BUTTERFLIES
AS CANARIES OF CLIMATE CHANGE

Biologists Jeremy Kerr and Diane Debinski team up to document what forces interact with a changing climate to drive species to the brink of extinction.

by Laura Eggertson

Halfway up the coast of James Bay, a determined grey-brown butterfly is gradually fluttering its way northward. The tiny bog copper is thriving in regions formerly far too cold to support it—a change that captivates two equally determined researchers who are charting the tiny insect’s progress.

Biologists Jeremy Kerr of the University of Ottawa and Diane Debinski of Iowa State University are tracking the bog copper’s movements. They know that butterflies, like the canaries used long ago as sentinels against gases in coal mines, are excellent indicators of how species respond to climate change.

As temperatures warm, butterflies like the bog copper literally flex their wings and take advantage of new opportunities. The biologists are investigating whether butterflies can adapt to climatic changes, rather than die out, by moving northward into Canada’s large tracts of virtually untouched wilderness.

Kerr and Debinski also know that more than one factor can tip a species toward extinction. In addition to climate change, they are exploring whether deforestation or the disappearance of farmland also force butterflies into new areas. The biologists are investigating whether butterflies can adapt to climatic changes, rather than die out, by moving northward into Canada’s large tracts of virtually untouched wilderness.

Kerr and Debinski can demonstrate that preserved wilderness acts as a protective factor for butterflies—and potentially other species—that evidence would bolster calls for increased efforts to conserve Canada’s boreal forests.

University of Ottawa biology professor Jeremy Kerr (opposite) and Diane Debinski of Iowa State University (left) are tracking how the bog copper (above) is responding to environmental change.

“I want to know: is wilderness protection going to help us conserve Canadian species? This is the first time anyone’s looking across Canada to ask if wilderness is a buffer against the ravages of climate change,” Kerr says of the team’s research.

He and Debinski are working together on this project thanks to the University of Ottawa’s Distinguished Visiting Researchers Program. Its purpose is to increase international research collaborations, as well as the University’s visibility around the world.

Kerr applied to the program to work with Debinski because he admired her “profound” insight into how particular species of butterflies respond to environmental change. When Debinski was awarded the fellowship, she spent four months working with Kerr at his lab in the fall of 2012.

“My one major regret is that I didn’t stay for a whole year,” she says. “I want to know: is wilderness protection going to help us conserve Canadian species? This is the first time anyone’s looking across Canada to ask if wilderness is a buffer against the ravages of climate change.” Kerr says of the team’s research.

“The professors’ collaboration enables them to capitalize on Kerr’s extensive data set mapping the distribution of more than 300 butterflies in Canada over the past 125 years, combined with Debinski’s expertise on the specific characteristics and ecological traits of various species of butterflies.

For instance, Debinski analyzes traits that might make butterflies more vulnerable to the effects of climate change, such as their wing size or the scope of their diet. That information is invaluable in determining which species respond most quickly to climate change, says Kerr.

“I tend to look at smaller geographic regions and I do a lot of fieldwork,” says Debinski. “What I wanted to learn was how to take more of a macroecological perspective in my research.”

By combining their knowledge about changes in butterflies’ southern ranges in the United States and in their northern ranges in Canada, Kerr and Debinski have developed a better continental view of how species are reacting to climate change. That has led to a long-term collaboration as the two professors continue to collect and analyze data.

“I don’t think we would have done this project in the same way if Diane had not been successful in securing the Distinguished Visiting Researchers Program,” says Kerr.

Ultimately, the biologists hope to demonstrate whether changes in land use will force butterflies into the only remaining wilderness areas where they can survive—or prevent them from being able to make it that far.