

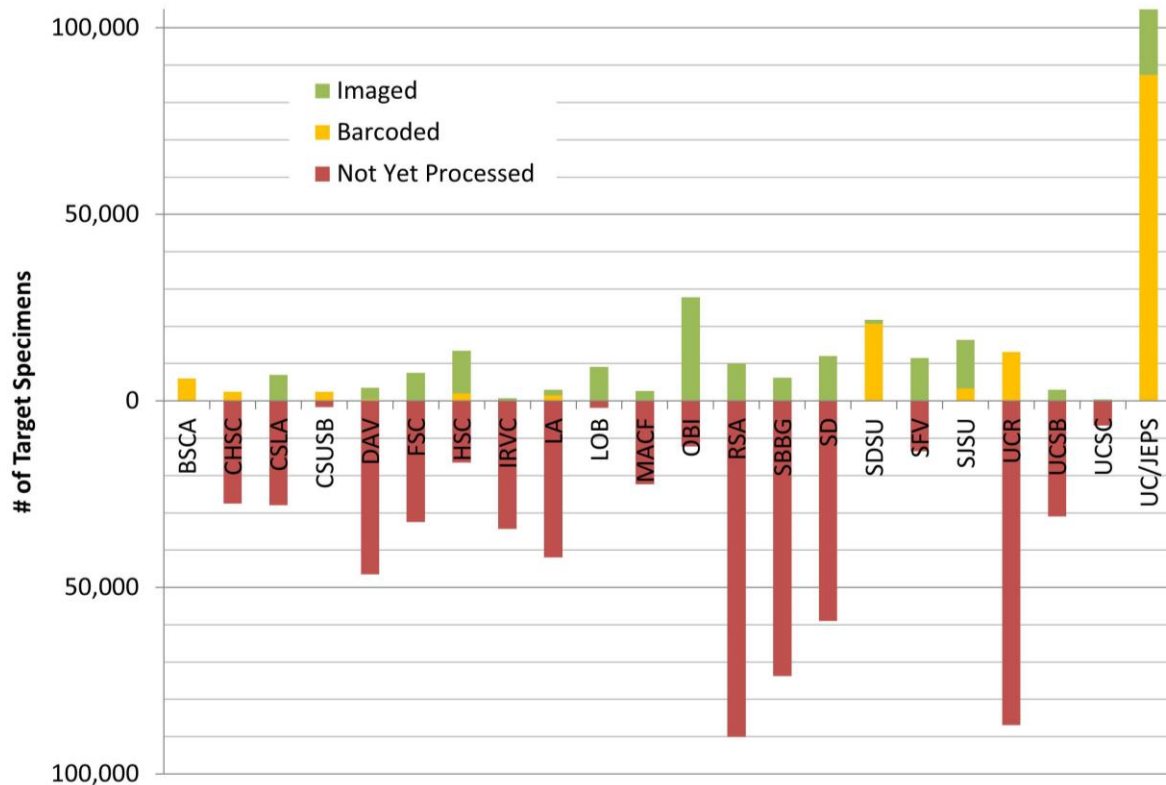
# CALIFORNIA PHENOLOGY TCN – QUARTERLY REPORT – MAY 2019

*Assembled by Katie Pearson and Jenn Yost, April 29, 2019*

The CAP TCN is a network of 22 institutions that is creating nearly 1 million images of flowering plant specimens and capturing phenological data of the specimens. The goal is to be able to understand flowering time shifts in California’s biodiversity hotspot.

## Progress in Digitization Efforts:

All institutions are now imaging specimens with the exception of two institutions (CHSC, UCR) that have experienced delays in acquiring imaging equipment. The project manager is actively working with the latter institutions to fast-track their progress and troubleshoot setup issues. RSA is currently imaging BSCA specimens and should be finished within several weeks. Figure 1 shows the distribution of unprocessed, barcoded/processed, and imaged target specimens per institution.



**Figure 1.** Barcoding and imaging progress of CAP TCN institutions as of April 29, 2019. Each colored bar represents the total number of specimens targeted as part of the project. Red portions of each bar below the x-axis represent numbers of specimens that have not been processed. Yellow portions of each bar show numbers of specimens that have been barcoded or otherwise made ready for imaging but have not yet been imaged. Green portions of each bar represent numbers of specimens that have been imaged. The proportions of imaged specimens that have been fully processed (converted into JPEG and DNG format, uploaded to server, made available online, linked to existing records, and archived) are not represented in this figure.

Extensive pre-curation of specimens (e.g., resolving pest damage; creating annotations) was necessary at some institutions (CSUSB, MACF, SDSU), which temporarily postponed imaging. Despite this, significant progress is still being made.

Katie Pearson (project manager; PM), Jason Alexander (data manager; DM), Jenn Yost (lead PI) and Ed Gilbert (Symbiota developer) have weekly video conferences related to portal development and data migration. The DM has finished merging georeference data from previous CCH projects with occurrence data in CCH2. The DM has also been consistently updating the taxonomic thesaurus of CCH2.

### **Share and Identify Best Practices and Standards (including Lessons Learned):**

The PM continues to monitor created images, solicit feedback from member institutions, and adjust recommendations as necessary to create the best possible images.

The lead PI and PM met with developers of the Plant Phenology Ontology (who are also members of the phenological standards advisory committee) on 3 April 2019 to discuss codifying phenological data in the CCH2 portal. A draft of the CCH2 phenological data format has been developed. The topic of phenological data standards will be discussed at a CAP TCN-led workshop at Botany 2019 in Tucson, AZ.

In collaboration with Patrick Sweeney at Yale, Symbiota developer Ed Gilbert has finished a beta version of the phenology Attribute Mining Tool, which will enable phenological scoring of specimen images in the CCH2 portal.

### **Identify Gaps in Digitization Areas and Technology:**

Web-hosting images remains the primary technological obstacle for this project. The PM has been uploading and linking specimen images for 11 of the 22 collaborating institutions due to the non-functionality of the iDigBio Media Ingestion Appliance at these institutions; however, because iDigBio recently revealed that they will no longer be accepting images through the Appliance as of 2020, we are seeking an alternative solution involving CyVerse.

At some institutions, student/volunteer turnover has presented challenges for rapid progress. Additional training videos and documentation are being developed to decrease the burden of training.

Linking a skeletal barcoded image record to the database record with the old stamped accession number is doubling the time it takes to fully digitize the specimen. If there were a program that could identify the stamped number and automatically link the image to the existing record, it would save us a lot of time.

### **Share and Identify Opportunities to Enhance Training Efforts:**

The PM surveyed collaborators for updates in mid-March, and, along with the lead PI, responded to questions, requests, and suggestions made by each institution. For example, UCSB suggested that an introductory course about the CAP TCN be developed, which the PM is now pursuing.

Collaborators who attended the California Botanical Society Graduate Research Symposium at lead institution Cal Poly, San Luis Obispo were invited to a CAP collaborators' luncheon. Collaborators were able to meet one another and discuss progress at their respective institutions. The lead PI and PM led a tour of the herbarium and the imaging facility and demonstrated the newly-launched Notes from Nature expedition featuring specimen images created through the CAP project (see E&O activities).

Two webinars were conducted in March 2019 and April 2019. The first described how to enter data into the CCH2 portal, and the second demonstrated data cleaning tools in CCH2. Recordings of these webinars are posted on the CAP TCN website ([capturingcaliforniasflowers.org](http://capturingcaliforniasflowers.org)). Future webinars will address the topics of collection management tools and georeferencing.

The website has been updated with the latest digitization protocols and new training resources. The PM produced two training videos: one to demonstrate [how to link images to their respective records in CCH2](#), and the other (per a collaborator's request) to demonstrate [how to print specimen labels in CCH2](#). An initial draft of the comprehensive digitization manual was posted on the website and contains a project overview, workflow, setup description, all protocols, and other necessary information.

The lead PI and PM will attend Botany 2019 in late July, where they will be able to meet and discuss pertinent topics with collaborators.

#### **Share and Identify Collaborations with other TCNs, Institutions, and Organizations:**

Collection data from the California Academy of Sciences are now imported via IPT into the CCH2 portal and are publically available for viewing and downloading. Occurrence data for the herbaria at BLM Redding Field Office, Klamath National Forest, Huntington Botanical Gardens, and Sierra Pacific Industries-Forestry have also been imported into CCH2. Both the DM and PM have reached out to 20 additional herbaria that have previously supplied data to the Consortium of California Herbaria. These herbaria are being encouraged to share data and perhaps even manage it live in CCH2.

As described above, the lead PI and PM met with developers of the Plant Phenology Ontology (who are also members of the phenological standards advisory committee) to discuss codifying phenological data in the CCH2 portal.

With the rollout of the first Notes from Nature citizen science expedition (see last section), the PM has reached out to relevant chapters of the California Native Plant Society (Orange County chapter, San Gabriel Mountains chapter, LA/Santa Monica chapter, South Coast chapter) and the Master Gardeners of Los Angeles and San Bernardino for solicited participation. Collaboration on this front is ongoing.

See next section for cyberinfrastructure collaborations.

#### **Share and Identify Opportunities and Strategies for Sustainability:**

In wake of the rollback of cyberinfrastructure support from iDigBio, Arizona State University has offered to host the Symbiota instance of the CAP TCN data portal, CCH2. Migration of the portal to ASU servers is scheduled for early summer.

As previously described, the CAP TCN is also seeking a new web-host for specimen images. Given the success of the SERNEC TCN with hosting images on CyVerse, as well as a positive response from CyVerse personnel upon inquiry, we are pursuing this option.

### **Share and Identify Education and Outreach (E&O) Activities:**

The PM shares updates on the project and phenology-related news via the network Twitter account (@CalPhenologyTCN).

The first Notes from Nature (NfN) expedition, which engages citizen scientists and other volunteers to transcribe specimen data from images of specimens, was launched in early April and consists of 1983 specimen images from Cal State Long Beach and Cal State Los Angeles. As of April 23, 2019, this expedition was over 20% complete. The PM is engaged with online volunteers through NfN Talk to clarify transcription questions and further develop the tutorial and help text. A Zooniverse blog post was published to introduce this expedition: <https://blog.notesfromnature.org/2019/04/05/consortium-of-california-herbaria-on-nfn/>. The PM is engaging California Native Plant Society chapters and Master Gardener communities for participation in this and future NfN expeditions. Cal Poly SLO hosted a Citizen Science Day event on 13 April 2019 in which 20+ students helped transcribe specimen data in Notes from Nature. Similar events are planned for the summer and fall.

CSU Fullerton, Cal Poly SLO, and CSU Northridge were each featured in institutional news stories about herbarium digitization (<https://www.capturingcaliforniasflowers.org/public-media.html>). The news story about CSU Fullerton included an introductory video: <https://youtu.be/7Gp9s4HbKns>. An article about the CAP TCN project at UC Davis was published in the Davis Botanical Society newsletter, *Lasthenia*.

The PM and lead PI have finished one round of revisions of a scholarly article that summarizes the CAP project and sent the draft to all collaborators for review. The tentative final submission date is scheduled for May.

Presentations and/or introductions of the project were also given (or are planned to be given) on these occasions by faculty, staff, and students at collaborating institutions:

- Herbarium staff at BSCA shared about the project with Anza-Borrego Desert State Park Botany Society volunteers.
- San Diego State University herbarium faculty and staff represented the herbarium to approximately 100 community members at the SDSU Science and Engineering Sampler on 23 March 2019.
- UC Irvine staff introduced the project at the Orange County California Native Plant Society “Botanical Bites” meeting in March 2019.
- The student supervisor for the Cal Poly herbarium presented CAP TCN poster at the California Botanical Society Graduate Student Symposium on 6 April 2019.
- Lead institution Cal Poly SLO held an open house and demonstrated herbarium specimen digitization for 60+ adults and prospective students on 12 April 2019.

- Staff at San Jose State University demonstrated herbarium imaging to junior high and high school students as part of the MESA Schools Program
- UC Davis collaborators will represent the project at the UC Davis Spring Internship and Career Fair.
- Student curators at Cal State LA will present a poster about herbarium digitization at their end-of-the-year BioBash event.