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North American migrating monarch butterflies (*Danaus plexippus*) have been declining for decades and their migratory phenomenon is considered at risk. Monarch butterflies migrate across Canada, Mexico, and the United States, and the threats they face go beyond borders. In response, the three countries have joined efforts to conserve the two migrating monarch populations.

Large-scale analyses are needed to better understand monarch population dynamics and its drivers. Over the years, extensive data on monarch butterfly and milkweed (*Asclepias spp.*) distribution have been compiled, but the data are scattered across various organizations and stored in different, often incompatible formats. Thus, the data are not readily accessible or analyzable, hindering research to address continental-scale issues.

At the Monarch Butterfly Research and Monitoring Workshop, held in February 2018 in Montreal, as part of the Commission for Environmental Cooperation (CEC) project *Science for Monarch and Pollinator Conservation*, participants identified as a priority the sharing of data and knowledge gained during decades of monitoring and research by several organizations and researchers along the migratory routes of the monarch.

**The Trinational Monarch Knowledge Network (TMKN) was launched in 2019. The TMKN is an online trilingual platform where datasets from various researchers and organizations can be uploaded, downloaded and visualized.**

Data are stored in a unified format based on the Darwin Core standards, which were developed by the nonprofit organization, Biodiversity Information Standards, and are used by international organizations such as the Global Biodiversity Information Facility.

The TMKN is built on the architecture of the Avian Knowledge Network hosted by NatureCounts, an interactive data portal managed by Bird Studies Canada since 2008 which hosts over 120 million natural inventory and monitoring occurrences from over 400 datasets. Thus, the TMKN is based on a technology that has demonstrated its value. Visualization tools include an interactive map and population dynamics plots.

**The TMKN is expected to:**

1. **foster continental-scale research and collaboration on monarch conservation,**
2. **increase access to standardized data for all stakeholders, and**
3. **bring new continental insights into monarch population dynamics so that conservation measures can be adapted accordingly.**

By the end of 2019, we expect all major research groups to have uploaded their datasets, representing around 2 million records.

We are calling on all monarch and milkweed monitoring organizations across North America to share their data on this platform.

## Data ownership

Organizations and individuals uploading their data in the TMKN remain the owners of their datasets. We encourage data owners to make their datasets widely accessible, but we understand that it is not always possible, depending on the context. Therefore, five different levels of data access can be attributed to datasets uploaded in the TMKN, ranging from unrestricted download and use to storage only.

## Partners

Partners in this project include Environment and Climate Change Canada, the US Fish and Wildlife Service, Mexico's National Commission for Protected Natural Areas (*Comisión Nacional de Áreas Naturales Protegidas—Conanp*), *Institut de recherche en biologie végétale* (IRBV) of the University of Montreal, the Montreal Insectarium/Space for Life, and Birds Studies Canada.

## CEC Monarch Publications

- Commission for Environmental Cooperation. 2008. *North American Monarch Conservation Plan*. Montreal (Quebec), Canada

- Commission for Environmental Cooperation. 2009. *Monarch Butterfly Monitoring in North America: Overview of Initiatives and Protocols*. Montreal (Quebec), Canada

- Commission for Environmental Cooperation. 2017. *Monitoring Monarch Butterflies and Their Habitat across North America: Inventory and Monitoring Protocols and Data Standards for Monarch Conservation*. Montreal (Quebec), Canada

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**To view or download our monarch publications, visit our Virtual Library at www.cec.org/library.**
Keep up-to-date with the CEC by following @CECweb on Twitter or like us on Facebook at www.facebook.com/cecconnect.

**For more information about the Trinational Monarch Knowledge Network, contact:**
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### About the Insectarium

The Space for Life's Insectarium is the largest museum in North America entirely dedicated to insects. Closed for extensive remodeling in 2019, it will pursue its mission when it reopens in 2021, in one-of-a-kind new premises, offering the visitor a "destabilizing space," as humans find themselves insinuated into the insect universe and discover the creatures' vital importance for the planet. Find out more at http://espacepourlavie.ca/insectarium and follow on Twitter @EspacePourLaVie #Insectarium #MissionMonarque

### About the Institut de Recherche en Biologie Végétale (IRBV)

Located within the Montréal Botanical Garden, established through a partnership between the University of Montreal (UdeM) and the City of Montreal (Space for Life), the IRBV is a center of excellence in research and teaching. It brings together research teams directed by twenty-one researchers with diverse yet complementary expertise in the plant sciences. Their research covers a wide spectrum of disciplines, including genomics, functional biodiversity, phytotechnology, biological control and ecological management, addressing both fundamental and applied research topics. Find out more at http://www.irbv.umontreal.ca and follow on Twitter @IRBV_Montreal

### About Bird Studies Canada

Bird Studies Canada is Canada's leading national charitable organization dedicated to bird science and conservation with programs operating in every province and territory in the country. Find out more at www.birdscanada.org/ and follow on Twitter @BirdStudiesCan