

TOP: Mountain Parnassian (*Parnassius smintheus*) at South Pass. 2008.
BOTTOM: North Cascades butterfly crew at Mt. Shuksan and Curtis Glacier. 2008

Cascades Butterfly Project

Climate change is expected to affect mountain ecosystems in many ways. Scientists predict that warmer summers may result in earlier snowmelt, more frequent forest fires, and changes in distributions of plants and animals. Although some ecosystem changes have already been observed, (e.g. melting glaciers), many future impacts remain uncertain. Monitoring provides a way to document ecosystem changes, anticipate future changes, and improve management of protected lands.

Butterflies are sensitive indicators of climate change because temperature influences the timing of an individual's life cycle and the geographic distribution of species. As individuals develop from egg to larvae to pupae and finally to mature butterfly, temperature thresholds may trigger these changes. Annual temperature patterns are often the primary determinant of the distribution of "generalist" butterflies. Generalist butterflies are species that can utilize many different plant species for nectar, larval development, and egg deposition. Specialist butterflies depend on a few plant species for food and development and they can be directly and indirectly influenced by climate (temperature and precipitation). An example of indirect influences is when climate limits the growth of the butterflies' "host" plants; when the quality or number of these plants decline, so do the number of butterflies.

Recently, studies in Europe and California have documented range shifts in butterflies in response to changing temperatures. As average annual temperatures have increased, some species have responded by moving northward or to higher elevations to track their optimum temperature range. However, scientists still have a lot of unanswered questions about the long-term survival of these species. For instance, even if

butterflies are able to fly to higher elevations in response to warming temperatures, will they be able to establish as breeding residents? Will host plants be able to migrate up quickly enough to support butterfly populations, or will some species become extinct?

What are we doing?

Six protected areas in the Cascade Mountains are establishing a program to monitor butterflies to learn how climate is affecting their populations. The six areas include four sites in Washington: North Cascades National Park, Mount Baker-Snoqualmie National Forest, Okanagan-Wenatchee National Forest, and Mount Rainier National Park and two areas in British Columbia: Skagit and Manning Provincial Parks.

We are using two approaches to study butterflies: inventory and monitoring. First, we are conducting inventories of butterflies across our landscape. Second, we are establishing permanent transects to monitor changes in butterfly abundance and species diversity. Permanent transects will be established in three areas: North Cascades National Park, Mount Baker-Snoqualmie National Forest, and Mount Rainier National Park. Along each transect, volunteers will record butterfly abundances and plants in flower.

To Volunteer to Monitor Transects:

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Interested in helping?

We are looking for volunteers for both parts of the Cascades Butterfly Project.

Photo-inventories

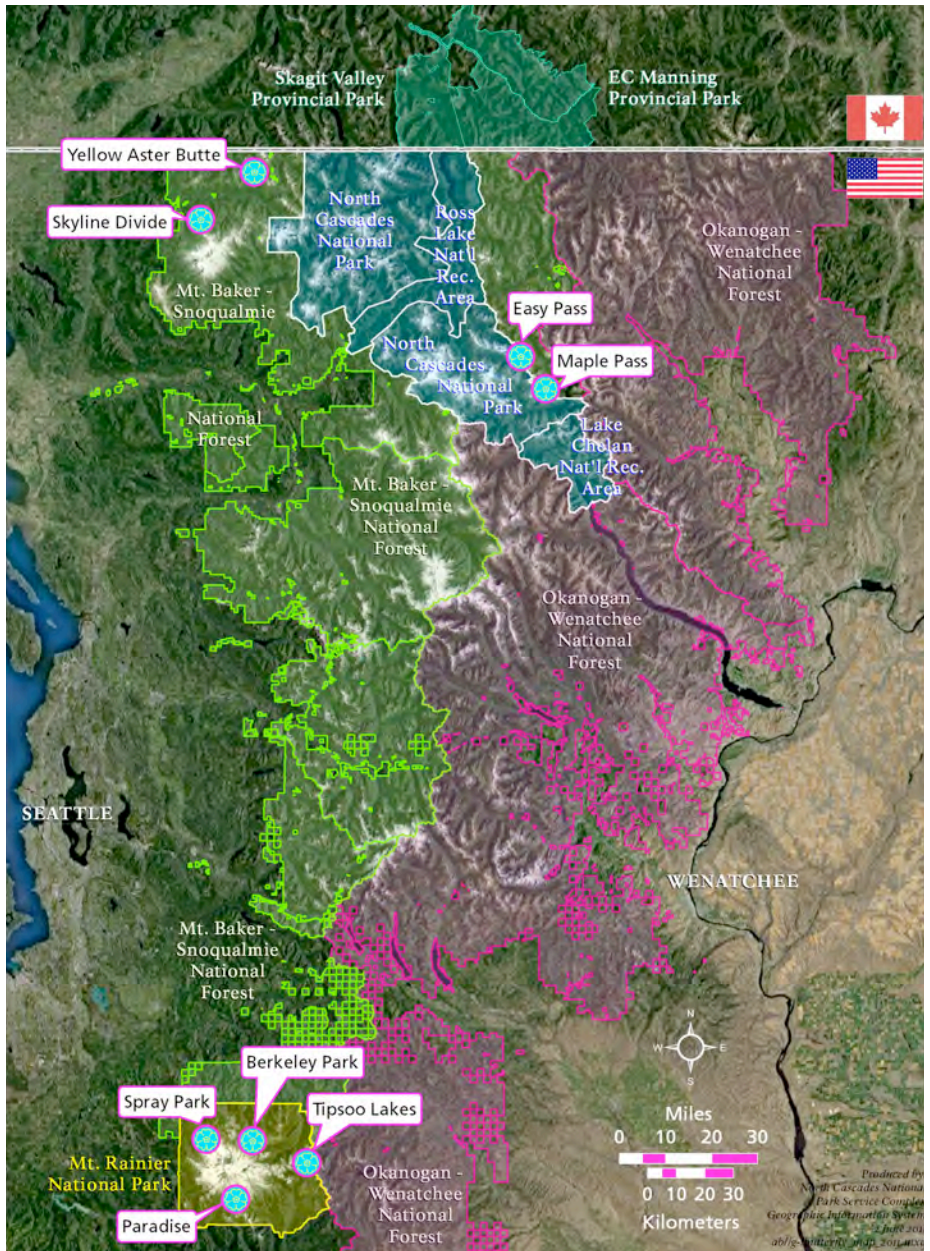
If you like to photograph, you can help us identify what species are present in the study areas. All you need is a camera, map, computer, and time to hike. We are working with the Butterflies and Moth of North America Project (<http://www.butterfliesandmoths.org/>). Any time you are out hiking and can get a detailed photo of a butterfly, snap it, and mark your location on a map. When you get back home, you can upload your photo to the website and mark the location of your photo on a map. We are working with butterfly experts who will study your photo and either verify your identification or identify the butterfly for you. In a couple of weeks, you will be able to see your photo and observation on the website. Your photo observations will help scientists document the distribution of butterfly species throughout the protected areas in order to better predict and study how these species will respond to a changing climate.

Butterfly Transects (see table)

If you already know butterflies and would like to help document abundances using a strict scientific protocol, this is the project for you. We are establishing eight 1-kilometer transects in subalpine meadows across our study area. Every week, we are looking for two volunteers to walk a transect and document every butterfly in a 5-m wide band. We are also documenting all flowering plants in this area to track plant phenology patterns. All transects are along trails and most transects are within a couple of miles of a road, but several require a steep, uphill hike.

Project Partners

- Mount Rainier National Park
- North Cascades National Park
- Mount Baker-Snoqualmie National Forest
- Okanogan-Wenatchee National Forest
- North Cascades Institute
- Western Washington University
- Carthage College
- British Columbia Parks, Ministry of Environment, Canada



LOCATION	TRAILHEAD	DISTANCE TO START	ELEVATION	ELEVATION GAIN
NORTH CASCADES NATIONAL PARK				
Maple Pass	Rainy Pass	5.6km, 3.5mi	1940m, 6360ft	550m, 1800ft
Easy Pass	Easy Pass	5.6km, 3.5mi	1970m, 6500ft	850m, 2800ft
MOUNT BAKER-SNOQUALMIE NATIONAL FOREST				
Yellow Aster Butte	Yellow Aster Butte	3.5km, 2.2mi	1595m, 5230ft	740m, 2440ft
Skyline Divide	Skyline Divide	3.2km, 2.0mi	1758m, 5800ft	457m, 1500ft
MOUNT RAINIER NATIONAL PARK				
Berkely Park	Sunrise	2.7km, 1.7mi	2063m, 6770ft	112m, 370ft
Naches Peak	Tipsoo Lake	Zero	1615m, 5300ft	183m, 600ft
Mazama Ridge	4th Crossing	1.1km, 0.7mi	1765m, 5790ft	360m, 1180ft
Spray Park	Mowich Lake Campground	4.0km, 2.5mi	1660m, 5450ft	440m, 1450ft