

Warmer springs mean less snow, fewer flowers in the Rockies

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Spring in the Rockies begins when the snowpack melts. But with the advent of global climate change, the snow is gone sooner. Research conducted on the region's wildflowers shows some plants are blooming less because of it.

David Inouye (University of Maryland) used data gathered in the Rockies from 1973 to the present to uncover the problem. Writing in the journal *Ecology*, he demonstrates that three flowers found in the Rockies are far more susceptible to late frost damage when the snow melts more quickly.

Inouye looked at three blossoms that are common to the famous mountain range. Larkspur (*Delphinium barbeyi*), holds its intense blue star-shaped, hooded blooms on thin-stemmed plants that can be anywhere from 3-6 feet tall. Aspen fleabane (*Erigeron speciosus*) is one of the most common asters to the region, and its small, purple daisy-like flowers have yellow centers. And aspen sunflowers (*Helianthella quinquenervis*) are well known for their startlingly bright yellow flowers which are often found in open, grassy areas.

Winter snow can be as deep as eight feet in the area where all three of these flowers grow, at 9,500 feet altitude, but the snow has been melting increasing early over the past decade because of a combination of lower snowfall and warmer springs. For the wildflower, earlier snowmelt results in an earlier growing season.

Once the snow is gone in the spring, the flowers begin to form buds and prepare to flower. But masses of cold air can still move through the region at night, causing frost as late as the month of June. The numbers indicate that frost events have increased in the past decade. From 1992 to 1998, on average 36.1 percent of the aspen sunflower buds were frosted. But for 1999-2000 the mean is 73.9 percent, and in only one year since 1998 have plants escaped all frost damage.

When those frost events occur, the long-lived plants do not die but are unable to produce flowers for that entire year. Without flowers, they cannot set seed and reproduce.

Inouye says the change happening here may be undetected by humans casually observing the area because these are all long-lived perennial plants. An individual sunflower, for instance, can live to be 50 or 75 years old.

“But we find that these perennials are not producing enough seeds to make the next generation of plants,” he says, and without new plants the transformations within plant and animal communities of this ecosystem could be quite intense.

Many insects such as the fruit flies known as tephritid flies, which eat the flowers’ seeds, seem to be plant specific, he points out, and so they may disappear, too if there are no flowers to produce seeds. Parasitoid wasps that feed on those flies will then feel the loss, as well.

Grasshoppers also feast upon the flower petals. And, these plants are eaten by many kinds of large herbivores, including deer, elk, cows and sheep.

“What will replace these colorful flowers? We don’t know,” says Inouye. “But we know that many animals depend upon them, and so the outcome could be quite dramatic.”

Inouye and his colleagues say that there is much work to be done on the topic of phenology, which is the study of periodic plant and animal life cycle events. These events are heavily influenced by environmental changes, especially seasonal variations in temperature and precipitation driven by weather and climate. There is even an important role to be played by citizen scientists, who can gather information for the National Phenology Network's new endeavor called Project Budburst.

“In the future, we anticipate climate change will affect plants and animals in many ways, but information is needed on how those changes will play out for specific plants,” says Inouye. Some, he says, may bloom sooner and others may not bloom at all. Some may become more prolific and others may die out completely. Citizen scientists who volunteer to help record phenological events can make an important contribution to such studies.

Source: Ecological Society of America

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