

PROJECT PROPOSAL

1. Project name: Supporting Science for Continental Conservation of the Monarch Butterfly

2. Two-year budget: C\$400,000

3. Short statement on the need identified (including current status), the project objective and the outcomes (achievable by June 2019) to address it:

Monarch populations have declined significantly, triggering an unprecedented international effort to conserve this flagship species that represents a broader suite of pollinators critical to our food security. Leveraging the Trinational Monarch Conservation Science Partnership (T-MCSP), this project fulfills a need for cohesive coordination of monitoring, of research, and of developing science tools that contribute to adaptive conservation for monarchs. Filling priority science gaps will inform policy-making and targeted conservation action while enhancing public knowledge and support for monarch conservation. The project will focus on: 1) coordination (e.g., working groups and work plan for five research priority areas); 2) a trinational monitoring strategy, with shared protocols and integrated data; 3) research to address shared priorities; and 4) conservation tools to assist planning, management and action (e.g., geospatial habitat mapping). Project results will support broader knowledge and action for pollinator conservation, particularly with regard to better understanding agrochemical exposure and nectar resources. Through this work, national agencies and conservation organizations will be able to prioritize their actions for more effective conservation results.

4. Select the strategic priority(ies) that the project addresses:

2015–2020 Strategic Priorities	Priority Areas
<input checked="" type="checkbox"/> Climate Change Mitigation and Adaptation	<input type="checkbox"/> Trade and the Environment (e.g., environment and innovations; movement of environmental goods and services)
<input type="checkbox"/> Green Growth	<input type="checkbox"/> Methane emissions reduction
<input checked="" type="checkbox"/> Sustainable Communities and Ecosystems	<input type="checkbox"/> Reduce and recover food waste
	<input type="checkbox"/> Black carbon inventory
	<input checked="" type="checkbox"/> Priority species and ecosystems (e.g., transboundary invasive alien species)
	<input type="checkbox"/> Health of oceans (e.g., marine litter; ocean acidification; marine protected areas)
	<input type="checkbox"/> Syndromic surveillance systems
	<input type="checkbox"/> Mexican Emissions Control Area (ECA)
	<input type="checkbox"/> TEK case studies

5. Explain how the project can achieve more impact by working trinationally, and why the CEC is the most effective vehicle to undertake this work:

The monarch's migration is an international phenomenon that captivates a diverse spectrum of the public in all three countries—helping to inspire a new generation of conservation stewards. The monarch's unique migratory nature makes working trinationally

an imperative. This project provides a unique and timely opportunity to highlight and empower a new and innovative model for international scientific collaboration in order to conserve a shared migratory species. The CEC has created forums to enhance these types of collaborations in the past, providing a value-added support structure to enhance such an effort, which will continue on after this project is completed.

6. Describe how the project may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation:

Pollinators are vital to food security because most fruit, vegetable, and seed crops are pollinated by animals. Numerous species of North American pollinators are in decline, including managed honey bees. In addition to pollinators' economic value, animal pollination provides essential functions for a wide range of natural communities in North America. The monarch butterfly serves as a flagship for the flowering grassland habitat these pollinators need to thrive. Investing in science and conservation in the monarch's migratory route and overwintering grounds provides multiple economic benefits, including job opportunities from reforestation and monitoring efforts. For example, monitoring efforts in Mexico involve 42 protected areas and dozens of employees and volunteers. The Monarch Butterfly Biosphere Reserve (MBBR) in central Mexico provides a protected winter home for the monarchs, as well as a means for local communities to generate revenue from tourism. More than 150,000 tourists visit the overwintering colonies every year. Investing in enhanced science, which includes monitoring, will support adaptive management of the MBBR and other key resources across the monarch's range that will also directly inform broader pollinator research and conservation.

7. List the objectives and activities to be conducted to achieve measurable results:

Objectives (must be SMART¹)	Main activities to achieve objectives (by 30 June 2019)	Measurable results
By 30 June 2019, the current status of monarch research in the three countries is known and cohesive trilateral coordination of monarch research has been achieved through the Trilateral Monarch Conservation Science Partnership.	<ul style="list-style-type: none"> • Annual meetings to convene scientific experts from the three countries to share information and further research. • Linking trilateral science work with other monarch/pollinator conservation efforts (e.g., urban). • Development of a work plan with a defined research agenda. 	<p>A compendium of trilateral monarch research is published for use by policy-makers and NGOs.</p> <p>An established work plan and sustained partnership for the T-MCSP and its members is in place.</p>
By 30 June 2019, a trilateral monitoring strategy integrating biological monitoring	<ul style="list-style-type: none"> • Finalize trilateral monarch monitoring strategy 	A trilateral monitoring strategy that integrates biological monitoring

¹ SMART: Specific, measurable, achievable, realistic and time-bound.

protocols and databases across the three countries is in place to support monarch conservation efforts.	documentation. <ul style="list-style-type: none"> • Field-monitoring projects to implement integrated protocols. • Concerted field-monitoring efforts in northern Mexico. • Workshops of experts to update monitoring protocols and databases. 	protocols and databases across the three countries is implemented.
By 30 June 2019, pilot studies have contributed to addressing knowledge gaps in five priority areas (climate change, overwintering density, natal origins, agrochemical exposure, and nectar resources).	<ul style="list-style-type: none"> • Establishment of working groups for each T-MCSP research priority. • Research projects in five priority areas. 	Demonstration studies on the five research priorities are completed, published, or significantly underway.
By 30 June 2019, strategic conservation tools are available to support informed decision-making for climate-resilient adaptive monarch conservation.	<ul style="list-style-type: none"> • Identify priority tools (e.g., geospatial habitat mapping, natal origins mapping, etc.). • Develop priority tools. 	A set of conservation tools for strategic monarch conservation in the context of habitat loss and degradation (including deforestation) and climate change scenarios is available for government agencies and NGOs.

8. Describe how the project complements or avoids duplication with other national or international work:

This project focuses on value-added integration of ongoing efforts in Canada, Mexico, and the United States. Collaborative efforts are coordinated through the Trilateral Committee for Wildlife and Ecosystem Conservation and Management (Trilateral Committee), under the leadership of the US Fish & Wildlife Service, Environment and Climate Change Canada, and Mexico's National Commission of Natural Protected Areas. The CEC has played a critical role in serving as a launching pad for implementation, convergence, and expansion of previous and similar ongoing efforts. This project fills a critical gap in achieving trinational objectives under the 2008 North American Monarch Conservation Plan, which the CEC published, in the area of applied science needed to drive conservation action and decision-making. The Trilateral Committee endorsed the Trinational Monarch Conservation Science Partnership (T-MCSP) in 2016. The Trilateral Committee continues to serve as a forum for monitoring T-MCSP progress and avoiding duplication with other international work, while linking coordinated and focused science and research with action and implementation.

9. Describe opportunities for inclusion of traditional ecological knowledge (TEK), if applicable, and how these opportunities are incorporated into the project :

Enhancing the scientific understanding of ecosystems cannot fully happen without the consideration and integration of traditional ecological knowledge (TEK). Past CEC efforts included completing a contract to identify TEK related to monarch conservation in Canada, Mexico, and the United States. The report found very little monarch-specific TEK throughout the migratory corridor.

However, knowing that TEK is usually limited to certain individuals and is not always widely available through publicly available sources, the project will build upon the findings of the report and aim to expand the current knowledge base. TEK experts will be invited into the workshops and the development of this project's products and research projects.

10. Describe opportunities for youth engagement, if applicable, and how these opportunities are incorporated into the project:

Monitoring for monarch conservation heavily relies on citizen-science programs in all three countries, which provides incredible opportunities to engage young people. Participating partners in the T-MCSP work with university students and community members (including kids and families) to recruit, train, and deploy volunteer citizen-scientists to collect important data on monarch butterflies, milkweed, and nectar plants to engage thousands of young people. The integrated monitoring strategy called for in this proposal will support those programs. Additionally, the monitoring work involves different land-cover types while engaging those sector-specific stakeholders, including urban, agricultural, rights-of-ways, and protected areas.

11. List significant involvement of other levels of government, Indigenous groups, local communities, experts, private sector, civil society and others, as applicable:

This effort encompasses broad trilateral collaboration of government agencies, academic institutions, and non-governmental organizations. It builds upon their existing work and capacities, including research sponsored by both government and universities. The T-MCSP brings together the leading experts on monarch science in all three countries, acting as a "think tank" for monarch conservation, and this project would benefit directly from that expertise. The leading targeted partners for this project include:

Government - US Fish & Wildlife Service, US Geological Survey, and Natural Resources Conservation Service (US Department of Agriculture) from the US; Environment and Climate Change Canada, Canadian Wildlife Service, and Parks Canada from Canada; and *Comisión Nacional de Áreas Naturales Protegidas* (Conanp), *Comisión Nacional para el Conocimiento y Uso de la Biodiversidad* (Conabio), and the *Instituto Nacional de Ecología y Cambio Climático* (INECC) from Mexico.

Academia - University of Guelph from Canada; University of Minnesota, University of Kansas, and University of Arizona from the US; *Instituto de Biología*, *Universidad Nacional Autónoma de México* (UNAM) from Mexico.

Nongovernment - *Insectarium de Montréal* from Canada; Monarch Joint Venture (partnership of over 54 organizations in the United States, including Xerces Society for Invertebrate Conservation and Monarch Watch) from the US; World Wildlife Fund-Mexico, *Ecosistémica*, and *Pronatura México* from Mexico.

By working together with such diverse and engaged partners, this project will make the most effective and efficient use of resources for better informed decision-making. This work also engages local communities, Indigenous groups, and local civil society groups in the monarch's migratory route by leveraging them as citizen scientists and collaborators on monitoring and research projects.

12. Identify relevant committee members and their federal agencies in each country committed to developing this project, and implementing it, if approved:

Canada: **Gregory Mitchell** (Environment and Climate Change Canada), gregory.mitchell@canada.ca

Mexico: **Ignacio March Misfut** (*Comisión Nacional de Áreas Naturales Protegidas*), ignacio.march@conanp.gob.mx

United States: **Ryan Drum** (US Fish and Wildlife Service), ryan_drum@fws.gov

In collaboration with: **Víctor Sánchez-Cordero** (*Instituto de Biología, UNAM*), victor@ib.unam.mx; **Michael Gale** (US Fish and Wildlife Service), Michael_gale@fws.gov; **Holly Holt** (Monarch Joint Venture), hholt@umn.edu; **Keith Hobson** (Environment and Climate Change Canada), khobson6@uwo.ca; **Maxim Larrivée** (*Insectarium de Montréal*), maxim.larrivee@ville.montreal.qc.ca; and other members of the T-MCSP.