

Public Abstract

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Graduation Term:FS 2014

Department:Biological Sciences

Degree:MA

Title:DOES HISTORY REPEAT ITSELF? IMPACT OF CLIMATE ON FLORAL RESOURCES FOR BUMBLE BEES THEN AND NOW

Bumble bees require abundant floral resources that match the timing of colony establishment and growth. In alpine ecosystems, winter snowpack influences timing of flowering while summer temperature impacts retention of soil moisture to support flower production. I surveyed the seasonal timing of floral resource availability provided by nine plant species that historically received 90% of bumble bee visits at our Rocky Mountain field site. Surveys were made in years of extreme low snowpack (1977 and 2012) and years of average to high snowpack (1979-80 and 2013). Flowers were counted throughout the summer in habitats spanning an altitudinal gradient from 3500-4000 m. First and peak flowering dates were later in summers following deeper snow, and earlier under warm minimum summer temperatures. Flowering duration was shorter in the 2010s when minimum summer temperatures were 2.4 °C higher than in the late 1970s. Both seasons in the 2010s failed to support flower densities as high as those observed in 1977. Peak flowering time and duration of flowering varied significantly among habitats. Lower altitude habitats near timberline showed greater decreases in flower density than upper ones. The drought of 2012 increased overlap in the time of peak flowering among co-occurring species and especially reduced late season resources. Our model of resource intake indicates that both *Bombus balteatus* and *B. sylvicola* have faced ~74-80% reductions in potential resource intake over the season. Together, these results demonstrate strong sensitivity to climate change for resources that have been historically critical for bumble bee pollinators in the alpine.