



Biological Survey of Canada Northern Biodiversity Program

The Arctic is among the most fragile ecosystems on Earth; it is also under immense environmental pressure as the effects of global warming are felt most acutely at northern latitudes. With their diversity and potential for rapid population growth, arthropods (insects, spiders and their relatives) can serve as barometers of environmental change. The Biological Survey of Canada (BSC) will document changes in Canada's arthropod fauna by repeating the half century old Northern Insect Survey – an unprecedented initiative that sampled diversity at 58 arctic and subarctic localities at a time when climate change was not yet a global concern. The current Northern Insect Survey will complement the Federal Government's geo-mapping program in the Arctic, and provide further evidence of Canada's sovereignty in the north.

Objectives

- 1) Inventory arthropod diversity at up to 58 arctic and subarctic localities sampled during the original Northern Insect Survey;
- 2) Generate curated and databased biological collections for major national and provincial institutions, thereby providing the basis for future monitoring initiatives;
- 3) Provide science-based advice for sustaining native biodiversity in Canada's Arctic and Subarctic ecoregions; and;
- 4) Disseminate results in BSC publications, which will document, measure, and predict changes in northern arthropod diversity.

Why the need for another northern insect survey?

The Canadian north is experiencing profound and irreversible changes due to global warming. No group of animals is as sensitive - or responds as rapidly - to changes in temperature as arthropods. However, recent anecdotal observations of southern insects colonizing the North (e.g., yellow jacket wasps on Baffin Island) fail to measure the intensity and extent of distributional changes over time. The approximately two million specimens collected during the first Northern Insect Survey offers an unrivalled opportunity to accurately gauge biotic changes (i.e., range expansions and contractions) in Canada's north. Such knowledge is fundamental for developing predictive models about how biodiversity in the north will respond to global warming.

Strength through collaboration

With a secretariat based at the Canadian Museum of Nature, our network forges collaborations among federal and provincial departments and museums, and academic institutions. The BSC has a 30-year history of scientific credibility and of high productivity of scientific publications about Canada's biological wealth – especially with respect to arthropods. Although the North has long been a focus of BSC research, most activities have been scattered or directed toward particular geographical regions (e.g., the Yukon). The current scope and intensity of biotic changes demand a more coordinated effort. By making the Canadian north a priority, the BSC aims to undertake a series of field expeditions to more rigorously document changes in arthropod diversity over the last half century. Archiving of specimens and baseline data will add to the original survey data, providing a critical benchmark for future studies.

Projects

The BSC envisions a 4 to 5 year timeframe to adequately replicate the original Northern Insect Survey. Financial and logistical constraints dictate that only a subset of the original 58 localities be revisited, with emphasis on sites that were foci of the most intensive collecting efforts or in areas that are predicted to experience the greatest impact due to climate change. The results of this survey and an analysis of biotic changes over the last half century will be made available in a major multi-authored publication by the BSC. In addition, numerous other publications will result from this initiative, including keys to various groups of northern arthropods in the electronic journal *The Canadian Journal of Arthropod Identification*.