

# Climate changes can throw off wildlife patterns

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**By Ruby Lyon**

A shifting climate affects the timing of important events in the plant and animal world. These important life cycle events – known as phenology – happen when the wildflowers bloom, when plants make fruit or new leaves, or when birds migrate or build nests. The timing of these life cycle events is intricately connected to many environmental factors, including elevation and weather.

For example, a long winter with heavy precipitation will result in many phenological events happening later in the season, while a mild, dry winter, such as those in recent years, is linked to the early arrival of spring.

Some phenological processes may be responsive to weather events and therefore can react quickly as climate shifts. For example, local sparrows, robins, and bluebirds may only descend to lower elevations during the harshest winter weather, then return after a couple of mild weeks.

## **Migrating animals**

This is not the case for many other organisms. Western tanagers wintering in Central America have no idea if Tahoe is having a mild winter and an early spring. They try to get here early to secure the best territory and capitalize on the brief summer flush of resources, but if they arrive too early, they may be faced with limited food and freezing weather. Migration patterns develop over many generations, and it can take a while for these patterns to shift to match changing conditions

at Lake Tahoe.

With small feet and heavy bodies, Tahoe's mule deer are not built to cope with deep snow. To make matters worse, their principal food source gets buried. Therefore, Tahoe's deer typically move to lower elevations for the winter, with many making the shortest trip possible by heading east. Many of Truckee's Loyalton herd will descend the Truckee River canyon to Verdi; others head north. The Carson Range deer have an easy migration to lower elevations, while deer in Christmas Valley and the Angora Burn area migrate up over Luther Pass to Hope Valley, and then down the Carson River.

It is not unheard of for deer to be caught by early snowfall and get trapped in the Tahoe basin, and such animals usually are seen in the vicinity of Emerald Bay, where they spend the winter at lake level. Quite a few deer have been seen at Tahoe mid-winter in recent years, and earlier this year a few young bucks were seen swimming off Pope Beach in February. The timing and routes of deer migrations are worked out over many generations, and are passed down culturally by older members of the herd. After four years of drought, it is safe to assume that many of the deer now overwintering at Tahoe have never experienced a "real" Tahoe winter, and have never learned to migrate away from an average Tahoe snowpack. Mule deer only live around 10 years on average, so additional mild winters may bring about a significant drop-off in the numbers of deer that know how to migrate.

### **Early insects**

Plants seem to be more responsive than animals to warming temperatures, leafing out or flowering as soon as possible. However, danger lies in that flowers may open up before their pollinators are available.

Another challenge is that flowers are vulnerable to spring storms and frost damage. This latter issue is equally

problematic for the insects that try to emerge earlier in an attempt to sync up with the plants. Many insects may not have a choice, and butterflies are a classic example. Plants develop chemical compounds to make themselves unpalatable to insects. Butterflies then evolve defenses and a tolerance to these compounds, and as a result they begin to specialize in only eating certain plants as caterpillars. Therefore, most butterflies have a fairly narrow range of options for larval host plants. If the plants are growing earlier in the season, the caterpillars must be active earlier in the season as well, and often that means the adults must fly earlier in the season to find the right plants on which to lay their eggs.

Research has shown many different adaptations to shifting climate as it relates to butterflies and their host plants. Most commonly, we see the butterflies flying earlier in the season, but emerging earlier is still a risky move in the mountains, and spring storms are always likely. Many butterfly species are shifting habitats or ranges. Some are showing disrupted migration patterns, while other species are showing more novel shifts like staying locked in their typical timing, but shifting host plants instead. However, many species have shown a complete lack of adaptive response, falling out of sync with their host plants, and these species and populations may be disappearing.

### **Future monitoring**

The understanding of life cycle events and their consequential effects on birds, insects, and mammals will be an important factor to monitor in the future. Anecdotal evidence is already demonstrating a shift in the behavior of Tahoe's organisms due to unseasonably warm winters and drought conditions. A more permanent shift in our weather patterns could have effects on everything from successful gardens and ski seasons to larger-scale impacts related to food security. In response, the Tahoe Institute for Natural Science has created the Sierra Seasons Project, a citizen science program monitoring Tahoe's

phenology. It is our hope that long-term observations from local school kids, hikers, and residents will result in data that can be used to determine how climate change is affecting the phenology of Tahoe.

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