Evidence for Democracy

From Observation to Action

eButterfly and the Policy Path to Monarch Protection



MONARCHS IN DECLINE FROM OBSERVATION TO ACTION : EBUTTERFLY AND THE POLICY PATH TO MONARCH PROTECTION

2025 Case Study

October 2025

By Katherine Peel

Acknowledgements

We would like to thank all of the individuals who supported the development of this report, including Evidence for Democracy's Trevor Potts.

This project was developed by Evidence for Democracy.

Evidence for Democracy (E4D) is Canada's leading non-partisan, not-for-profit organization championing the integration of scientific evidence in government decision-making. Through original research, skills training, and advocacy campaigns, we foster public demand for transparent and evidence-informed policies that benefit society. By equipping the scientific community with tools and knowledge, we empower researchers to take an active role in democracy alongside us as we bridge the gap between science and policy.

evidencefordemocracy.ca

TABLE OF CONTENTS



About The Author 4

Executive Summary 4

Introduction and Background 5

Methodology 7

Problem Recognition & Context 8

Case Study Analysis 9

Results and Outcomes 14

Discussion: Lessons Learned & Implications 14

Policy Recommendations 15

Conclusion 16

References 17



About the Author



Katherine is a Research Associate with Evidence for Democracy. She holds a Master of Science in Biology with a focus on global change ecology. Her research examined plant-insect interactions in the context of environmental change. Specifically, she studied the impacts of warming temperatures on the endangered monarch butterfly, with the goal of informing habitat restoration policies to support pollinator conservation. In addition to her academic work, Katherine brings experience in federal policy through her involvement in a project evaluating how wildlife health is represented in Canadian conservation policy. This work investigates the extent to which wildlife health considerations are integrated into Species at Risk Act (SARA) documents. Katherine's background bridges ecological research and policy analysis, with a strong interest in translating science into actionable strategies for biodiversity conservation.

Executive Summary

The monarch butterfly is an iconic migratory insect whose population size has declined dramatically in the past 30 years and is now listed as endangered in Canada. Habitat loss, climate change, and reduced environmental protections have created critical gaps in the conservation of the species. Citizen science (or community science) platforms like eButterfly can provide a powerful solution, engaging thousands of volunteers to collect high-quality data on monarch distribution, migration timing, and habitat use that would be difficult for professional scientists to gather alone.

This case study demonstrates that eButterfly adheres closely to established best practices for community science and contributes directly to peer-reviewed research that is used to inform conservation decision-making. Beyond research, it fosters public engagement, builds ecological awareness, and supports long-term species monitoring. Expanding funding and integrating community science with professional research can strengthen conservation efforts and help ensure the survival of this extraordinary species.

Introduction & Background

The monarch butterfly is one of the most iconic and recognizable insect species in the world, celebrated for its extraordinary long-distance migration across North America. Each year, millions travel thousands of kilometers from the mountain forests of Mexico, through the United States, and into southern Canada, a relay completed over several generations. Most monarchs live just two to six weeks breeding in Canada and the US, before the final generation makes the astonishing return flight to Mexico to survive the winter. This epic journey, unmatched in the insect world, depends on healthy habitats and conservation measures across all three countries in its range.

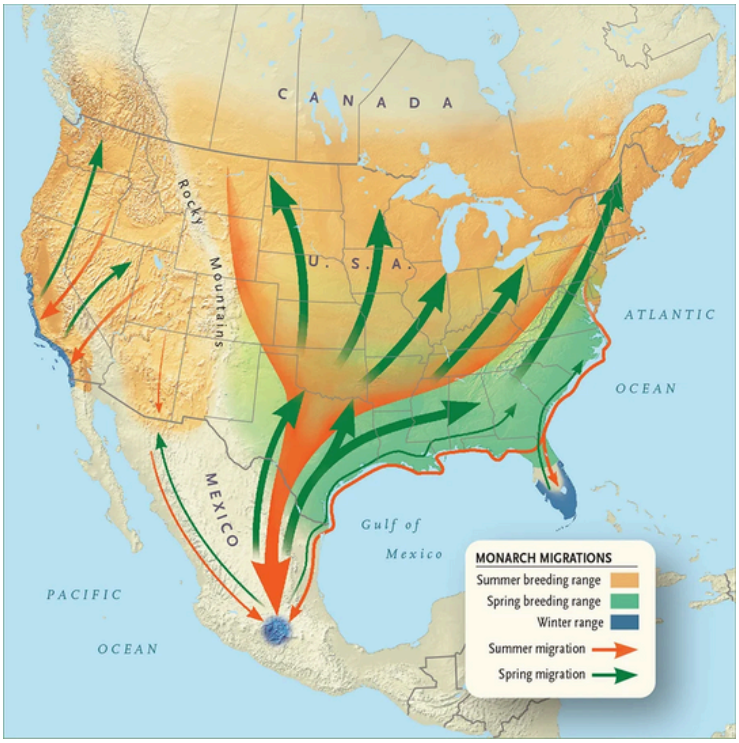


Figure 1. Monarch population migration route and range information. Eastern migratory population information is illustrated east of the Rocky Mountains. Map: Chris Brackley/Canadian Geographic[1] based on MonarchWatch Monarch Butterfly Fall and Spring Migrations Map (monarchwatch.org).

Legal protections for monarchs, whose populations have decreased by 90% in the last 30 years, vary across borders[2]. In Canada, the monarch butterfly is listed as an endangered species and is granted legal protection under the Species at Risk Act[3]. In Mexico, it is designated as a species of special protection under national law, with critical wintering habitat safeguarded within the Monarch Butterfly Biosphere Reserve[3]. In the United States, monarchs are not currently listed on the Endangered Species Act, though their potential listing has been under review for many years[3] [4].



Effective monarch conservation requires coordinated research, monitoring, and policy alignment[5] that spans the tri-national range of the species[6]. However, recent political shifts have further disrupted this collaboration. In Mexico, President Claudia Sheinbaum Pardo, a climate scientist by training, has enacted policies strengthening protections for monarch habitat, where illegal logging and climate change are major concerns[7] [8]. Both the US and Canadian governments have welcomed new administrations in 2025 whose policies have created new challenges for cross-border conservation[9]. Given the recent policy changes in the United States to slash climate research budgets, undermine environmental legal protections[10], and eliminate thousands of climate scientist positions[11], conservation for this endangered species is now at risk. Canada, which relies on both provincial action and international agreements, is shifting from centralized, government-led data collection toward more distributed, community-driven initiatives with decreased funding towards climate and conservation research. Meanwhile, Mexico continues to prioritize the Biosphere Reserve network and local community partnerships, yet faces persistent threats from illegal logging within protected areas[12]. These differences in legal status, combined with diminishing conservation strategies of new administrations in Canada and the US, highlight the need for stronger tri-national cooperation to ensure the species' survival.

It is important to note that Indigenous communities across North America play a critical role in monarch conservation. These communities steward and maintain ecologically important lands along the migratory routes and breeding areas of the monarch butterfly[13]. Their knowledge systems, land management practices, and cultural connections to the species are vital to sustaining healthy monarch populations, and serve as an example on how collaboration between nations is possible for conservation.

Citizen science, or community science, involves engaging the public in scientific research and can address a wide range of practices, offering a promising avenue for addressing the growing gaps in monarch research[14]. Community science projects can expand geographic coverage, increase temporal monitoring frequency, and build public awareness of conservation challenges.

eButterfly is one such platform, operating as a free, continent-wide platform dedicated to butterfly biodiversity, conservation, and education. Supported by an interactive web interface, participants record when, where, and how they observe butterflies. Observations can then be verified by other users and regional experts, ensuring a level of data quality that can meet scientific standards. For monarchs, these contributions can reveal migration timing, identify breeding hotspots, and track changes in habitat quality over time. eButterfly's datasets can also inform landscape-scale planning and policy decisions, benefitting not only monarchs but a wide range of butterfly species and pollinators across North America[15].

eButterfly's strengths make it well-suited to contribute to monarch conservation in a time of political and institutional uncertainty. The platform's continental-scale coverage encompasses the full range of the monarch's annual migration, though participation in Mexico remains limited. As Dr. Jeremy Kerr of the University of Ottawa testified to the House of Commons Standing Committee on Science



and Research, the rate of data generation is extraordinary. Professional scientists have collected 300,000 butterfly records of 297 species in Canada over 130 years, while eButterfly users have doubled that volume in just 7 years[21]. This scale of data collection enables rapid detection of shifts in the timing of life history events, population declines, and habitat changes.

This case study examines how eButterfly or similar platforms can be leveraged as tools to bridge the widening gaps in tri-national monarch monitoring, particularly in the face of shifting political landscapes and funding constraints. By exploring its potential to complement and enhance traditional scientific programs, we highlight the role of community science as a critical component of monarch conservation in the 21st century.

Methodology

We identified the following four components as essential to our methodology in writing this case study:

1. Literature Review and Policy Analysis: We began with an extensive literature search to identify peer-reviewed research, government reports, and non-governmental organizations publications citing eButterfly (or citizen/community science and Global Biodiversity Information Facility) in the context of butterfly monitoring and conservation. We also identified policy documents from federal and provincial/state sources in Canada, the US, and Mexico to assess recent changes in climate and biodiversity programs, focusing on implications for monarch monitoring capacity.

2. Stakeholder Identification and Mapping: The second stage involved mapping stakeholders across jurisdictions and sectors, by grouping stakeholders into three categories (Professional Science, Policymakers, Citizen/Community Science) to visualize relationships and roles in conservation efforts.

3. Community Science Platform Assessment: In order to fully assess eButterfly as an effective community science initiative, we developed a framework using the Citizen Science Principles of Good Practice from Alberta Ministry of Environment and Parks[16] [17]. Using the framework, we reviewed platform documentation, published use cases, and examples from existing research. Additionally, we assessed geographic coverage, temporal resolution, species identification protocols, data validation methods, as well as compared eButterfly to other community science platforms.

4. Identification of Limitations: Lastly, we identified a list of limitations. We did not feature primary data collection, instead relying on secondary data and existing datasets which depend on accuracy and completeness of available literature and may not reflect rapidly changing policy environments in real time.



Problem Recognition & Context

In recent months, Canadian governments have taken significant steps away from previous climate initiatives and commitments. The most prominent example being the federal government's rapid introduction and passing of Bill C-5, specifically the Building Canada Act, which grants the federal Cabinet sweeping powers to designate certain major infrastructure and resource ventures as "national interest projects". This allows the government to bypass existing environmental laws and regulatory measures, streamlining their approval regardless of whether they violate environmental assessment protocols. Additional efforts by the Ontario provincial government to introduce legislation to bypass existing provincial environmental laws in favour of prioritizing "special economic zones", and to replace the Environmental Species Act to eliminate protections for endangered species, seriously harm species habitats and migration[18].

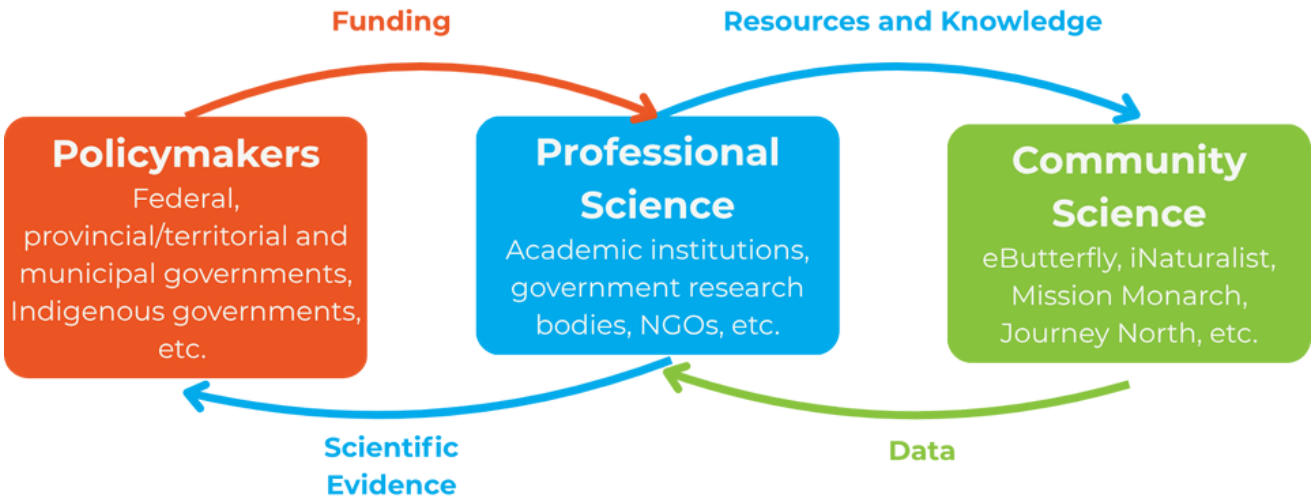
The decline in centralized scientific capacity has meant that conservation is increasingly reliant on non-state actors, leaving non-governmental organizations (NGOs), academic institutions, Indigenous communities, and grassroots organizations to fill these gaps. Fortunately, technological advances in mobile applications, cloud-based databases, and machine learning now make it possible for distributed observers across North America to contribute high-quality ecological data in real time. In this environment, community science platforms can play an expanded role, by mobilizing thousands of volunteers across political boundaries, helping to maintain and expand the geographic and temporal coverage of monarch monitoring.

Data from eButterfly has been used in peer-reviewed research, including studies on shifts in the timing of life events, species distribution modelling, and conservation prioritization mapping. Such information can guide policy interventions, inform land management strategies, and enhance habitat restoration targeting.

While community science offers significant potential, it is not without limitations. Data quality can be variable due to differences in observer skill, and sampling effort is often biased towards easily accessible and highly populated areas. Seasonal participation can also fluctuate, and sustaining long term volunteer engagement requires ongoing outreach and support. Technological barriers, such as limited access to smartphones or internet in rural and remote communities, can also restrict participation.

Despite its limitations, in the context of weakening governmental monitoring systems across North America, the expansion of platforms like eButterfly represents an important opportunity. By strategically integrating volunteer-generated data with existing scientific and Indigenous knowledge systems, it is possible to mitigate some of the data and policy gaps emerging in monarch conservation. This case study explores how such integration could strengthen tri-national collaboration, maintain continuity of research despite political shifts, and ultimately contribute to the persistence of North America's most celebrated migratory insect species.

Figure 2. A workflow diagram illustrating the actors involved in monarch butterfly conservation across sectors and jurisdictions related to citizen science across Canada, the United States, and Mexico.



Case Study Analysis

The success of a community science initiative is dependent on a strong foundation and appropriate application of research. We used the Citizen Science Principles of Good Practice from the Alberta Ministry of Environment and Parks[16] along with an evaluation framework from Hughes et al. 2022[17], to evaluate eButterfly in this context, as shown below. We found that overall, while there are still ways that the platform may be improved, eButterfly closely follows the established best practices, indicating a robust scientific initiative that has the potential to influence conservation policy.





Table 1. Analysis of the eButterfly initiative as an effective citizen science, or community science, program.

Citizen Science Principles of Good Practice:	Evaluation Question(s)	Indicator(s)	eButterfly Assessment
Purpose and Scientific Outcome	What is the stated purpose and/or scientific outcome? Are the outcomes clear?	Documentation of the program purpose, goals, and/or desired scientific outcomes.	Clear mission to collect and share checklists and photos for science, conservation, outreach and education, and build rich datasets for use in scientific publications to answer research questions.
Fit-for-Function and Quality Control	How does the program design match the program purpose? How does the program ensure the production of rigorous, high-quality data? How do participant training and resources match the task (i.e., data collection)?	Documentation specific outcome statements. Quality control measures for data (e.g., expert data verification). Appropriate training and resources for participants.	The program uses standardized protocols (transects, area searches, timed counts, and casual observations), aligning data collection with scientific modelling needs. The platform also employs rigorous data collection through set protocols, using a combination of automated screening and expert verification to ensure high quality of data. Participants are guided through interactive three-step submission and observations are vetted by regional experts.

Openness and Transparency	What data collection tools are being used? Are data ownership and access rights clear and transparent?	Data and results are shared with participants in suitable formats (e.g., data visualizations).	eButterfly uses large-scale, crowd sourced data collection where users access an online system to submit checklists for monarch butterflies, including location, time, species present, and counts, with an additional option to upload photos as proof or verification. eButterfly data are accessible to anyone via the eButterfly website, but a feature to download and use eButterfly data is not yet available.
Inclusivity and Engagement	What participant recruitment strategies were used to engage with a diversity of participants? To what degree are participants involved in project tasks?	A diversity of participants are engaged in all aspects of the project.	eButterfly welcomes participants of all experience levels, from casual butterfly-watchers to season experts. eButterfly participants are engaged primarily in active data collection consisting of recording and submitting sightings. More experienced contributors are able to participate in data validation, reviewing sightings for accuracy. There is no indication that users play an active role in defining research questions or designing program objectives.

Benefits and Acknowledgment	How do both the researchers and participants benefit? How are participants provided with ongoing learning opportunities? How are participant contributions acknowledged?	Discussion of potential benefits to participants, including developing their skills or the creation of new knowledge, to help inform environmental decisions.	The platform includes tools such as life lists, distribution maps, phenology charts, and project leaderboards to motivate continued learning and participation from users. The aggregated data support conservation, phenology studies, climate change research and more topics in scientific publications. The platform also recognizes participant contributions by publicly showcasing user stories, highlighting both individual and group contributions, and marking participant achievements as spotlights for the broader community to celebrate.
Consideration of safety, legal and ethical standards and guidelines.	How does the project consider participant safety? How does the project consider governance and management of data and information?	Protocols are established and participants trained on the protocols. Documentation of ethical research practices such as data sharing agreements.	Data collection protocols are established, but participant safety protocols are not presented prior to data input. eButterfly data is stored in secure servers at the University of Ottawa, archived daily, and accessible to all.



1. Purpose and Scientific Outcome

eButterfly clearly states its mission to collect and share checklists and photos for science, conservation, outreach and education, and build rich datasets for use in scientific publications to answer research questions.

2. Fit-for-Function and Quality Control

eButterfly data are stored securely and archived daily at the University of Ottawa[19]. They are also shared with the Global Biodiversity Information Facility (GBIF), a global repository of open source biodiversity data used by institutions around the world. Remarkably, biodiversity data available through GBIF has increased a staggering 1,150% from 2003 to 2019, partially due to participation of community scientists, including users of eButterfly[20].

3. Openness and Transparency

eButterfly uses large-scale, crowd sourced data collection where users access an online system to submit checklists for monarch butterflies, including location, time, species present, and counts, with an additional option to upload photos as proof or verification. Data are accessible to anyone via the eButterfly website, but a feature to download and use eButterfly data is not yet available.

4. Inclusivity and Engagement

eButterfly welcomes participants of all experience levels, from casual butterfly-watchers to season experts. Anyone interested can contribute, while more experienced users play a key role in data verification. eButterfly participants are engaged primarily in the active data collection phase in recording and submitting sightings. More experienced contributors are able to participate in data validation, reviewing sightings for accuracy. There is no indication that users play an active role in defining research questions or designing program objectives.

5. Benefits and Acknowledgement

The platform includes tools such as life lists, distribution maps, phenology charts, and project leaderboards to motivate continued learning and participation from users. The platform also recognizes participant contributions by publicly showcasing user stories, highlighting both individual and group contributions, and marking participant achievements as spotlights for the broader community to celebrate.

6. Consideration of safety, legal, and ethical standards and guidelines

Data collection protocols are established, but participant safety protocols are not presented prior to data input. eButterfly data is stored in secure servers at the University of Ottawa, archived daily, and accessible to all.



Results and Outcomes

Peer-reviewed studies that incorporate community science data, such as those from eButterfly, play an increasingly important role in shaping conservation policy in Canada. A clear example comes from the federal Species at Risk Act (SARA) Species Assessment for the monarch butterfly, which states that “the distribution of the Monarch in Canada was determined by efforts of collectors, researchers, and community scientists”[22]. This recognition highlights the direct impact of platforms like eButterfly, as the observations, photos, and sightings submitted by volunteers were critical to informing the Distribution and Populations Sizes and Trends sections, which ultimately guide legal protections and management actions for the species.

The integration of community science with professional monitoring is becoming a cornerstone of evidence-informed conservation. Community scientists can provide the large-scale, long-term datasets needed to detect shifts in species ranges and population dynamics over time, while professional surveys contribute standardized methods and rigorous validation. Together, these approaches create a stronger and more comprehensive evidence base than either could achieve alone.

Importantly, conservation also depends on valuing and incorporating the distinct ecological knowledge of Indigenous Peoples, whose long-standing relationships with the land contribute perspectives not captured by Western scientific approaches. Recognizing and integrating the diverse knowledge systems of professional science, Indigenous Knowledge, and community science offers the most powerful path forward for conserving biodiversity in Canada.

Discussion: Lessons Learned & Implications

The success of eButterfly illustrates how community science initiatives rarely operate in isolation, but instead build upon and inspire one another. eButterfly was inspired by the highly successful eBird platform, while a subsequent community science initiative, Mission Monarch, was modeled after eButterfly. This cross-pollination of ideas and models demonstrates how innovation in one platform can help build new initiatives and expand opportunities for public participation in science. Each additional observation recorded in any of these platforms strengthens not only the host initiative, but also the broader ecosystem of ecological science, as datasets can be integrated, compared, and leveraged across multiple projects.

Beyond project-specific uses, data from eButterfly and other community science initiatives are aggregated into global biodiversity repositories such as the Global Biodiversity Information Facility, where millions of records are compiled to support large-scale ecological analyses. Such aggregation magnifies the value of individual contributions, ensuring that local observations inform continental and even global biodiversity research.

The influence of community science extends beyond academic research into the policy realm, where evidence generated by the public is shaping environmental decision-making. Several Canadian initiatives highlight this potential. The Great Canadian Shoreline Cleanup mobilized thousands of volunteers to collect data on plastic pollution, directly informing Canada's 2022 ban on single-use plastics[23]. Programs like Alberta's GrizzTracker have significantly influenced provincial wildlife management practices[24], while the Ocean Networks Canada Arctic Program demonstrates how community-driven data collection can both enhance safety and inform long-term climate adaptation strategies in northern regions[25].

In addition to its value for research and policy, community science is a powerful outreach tool. By inviting people to participate in data collection, projects like eButterfly spark curiosity and deepen public understanding of ecological issues[26]. This makes science more accessible and in turn, community scientists often become advocates, carrying their knowledge into communities and inspiring broader support for biodiversity protection.

Together, these examples underscore that community science is, and should remain, central to biodiversity research and conservation policy. By fostering partnerships between community scientists, professional researchers, and Indigenous knowledge holders, platforms like eButterfly can expand their reach and ensure that diverse forms of knowledge contribute to evidence-based decision-making. As community science continues to grow in scope, scale, and credibility, its role in addressing Canada's pressing biodiversity challenges will only deepen, illustrating the collective power of public engagement in science to drive meaningful environmental outcomes.

Policy Recommendations

As a result of this case study analysis, we have developed a series of policy recommendations to be undertaken by governments across the tri-national range of the monarch butterfly that will help ensure that conservation and recovery of this renowned species are successful. These recommendations are as follows:

1. Sustain and expand funding for community science initiatives: we encourage governments in the tri-national range of the monarch butterfly to dedicate long-term funding streams for community science programs to ensure platform maintenance, volunteer training, outreach, and data quality improvements.

2. Support integrated research programs: continue and expand funding for professional ecological research while incentivizing partnerships with community science initiatives.

3. Encourage cross-platform collaboration and data sharing: strengthen infrastructure that allows community science data to flow seamlessly into global repositories like the Global Biodiversity Information Facility (GBIF).

4. Recognize community science in policy frameworks: formally acknowledge community science as a critical source of biodiversity evidence in national and tri-national policy frameworks (such as the Species at Risk Act in Canada). Explicit recognition would enhance legitimacy, visibility, and incorporation of volunteer-generated data in decision-making.

Conclusion

The monarch butterfly's current population decline highlights the urgent need for coordinated conservation across North America, particularly as shifting policies in Canada and the United States have weakened traditional monitoring systems. In this context, community science platforms like eButterfly provide an essential complement to professional research by generating large-scale, timely data on monarch distribution, migration, and habitat use. By connecting with other initiatives such as Journey North and Mission Monarch, and contributing to global repositories like GBIF, eButterfly expands the reach of individual observations and strengthens tri-national capacity to address biodiversity loss.

Beyond research, community science has demonstrated its policy impacts, from shaping Canada's single-use plastics ban to informing endangered species assessments and regional wildlife management. To build on these successes, governments in Canada, the United States, and Mexico should expand funding for community science initiatives and continue supporting professional monitoring. Together, these approaches can create a resilient, collaborative framework for safeguarding monarch butterflies and the broader biodiversity that sustains ecosystems across North America.





References

1. Brackley C. Monarch Butterfly: Endangered Species [Internet]. Canadian Geographic; 2014. Available from: https://canadiangeographic.ca/articles/monarch-butterfly-endangered-species/

2. Dalusong J. “Alarmingly low” monarch butterfly population calls for international conservation strategy: Guelph professor [Internet]. CBC.ca. 2025. Available from: https://www.cbc.ca/news/canada/kitchener-waterloo/monarch-butterfly-population-conservation-guelph-professor-1.7598688

3. Monarch Joint Venture. North American monarch protections and listing status [Internet]. 2024. Available from: https://monarchjointventure.org/monarch-biology/status

4. U.S. Fish and Wildlife Service. Fish and Wildlife Service Proposes Endangered Species Act Protection for Monarch Butterfly; Urges Increased Public Engagement to Help Save the Species [Internet]. 2024. Available from: https://www.fws.gov/press-release/2024-12/monarch-butterfly-proposed-endangered-species-act-protection

University of Guelph. Saving Monarch Butterflies Requires Immediate Cooperation Between Canada, U.S. and Mexico [Internet]. UofG News. 2025. Available from: https://news.uoguelph.ca/2025/07/saving-monarch-butterflies-requires-immediate-cooperation-between-canada-u-s-and-mexico/

6. Jewell SD. Recovery Goes Continental—How Three Countries Overcome Border Barriers. Proc Species at Risk 2004 Pathways to Recovery Conference. 2004;7.

7. Zylstra ER, Ries L, Neupane N, Saunders SP, Ramírez MI, Rendón-Salinas E, et al. Changes in climate drive recent monarch butterfly dynamics. Nat Ecol Evol. 2021 Jul 19;5(10):1441–52.

8. Zylstra ER, Thogmartin WE, Ramirez MI, Zipkin EF. Summary of available data from the monarch overwintering colonies in central Mexico, 1976-1991. U.S. Geological Survey; 2020. (Open-File Report).

9. ecojustice. Environmental and civil society groups react: Bill C-5 becomes law, setting a dangerous precedent [Internet]. 2025. Available from: https://ecojustice.ca/news/environmental-and-civil-society-groups-react-bill-c-5-becomes-law-setting-a-dangerous-precedent/

10. U.S. Environmental Protection Agency. EPA Releases Proposal to Rescind Obama-Era Endangerment Finding, Regulations that Paved the Way for Electric Vehicle Mandates [Internet]. 2025. Available from: https://www.epa.gov/newsreleases/epa-releases-proposal-rescind-obama-era-endangerment-finding-regulations-paved-way



11. Evidence for Democracy. Trump's War on Science: How His Policies Affect Canadian Research [Internet]. 2025. Available from: https://evidencefordemocracy.ca/trumps-war-on-science-how-his-policies-affect-canadian-research/

12. Verza M. Illegal logging thrives in Mexico City's forest-covered boroughs, as locals strive to plant trees [Internet]. CityNews. 2023. Available from: https://kitchener.citynews.ca/2023/08/28/illegal-logging-thrives-in-mexico-citys-forest-covered-boroughs-as-locals-strive-to-plant-trees/

13. Lemelin RH, Hutter A, Whyte KP, Root G. From Aamoo (Bees) To Memengwaa (Butterflies), Living Well with Manidoons (Insect Pollinators) and Ninwish (Milkweed): Indigenous Peoples and Insect Pollinators on Turtle Island (North America). American Entomologist. 2020 Dec 11;66(4):42–7.

14. Flockhart DTT, Larrivée M, Prudic KL, Norris DR. Estimating the annual distribution of monarch butterflies in Canada over 16 years using citizen science data. Kevan PG, editor. FACETS. 2019 Jun 1;4(1):238–53.

15. eButterfly. About eButterfly [Internet]. Available from: https://www.e-butterfly.org/en/content/about

16. Government of Alberta. Citizen Science Principles of Good Practice [Internet]. Alberta: Ministry of Environment and Parks; 2020 May p. 10. Available from: https://open.alberta.ca/publications/9781460146514

17. Hughes C, Tremblett K, Kummer J, Lee TS, Duke D. How Can We Do Citizen Science Better? A Case Study Evaluating Grizzly Bear Citizen Science Using Principles of Good Practice in Alberta, Canada. Animals (Basel). 2022 Apr 20;12(9):1068.

18. Casey L. Proposed Ontario bill would strip away key environmental protections, advocates say [Internet]. 2025. Available from: https://www.cbc.ca/news/canada/toronto/advocates-criticize-ontario-bill-projects-exempt-from-laws-1.7528119

19. Larrivée M, McFarland K, Xinbao Zhang, Prudic K, Solis R, Bunsen M, et al. eButterfly Surveys [Internet]. Vermont Center for Ecostudies; 2025 [cited 2025 Aug 14]. Available from: https://www.gbif.org/dataset/cf3bdc30-370c-48d3-8fff-b587a39d72d6

20. Heberling JM, Miller JT, Noesgaard D, Weingart SB, Schigel D. Data integration enables global biodiversity synthesis. Proc Natl Acad Sci USA. 2021 Feb 9;118(6):e2018093118.

21. SRSR Committee Meeting [Internet]. House of Commons Canada; 2023. Available from: https://www.ourcommons.ca/documentviewer/en/44-1/SRSR/meeting-31/evidence

22. Harris AG, Foster R, Heron J. COSEWIC assessment and status report on the Monarch, Danaus plexippus, in Canada. Ottawa: Environment and Climate Change Canada; 2017.

23. Ocean Wise & WWF. Great Canadian Shoreline Cleanup Impact Report [Internet]. 2022 p. 16. Available from: https://www.ocean.org/app/uploads/2023/04/Shoreline-Cleanup_2021-Impact-Report.pdf

24. Steenweg RJ, Lee TS, Duke D, Hughes C. Using community science to advance grizzly bear conservation. Lesbarrères D, editor. FACETS. 2024 Jan 1;9:1–11.

25. Fisheries and Oceans Canada. The Government of Canada invests in world-class ocean monitoring system to enhance Canada's ocean protection for the next generation [Internet]. Government of Canada; 2023 Feb. Available from: https://www.canada.ca/en/fisheries-oceans/news/2023/02/the-government-of-canada-invests-in-world-class-ocean-monitoring-system-to-enhance-canadas-ocean-protection-for-the-next-generation.html

26. Saunders ME, Roger E, Geary WL, Meredith F, Welbourne DJ, Bako A, et al. Citizen science in schools: Engaging students in research on urban habitat for pollinators. Austral Ecology. 2018 Sep;43(6):635–42.



This project was developed by Evidence for Democracy.

Evidence for Democracy (E4D) is Canada's leading non-partisan, not-for-profit organization championing the integration of scientific evidence in government decision-making. Through original research, skills training, and advocacy campaigns, we foster public demand for transparent and evidence-informed policies that benefit society. By equipping the scientific community with tools and knowledge, we empower researchers to take an active role in democracy alongside us as we bridge the gap between science and policy.

evidencefordemocracy.ca