

PRISSM: Data management plan for monitoring of plant phenology in the California sage scrub ecosystem.

Data and Materials Produced

PRISSM plant phenology protocols were designed to monitor phenological patterns of common CSS plant species on a weekly basis beginning in November and ending at the end of June every year. GPS coordinates of each individual, dates of each observation, and the identity of the recorder are important metadata that will be recorded.

The five species of plants chosen for phenological monitoring include: California Sagebrush (*Artemisia californica*), White Sage (*Salvia apiana*), California buckwheat (*Eriogonum fasciculatum*), California Thistle (*Cirsium occidentale*), and royal penstemon (*Penstemon spectabilis*). We also recommend that yerba santa (*Eriodictyon trichocalyx* or *Eriodictyon crassifolium* depending on the site) and deerweed (*Lotus scoparius*) be monitored at sites when managers can expand their efforts. Currently, we are expanding our efforts to include the phenology of non-native grasses, mostly *Bromus* spp.. Monitoring of non-native grasses is happening at the BFS only, in an effort to work on our approach. Expansion of this is expected during the 2018-19 season.

To monitor the phenology of these plant species, at least six individuals of each species should be identified and tagged, less if a site does not have a species or fewer than six individuals of a particular species. Individuals should be widely distributed across each CSS fragment to effectively sample phenology in various micro-habitats. When possible, individuals will be tracked for as many years as possible. If an individual dies during or between sampling seasons, a new individual should be chosen and given a new identifying code. Starting the first week in November and every week after until the beginning of July, researchers should visit each individual plant and record characteristics identified for each species. While our focus is on timing of flowering and floral resources, occasionally, we record life-history characteristics: presence/abundance of functioning leaves, buds, flowers, and/or fruit. For more detailed information on what needs to be recorded for each species, please download the PRISSM plant phenology data collection sheet and the PRISSM plant phenology category description document (www.prissm.org).

Raw data will be made publically available on an annual basis for researchers and managers to use starting in October 2017 and each October thereafter.

Standards, Formats and Metadata

Data will be saved in three separate formats:

- (1) field data sheets will be stored by each institution
- (2) synthesized data from all participating locations will be stored in Excel using a separate file for each plant species.
- (3) in addition to Excel, synthesized data will be saved in a text file (tab delimited format)

We will use the program Morpho to upload Excel and text files and input all appropriate metadata using Ecological Metadata Language. Upon completion, the metadata and data will be made available on Data ONE's KNB Network. All links will be attached to the PRISSM: Partnership of Regional Institutions for Sage Scrub Monitoring website (<https://prissm.org/>).

Roles and Responsibilities

Wallace Meyer (WM), Director of the Robert J. Bernard Field Station, will oversee input of data in collaboration with Erin Questad (EQ; Cal Poly Pomona) and Erin Opliger (EO; San Bernardino County). Other members will be added as collaborators increase.

WM will:

- (1) send reminders to initiate sampling each Fall in late October
- (2) will update all participants to any change in protocols
- (3) set up a meeting in the summer to discuss and combine data
- (4) oversee that data and metadata are uploaded each year with the objective to have data available by the end of the October.

EQ and EO will contribute to the process and agree to attend meetings. Changes in responsibility will be agreed upon by participating members. However, not adhering to the data management plan and actions required may result in exclusion of the data collected. Data will be uploaded once each year.

Dissemination Methods

While data will be made openly accessible to the public on the KNB network with links from the PRISSM website each year starting October 2017, data may be embargoed if data are being used for a publication. In either instance, all metadata needed to understand the approach and files will be available. The process for accessing the metadata will be to either search the KNB network for these key terms: PRISSM, Bernard Field Station, Voorhis Reserve, sage scrub, plant phenology, or by following links to the data from the PRISSM website (www.prissm.org). If data is currently under an embargo, access to data can still be provided by contacting Wallace Meyer (Wallace_meyer@pomona.edu) following consultation.

Policies for Data Sharing and Public Access

If data are not embargoed, no restrictions will be placed on its use. If the data are used in a publication, we expect that PRISSM be acknowledged and that a copy of the manuscript be sent to Wallace Meyer (wallace_meyer@pomona.edu) to help us document the importance of the data and justify its collection. While we intend to use these data in classes and to provide context to appropriate management decisions at our sites, we hope other researchers use our data.

Archiving, Storage and Preservation

Because we view the data as key baseline data for our sites and region, we are using the KNB network to store the data and metadata for long-term preservation. Each site will maintain hard copies of raw data to assure that data is preserved.