



California Phenology Project at Santa Monica Mountains National Recreation Area

Background

Phenology is the study of the seasonal timing of biological events such as plant flowering, leaf out and fruiting, insect emergence and the arrival of migratory birds and other animals. Many factors can affect the timing of these events. Climate change is one of these factors.



Ambush bug nymph on *Eriogonum fasciculatum*

Plants are extremely sensitive to changes in their environment. By observing and recording the timing of these phenological events, or **phenophases**, scientists can measure changes brought about by shifts in climate. Field-based observations are an important component of understanding the relationships between ecosystems, climate and climate change.

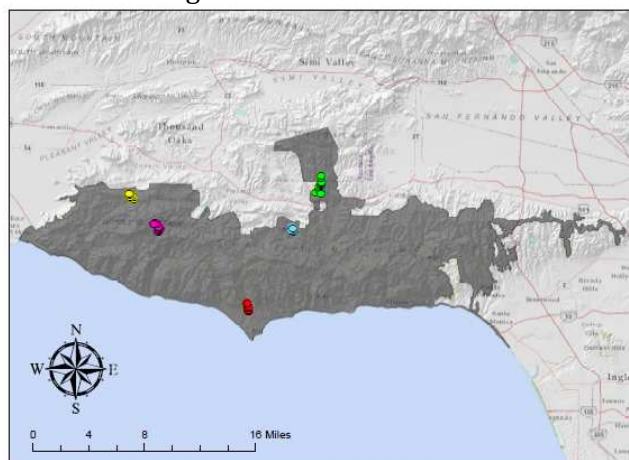
In 2010, Santa Monica Mountains National Recreation Area (SAMO) along with six other national parks in California, teamed up with researchers from the UCSB Phenology Stewardship Program, the U.S. Geological Survey and the national coordinating office of the USA-NPN to form the California Phenology Project (CPP). This is a three year pilot project to develop a program to monitor plants for phenological

responses to climate change. The project, now in its third year, is designed to collect useful data, educate the public and enlist public participation in science.

Monitoring Efforts

Six species are currently monitored at SAMO: chamise (*Adenostoma fasciculatum*), California buckwheat (*Eriogonum fasciculatum*), coyote brush (*Baccharis pilularis* ssp. *consanguinea*), blue elderberry (*Sambucus nigra* ssp. *cerulea*), coast live oak (*Quercus agrifolia*), and valley oak (*Quercus lobata*).

CPP Monitoring Site Locations at SAMO



Trail Locations

- Cheeseboro Canyon
- Paramount Ranch
- Rancho Sierra Vista
- Sandstone Peak
- Zuma Canyon

Two hundred individual plants were tagged and GPS locations recorded at forty monitoring sites located along hiking trails at five different SAMO park units. Rancho Sierra Vista has 6 sites with 34 individuals, Cheeseboro Canyon 10 sites and 35 individuals, Paramount Ranch 9 sites and 53 individuals, Zuma Canyon 6 sites and 22

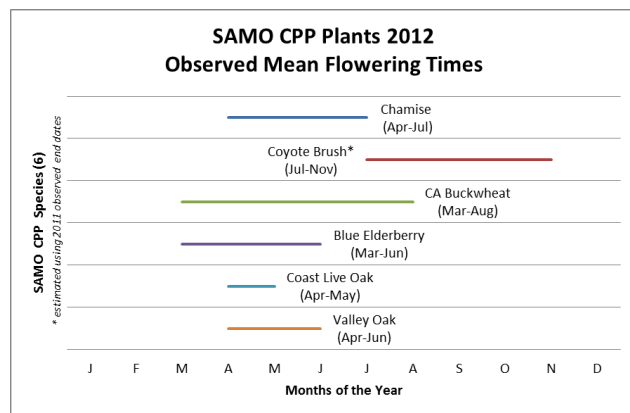


individuals, and Sandstone Peak at Circle X Ranch has 9 sites with 56 individuals.

Field-based monitoring efforts began in fall 2011 and are ongoing. NPS volunteers, interns, partners and staff visit phenology monitoring sites once per week, record observations and upload them directly to the USA-NPN website.

Initial Results

A single data point describes the specific phenophase of one plant and a series of 7-12 data points, unique to each species, make up a complete observation. As of August 2012, over 54,000 data points from more than 6,000 complete observations have been collected.



Flowering phenophase includes open and unopened flower buds.

All phenophases were observed during the monitoring period from August, 2011 – August, 2012. Start dates and end dates for phenophases were captured within a mean data gap range of 6-8 days. In some cases, phenophases were difficult to identify, especially during transition periods where endpoints for some species are not always clear. Plants such as *E. fasciculatum* can bloom at any time of the year and fruit can persist on the plant for several months.

Volunteer Recruitment and Training Efforts

In addition to NPS staff and interns, SAMO has four committed volunteers that monitor on a regular weekly basis. Phenology training

workshops are usually held in the fall and refresher training, recruitment and retention activities are offered throughout the year by NPS staff.



Students collecting data on *Baccharis pilularis*

This year, as part of SAMO's educational outreach programs, NPS staff developed a Special Topics course for university students and pilot tested a Jr. Phenologist program aimed at 4th -7th grade students. During the program, children were assisted by the university students in collecting data. Additionally, two phenology workshops for teachers were hosted by NPS staff and UCSB researchers. The workshops will conclude with field based training being offered in October 2012.

Future considerations

- Continue regular weekly monitoring to maintain monitoring consistency
- Continue to support our volunteers by hosting special events and workshops
- Continue volunteer recruitment efforts to increase observer base

As more data are collected, scientists will be able to better determine the relationships of plants to their environment as well as detect signs of ecological changes due to climate change.

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