



Monitoring Subalpine Butterflies as Climate Changes

2017 Field Season

Introduction

Butterflies and plants are sensitive indicators of climate change because air temperature influences their life cycles and their geographic distribution. As butterflies develop from egg to larvae to pupae and finally to full maturation, temperature thresholds may trigger these changes. Plant budburst, flowering, and fruiting times are also influenced by temperature and precipitation. Butterflies depend on plants as host plants – providing nectar or shelter for eggs and developing larvae.

Climate models project warmer summers, earlier snowmelt, more frequent forest fires, and changes in distributions of plants and animals, but not details on how species in our area will respond to these conditions. Studies in Europe and California have documented range shifts in butterflies in response to changing temperatures. Some species have moved northward or to higher elevations to track their optimal temperature range.

We are monitoring butterflies and plant phenology to understand how species in our parks are being influenced by warmer climates.

What Are We Doing?

We are monitoring butterfly abundance and plant phenology at ten permanent survey sites in two national parks and two national forests:

- North Cascades National Park Service Complex
- Mount Rainier National Park
- Mount Baker-Snoqualmie National Forest
- Okanogan-Wenatchee National Forest

Monitoring Objectives

1. Monitor long-term trends in butterfly species richness and population abundance in select areas
2. Monitor long-term trends in plant phenology
3. Engage citizen scientists in collection of data and communication of information to the general public
4. Provide field science internship opportunities to young scientists
5. Provide data to national parks and forests to inform and adapt land management practices as climate changes

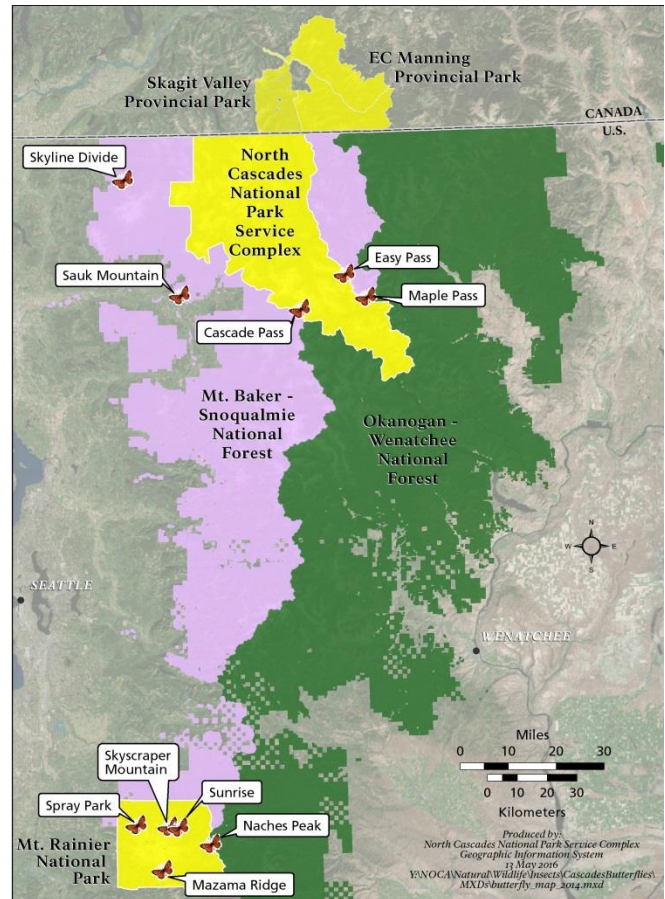


Figure 1. Map of survey sites

Monitoring Methods

- Butterfly abundance and plant phenology is monitored along ten 1-kilometer survey routes in 2 national parks and 2 national forests
- Monitoring is conducted weekly from snow-melt (~early July) until the first frost (~early September)
- Butterfly abundances are monitored using the Pollard Walk method
- Butterfly data are stored in partnership with the North American Butterfly Monitoring Network's Pollard Base database (NABA) and Butterflies and Moths of North America (mp.butterfliesandmoths.org)

Results - Butterflies

Each year we have completed more surveys and documented more species with our volunteers and interns.

Table 1. Summary of number of surveys, species documented, and butterflies from 2011 – 2016.

Year	# Surveys	# Species	# Butterflies
2011	29	23	819
2012	29	21	480
2013	34	21	1,585
2014	65	30	2,519
2015	100	36	4,431
2016	82	37	3,573

In 2016, our first date of butterfly observations and peak abundances were lower than we had seen in the early snowmelt, warm summer of 2015.

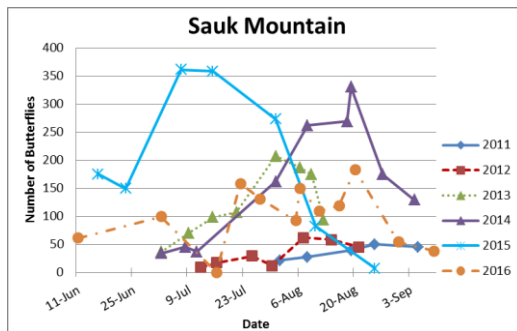


Figure 2. Butterfly abundances on Sauk Mountain, 2011- 2016

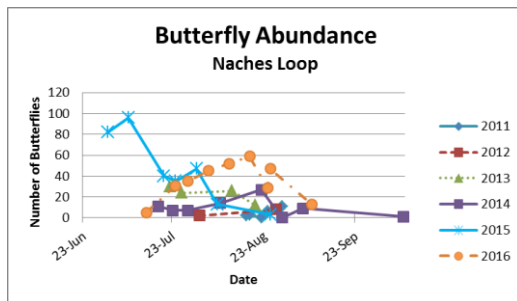
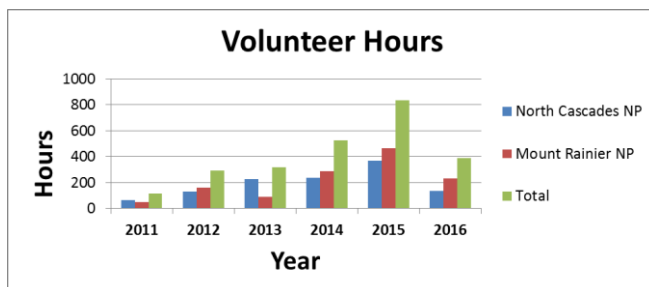


Figure 3. Butterfly abundances on Naches Peak, 2011- 2016

Results - Volunteer Involvement

Our program started in 2011 and our volunteer corps is growing allowing us to survey sites more frequently.



2017 Field Crew

North Cascades National Park Service Complex



Tanner Humphries is the Field Lead for North Cascades. Tanner has worked with the Cascades Butterfly Project (CBP) since 2013. He graduated from Western Washington Univ. in 2013



Alex Brito graduated with his MS in Forest Ecology from University of Wisconsin in 2016. This is his first season with the CBP as an intern through the NPS Latino Heritage Program.

Mount Rainier National Park



Ana Casillas Brownson is back for her second season as the Field Lead for CBP at Mount Rainier National Park. She has an MSc from Bangor University (Wales) in 2013 and a BA from Evergreen State University.



Tucker Grigsby graduated from U. of California, Santa Barbara in 2016. This will be his first season with the CBP as an intern with the NPS "Mosaics in Science Program."



Regina Rochefort is the CBP Program Lead and a Plant Ecologist and Science Advisor. She received her PhD from U. of Washington while conducting research on subalpine and alpine plants in Mount Rainier NP.

More Information

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