



Program Proposal

Citizen Scientists - GPS Explorers Program

Rural Libraries, Young People and STEAM

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The purpose of this proposal is to request approval and funding for the **Citizen Scientists - GPS Explorers** program as part of the Rural Libraries, Young People and STEAM initiative to develop and deliver innovative STEAM programming and services to our community. Funding of \$999 is requested to purchase program equipment and supplies, including handheld GPS units, science backpacks, navigation tools, and educational resources.

Background

Over the past decade, there has been increasing recognition of the importance of digital literacy and STEAM education in equipping youth with the skills needed to meet the demands of the 21st century. Despite a proliferation of STEAM programming in urban and suburban libraries, research indicates that rural libraries are significantly less likely to offer free STEAM programs (Public Library Association, 2023). Consequently, many rural communities in Canada are experiencing a mismatch between the skills required for industries of the past and those needed for future industries and our current knowledge economy (Gregg & McKendry, 2020). While the need for STEAM programming has never been greater, rural libraries, including the Deseronto Public Library, face unique challenges in delivering these programs, including a lack of technology training spaces, aging infrastructure, and limited resources (Public Library Association, 2023).

Despite these challenges, several emerging trends in rural STEAM education are helping to address these gaps. Two of the most promising trends are place-based STEAM programming and citizen science, both of which capitalize on one of the rural library's greatest assets: their unique natural environment. Place-based STEAM education emphasizes locally-driven, ecologically-based, community-focused programming. This approach is particularly well-suited to rural libraries and has been shown to increase youth engagement, spark curiosity, strengthen connections to the community, and improve achievement in science (Pulido et al., 2025). Similarly, through public participation in scientific research, citizen science programs increase participation and enhance the relevance of STEAM by strengthening the participant's connection to and understanding of their local ecosystem (Taylor et al., 2026). Additionally, a third emerging trend is the growing emphasis on informal STEAM learning and the importance of family involvement (Gülhan, 2023; Espinosa-Gutiérrez et al., 2025). Research demonstrates that although parental participation in informal STEAM activities increases children's motivation and contributes positively to achievement in science, technology, engineering, and mathematics (Sheahan, 2016; Šimunović & Babarović, 2020), many parents lack the confidence, knowledge, or resources to facilitate STEAM learning at home (Mei, 2017).

By integrating these three evidence-based approaches, **Citizen Scientists - GPS Explorers** aims to combine GPS technology, outdoor exploration, citizen science, and family learning into an accessible program that promotes digital literacy, environmental stewardship, and scientific inquiry.

Example Programs

San Diego Public Library - Spring into STEAM 2017 - Bug Out

Spring into STEAM is San Diego Public Library's annual science-focused program aimed at children ages 9-12. The program's 2017 theme, Bug Out, included an innovative citizen science project in which library program participants collected bug specimens from their communities to contribute to the Barcode for Life project which is the largest citizen scientist project ever to include DNA barcoding. This program is an excellent example of how libraries can move beyond traditional STEM programming by engaging youth in meaningful citizen science research. It also showcases the value of community partnerships, and place-based learning, both of which we hope to include in our own program.

Innisfil ideaLAB & Library Explorer Backpacks

The Innisfil ideaLAB & Library currently offers 6 different explorer backpacks – 6 for kids and 2 for adults – that can be borrowed at any time. Each backpack contains exploration equipment, resource books, and a guide full of online resources and apps including iNaturalist. The explorer backpacks are a great example of the different kinds of science/nature kits that libraries can offer for place-based STEM exploration as well as the different online resources that are available to help support the kind of family-involved and participant-led programming we are proposing.

Waterloo Public Library Family Geocache Challenge

Waterloo Public Library's Family Geocache Challenge is an outdoor STEM program that introduces families to GPS navigation through geocaching. Families use their GPS devices to locate hidden treasures, solve mysteries, and crack codes. This program is a prime example of how libraries can incorporate parental involvement in STEM programming and create fun and engaging family-centred learning experiences. It also demonstrates how libraries can incorporate technology, in particular gps technology, into outdoor recreation to enhance learning and exploration, which is one of the aims of our program.

Program Overview

Citizen Scientists - GPS Explorers is an interactive outdoor orienteering program for children ages 8+ and their families that introduces them to the exciting world of citizen science, geolocation, and biodiversity exploration. Participants will attend an orientation session before receiving a science backpack filled with everything they need to take out into the field and start their exploration including a handheld gps device, an orienteering map, a local field guide, as well as instructions on how to use the provided tools. Participants will be encouraged to explore as much or as little as they wish and to use the Seek by iNaturalist app to identify and log local plants and wildlife into the community database. Following the program, participants will be able to share their discoveries with the local community using the display board in the library.

Anticipated Outcomes

Participant and Educational	Community and Scientific	Library
<ul style="list-style-type: none">• Increased interest in STEM subjects and learning• Greater appreciation for nature and local biodiversity and ecosystems• Improved GPS, map-reading, and navigation skills• Increased confidence in using digital technology in scientific inquiry• Increased environmental stewardship• Enhanced sense of place and connection to the community• Improved sense of self-efficacy towards science and the environment	<ul style="list-style-type: none">• Greater public engagement with local ecosystems and conservation efforts• Increased biodiversity data collection and creation of robust data sets• Increased sense of community through knowledge sharing	<ul style="list-style-type: none">• Increased interest in STEM/STEAM programming at the library• Enhanced public image of the library as a place for STEM learning and community involvement

Partnership Opportunities

Watersheds Canada

Watersheds Canada partners with libraries, schools, and community groups through their Nature Discovery Backpack program. Partnering with Watersheds Canada would help us build the backpacks with the necessary tools, resources and appropriate program activities. This partnership would save the library money and administrative resources and time.

Quinte Conservation

Quinte Conservation is a natural partnership for this program as they already provide programming support to the library through nature programs as well as lendable parking passes to their conservation areas. Additionally, they currently run gps orienteering programs for school groups and would be able to provide orienteering maps and instruction guides for the program backpacks, as well as run the orientation sessions.

Queen's University, Department of Environmental Studies

Queen's University's department of environmental studies runs children's programming including gps scavenger hunts and orienteering sessions out of their Elbow Lake Environmental Education Centre. Student volunteers from the program could provide program consultation and act as guest educators for the program's orientation sessions.

Mountain Equipment Company (MEC)

MEC regularly funds community programs and activities that teach outdoor skills, protect wild spaces, and promote outdoor activities. MEC already has a history of donating to libraries, including donating equipment to the North Vancouver City Library Hiking Backpack program. A request will be submitted to MEC for equipment donations to fill the backpacks.

Budget

The provided budget represents the real cost of the program before donations. These numbers are based on three backpacks and 6 sessions between May and October. Consumables and extra supplies have been factored into the costs.

Description	Quantity	Unit Price	Cost
Backpacks	3	\$30	\$90
Garmin eTrex SE Handheld GPS	3	\$180	\$540
Parking Passes (already available for loan)	3	\$0	\$0
Binoculars	3	\$40	\$120
Magnifying Glasses	3	\$7	\$21
AA Batteries (20-count pack)	1	\$16	\$16
Field Guides	3	\$25	\$75
Field Notes Notebooks (pack of 5)	4	\$12	\$48
Pencil Crayons (2 packs)	2	\$13	\$26
Pencils (12-count pack)	1	\$3	\$3
Nature Stickers (100 pack)	3	\$13	\$39
Lock-N-Lock Containers (2 pack)	3	\$7	\$21
Total			\$999

Administrative Details and Resources

Staff and Volunteers Needed	Tasks
1 Program Coordinator (Librarian)	<ul style="list-style-type: none">• Coordinate community partnerships• Develop all aspects of the program including the acquisition of materials, creation and maintenance of backpacks, organization of the orientation sessions, cataloguing of backpacks, oversight and contribution to the creation of the orienteering course, resource materials, activity sheets, and display map• Program evaluation

1 Library Assistant	<ul style="list-style-type: none"> • Assist with creation and maintenance of the backpacks • Assist with materials creation, as needed • Assist in the set-up and maintenance of geocaches
1 to 2 Volunteer/Naturalist (from Quinte Conservation or Queen's University)	<ul style="list-style-type: none"> • Lead orientation sessions • Consult on the creation of activity sheets • Create and/or consult on the orienteering maps and geocaching course • Assist in the set-up and maintenance of geocaches

Space Needed

- Central area of library for orientation session with a table for the instructor and chairs for participants
- H.R. Fink Conservation Area for orienteering course and exploration

Program Timeline

Timeline	Activities
6 months before launch	<ul style="list-style-type: none"> • Confirm funding and secure program partners • Develop detailed program plan
4-5 months before	<ul style="list-style-type: none"> • Secure all donations and purchase any remaining materials • Consult with Quinte Conservation and/or volunteers at Queen's University and develop the orienteering course, resource guide and activities • Develop lending policies and procedures for the backpacks
2-3 months before	<ul style="list-style-type: none"> • Ensure that all activities, maps, and resources are finalized • Finalize all materials and equipment for the backpacks • Assemble backpacks
1 month before	<ul style="list-style-type: none"> • Create promotion materials and begin marketing the program • Enter backpacks into the catalogue
Program launch	<ul style="list-style-type: none"> • Deliver orientation session • Distribute backpacks • Troubleshoot and provide support during lending period • Collect backpacks at end of borrowing period • Repair and replace items, as needed • Collect feedback and assist participants with sharing their findings on the display board

Publicity Materials Needed

- Posters placed in library, community centres, schools, and at the Quinte Conservation area sites

- Social media posts
- Event notice on library website
- Email newsletter

Program Plan

Program Type

This is a registered lending program with independent exploration. It will consist of a registered orientation session followed by a 2 week lending period where families are free to explore and use the backpack as they wish. Upon returning the backpack participants will be free to share their findings with the library community by posting their photos, sketches, and discoveries on a display board in the library. Due to the limited number of backpacks available, there will only be 3 family spots available per month for participants and their families. Participants can register online or in-person and spots are first come, first served.

Audience	Dates and Times	Duration	Location
<ul style="list-style-type: none"> • Children 8 and up and their caregivers. 	<ul style="list-style-type: none"> • This is a recurring program that will run from May until the end of October with a total of 6 sessions. • Orientation sessions and backpack distribution will occur on the first Saturday of every month at 10am. 	<ul style="list-style-type: none"> • Orientation sessions are 1 hour long. • Following the orientation session, backpacks will be signed out to participants for a period of two weeks. 	<ul style="list-style-type: none"> • Orientation sessions will be held at the Deseronto Public Library in the main room. • Orienteering and exploration will take place at the H.R.Fink Conservation area.

Materials/Supplies

- Projector and screen for orientation session
- Table and chairs for orientation session
- 250 Stickers for geocache checkpoints
- 6 Containers to hold stickers
- 3 backpacks containing the following:
 - 1 handheld GPS navigator
 - 1 wildlife field guide
- Resource and instruction sheets
- 1 pair binoculars
- 1 orienteering map
- Coloured pencil set and regular pencils
- 1 field notes notebook
- 1 set of activity sheets/booklet
- A Quinte Conservation parking pass

Stages of the Program

1. *Introductory Orientation Session - 60 to 90 minutes*

- Introduction to orienteering and how to use the provided maps
 - Learn how to use GPS units and equipment
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- Review of backpack contents and provided activities
- Learn about the iNaturalist apps and how to use them
- Learn about the Quinte Conservation areas, local flora and fauna, environmental stewardship, and outdoor safety
- Receive backpacks

2. *Free Exploration - 2 weeks*

- Families visit the participating conservation area(s)
- Participants are free to complete the orienteering/geocaching and related activities at their own pace
 - Related activities include completing provided activity sheets, making observations and drawings in their field notes, taking photos, and submitting findings to iNaturalist
 - At each orienteering checkpoint (6 in total) participants will receive a different nature-themed sticker
- All activities are optional. Participants are encourage to explore and engage with the program as they see fit.

3. *Backpack return and Discovery Sharing*

- After two weeks, participants must return the backpacks so they can be restocked for the next session
- A display will be set up in the library for participants to share their discoveries (through notes, photos or drawings), if they wish

Anticipated Challenges/Proposed Solutions

Anticipated Challenge	Proposed Solution
Limited number of backpacks	Families can join and work together; if demand is high, we can increase the number of available sessions.
Limited GPS experience and/or technical difficulties while out exploring	Participants will receive GPS training during orientation and will receive an instruction and troubleshooting guide in their backpacks.
Participants without smartphones	Participants can still participate and log their discoveries by doing the analog activities including leaf rubbing, taking notes and making drawings in their field notes. Discoveries can be logged on the iNaturalist website when they return home, if they wish.
Participants and/or conservation area visitors clearing out the caches of stickers	Caches will be checked periodically by either library or conservation area staff to make sure they are replenished; additional stickers will be kept at the library circulation desk to give out to families that encountered empty caches.

Evaluation

The program will be evaluated using the following quantitative and qualitative methods:

- Participant enrolment numbers and orientation attendance
- The amount of post-exploration engagement with the display and discovery sharing
- Staff observations and reflections following the orientation session
- Participant Survey: Participants will be asked about their confidence using a GPS, what they learned during their exploration, their overall experience and satisfaction with the program, and whether or not they would participate in a similar program again.

Follow-up

Follow-up programs could include the following:

- An expansion of the Nature Exploration Backpacks to include different outdoor STEM activities (water testing, bird watching, stargazing etc.)
- A Community iNaturalist Challenge
- Subsequent and expanded Citizen Scientists programs that engage with citizen science projects found on the SciStarter website

Resources

- [SciStarter.org](https://www.scistarter.org) - A non-profit citizen science platform that connects organizations with scientific research projects. The website provides resources, products, and services to help individuals and organizations engage with citizen science including specific programming resources for libraries.
 - [Watersheds Canada](https://www.watersheds.ca) - The Watersheds Canada's Nature Discovery Backpacks page provides examples of their program partnerships as well as links and downloads to a variety of workbooks and activity sheets.
 - [Let's Talk Science](https://www.letstalkscience.ca) - Let's Talk Science is a Canadian charitable organization dedicated to improving youth education and engaging youth in STEM. The website provides a variety of place-based STEM programs and resources. While the programs are designed for educators and families, many of the programs could be adapted for libraries and provide a number of useful resources and hands-on activities that can be incorporated into our program.
 - [iNaturalist](https://www.inaturalist.org) - Participants will have the option to use the iNaturalist and/or the Seek by iNaturalist app during their nature exploration. Seek by iNaturalist is a free kid-friendly app that allows young naturalists to identify plants and wildlife, make observations, and earn badges. Kids older than 13 and/or parents who would like to log their findings into the iNaturalist database can use the iNaturalist app. The iNaturalist website can also be used to find local citizen science projects and provides guides and resources for how to use iNaturalist.
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- Orienteering Canada - The Orienteering Canada website provides resources for youth leaders on how to create orienteering course, maps, and activities.

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