strategy: Citizen Science

Activities:

- Build SAR wetland bird observation reporting (how to ID by site and call, how to ID habitat, etc.) into existing citizen science programs including Wetland Watchers and Phrag Fighters.

Target: Lakes and Shorelands

The Land Between is home to over 2,400 lakes.The water in the region is interconnected above and below ground, and represents critical headwaters, as well as discharge sites, that feed and regulate aquifers and rivers for large cities in the region, as well as a large part of southern Ontario. Lakes provide habitat for countless species including fish, turtles, molluscs, insects, birds and plants. They are also indispensable resources for humans, providing a source of drinking water, recreation areas for activities such as boating, swimming and fishing, and supporting countless economies throughout The Land Between through the cottaging and outdoor recreation and tourism industry they support.

Several factors go into the maintenance of healthy lakes. One of the most crucial is the maintenance of an intact, natural shoreline, or more accurately shoreland, area. The term shoreland is used here, and will be used throughout the rest of the document, in an effort to impart the fact that a ‘shoreline’, that is what people tend to think of as the line between the water and the land, is not a line at all, but rather an area. The ‘shoreline’ is actually the area from a depth of 1 meter in the water (the depth to which sunlight is able to penetrate), to 30 meters upland.

The Land Between bioregion has the highest shoreline to area ratio in Ontario. These vast stretches of shoreland support over 90% of aquatic species, which rely on shorelines for one or more of their life history events. Intact shorelines also provide critical habitat for fish, particularly fish nurseries, providing shade and shelter from predators. The native plants that occupy a shoreline further provide food, shelter and a place to rest for terrestrial and aquatic species alike including birds, insect pollinators, snakes and turtles.

Shorelines further provide important ecological service to humans, including natural erosion control, the filtration of runoff, which ultimately maintains good water quality, flood mitigation, nuisance and pest wildlife control (such as geese and mosquitos), and provides a natural buffer against changes such as those resulting from climate change.

Despite the essential nature of both lakes and shorelines in The Land Between bioregion, these habitats face several threats, with one of the greatest being rampant development along shorelands of both cottages and year-round residences. With this development comes an increased amount of shoreline hardening and shoreline vegetation removal, increased unfiltered runoff into lakes and rivers, and therefore increased nutrient and contaminant loading in these water bodies. Other threats include increased erosion and sedimentation, invasive species proliferation (both plants and animals), and increased noise and light pollution. These threats and more ultimately result in habitat destruction for the countless species that depend on these habitats, as well as the depreciation of the economic value of the limited resource of lakes and shorelands in the region. One of the most significant barriers to lake and shoreland protection identified is knowledge gaps and an absence of specific skills amongst those who influence lakeshore practices (Paterson, O'Donnell, Loomis, & Hom, 2010; Egan, 2014). This strategy will work to address these threats and limitations.

Goals:

- By 2035, the amount of suitable native fish habitat in The Land Between is increased by 25%.
- By 2031, at least 75% of the shoreland habitat around each waterbody in The Land Between is maintained or restored.
- By 2031, at least 75% of the shoreland habitat on each privately owned land parcel is maintained or restored.

Objectives:

- By 2027, determine the approximate percentage of developed shorelands around lakes in The Land Between.
- By 2027, as much as possible, determine the baseline percentage of privately owned properties with hardened shoreline or shoreland structures.
- By 2035, a 50% reduction in the area of hardened surfaces around shorelands on private property in The Land Between is achieved.
- By 2029, increase landowner, municipal and public knowledge, understanding and appreciation of shorelands and lakes for their biodiversity, interdependent functions and services
- By 2029, increase landowner, municipal, and public knowledge and understanding of what exactly a shoreland is and why it is so integral to lake health.
- By 2029, increase landowner, municipal and public knowledge and understanding of the fragility lakes to alterations and impacts, and the role of healthy, intact shorelands in maintaining lake health
- By 2029, increase the understanding of landowners, municipalities and the general public of the impacts of recreational boat use on lake health.
- By 2029, increase the capacity of recreational boaters to limit their impact to lake health.
- By 2029, increase the understanding of landowners and municipalities of the impacts of human activity and development on lake health

- By 2031, increase the capacity of private landowners to limit the impact of their alteration and/or use of shoreland habitats.
- By 2031, increase the capacity of private landowners to live in harmony with an intact, native and natural shoreland, and the species they support.
- By 2029, increase landowner awareness and understanding of the potential impacts of docks on lake health, and increase landowner capacity to mitigate these potential impacts
- By 2031, increase the knowledge, skills and capacity of key stakeholders including real estate agents, municipal officials, landscapers and planners to educate landowners and mitigate the risks posed by development on shorelands to lake health.

Strategy: Research and Monitoring

Activities:

- Gather available data on shoreland development and the degree of habitat connectivity around lakes in The Land Between.
- Connect with and support researchers and other conservation groups monitoring shoreland development in and around the region.
- Use best available data and knowledge to estimate baseline levels of development around shorelands in The Land Between.
- Use best available data and knowledge to estimate the baseline percentage of hardened shoreland structures around each lake (with development around it) in The Land Between.
- Continue to participate on the steering committee of Watersheds Canada's Planning for our Shorelands project, surveying and discussing the issues faced by municipalities, planning officials, Lake Association members, and other stakeholder groups, and contributing to discussions on how the issues can best be addressed, with a specific focus on what charities and other NGOs can do to address the issues

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate maps.
- Monitor trends in shoreland development over time.

Strategy: Outreach, Communication and Education

Activities:

- Communicate the science of shorelands (what they are, what they do for the ecosystem, etc.), the value of an intact shoreland, the impacts of shoreland development on the function of the natural ecosystem, and the ways that private landowners can use their shoreland habitat without destroying it through the Design-your-own Shoreline Garden Workshops and Guidebook, shoreline restoration programming and site visits, Blue Lakes website content and resources, social media posts and blogs.

- Increase the awareness and understanding of private landowners, municipalities and the general public of the impacts associated with development in and around the shoreline through through the Design-your-own Shoreline Garden Workshops and Guidebook, shoreline restoration programming and site visits, Blue Lakes website content and resources, social media posts and blogs.
- Increase the awareness and understanding of private landowners, municipalities and the general public of the impacts of human activity around the shoreline including night lighting, algae blooms, calcium declines, phosphorus increase, noise, runoff, erosion, surface hardening, and habitat and food removal through programming, website content, social media posts and blogs.
- Create a mini documentary highlighting the fact that children would rather play in and around natural, undeveloped shorelines as opposed to a “clean” and “manicured” one, and highlight why that is (frogs, bugs, flowers, etc.).
- Communicate the economic impacts associated with uncontrolled and unregulated shoreland development to municipalities, private landowners and the general public through targeted outreach and sustained relationship building efforts.
- Develop and launch a communication campaign on waterfront walls and shoreline hardening, communicating the impacts, ecological, aesthetic, and financial, as well as the science behind why they ultimately do not work (except in exceptional circumstances).
- Host a natural and native shoreline garden contest (along a certain lake, collection of lakes, watercourse, etc.) to be judged by the general public, municipal officials, lake association members, etc.
- Consider the revival of The Land Between’s “delicate” ecotourism program but rebranded to heavily focus on treading lightly in all environments in The Land Between.
- Publicise and promote the impacts to human health and wildlife associated with artificial night lighting through website content, social media posts, information sheets and blogs, as well as through programs such as “The Year of the Night Sky”. Consider instituting an annual “Week/Month of the Night Sky” to educate the general public of the issue, as well as easy fixes and adjustments to address them.
- Publicize and promote the impacts to human health and wildlife associated with noise pollution through website content, social media posts, information sheets and blogs. Communications should emphasize the fact that people live in The Land Between (rural, comparatively undeveloped) for a reason, which is the same reason that people choose to have their cottages in the region; and one of those reasons is the nature and natural quiet.
- Publicise and make readily accessible municipal bylaws regarding the issues of artificial night lighting and noise pollution through information sheets and website content/databases.
- Promote the night sky preserves that exist in The Land Between

Strategy: Skills Development and Capacity Building

Activities:

- Increase landowner capacity to naturalize their shorelines (or maintain their shoreline in a natural state) through the Design-your-own Shoreline Garden Workshops and Guidebook, shoreline restoration programming and site visits, and Blue Lakes website content.
- Continue to encourage proper lake stewardship by private landowners, and educate landowners on why such stewardship is necessary, through the Blue Lakes ecolabel program.
- Create and publish a “Guide to living in The Land Between” which includes basic information for landowners and cottagers about living in harmony with nature, rather than on top of it. Included in the guide information about the impacts of recreational aquatic motor vehicles (boats, jet skis, etc.) on lake health (including the “bathtub effect”, spreading invasive species, turtle strikes, other wildlife strikes and disturbance, etc.), and how these potential impacts can be mitigated or avoided.
- Identify highly used boat launches across The Land Between that do not have clear instructions regarding boat washing (how to) and why it is so necessary (invasive species). Install informational boards covering these topics where gaps exist. Work with local municipalities to make this happen.

Strategy: Habitat restoration

Activities:

- Renaturalize shorelines and create shoreline habitat by assisting in the delivery of Watersheds Canada’s Natural Edge program and through the installation of native shoreline gardens through the program.
- Restore habitats through invasive species removal and control. Specific details are outlined in the Upland Invasive Plant Species Target and the Aquatic Invasive Plant Species Target for specific strategies and goals related to this topic.

Strategy: Services

Activities:

- With the help of partners, registered professionals, and information experts, develop a curricula and associated certification program for professionals whose work directly impacts/informs or has the potential to impact/inform, shoreland health and management including landscapers, real estate agents, municipal officials, and other relevant stakeholder groups. The certification program will cover the science, function and importance of natural shorelands, as well as industry specific information.
- Design and/or promote existing best management/maintenance/installation and usage practices documents for docks in The Land Between. Make these documents widely available to all residents and cottagers by having them available on all The Land Between and affiliated organizations websites (Blue Lakes, Turtle Guardians, but also partners like Watersheds Canada, etc.).
- Create a ‘Welcome Wagon’ program to be delivered to landowners when they purchase a waterfront property. The Welcome Wagon will include information on lakes and shorelands (what they are, what they do, what they support, etc.), proper lake and

shoreland stewardship, and resources about The Land Between and other local conservation organizations where they can learn more about lakes and shorelands and their stewardship.
- Create a database of permits and approvals and an easy how to sheet on the process of getting permission to remove invasive species on private or private land, or along road right of ways
- Create a directory of bylaws (regarding shoreline, lake and river issues) by topic, along with who and where to contact (municipal office, municipal official, conservation authority, etc.) for further information/guidance on the issue/bylaw.
- In partnership with Watersheds Canada and other steering committee members and partner organizations, create a Best-Management Practices resource and online forum related to lakeshore and land-use planning to inform and unify rural Municipalities in their efforts to conserve critical socio-economic and ecological resources.

Sub-Target: Lake Trout

Oligotrophic lakes are deep, oxygen rich, and nutrient poor lakes. The Lake Trout is the only major sportfish native to Ontario that is adapted to the conditions in these lakes (OMNRF, 2015). Only 1% of the lakes in Ontario currently support Lake Trout, representing about one quarter of the global Lake Trout lakes (*ibid.*). Lake Trout are very sensitive to environmental changes, have a slow growth rate, and a slow replacement rate, making their populations very susceptible to the impacts of threats (*ibid.*).

There has been a declining trend in both Lake Trout populations and Lake Trout habitat in Ontario (*ibid.*). Threats to the species and its habitat include overfishing as well as habitat destruction as a result of residential development including shoreland vegetation removal and surface hardening (*ibid.*). Development in turn results in pollution from septic systems and fertilizers, increased erosion and water acidification (*ibid.*).

Goals:

- Maintain Lake Trout populations in The Land Between in perpetuity.

Objectives:

- Where feasible, by 2029, determine the approximate baseline population levels of Lake Trout populations in The Land Between bioregion. Where this information is already known, integrate it into conservation planning efforts.
- Increase public awareness, knowledge and appreciation of the ecological uniqueness of Lake Trout by 2030.
- By 2031, reduce the use of wake boats and other submerged motor boats on oligotrophic (Lake Trout Lakes) lakes.
- By 2031, strict site plan controls are imposed and enforced on oligotrophic lakes in The Land Between.

- By 2031, the use of bubblers and fans is banned in all municipalities across The Land Between.

Strategy: Research and Monitoring

Activities:

- Gather available population data for Lake Trout populations in The Land Between.
- Connect with and support researchers, conservation groups, anglers and other relevant stakeholder monitoring/tracking Lake Trout populations in and around the region.
- Use best available data and knowledge to estimate baseline population levels.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate maps.
- Monitor trends in habitat availability over time.

Strategy: Outreach, Communication and Education

Activities:

- Increase public awareness, knowledge and appreciation of Lake Trout and how limited their populations are through website content, information sheets, blogs, and social media posts.
- Increase public awareness of the ecological uniqueness of oligotrophic/Lake Trout lakes through website content, information sheet, blogs, and social media posts.
- Increase public awareness of the impacts of motor boats and other submerged motor craft on oligotrophic/Lake Trout lakes, through website content, information sheet, blogs, and social media posts.

Strategy: Skills Development and Capacity Building

Activities:

- Create and publish a “Guide to living in The Land Between” which includes basic information for landowners and cottagers about living in harmony with nature, rather than on top of it. Included in the guide information about the impacts of recreational aquatic motor vehicles (boats, jet skis, etc.) on lake health (including the “bathtub effect”, spreading invasive species, turtle strikes, other wildlife strikes and disturbance, etc.), and how these potential impacts can be mitigated or avoided.
- Educate private landowners, municipalities and the general public on the impacts of bubblers and aquatic fans to wildlife, as well as alternatives to their use through both the Habitat Health Check program (for private landowners), as well as through website content, information sheet, blogs, and social media posts.

Strategy: Collaboration

Activities:

- Participate in the Fisheries Management Zone advisory councils for the FMZs in The Land Between.
- Work with municipal, provincial and, if necessary, federal governments, to impose and enforce strict rules around development on oligotrophic/Lake Trout lakes.
- Work with municipalities to ban the use of bubblers and aquatic fans on public and private property across The Land Between.

11.5 Target Category: Stand Alone Suites/Individual Aquatic Species

The following sub-targets are included in this category:

- Turtles occurring in The Land Between
- Western Chorus Frog
- Engelmann's Quillwort
- All Amphibians
- Disappearing Common Aquatic/Semi-Aquatic Species

<u>Sub-target: Turtles Occuring in The Land Between</u>

There are eight species of turtle native to Ontario, with over one third of the populations, and seven out of eight species, occuring in The Land Between. All eight species are listed as Species at Risk by COSEWIC, and seven out of eight (all but the Midland Painted Turtle) are federally listed as Species at Risk. Included in this target are six of the native turtle species occurring in The Land Between bioregion: Blanding's Turtle (Great Lakes/St. Lawrence population), Eastern Musk Turtle, Midland Painted Turtle, Northern Map Turtle, Snapping Turtle and Spotted Turtle.

The only other native species of turtle occurring in The Land Between is the Wood Turtle, which was addressed as an individual target in the upland section of this document. The only native turtle species not addressed in this target is the Spiny Softshell Turtle (Federally Endangered, Provincially Threatened), as its range falls outside of The Land Between.

Turtles continue to be threatened by human activity and development, making the Land Between bioregion, a landscape that is currently predominantly undeveloped, a last refuge and safe haven for Ontario turtles. Habitat loss and fragmentation, invasive species, nest predation and illegal collection for the black market all negatively affect turtle populations, however, the greatest risk to most turtle species is road traffic. Because adult females in search of nesting sites are the most affected by roadways, vehicle impacts often affect not only the individual turtle, but future generations.

A brief description of each of the species included in this target can be found below, along with a description of any additional or unique threats faced by each of the species.

Blanding's Turtles

The Great Lakes/St. Lawrence population of Blanding's Turtles is listed as Endangered Federally, and Threatened Provincially. During the active season, Blanding's Turtles spend their time foraging, basking, and moving between habitats. They often travel great distances on land. Blanding's Turtles have a preference for nutrient-rich, slow-moving, shallow water bodies with abundant aquatic vegetation and basking sites. They bask on rocks and logs just above the water's surface as well as in sunny, open areas on land. Blanding's Turtles typically nest in open areas with full sun exposure such as shorelines, forest clearings, or rocky outcrops. They will also nest on human influenced sites, such as gardens, gravel roads and road shoulders. Blanding's Turtles overwinter in habitats with shallow, un-frozen water and can tolerate extremely low levels of oxygen.

The threat posed by roads is especially high for Blanding's Turtles, as they often travel large distances over land, especially during nesting season, putting them at risk of vehicle collisions as they encounter roads and railways. Additional threats to Blanding's Turtles include habitat loss due to residential and commercial development, increasing numbers of human-subsidized predators such as raccoons, foxes and skunks, which in turn results in higher levels of nest predation, and illegal collection.

Eastern Musk Turtles

Eastern Musk Turtles are listed as Special Concern both Federally and Provincially. In Canada, the Eastern Musk Turtle's range extends from southern Ontario, north to Sudbury and North Bay, and to the southernmost parts of Quebec. The Eastern Musk Turtle is a highly aquatic species that rarely leaves the water except to nest or to access adjacent wetlands. They are most active at dusk and dawn, avoiding the midday sun by basking just below the water's surface under the cover of floating vegetation. Eastern Musk Turtles are most commonly found near the shores of well-vegetated, shallow waterways with slow currents such as rivers, bays of lakes, marshes and ponds. They overwinter in shallow waters, burying themselves in the bottom substrate and will occasionally use the burrows of other animals, or muskrat and beaver lodges. During the nesting season, females dig shallow nests in decaying plant matter, rotting wood, or sand and lay 2 to 5 eggs.

Specific threats to Eastern Musk Turtles include habitat loss due to shoreline development and shoreline vegetation removal; fishing, as baited hooks can catch turtles causing serious injury or death; water control structures that alter aquatic corridors, limiting the ability of the turtle to move between water bodies; and changing water levels, which can change habitat composition and flood nests along shorelines. As Eastern Musk Turtles bask hidden just below the water's surface, they are also at risk of injury or mortality as a result of collisions with boats and/or boat propellers.

Midland Painted Turtle

The Midland Painted Turtle is Federally and Provincially Unlisted, but is listed as Special Concern by COSEWIC. Midland Painted Turtles occur from southern Ontario to the southern parts of northern Ontario, and across to southern Quebec. They prefer slow moving, relatively shallow, well-vegetated wetlands with abundant basking sites and organic substrate. This includes marshes, ponds, lakes, and some man-made water bodies. Females typically nest in the afternoon and evening, especially during rainfall, in areas with an open canopy and sand, clay, or gravel substrates including shorelines, sandbanks, gravel roads and road shoulders. Instead of emerging from their nests in the fall, hatchlings will often overwinter in their nests. Adult Midland Painted Turtles overwinter buried at the bottom of wetlands and remain relatively inactive during hibernation. They have a high tolerance for low oxygen conditions.

Threats to Midland Painted Turtles include road mortality, habitat loss, and invasive species such as Red-eared Sliders which outcompete native turtles for food and habitat, and introduce foreign parasites and pathogens.

Northern Map Turtle

The Northern Map Turtle is listed as Special Concern both Federally and Provincially. In Canada, the Northern Map Turtle occurs in southern Ontario and southern Quebec, primarily near the Great Lakes and the St. Lawrence Basin. Northern Map Turtles prefer large lakes with marshy or well-vegetated areas, and rivers with slow to moderate flow. Well-oxygenated water bodies are critical for overwintering sites as Northern Map Turtles have higher oxygen requirements during hibernation than many other species. During their active season, suitable basking sites include partially submerged rocks and logs that are next to deep water. Northern Map Turtles are an extremely cautious species, diving back into the water at the slightest disturbance. Females nest in sand or gravel, preferably with full sun exposure, in close proximity to the water in order to reduce travel on land.

Threats to Northern Map Turtles include shoreline development, as Northern Map Turtles heavily favour natural shorelines, collisions with boats, and fishing, as passive fishing techniques often leave nets unchecked, which causes captured turtles to drown

Snapping Turtle

Snapping Turtles are listed as Special Concern both Federally and Provincially. The Canadian range of the Snapping Turtle extends from southern Saskatchewan to mainland Nova Scotia. Snapping Turtles are most active in the early mornings and late afternoons, prefering to bask just below the water's surface but also basking on partially submerged logs and rocks. Snapping Turtles can be found in almost every type of freshwater habitat, although they prefer slow-moving water with soft mud bottoms and lots of aquatic vegetation. Females generally show high nest fidelity, choosing soft substrates such as sand, soil, or gravel along the banks of waterways, roadways and gardens. Typically nests are laid in the early mornings and evenings during rainfall events.

Threats to snapping turtles include road mortality, habitat loss, and increasing numbers of human-subsidized predators such as raccoons, foxes and skunks, which in turn results in higher

levels of nest predation. Snapping Turtles are further targeted by illegal acts of abuse due to their size and inaccurate reputation of being aggressive, as well as because they are perceived as competition by hunters and anglers due to their ability to eat big fish and waterfowl.

Spotted Turtle

Spotted Turtles are listed as Endangered both Federally and Provincially. Within Canada, Spotted Turtles occur in southern Ontario and southern Quebec. Spotted Turtles are most active in the cooler, spring weather and emerge from hibernation before any other species of turtle, some as early as April. Spotted Turtles have also been known to have periods of inactivity during the summer months when temperatures are highest, hiding in cooler sites to avoid dessication. Spotted Turtles prefer wetlands with high organic content, shallow, unpolluted water, and large amounts of aquatic and emergent vegetation. This includes ponds, bogs, fens, marshes and the sheltered edges of shallow bays and swamp habitats. Females nest primarily at night in well-drained sites with nutrient rich soils, gravel, or sphagnum mosses. This can include mounds of bunch grasses, leaf litter and soil on rocky outcrops, mossy and flooded pastures, and muskrat lodges.

Threats to Spotted Turtles include habitat loss and fragmentation, illegal collection for the pet trade and invasive species. Although Spotted Turtles typically travel on land less than other species, roadways near wetlands can also pose a threat to the species.

Goal:

- By 2031, stop and reverse population declines of the turtle species occurring in The Land Between.

Objectives:

- Assist in efforts to determine the approximate baseline population levels of each turtle species' in The Land Between bioregion by 2026. Where this information is already known, integrate it into conservation planning efforts.
- Where possible and feasible, determine the approximate amount and location of suitable habitat for each of the species occurring in The Land Between by 2026.
- Continually work to identify and establish contact with private landowners where Blanding's and Spotted Turtles have been observed, or where potentially suitable habitat has been identified.
- Identify high mortality areas on roads across The Land Between by 2028.
- Ensure a constant supply of habitat for each of the turtle species occurring in The Land Between in perpetuity.
- Increase capacity of all private landowners with suitable or potentially suitable habitat for any of these species to steward their land to support turtles by 2031.
- By 2028, increase municipal, landowner and other stakeholder awareness and understanding of the threats posed to turtles by water management and dredging activities, and increase the capacity of these groups to minimize the impact of their actions to the species

- By 2031, increase municipal, landowner and other stakeholder group knowledge and capacity to reduce or eliminate the contamination and nutrient runoff from their waterfront properties from entering water bodies
- By 2026, increase awareness of private landowners and municipalities of the use and availability of nest cages, and their role in protecting turtle nests from predators.
- By 2026, increase landowner capacity to construct and install nest cages on nests found on private property.
- By 2026, increase public awareness, understanding and appreciation of Snapping Turtles, the role they play in the environment, and how little harm they pose to human health.
- By 2031, eliminate the threat of persecution to all turtles, particularly Snapping Turtles.
- By 2026, increase public, municipal and landowner awareness of the threats possessed by human subsidized predators, and increase the knowledge and capacity of these groups to assist in addressing the problem.
- Reduce the threat of illegal collection to turtles by 2031.
- By 2031, increase awareness and capacity of freshwater fishermen/fishers to reduce or eliminate the bycatch of turtles.
- By 2031, increase awareness and capacity of boaters and other aquatic motor vehicle users to limit the impact of their activities on turtle populations.
- By 2031, reduce the threat of road mortality to turtles by 15%.
- Increase road permeability for turtles in high priority areas by 2031.
- Increase the capacity of the general public to mitigate and/or avoid road mortality of turtles by 2031.
- Continue to excavate and incubate as many turtle nests as possible across The Land Between bioregion as long as is required to assist turtle populations in their recovery.
- By 2031, increase the hatch rate of BLTU, SNTU, PATU in The Land Between by 25%.
- Increase awareness of municipal road crews and the general public of the presence of turtles on roads by 2026.
- By 2031, increase the capacity of provincial and municipal planners to take the needs of turtles into account when planning road or other construction projects
- Increase the capacity of municipal road crews, development crews, and other industry stakeholders to minimize the impact of their work on turtles by 2031.
- By 2031, increase the capacity of municipalities to mitigate and avoid disturbance to turtle nests and nesting turtles.

Strategy: Research and Monitoring

Activities:

- Gather available population data for turtle species in The Land Between.
- Connect with and support researchers and other conservation groups monitoring turtle populations in and around the region.
- Use best available data and knowledge to estimate baseline population levels.
- Continue to conduct research on suitable methods and infrastructure to reduce the threat of nest predation to turtles.

- Continue to collect data on species distribution, mortality hotspots, as well as data on individual size, weight and condition through staff-conducted surveys.
- Continue to identify high turtle mortality areas on roads across The Land Between through staff-conducted surveys.
- In collaboration with partner experts, continue to conduct research on suitable methods and infrastructure to reduce the threat of road mortality to turtles and other animals (particularly amphibians and reptiles).
- Continue to share all relevant data acquired through all data-generating streams with relevant bodies and partners.
- Conduct pre and post monitoring surveys of mortality at all road mortality mitigation structure installation sites.
- Continue to record the location of all nests, predated or not, found during field surveys, as well as through volunteers. Prioritize these sites for revisit on a regular basis the following year so to hopefully be able to collect the eggs before they are predated.
- Continue to perform basking surveys in areas with wetlands close to/visible from the road with few or no turtle observations reported.
- Conduct pre and post mortality monitoring surveys in areas where Turtle Crossing signs have been or will be installed.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate maps.
- Monitor trends in habitat availability over time.
- As much as possible, identify areas with high/the potential for a high occurrence of boat/other aquatic motor vehicle collision with turtles.
- Based on all available data, determine the location that would most benefit from Turtle Crossing Signs, or other turtle road mortality mitigation infrastructure (underpasses, exclusion fencing, jump outs, etc.).

Strategy: Outreach, Communication and Education and skills development

Activities:

- Educate private landowners, municipalities, and the general public on the biology, needs and threats to Ontario's turtles through the SAR toolkit, website content, blogs, social media posts, Turtles at 2, billboards, etc.
- Foster an appreciation and respect for Ontario's turtles through a series of turtle themed communications including various pieces of artwork depicting turtles (murals, painted rocks, etc.).
- Consider and potentially work with partners to create a series of youth-oriented products including "Turtle League" Trading Cards.
- Continue to host annual Turtle Walks in communities across The Land Between.

- Develop and host the “Week of the Turtle” during which various learning activities are hosted, and awareness about the issue of turtles on roads is raised.
- Promote the purchase and use of Think Turtle’s “Watch 4 Turtle” Signs, particularly by private landowners with properties on busy roads.
- Continue to run Turtle Tours from The Land Between/Turtle Guardians Field Office, to educate visitors about turtles, their needs and their threats, as well as to address the stigma faced by Snapping Turtles.
- Continue to use “branded” cars for field research (painted cars, “Turtle Research” decals) to inform the public of the research activities being conducted.
- Continue to attend farmers markets throughout The Land Between as a way to educate the general public about turtles, their threats, and their role in a functioning ecosystem.
- Continue to promote and encourage the use of the Turtle Stories website as a way for people across the region, province and world to connect over a common love of turtles, share their experiences, and learn from each other.
- Continue to promote and encourage the use of the Turtle Guardians Curriculum for students of all ages to learn about turtles, while meeting the provincial educational requirements of each academic year.
- Continue, with appropriate permissions, to share the Indigenous creation story.
- Continue to create and disseminate Turtle Guardians Calendars.
- Continue to educate the general public on the threats posed by non-native Red-eared Sliders to native turtle populations through Turtles at 2, Turtle Tours, social media posts and other platforms and channels.
- Create fact sheets on the impacts of illegal collection of turtles on wild turtle populations in the language(s) of the target audience(s).
- Promote and continue to disseminate the Snapping Turtle Bite force video created by Scales Nature Park, debunking the myth that a snapping turtle can bite off human appendages.
- Promote and continue to offer to make additional “Swimming with Snapping Turtle” videos with concerned shoreline property owners to demonstrate how docile snapping turtles are in the water.
- Develop, promote and popularize a universal “signal” that drivers can give to each other to indicate the presence of a Turtle (or any other slow moving animal) on the road ahead. Consider encouraging people to flash their headlights.
- Increase awareness and knowledge of the general public and watercraft operators of the existence and habitat of Eastern Musk Turtles through the SAR Toolkit, website content, info sheets, social media posts and blogs.

Strategy: Skills Development and Capacity Building

Activities:

- Continue to educate landowners on how to best steward their properties for turtles and all other species through the Habitat Health Check program.
- Continue to encourage and support shoreline habitat renaturalization through the Natural Edge Program, the Design-your-own Shoreline Garden Program and the Design-your-own Shoreline Garden Guidebook.

- Create and deploy signs in hotspot areas indicating to drivers to watch out for nesting turtles and hatchlings.
- Create an information sheet and corresponding video on when, how and why to lift your boat motor in certain areas, and what areas in a lake should be avoided all together.
- Install educational billboards in high mortality areas demonstrating replacement rate of turtles compared to other wildlife commonly found on roads.
- Continue to advocate for the installation of additional Turtle Crossing Signs.
- Install signs in high priority areas or high priority lakes/waterbodies instructing watercraft operators to avoid motoring in vegetated shallow areas, and why this is required.
- Develop and deploy signage at public beaches communicating that Snapping Turtles are not a threat to human health and safety, and that they are in fact very shy.

Strategy: Collaboration

Activities:

- Continue to collaborate on existing efforts for all species and relevant habitats wherever possible.
- Participate in existing wildlife road safety working group meetings between the OPP, road maintenance crews, and other industry stakeholders.

Strategy: Citizen Science

Activities:

- Continue to collect data on species distribution and mortality hotspots through the Turtle Guardians Road Researchers Citizen Science program.
- Continue to collect chance observations from citizen scientists and the general public through the Repfiles App and the online SAR observation reporting form.
- Continue to solicit calls to Turtle Guardians and the START Hotline in the event of an encounter with a Turtle on the road/elsewhere (private property, etc.).
- Continue to encourage participation in, as well as train volunteers in all protocols and required information, the Turtle Guardians citizen science program, and its secondary programs including Road Researchers, Wetland Watchers, Nest Sitters, and Underpass Assessors.
- Create, promote and make readily accessible an info sheet and instructional video on how to collect evidence of deliberate turtle kills on roads, and what to do with the evidence.
- Develop an “adopt a turtle underpass” program, where community volunteers/organizations can adopt an underpass or section of an underpass, to regularly maintain.
- Continue to attract, train and deploy Nest Sitters, to protect turtles while they are nesting along the sides of the road, and to allow for more eggs to be collected.
- Inform fishers/fisherman and the general public of the threat of fishing bycatch to some of Ontario’s turtles, as well as the tools and methods that exist to address this issue, through website content, blogs, information sheets, and social media posts.

- Develop and/or promote a BMP document for the use of boats and other aquatic motor vehicles that addresses the threat of collision with turtles and other SAR and non-SAR wildlife.

Strategy: Mitigation Structures

Activities:

- Continue to perform turtle underpass assessments and installations based on feasibility and hotspot mapping.
- Assist efforts to address the threat of shoreline habitat destruction and contaminant and nutrient loading into water bodies through the Design-your-own Shoreline Garden. Workshops and Guidebook, shoreline renaturalization site visits and the administration of the Natural Edge Program.

Strategy: Conservation

Activities:

- Continue to excavate and incubate as many turtle eggs as possible (while respecting permit and capacity limitations).
- Promote the sale, construction and use of turtle nest cages to private landowners and municipalities.
- Educate landowners on how to construct a nest cage, and the value of implementing them on their property, through instructional online videos, worksheets and live training sessions.

Strategy: Services

Activities:

- Promote and support the integration of existing BMPs regarding reptiles on roads into the practices and operations of municipal road crews and other relevant stakeholders. Where situational BMPs are lacking, work with partner experts to develop new and/or additional BMPs.
- Continue to offer underpass assessments to concerned citizens/citizen groups who would like to pursue having a tunnel/mitigation structure installed in their community.
- Amass and continue to develop a portfolio of services available for municipalities including pre- and post construction/road work surveys for turtles and turtle nests, turtle underpass assessments in advance of major road work and/or the construction of new roads, Species at Risk habitat assessments, etc.
- Continue to offer training to municipal road crew members and other relevant stakeholder groups on SAR reptile identification as well as on what to do in the event they come across a SAR turtle while they are performing their work duties through live presentations and recorded webinars.
- In partnership with experts, develop a training program for municipal officials to inspect and repair turtle road mortality mitigation structures.

Sub Target: Western Chorus Frog

In Canada, the Western Chorus Frog occurs only in southern Ontario and southwestern Quebec. Western Chorus Frogs are poor swimmers and spend only about 20 days of the breeding season in aquatic habitats. They are one of the first frogs to call in the spring, sometimes as early as March, and can start breeding before the water is free of ice. Western Chorus Frogs lay their eggs in shallow, often temporary water bodies such as flooded fields, ditches, and swamps to avoid aquatic predators. Terrestrial habitat is often selected based on proximity to breeding ponds, but grassy or wooded areas near water, or damp, open habitats are preferred. Western Chorus Frogs are freeze-tolerant and hibernate under rocks, logs, leaf litter, and loose soil.

The Western Chorus Frog is listed as federally threatened and is unlisted in Ontario. Threats to the species include habitat loss due to commercial and agricultural development, road mortality, and pollution.

Goal:

- Assist in efforts to maintain or increase Chorus Frog population levels in The Land Between in perpetuity.

Objectives:

- Increase public awareness, knowledge and appreciation of the ecological uniqueness of the Chorus Frog by 2026.
- Support the efforts of other conservation, research, governmental and other groups in their conservation efforts for the species.

Strategy: Outreach, Communication and Education

Activities:

- Educate landowners, municipalities and the general public on how to identify the Chorus Frog, as well as their habitat needs and threats through the SAR toolkit, information sheets, social media posts and website content.

Strategy: Citizen Science

Activities:

- Add and include the Chorus Frog in the Wetland Watchers Citizen Science program

Additional strategies:

- See the “All amphibians” section

Sub Target: Engelmann’s Quillwort

In Canada, Endelmann’s Quillwort can only be found along the Severn River in Muskoka and Simcoe, and along the Gull River near West Guilford, making it a species of responsibility for

The Land Between. It grows near the shores of flowing waters where it is protected by waves and heavy currents. Endelmann's Quillwort is often found in large, dense clusters and roots in layers of sandy substrates over clay, in partial shade or full sunlight. It is typically completely submerged, but can be found partially exposed in some areas later in the summer. Reproduction occurs in August through the mixing of spores from male and female plants that are dispersed by water currents.

The Engelmann's Quillwort has been designated as an individual target for two reasons:

1. It is the only aquatic plant species listed as at risk in the region and;
2. Its incredibly limited range is completely confined to The Land Between, making it a species of responsibility for the charity.

Engelmann's Quillwort is listed as Endangered both Federally and Provincially. Habitat loss due to residential and recreational development is a considerable threat to the species, as the construction of docks, beaches and waterfront properties disrupts shoreline habitats. Other threats include recreational use of the shoreline habitat by humans (i.e. boat propellers and trampling), and changes in water quality and plant community due to pollution, herbicides and fertilizers.

Goal:

- Assist in effort to maintain or increase Quillwort populations in The Land Between in perpetuity.

Objectives:

- Increase the awareness, appreciation and knowledge of municipalities, landowners and the general public of the existence of Engelmann's Quillwort, and its presence in public and privately used waterways by 2028.
- Increase the awareness, knowledge and appreciation of municipal staff and all others involved in municipal planning activities of the existence and presence of Engelmann's Quillwort in the areas where the plant is found by 2028.

Strategy: Outreach, Communication and Education

Activities:

- Ensure that the presence and habitat needs of Engelmann's Quillwort are taken into account and addressed in any future development actions in areas around where it is found by working collaboratively with municipal planners and all other involved in municipal planning activities.
- Increase the awareness and knowledge of landowners and the general public of Engelmann's Quillwort, its habitat and threats, as well as how to identify it through the SAR Toolkit.

- Promote and publicize Englemann's Quillwort as a species of responsibility of The Land Between, and of Haliburton County specifically by making it the plant "mascot" of the region.

Strategy: Skills Development and Capacity Building

Activities:

- Assist in efforts to develop and initiate an adjacent landowner contact program, promoting good stewardship practices by proper owners near areas where the plant is found, and educating landowners on how to do so.

Sub Target: All TLB Amphibians (non- /SAR)

There are 18 species of amphibian found in The Land Between: 10 frogs, one toad, and seven salamanders. These species include:

Salamanders

- Blue-spotted Salamander (Unlisted)
- Eastern Red-backed Salamander (Unlisted)
- Four-toed Salamander (Federally Unlisted, Provincially Not at Risk)
- Mudpuppy (Federally Unlisted, Provincially Not at Risk)
- Northern Two-lined Salamander (Unlisted)
- Red-spotted Newt (Unlisted)
- Spotted Salamander (Unlisted)

Toad:

- American Toad (Unlisted)

Frogs:

- American Bullfrog (Unlisted)
- Gray Treefrog (Unlisted)
- Green Frog (Unlisted)
- Mink Frog (Unlisted)
- Northern Leopard Frog (Federally and Provincially Not at Risk)
- Pickerel Frog (Provincially Not at Risk, Federally Unlisted)
- Spring Peeper (Unlisted)
- Wood Frog (Unlisted)

The only amphibian found in The Land Between that is not included in this list is the Chorus Frog, which is included in this strategy as an individual sub target because of its at-risk status.

The risks to amphibians vary by species, but in general they include habitat loss, destruction and fragmentation, road mortality, pollution and a general lack of baseline information on population levels and distribution.

Goal:

- Assist in efforts to maintain or increase amphibian population levels in The Land Between in perpetuity.

Objectives:

- Continue to collect data on population levels and distribution of the amphibians found in The Land Between in perpetuity.
- Increase public awareness, respect and appreciation for the role of amphibians in the environment, and how individual human actions impact amphibian populations in The Land Between, Canada, and elsewhere in the world by 2026.
- Increase public knowledge about what exactly an amphibian is and why they are so ecologically unique by 2026.
- Increase public knowledge and awareness of the species of amphibians found in The Land Between by 2026.
- Increase public awareness of the presence of amphibians on roads by 2026.
- Increase public capacity to identify different species of amphibian and report them to citizen science reporting forums by 2026.
- Increase the capacity of the general public to be able to limit their impact to these species on roads by 2031.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge
- Generate road mortality hotspot maps
- Monitor trends in mortality on roads over time, including mortality rates before and after a mitigation measure is installed.

Strategy: Outreach, Communication and Education

Activities:

- Increase public knowledge and awareness of what exactly an amphibian is through website content, blogs, social media posts and information sheets
- Increase public knowledge and awareness of each of the amphibian species found in The Land Between, and how to identify them, through website content, blogs, social media posts and information sheets
- Increase public knowledge and awareness of the role of amphibians in an ecosystem through website content, blogs, social media posts and information sheets
- Increase public knowledge and awareness of the presence of amphibians on roads through seasonal media blitzes (social media and blog posts), as well as through signage in identified mortality hotspot areas across the region.

Strategy: Citizen Science

Activities:

- Promote and encourage reporting chance sightings of frogs to Frog Watch and/or The Land Between's iNaturalist
- Develop a road mortality Citizen Science protocol to collect data on what species commonly found on roads are being impacted by roads and where.

Strategy: Habitat Restoration

Activities:

- Work with experts to evaluate the feasibility of installing road mortality mitigation infrastructure for amphibians in various locations across The Land Between. Where deemed feasible, work with experts and partners to install required infrastructure.

Sub Target: Disappearing Common Aquatic/Semi-Aquatic Species

The Common Loon (*Gavia immer*) is Ontario's provincial bird and a well-known character in cottage country – its mournful wails and uplifting laughter play the song of summer. It would be difficult to picture Ontario's wilderness without them as Ontario currently hosts more than one third of the global population of breeding Common Loons. However, scientists believe that something quite troubling has been happening to the loon population in Ontario for many years now.

A recent study (2020) conducted by Bianchini et al. found that the reproductive success of loons has been on a consistent decline in Ontario, due to acid rain and biomagnification of mercury. Other factors related to human-born disturbances including noise and habitat loss are also leading to decreases; shoreline development is a large threat to loons who rely on healthy, vegetated shorelines for nesting and raising their young (Heimberger, 1983). Studies have shown that hatchling success decreases as cottage prevalence increases, mainly because disturbed shorelines remove nesting habitat and make loons more vulnerable to predators.

Reproductive success of loons is used as a bioindicator for how healthy lake ecosystems are since loons are at the top of the food chain and rely on a plethora of organisms lower on the food chain. Healthy food webs are needed to successful fledge chicks, therefore declining loon reproduction rates also correspond to declining lake health (Eyken, 2021).

Goals:

- Assist in efforts to stop or reverse declines of populations of these common species in The Land Between in perpetuity.

Objectives:

- Where possible and feasible, determine the approximate baseline population levels of Loons in The Land Between by 2025.
- Ensure a constant supply of habitat for Loons in The Land Between in perpetuity
- Increase public awareness of the presence of these and other common, cornerstone species on The Land Between Landscape, and the threats they face by 2026.
- By 2031, increase the capacity of municipalities to build the needs of Loons into their official plans.
- By 2031, the amount of private land that is being effectively stewarded for wildlife, common and otherwise, is increased by 15%.

Strategy: Research and Monitoring

Activities:

- Gather available population data for each of these species in The Land Between.
- Connect with and support researchers and other conservation groups monitoring these species in and around the region. Support population monitoring efforts wherever possible.
- Use best available data and knowledge to estimate baseline population levels.
- Support and/or advocate for the continual monitoring of the status of the populations of Loons in The Land Between.
- Support, wherever possible and feasible, efforts to monitor the carrying capacity of the landscape, through in-kind support and coordinated efforts.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate maps.
- Monitor trends in habitat availability over time.

Strategy: Outreach, Communication and Education

Activities:

- Increase public awareness of the presence of these and other common, cornerstone species of The Project, and the threats they face through website content, social media posts, information sheets, and the Habitat Health Check program.

Strategy: Skills Development and Capacity Building

Activities:

- Continue to advocate for provincial and federal direction for the appropriate management of The Project, including the implementation of new/additional legislation where necessary.

- Increase the amount of protected habitat on private land through stewardship through the Habitat Health Check program.
- Promote the integration of conservation blueprint models in official municipal plans and provincial guidelines to municipal officials as well as the general public.

12.0 The Project: Goals, Objectives, Strategies and Activities by Human Well-being Target

Human well-being targets: *those components of human well-being affected by the status of conservation targets and associated ecosystem services*

Human well-being targets are elements of human well-being that are directly impacted by the state of a given conservation target such as mental, physical or economic health (CMP, 2020). As humans are a part of the natural world too, The Strategy Document will also include efforts to conserve and enhance the important elements of human well-being that are directly related or impacted to the state of the natural world.

These Targets include:

- Nature-Connectedness
- Increased Indigenous Voice and Capacity
- Mental Health
- Physical Health
- Ecosystem Services
- Intact Economic Structure

Target: Nature-Connectedness

Humans and nature have always been intimately connected. For millennia nature has provided us with all we need to survive and thrive. This ancient connection is so ingrained in our being that, to this day, there are measurable mental and physical health benefits from spending time outdoors.

A substantial amount of research suggests that spending time in nature can support better mental health (Bratman et al., 2019). Regardless of where nature is experienced – a backyard, an urban park, or in remote wilderness locations – its benefits are wide-ranging. Both passive and active engagement (sitting, walking, etc.) in outdoor areas with mostly natural features, including being around trees or bodies of water, have been shown to reduce stress, anxiety, and depression, and increase happiness, joy, and awe. Nature's effects on well-being can also be quite fast-acting; even 15-20 minute walks in nature can boost mood and vitality.

We are losing our connection with nature. About 70% of the world lives in cities; modern humans spend about 90% of the time indoors. There has been a dramatic loss of natural images and words in dictionaries and in media.

Without a connection, we don't understand, value or care for nature. Meanwhile, we cannot survive without nature. Nature is the source of irreplaceable services from water filtration, to

pollination, pest control, food, medicines, and more. Nature also provides incredible mental and physical benefits in our lives.

People who spend more time in nature tend to feel a stronger sense of connection with the natural world (a construct known as nature connectedness or nature relatedness (Tam, 2013). People with greater nature-connectedness not only engage in more environmentally-protective behaviours, but also report greater life satisfaction, personal growth, and purpose or meaning in their lives (Pritchard, 2019).

Goals:

- By 2031, the degree of nature connectedness of residents and visitors to The Land Between is increased.

Objective:

- By 2026, __% of residents (seasonal or year-round) and __% of visitors have participated in baseline assessments of nature connectedness.
- By 2031, increase the degree to which residents and visitors to The Land Between care for nature.
- By 2026, increase awareness and understanding of the general public of human's place in, and reliance upon, nature.
- By 2031, the economic value of nature and the natural capital in The Land Between is understood, appreciated and valued by municipalities, landowners and the general public.
- By 2031, increased participation in citizen science and other nature-based volunteerism in The Land Between.

Strategy: Outreach, Communication and Education

Activities:

- Educate the general public on humans' reliance upon, and role in nature through presentations, webinars, social media posts, website content, blog posts and information sheets.
- Promote, publicize and educate municipal, provincial and federal governments of the economic value of nature (ie. ecosystem services) and natural capital through easy to interpret pictographs, information sheets, website content and social media posts.

Strategy: Fostering Behaviour Change

Activities:

- Work with a Behaviour Change Specialist to develop pre- and post-intervention surveys for residents and visitors to The Land Between to assess baseline levels of nature connectedness and care for nature of the people that live in and visit the region.

- Work with a Behaviour Change Specialist to develop tools and strategies for measuring change in nature connectedness of the general public over time.

Strategy: Citizen Science

Activities:

- Continue to advertise, promote and encourage participation by visitors and residents in each of the citizen science programs offered by The Land Between, as well as those offered by partners and other conservation groups in The Land Between and elsewhere in Ontario and Canada.
- Continue to develop relevant and engaging citizen science programs that not only fill a need or gap in scientific data, but that are also fun and engaging for the people who participate in them.
- Continue to monitor year-over-year participation in The Charity's citizen science and other volunteer programs.

Target: Indigenous Voice and Capacity

It is only by the kindness of Indigenous Peoples that Canada was open to settlement. That kindness was embodied in the First Treaties, The Royal Proclamation and the Great Wampum. In order to make the treaties of central and eastern Canada, hundreds of Indigenous Elders and Leaders congregated at Niagara Falls to pray and discuss over many years. The Treaties talked of sharing the land as brethren; the land being as deep as the plow (and not the water). The treaties talked of self-governance and leadership, where each Nation (the red and white) would not interfere with each other. Meanwhile it was offered and actualized, then and now that Indigenous peoples would help and teach the settlers about this Land and how to live well within it. This generosity of spirit is the backbone of this Country.

However, the Treaties were soon breached when early colonizers found gold and other coveted resources. The colonizers soon enacted the Indian Act of Canada – still very much at play today – which controls all aspects of Indigenous livelihoods and identity. But the abuses did not stop there; an illegal Reserve and Pass system restricted Indigenous peoples movements: they could not leave the Reserve without a pass. Bogus treaties such as the Williams Treaty took away hunting and fishing rights, which meant that many suffered and many starved. The Residential School system and the 60s scoop took children by force from their parents. Because of these treaties and because of these injustices we have a duty to learn more about our shared history. Despite these atrocities the Indigenous spirit of kindness is prevalent today and we have the amazing opportunity to enrich our lives and learn about Indigenous ways of knowing and perspectives.

There remains the Duty to Consult Indigenous Nations for any actions that may affect their Original Rights and Title. This Duty has been ratified by the Supreme Court of Canada.

Goals:

- Increase support for Indigenous-led conservation, and Indigenous input across The Land Between bioregion.
- Immediate and sustained increased cooperation and partnership with Indigenous Peoples and Communities in The Land Between.

Objective:

- By 2028, an increase in the understanding and awareness of the full history of Canada by all Canadians, particularly those residing in The Land Between is achieved.
- By 2031, increase honouring and integration of Traditional Ecological Knowledge in all planning and conservation efforts by The Land Between.

Strategy: Outreach, Communication and Education

Activities:

- Educate the general public, and specifically residents of The Land Between, of the full history of Canada through presentations, webinars, social media posts, website content, blog posts and information sheets.

Strategy: Services

Activities:

- Establish a model that normalizes honest communication; and prioritizes inclusion, cooperation, and grassroots collaboration.
- Continue and increase input by Indigenous groups into SAR recovery planning and efforts in The Land Between.

Target: Mental Health

There is substantive pre-existing evidence that suggests that interacting with nature – even as little as a 15 minute walk in a natural setting – can significantly lower the heart rate, increase parasympathetic nervous system activity (rest and digest), and decrease sympathetic nervous system activity (fight or flight) compared to a 15-minute walk in city streets.

Ongoing research continues to show that residents of greener areas feel healthier than residents of less green areas; having access to green-space is especially important for mental health. Quantity as well as quality of greenspace in residential areas were positively related to health. These relationships could be (partly) explained by the fact that residents of greener areas experienced less stress and more social cohesion (Groenewegen et al, 2012).

Goals:

- The mental health of the residents and visitors to The Land Between is continually and markedly improved as a result of the work of the charity, its partners, and other organizations in the region.

Objective:

- By 2026, increase the knowledge and awareness of the general public and private landowners of nature's role in supporting mental health.
- By 2031, increase the feelings of awe, contentedness, safety, security of the residents and visitors of The Land Between as a result of the natural beauty of the area.

Strategy: Outreach, Communication and Education

Activities:

- Educate landowners and the general public of the link between time spent in nature and improved mental health through presentations, webinars, social media posts, website content, blog posts and information sheets.
- Encourage landowners and the general public to reflect on how time spent in nature makes them feel.

Strategy: Fostering Behaviour Change

Activities:

- Work with a Behaviour Change Specialist to develop pre- and post-intervention surveys for residents and visitors to The Land Between to assess baseline levels of awareness of the role of nature in supporting mental health, and baseline levels of awe, contentedness, safety, security of the people that live in and visit the region.
- Work with a Behaviour Change Specialist to develop tools and strategies for measuring change in nature connectedness, awe, safety and security of the general public over time.

Target: Physical Health

Many people can attest to the positive impacts associated with spending time in nature; studies attest to the positive correlation between even brief stints outdoors, and improved human physical health.

Different research proposals seeking to study the connection between humans and the natural world have indicated that time outside can improve sleep, reduce stress, boost immunity; augments vitamin D levels, lowers blood pressure and improves eyesight; and reduces the risk for many chronic diseases like heart disease, type-2 diabetes, or obesity (Oberman, 2023).

Ensuring that people have access to green spaces, as well as offering incentives to spend time outside (ex. engagement in plant and animal surveys, volunteering or Citizen Science programs) may have a resulting positive impact on human physical health.

Goal:

- The physical health of the residents and visitors to The Land Between is continually and markedly improved as a result of the work of the charity, its partners, and other organizations in the region.

Objectives:

- By 2026, increase the appreciation and awareness of the general public of the space nature provides to achieve physical fitness including clean air, clean space, and free spaces.

Strategy: Outreach, Communication and Education

Activities:

- Promote and publicize the role of a healthy natural environment in contributing to human physical health on all platforms and channels including website content, blog posts, social media posts and information sheets.
- Promote and publicize the space nature provides to achieve physical fitness including clean air, clean space, and free spaces on all platforms and channels including website content, blog posts, social media posts and information sheets.
- Incorporate the role of all of the citizen science and stewardship activities offered by The Land Between in contributing to human physical health.

Target: Ecosystem Services

The Land Between is an ecological and physical ecotone, with geology, plants and animals of distinct and separate ecosystems meeting and mixing in a relatively small geographic area. The congregation of these separate ecosystems means that The Land Between has extra buffering from climate change effects. Development and climate change remove or negatively affect services within the ecosystem; because The Land Between has three separate trophic pyramids: based on Southern limestone, Northern granite, and the unique metamorphic geology of The Land Between itself, there are a greater number of ecosystem services available. This mosaic patchwork landscape creates a braided belt of resilience that allows for species' adaptations and continuing ecological services to benefit all of southern Ontario, during climate change. The resources and diversity of the region provide key services and shelter today that may be vital in the future.

The Land Between is a remarkable biological and physiological ecotone that can be seen by the naked eye. It is a strong braided belt of diversity and function that provides resilience for Ontario during Climate Change.

The Land Between features an incredible patchwork of natural habitats and increased "edges;" these ecotones-within-ecotones provide for more diversity and therefore greater functions and refuges for species during Climate Change – including those from the north and south that meet here. The multitude of natural edges can limit the spread of invasives if kept natural. The undulations from high to low and wet to dry contribute to the plethora of biodiversity and habitat diversities; here, some species may be able to adapt in situ by finding new microhabitats at different topographies. Due to the region's position in Ontario, it is the current northern limit for ectotherms, and has the potential to be a final refuge as climate change forces their populations northward.

Protecting the unique landscape is necessary to preserve these ecosystem services, and the numerous benefits (quantitative and qualitative) for humans and other species that they provide. However, the limited soils, with abundant shores, and starker climate make the region extremely sensitive and disturbance here is far-reaching and long-lasting.

Goal:

- The ecosystem services provided by The Land Between bioregion are maintained or enhanced in perpetuity.

Objectives:

- By 2026, increase public awareness of the ecosystem services the The Land Between provides.
- By 2026, increase public awareness, knowledge and understanding of what ecosystem services are.
- By 2031, increase the capacity of municipalities, landowners and the general public to steward, care for and maintain ecosystem services and their vectors.
- By 2026, increase the knowledge, awareness and understanding of municipalities, private landowners and the general public of the economic value of ecosystem services.

Strategy: Research and Monitoring

Activities:

- Connect with and support researchers and other conservation groups monitoring function and sustainability of ecosystem services in and around the region.
- Use best available data and knowledge to estimate baseline levels.
- Attempt to qualify and quantify measurable ecosystem services such as water regulation.

Strategy: Mapping and Modeling

Activities:

- Use relevant studies and/or research with modeling to determine the impact zone of the associated ecosystem service (ie. species population distribution to determine seed dispersal potential; watershed maps to determine flood zones).
- Generate maps.

Strategy: Outreach, Communication and Education

Activities:

- Promote, publicize and educate the public on the many ecosystem services The Land Between provides (including pollination, seed dispersal, (food security), pest control, water filtration and regulation, air filtration, carbon sequestration) through all platforms and channels including social media posts, website content, blog posts and information sheets.
- Educate the public on exactly what ecosystem services are through presentations, webinars, social media posts, website content, blog posts and information sheets.
- Promote, publicize and educate municipalities, private landowners and the general public of the economic value of ecosystem services through easy to interpret pictographs, information sheets, website content and social media posts.

Strategy: Skills Development and Capacity Building

Activities:

- Increase the capacity of landowners and the general public to steward, care for and maintain ecosystem services and their vectors through The Charity's many stewardship programs tools and services including the Habitat Health Check program and the Design-your-own Shoreline Garden Workshops and Guidebook.
- Increase the capacity of municipalities to steward, care for and maintain ecosystem services and their vectors through specialized training for road maintenance crews regarding invasive species management and removal and pollinator habitat protection, as well as through the creation of resources and training programs regarding shoreline ecology and science.

Target: Intact Economic Structure

The Land Between is an economic and cultural asset for residents in local and nearby towns and for seasonal residents and visitors from cities 1.5-2 hours' drive away– Greater Toronto Area, Barrie, Kingston and Ottawa. Few metropolitan areas in the world have such large and entire natural wonders so close by. Tourist resorts and services for cottagers are central to local economies. Cottages are the dominant settlement type in The Land Between. Very few villages or hamlets dot the landscape and are mostly along the edges of the region, and in many municipalities, the number of seasonal residents far outnumbers permanent ones.

Statistics Canada indicates that 50% of the permanent residents in The Land Between are over the age of 50. Numbers of commuters and retirees moving to the area are on the rise. Both residents and visitors use the area for the vast range of nature-based recreational activities that an area of this quality offers. Indeed, this is the culture of The Land Between. Industries secondary to tourism and recreation involve public services and construction. The thin soil and exposed rock made The Land Between primarily unproductive for farming and not very good for forestry. Some mining is conducted in the east half of the region and quarries operate in the west. Therefore, the most important economic and social activities today (i.e. tourism for visitors and services for cottagers) depend on maintaining the natural characteristics of The Land Between.

Stemming from a spirit of creativity and resilience, the settlers are hearty and jack of all trades- they are innovative and entrepreneurial, so that with the limited roads and industry, even today the small dispersed communities that dot the landscape have a primarily creative economy. The Land Between has a rich density of artisans, crafts people, and small business owners with a multitude of wares and services. Individuals with diverse skills, hardiness, and bravery. Their economy and trades more often have a direct relationship with the natural landscape and the resources of the land than may be found in most places in southern Ontario. This economy is part of the culture of The Land Between, and is founded on the natural environment of The Land Between.

Goal:

- The economic prosperity and viability, as well as the environmental integrity of The Land Between is maintained or increased in perpetuity.

Objectives:

- By 2027, increase the knowledge, understanding and awareness of municipalities, landowners and the general public of the role a sustainably managed and healthy environment plays in the economic prosperity of the region.
- By 2031, increase the capacity of municipalities and private landowners to make decisions that allow for the sustainable management of the natural capital in the region.
    - 25%: Working Watersheds and water regulations
- By 2027, increase the understanding of municipalities and landowners of the role of intact and healthy shorelines in maintaining lake health, and the role of healthy lakes in the economic function of the region

Strategy: Outreach, Communication and Education and skills development

Activities:

- Promote, publicize and educate municipalities, private landowners and the general public of the economic value of maintained ecosystem services and sustained natural capital through information sheets, website content and social media posts.
- Increase the understanding of private landowners of the value and importance of sustainable land stewardship, and increase their capacity to properly maintain and

steward their properties through the Habitat Health Check program, and the Design-your-own Shoreline Garden workshops, site visits and Guidebook.

Strategy: Services

Activities:

- Publicise and promote the resources created and offered by The Land Between, as well as those created by partner/other organizations through website content, and blog and social media posts.
- With the help of partners, registered professionals, and information experts, develop a curricula and associated certification program for professionals whose work directly, or has the potential to, impacts/informs shoreland health and management including landscapers, real estate agents, municipal officials, and other relevant stakeholder groups. The certification program will cover the science, function and importance of natural shorelands, as well as industry specific information tailored to each professional group (i.e. native plant alternatives for landscapers, etc.).
- See associated strategies in Section 11.4, Sub-Target Lakes and Shorelands.

13.0 The Conservation Strategy Document Goals, Objectives, Strategies and Activities by Target

Our vision for The Strategy Document is two-fold: first, as a result of the publication of this conservation strategy, we aspire to see a coordinated approach to species conservation in The Land Between by conservation groups, landowners, municipalities and other stakeholders, across all sectors and government levels and jurisdictions. We further aspire to see future conservation efforts by conservation groups and other stakeholders utilize approaches that are rooted in behaviour change science, where actions and programs work to affect change in the behaviours of individuals, so that, ultimately, new social norms and conservation can be realized on a greater scale.

These Targets include:

- Future Conservation Initiatives
- Conservation Collaboration
- Behaviour Change
- Data Collection and Modelling
- Climate Change

Target: Future Conservation Initiatives

Goals:

- Inspire, inform and streamline future conservation initiatives in The Project for Species at Risk and their habitats, as well as for disappearing common species across the region.

Target: Conservation Collaboration

Grassroots community efforts are the base that supports the pyramid of the conservation sector. Landowner and community engagement are the foundation of any change, and there is strength in numbers. Through social networks and social connection, change can happen surprisingly quickly once it reaches a threshold of the population or community. Also the change that does occur is deep and therefore more lasting because, although it may at first be externally motivated through social pressures, it shifts to become intrinsic as new understandings evolve and new personal identities are formed, eventually establishing new social norms.
The environmental sector has experienced drastic and continuing reductions in funding support and resources are dwindling resulting in diminishing capacities. Scientific research and conservation efforts are increasingly reliant upon or fortified by Citizen (Community) Science and/or volunteerism.

Cross-sector collaboration, the sharing of funds, resources, knowledge, perspectives and expertise; complementing organizational and individual strengths and weaknesses; filling gaps;

all are essential to maximize limited resources of time, energy and funds. Collaboration allows for the minimization of effort duplication, and ensures challenges to effective conservation are being considered from as many angles as possible. It further makes an effort to include all stakeholders in the regions and the issues, from either side of the line, a part of the planning and solution-finding efforts to shared problems, threats and issues. By including as many diverse voices in the conservation process as possible from the beginning, more effective plans and solutions are brought forward.

The target audience for TLB Charity's Strategy Document includes Conservation Groups in the hope that it be used and referenced by members of each of the above groups, so that our efforts may complement and not duplicate, and so that the ambitious goals and objectives for TLB bioregion may be met.

Goals:

- Foster effective communications and partnerships between agencies and organizations working to conserve and effectively manage SARs and their habitats across The Land Between bioregion in perpetuity.

Objectives:

- Identify and connect with other agencies and organizations working in conservation, sustainable development, biodiversity research or other associated fields in and around The Land Between bioregion by 2025.

Strategy: Outreach, Communication and Education

Activities:

- Host / facilitate Knowledge Circles with other agencies and organizations working in conservation, sustainable development, biodiversity research or other associated fields in and around The Land Between bioregion to share knowledge, research, successes and gaps.
-

Target: Behaviour Change

The need for major independent and social behaviour change to address climate change has already been addressed in Section 3.0: Explanation of Behaviour Change. In order to enact large spread behaviour change, we are attempting to address the issue on multiple fronts, through many different strategies and activities.

Our approaches, as stated in Section 3.0 are: to target specific behaviours, increase intrinsic motivation for conservation, and foster a connection with Nature.

Goals:

- Demonstrate the need for the inclusion of behaviour change science in conservation planning by 2028.
- Encourage the adoption of the behavior change model by other organizations across the region and beyond to ensure effective future conservation efforts in perpetuity.

Target: Data Collection and Modelling

A key aspect of the work of the Charity is in data collection, as well as ensuring that this data is accessible and understandable to other conservation groups.

Goals:

- Create a comprehensive regional conservation strategy with SMART benchmarks for measuring success by 2023.
- Update tracking models in perpetuity.

Strategy: Mapping and Modeling

Activities:

- Contact partners and other relevant stakeholder groups to gather required data (where gaps exist) and expert knowledge.
- Generate maps.
- Monitor trends in habitat availability over time.

Target: Climate Change

Given the size and all encompassing nature of the issue of Climate Change, The Land Between requires a Climate Change-specific strategy. When appropriate funding has been secured, a Climate Change adaptation strategy centered on nature-based solutions with biodiversity as the key to adaptation will be drafted.

However, it is important to note that this document does tackle many nature-based solutions for climate change, such as watershed management, land use planning, and wetland protection.

Moreover, since climate change has a reciprocal impact on biodiversity loss, by tackling biodiversity loss, The Strategy is supporting some mitigation of climate change, in the form of nature based solutions. Interlinked problems have interlinked solutions.

Next Steps

Where the Charity goes from here:

The Charity endeavors to become a central resource for stakeholders, and clearinghouse of data, in order to support planning and conservation, mitigation and best management practices. By establishing a network of collaborative conservation groups; supporting large-scale public behaviour change towards nature connection and appreciation; and providing resources and knowledge for municipalities and organizations to mitigate negative impacts of development, The Charity's ultimate goal is to become redundant.

How The Strategy will be used:

The Strategy aims to provide benchmarks via which progress can be measured, and successes as well as gaps can be identified. The hope of The Charity is that this comprehensive document can be a ratified and common foundation for action amongst partners. Having clearly named targets, and provided the scientific and literature-based explanations for prioritizing them, The Strategy will facilitate any new actions that align with these targets.

How progress towards goals and objectives will be tracked and monitored:

Quantifiable goals and objectives will be tracked and monitored where applicable, through research, GIS models, data accumulation, and implementation of best practices. The Charity seeks to track qualitative goals, ie. behaviour change, through: structured surveys specific to nature connectedness; numbers of volunteers, committed hours, attendance at events and through Citizen Science programs; and collected testimonials from locals, tourists, staff and volunteers. Qualitative goals of increased collaboration will be measured in number and strength of partnerships across the bioregion.Progress will be tracked and communicated online through our Miradi project.

Appendix 1 – Document Glossary

From Open Standards for the Practice of Conservation.

Term	Meaning
Activity	A specific action or set of tasks undertaken by project staff and/or partners to reach one or more objectives. Sometimes called an action, response, or strategic action. (See relationship to strategies.)
Audience	Those individuals or groups a project team is trying to reach, be it for communication purposes or to influence a particular behavior.
Conservation target	An element of biodiversity (species, habitat, or ecological system) at a project site on which a project has chosen to focus. All targets should collectively represent the biodiversity of concern at the site. (Synonymous with biodiversity target, conservation focus, or conservation value.)
Ecosystem Service	Services that intact, functioning ecosystems, species, and habitats provide and that can benefit people.
Evaluation	An assessment of a project or program in relation to its own previously stated goals and objectives.
Goals	A formal statement detailing a project's desires, such as the desired future status of a target. A good goal meets the criteria of being specific, measurable, achievable, results-oriented, and time-limited (SMART).
Human well-being targets	In the context of a conservation project, human well-being targets are those components of human well-being affected by the status of conservation targets. All human well-being targets at a site should collectively represent the array of human well-being needs dependent on the conservation targets.
Method	A specific technique used to collect data to measure an indicator. A good method should meet the criteria of being accurate, reliable, cost-effective, feasible, and appropriate.
Monitoring	The periodic collection and evaluation of data relative to stated project goals and objectives.
Objectives	A formal statement detailing a desired outcome of a project, such as reducing a critical threat. A good objective meets the criteria of being specific,measurable, achievable, results-oriented, and time-limited (SMART). If the project is well-conceptualized and -designed, the realization of a project's objective should lead to the fulfillment of the project's goals and ultimately its vision. Compare to vision and goal.

Project	A set of actions undertaken by a defined group of practitioners – including managers, researchers, community members, or other stakeholders – to achieve defined goals and objectives. The basic unit of conservation work.
Project Area	The place where the biodiversity of interest to the project is located. It can include one or more conservation areas or areas of biodiversity significance, as identified through ecoregional assessments. Note that in some cases, project actions may take place outside of the defined project area.
Purpose	The organization's mission and current priorities.
Scope	The broad geographic or thematic focus of a project.
Stakeholder	Any individual, group, or institution that has a vested interest in or can influence the natural resources of the project area and/or that potentially will be affected by project activities and has something to gain or lose if conditions change or stay the same. Stakeholders are all those who need to be considered in achieving project goals and whose participation and support are crucial to its success.
Strategic Plan	The overall plan for a project. A complete strategic plan includes descriptions of a project's scope, vision, and targets; an analysis of project situation, an action plan, a monitoring plan, and an operational plan.
Strategy	A set of activities with a common focus that work together to achieve specific goals and objectives by targeting key intervention points, optimizing opportunities, and limiting constraints. A good strategy meets the criteria of being: linked, focused, feasible, and appropriate.
Target	Shorthand for conservation target.
Threat	A human activity that directly or indirectly degrades one or more targets. Typically tied to one or more stakeholders.
Vision	A description of the desired state or ultimate condition that a project is working to achieve. A complete vision can include a description of the biodiversity of the site and/or a map of the project area, as well as a summary vision statement.

Appendix 2 – List of Species Included in The Land Between

2a: SAR in The Land Between

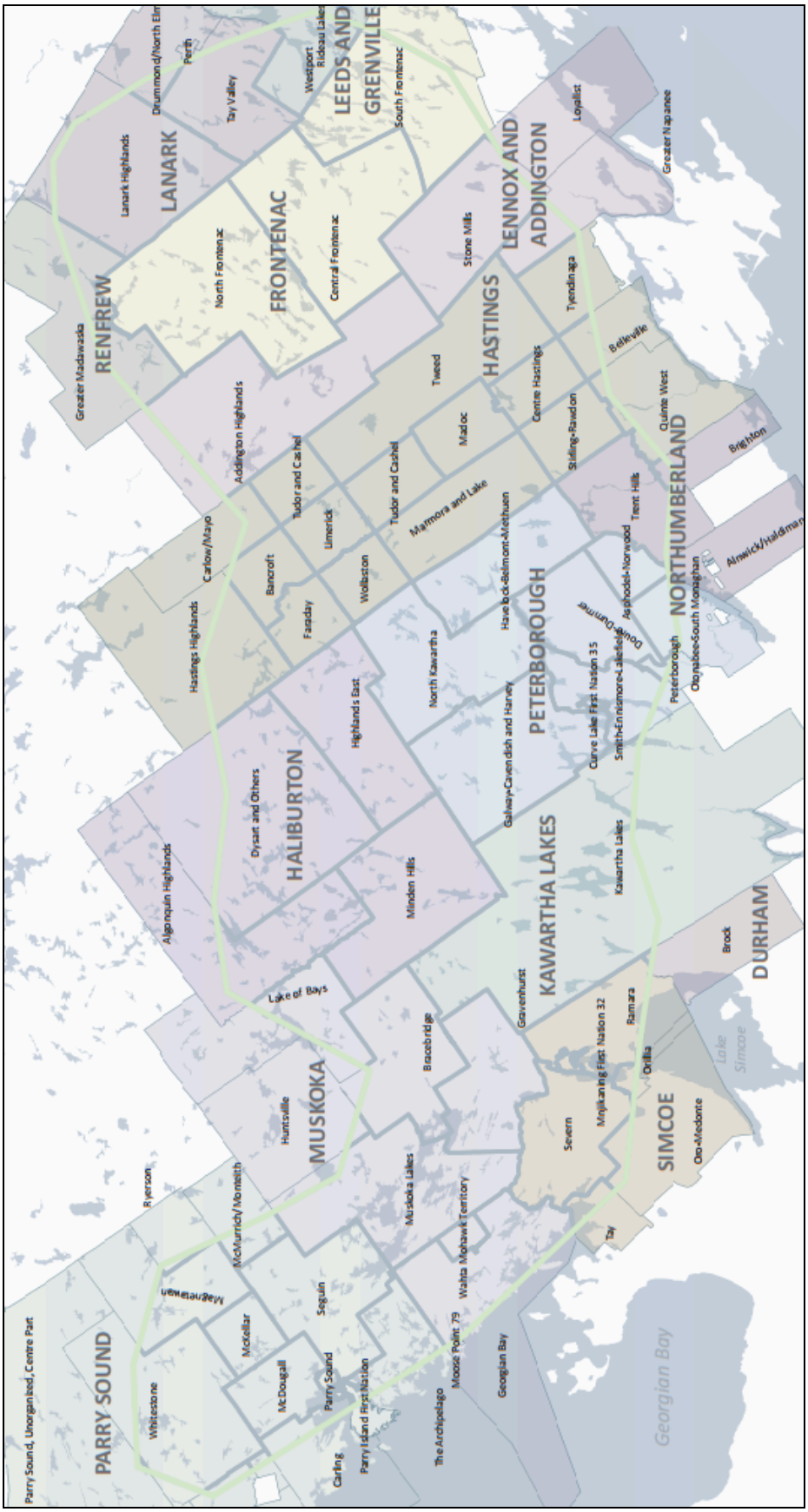
Birds (24)
ACADIAN FLYCATCHER (END) U
BANK SWALLOW (THR)
BARN SWALLOW (THR)
BLACK TERN (SC)
BOBOLINK (THR) U
CANADA WARBLER (THR)
CERULEAN WARBLER (END)
CHIMNEY SWIFT (THR)
COMMON NIGHTHAWK (SC)
EASTERN MEADOWLARK (THR) U
EASTERN WHIP-POOR-WILL (THR)
EASTERN WOOD-PEWEE (SC)
EVENING GROSBEAK (SC)
GOLDEN-WINGED WARBLER (THR)
GRASSHOPPER SPARROW (SC) U
HENSLOW'S SPARROW (END) U
KING RAIL (END) U
LEAST BITTERN (THR)
LOGGERHEAD SHRIKE (eastern subspecies) (END)
LOUISIANA WATERTHRUSH (THR) U
OLIVE-SIDED FLYCATCHER (SC) U
PEREGRINE FALCON (SC)
RED-HEADED WOODPECKER (THR)
WOOD THRUSH (THR) U
Mammals (4)
LITTLE BROWN MYOTIS (END)
NORTHERN MYOTIS (END)
TRI-COLORED BAT (END) U
EASTERN WOLF
Amphibians (1)
WESTERN CHORUS FROG (Great Lakes/St. Lawrence – Canadian Shield pop) (THR)
Insects (4)
MONARCH (END)
MOTTLED DUSKYWING (Great Lakes Plains pop) (END) AU *1931
GYPSY CUCKOO BUMBLE BEE
YELLOW BANDED BUMBLE BEE
Reptiles (14)
BLANDING'S TURTLE (Great Lakes pop) (END)
EASTERN FOXSNAKE (Great lakes/St. Law. pop) (END)
EASTERN HOG-NOSED SNAKE (THR)
EASTERN MILKSNAKE (SC)
EASTERN MUSK TURTLE (SC)

EASTERN RIBBONSNAKE (Great Lakes pop) (SC)
FIVE-LINED SKINK (Great Lakes/St. Lawrence pop) (SC)
GREY RATSNAKE (THR)
MASSASAUGA RATTLESNAKE (THR)
MIDLAND PAINTED TURTLE (SC)
NORTHERN MAP TURTLE (SC)
SNAPPING TURTLE (SC)
SPOTTED TURTLE (END) U
WOOD TURTLE (END)
Fish (1)
LAKE TROUT
Plants (10)
AMERICAN GINSENG (END) U
BLACK ASH (THR)
BRANCHED BARTONIA (THR)
BROAD BEECH FERN (SC)
BUTTERNUT (END)
EASTERN PRAIRIE FRINGED-ORCHID (END) U
ENGELMANN'S QUILLWORT (END)
FLOODED JELLYSKIN (EXT)
PALE-BELLIED FROST LICHEN (END)
SPOTTED WINTERGREEN (EXT)

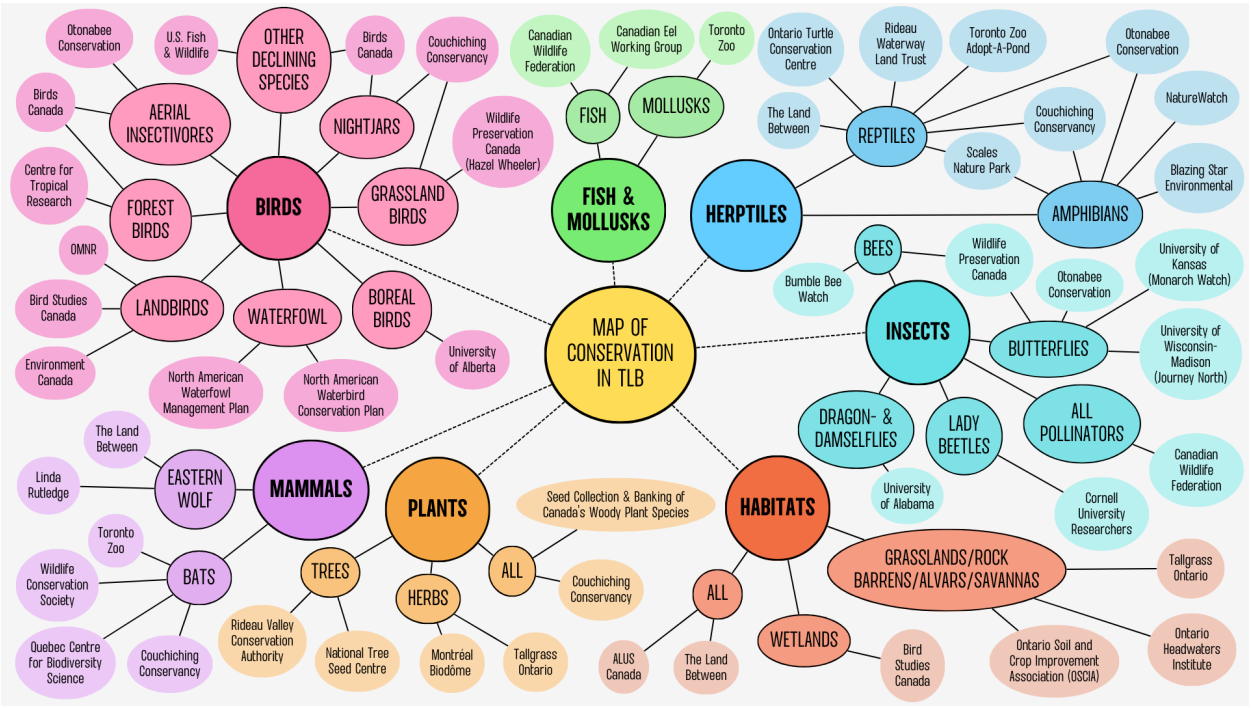
2b: Disappearing common species in The Land Between

Terrestrial species:
BEAR
MOOSE
Common Aquatic/Semi-Aquatic Species:
LOON

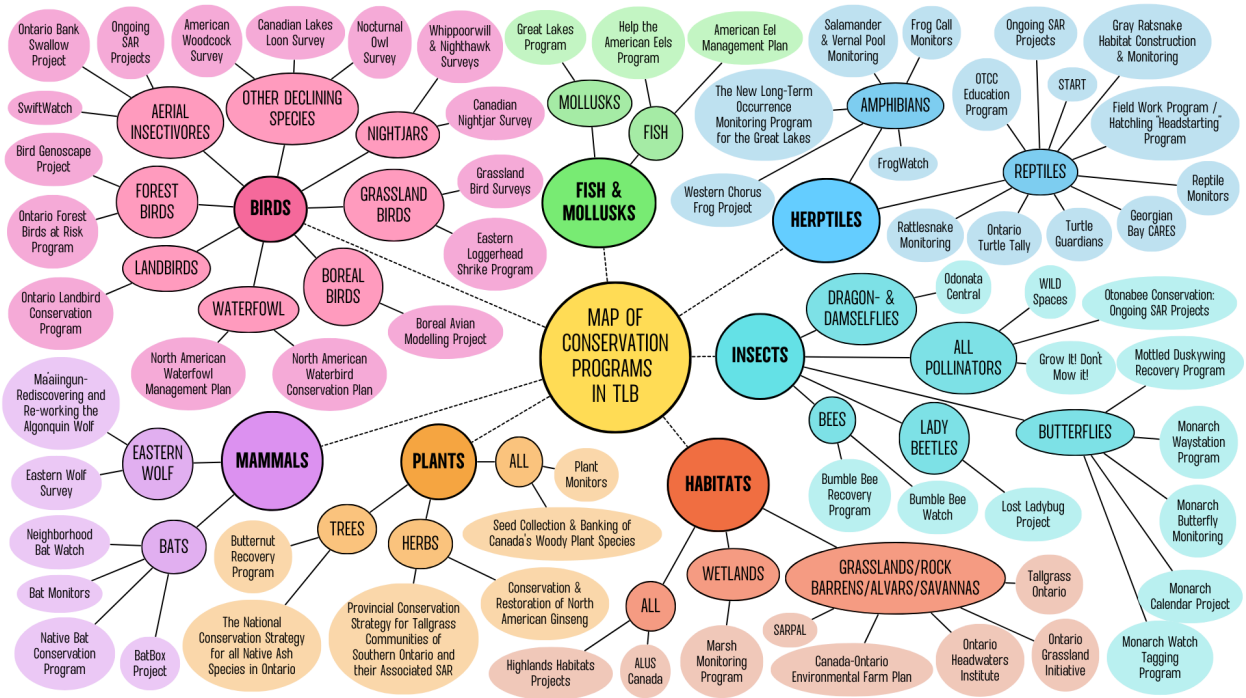
Appendix 3 – Map of The Land Between Bioregion



Appendix 4 – Mind Map(s) of other conservation groups in TLB



Mind Map of Conservation in The Land Between; sub-divided by target group, and identifying the Lead Organizer of each Conservation Program



Mind Map of Conservation in The Land Between; sub-divided by target group, and identifying the Conservation Program

Appendix 5 – List of the conservation targets and sub-targets of The Project

Target Category	Target	Sub-target
The Land Between Bioregion	Invasive Plants	
	Residential Development	
	Road Use Management	
	Land Use Planning	
	Primary Resource Extraction	
	Lack of understanding of the value and fundamental importance of nature	
Upland Habitats and Species	Open habitats, including grasslands, rock barrens and alvars	Grassland Birds
	Forests	Forest Interior Birds
		Eastern Wolf
Stand Alone Suites of Upland Species		All SAR/NON-SAR Birds
		Nightjars
		Aerial Insectivores
		Golden-winged Warbler
		Peregrine Falcon
		Wood Turtle
		Eastern Hog-nosed Snake
		Massasauga Rattlesnake and Eastern Foxsnake
		All Other Snakes found in The Land Between Bioregion
		Five-lined Skink

		SAR Bats
		Insect Pollinators
		SAR Lepidoptera of TLB (Mottled Duskywing, Monarch Butterfly)
		SAR Bumble Bees of TLB and all Native Bumblebees Bees
		SAR Plants
		SAR Lichen
		Disappearing common terrestrial species
Aquatic Habitats and Species	Wetlands	Wetland Birds
	Lakes and Shorelands	Lake Trout
Stand Alone Suites/Individual Aquatic Species		Turtles occurring in The Land Between
		Western Chorus Frog
		Engelmann's Quillwort
		All Amphibians
		Disappearing Common Aquatic/Semi-Aquatic Species

Appendix 6 – List of the human well-being targets and sub-targets of The Project

Target Category	Target
Human Well-being	Nature-Connectedness
	Indigenous Voice and Capacity
	Mental Health
	Physical Health
	Ecosystem Services
	Intact Economic Structure

Appendix 7 – List of the conservations targets of The Strategy Document

Target Category	Target
The Strategy Document	Future Conservation Initiatives
	Conservation Collaboration
	Behaviour Change
	Data Collection and Modelling
	Climate Change

Appendix 8 – Recovery Strategies

- Ontario Provincial Government Strategies:
    - A Wetland Conservation Strategy for Ontario (2017-2030)
    - Sustainable Growth: Ontario's Forest Sector Strategy
    - Ontario Invasive Species Strategic Plan
    - Ontario's Provincial Fish Strategy
    - Strategy for Wolf Conservation in Ontario
- Canada Federal Government Strategies:
    - Toward a 2030 Biodiversity Strategy for Canada
    - Invasive Alien Species Strategy for Canada

- Non-profit Independent Strategies:
    - Ontario Biodiversity Council: Ontario's Biodiversity Strategy (2023-2030)

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