The outreach deliverables that were not included in the August 2016 version of the final report include:

Item	Status
Ecosystem services monitoring handbook	Complete (see attached). Will be updated to include more qualitative measures based on 2016-2017 field data.
The management database	Version 1 almost complete. All data input sections complete for stakeholder use. Database team finalizing sign-in permissions/ accounts to store individual data. During summer of 2017, database team will greatly improve management practices and data sections to increase functionality of database for statistical analysis. Data will be inputted into database early fall 2017. Anticipated public launch November 2017.
Ecosystem service factsheets (which include ecosystem service maps available through the database)	Rely on output from database. Anticipated release spring 2018.
Producer trainings/ workshops	24 outreach talks and 4 outreach publications (in newsletters of stakeholders) during project. The trainings on the database and monitoring tools will occur during the 2017-18 growing season.

Ecosystem services monitoring handbook:

The handbook has been completed (see attached), and will be publically available on the project website, once that is opened to the public by the database team.

The current handbook highlights the measures that were most robust in sampling across multiple sites and years (mostly during the drought, and then during the 2015-16 moderate year of rain). Common alternative measurement approaches are included here, with references that provide detailed methods, but we did not include detailed methods for the alternative approaches here, because they were not consistent in measures across sites and years during the drought, compared to the ones included in the handbook. We are testing how consistent they are in the 2016-17 growing season, which will be an indicator of their robustness in a wet year, as well as in the 2nd year of recovery after drought (which is seeming more "normal" compared to the 1st year of recovery). Those that are robust under wetter conditions will be included in a modified version of this handbook (to be updated after this field season).

Once the database is ready for public use, we will do trainings on both the ecosystem monitoring and database entry and use. Based on feedback at these workshops, we will modify the ecosystem services handbook in response to feedback, and include videos of specific measurements from the workshops.
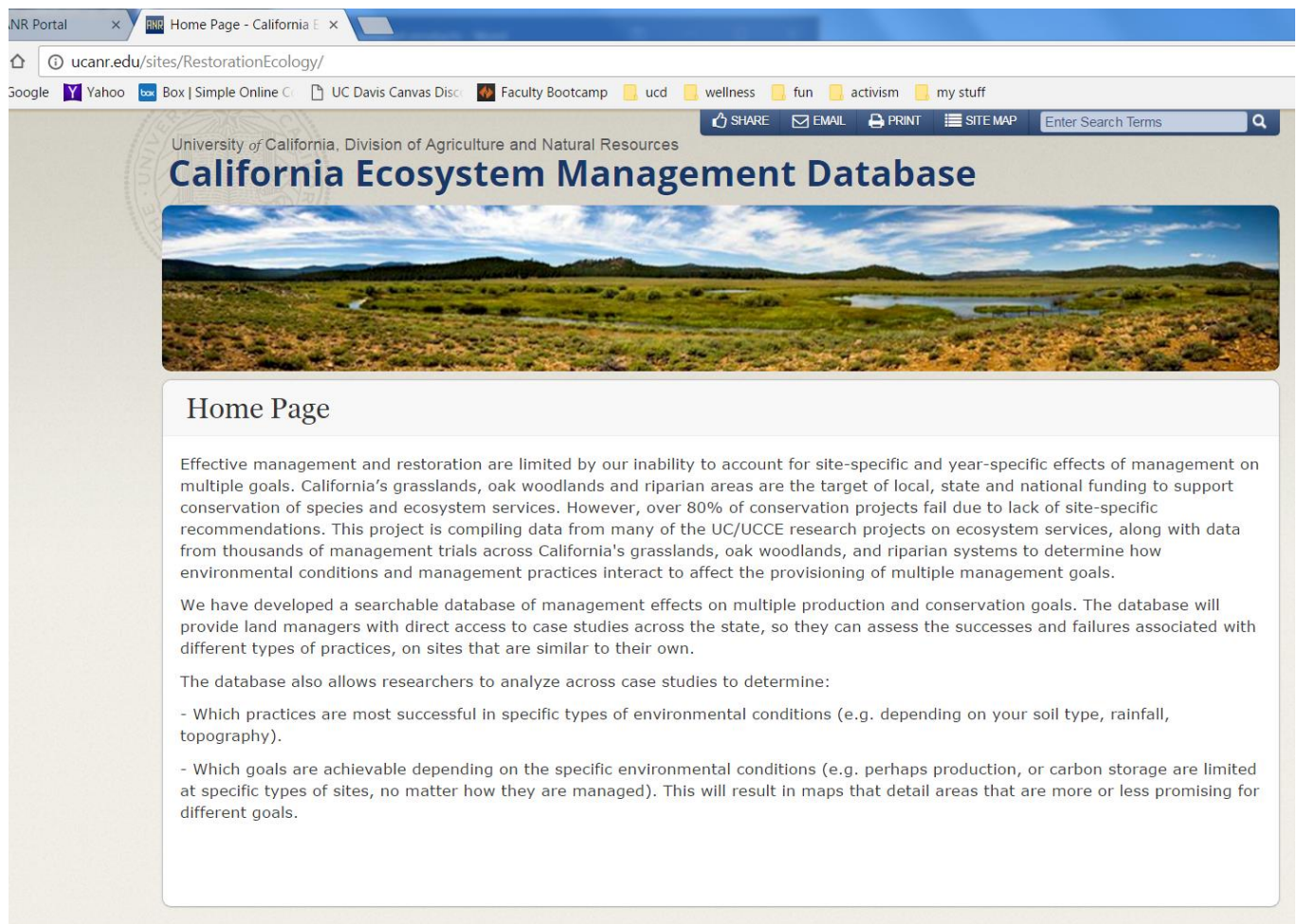
Database

The database construction was contracted to University of California's, Agriculture and Natural Resources Communication Services and Information Technology (CSIT) division. They have had repeated delays over the past 3 years, leading to repeated postponements of the other planned outreach and synthesis activities that rely on the database. These delays have been due to a combination of the database being more complex to develop than they anticipated, staffing changes, and some high priority system-wide projects that were unexpected and coopted staff time for this project. The full database is nearly complete, with a couple of sections (management practices

and data) currently in a "1.0" mode, meaning that they are now at a base level of functionality, and will be updated with pull-down menus to match other sections, in July-September of this year. Once that is complete, the case studies collected through this project can be uploaded into the database (we are formatting their data into an excel sheet that the developers can use to populate the database). This is anticipated to occur in October, with a public release of the website and available data in November.

Current status of specific parts of the database are outlined below, including screenshots of the current database sections. CSIT can provide WSARE access to these in development pages if they would like to work through the current "in development" web page.

Front page: Will be including links to the database and management handbook, will include the brands of funders (WSARE, UC ANR)

Database search page:

The current search functions allow searching by ecosystem type, key word, floristic province or project name (see below).


CSIT is updating the fields to search including:

- A drawdown menu of common management approaches
- A drawdown menu of common management goals
- Environmental conditions, including site challenges identified by managers (e.g. erosion, invasive species, low productivity, etc.)
- What type of data is available (e.g. forage production, soil C sequestration, invasive species % cover, etc.)

- A map to click on locations of available case studies (map on left). Case studies will also be searchable through the map based on similar soils, elevation, floristic province, and ecosystem type (See pull-down menu on the right). In these cases, users are able to search by a particular condition, to conditions similar to those at a site in the database, or to conditions similar to a point on the map they choose (e.g. their own property, and then the search will pull up sites with similar environmental conditions)
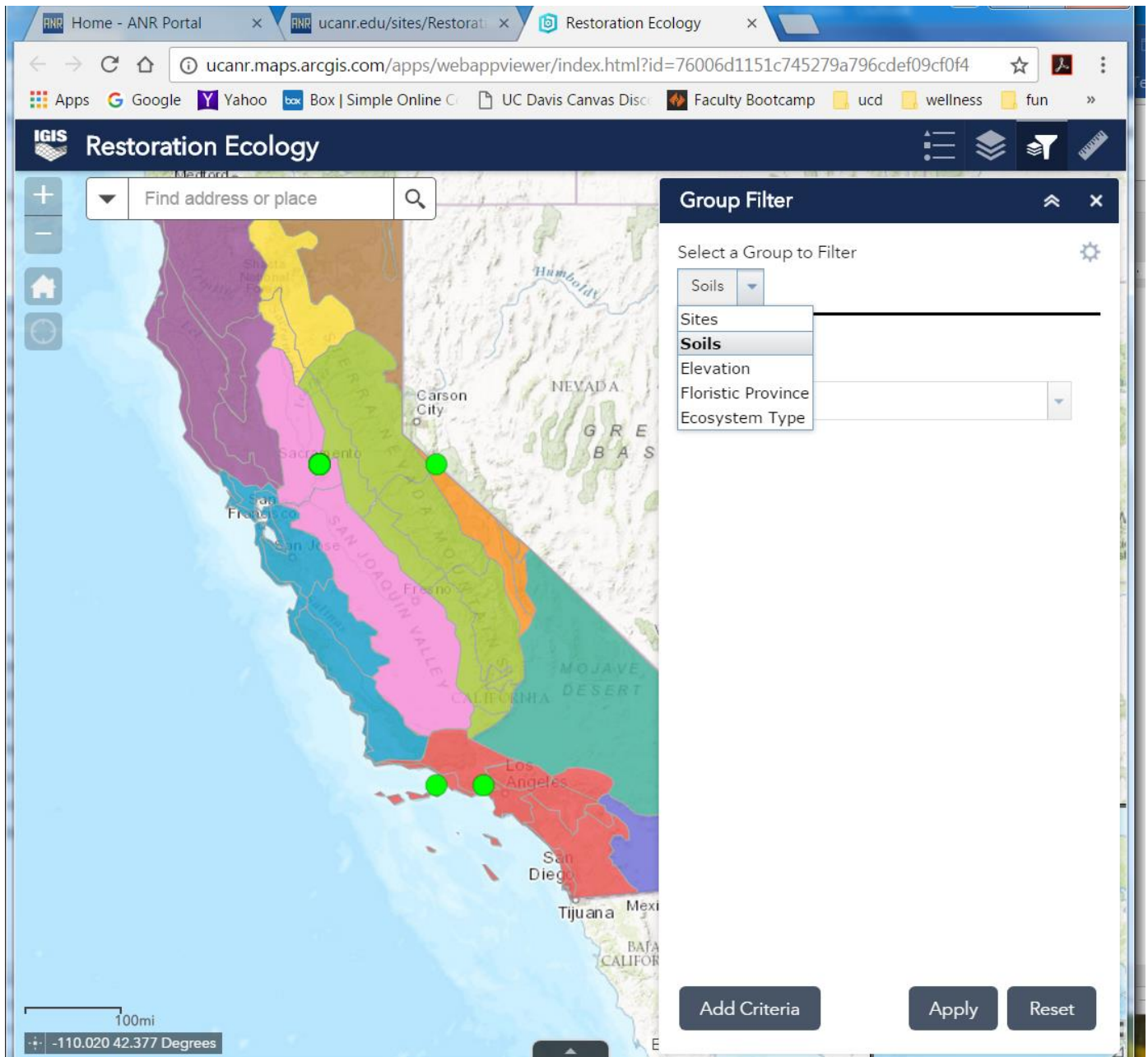
Site data:

- Current modules for site data include location and broad conditions (which will also be up-loadable by clicking on location of site, which will populate soils, data from nearest weather stations, topography, and vegetation classes through the GIS tool link). Site information also includes specific goals and monitoring techniques, and includes an export function to download the data.
- This front page provides an overall summary of the project

Site-specific data is then entered as seen below, in a series of screenshots

History

frequent fires (every few years) due to arson, unknown but variable history of management (mowing, seeding, prescribed fire)

Vegetation

largely yellow starthistle dominated, with frequent patches of wildrye, and occasional patches of exotic annual grasses and forbs.

Species

Common Name ▲	Latin Name ⇅	Rank ⇅	Action ⇅
barb goatgrass	Aegilops triuncialis	Occasional (11-25%)	Delete
Bluegrass	Poa secunda	Present (<1%)	Delete
California brome	Bromus carinatus	Present (<1%)	Delete
Clover	Trifolium microcephalum	Occasional (11-25%)	Delete
Fiddleneck	Amsinckia douglasiana	Rare (1-10%)	Delete
Filaree	Erodium botrys	Common (26-50%)	Delete
Geranium	Geranium sp.	Occasional (11-25%)	Delete
Oniongrass	Melica californica	Present (<1%)	Delete
Purple needlegrass	Nasella pulchra	Common (26-50%)	Delete
soft brome; soft chess; lopgrass	Bromus hordeaceus	Abundant (51-75%)	Delete
Sunflower	Helianthus sp.	Rare (1-10%)	Delete
Wild lettuce	Lactuca sp	Rare (1-10%)	Delete
wild oats	Avena fatua	Abundant (51-75%)	Delete
Wildrye	Elymus triticoides	Common (26-50%)	Delete
yellow starthistle	Centaurea solstitialis	Dominant (75-95%)	Delete
yellowflag iris; pale yellow iris	Iris pseudacorus	Full cover (>95%)	Delete

Showing 1 to 16 of 16 entries

Add species

Pre-project condition

Challenges   ☐ Erodible

☐ Low Production

☑ Low Forage Quality

☑ Low Plant Diversity

☑ Invasive Plants

Yellow starthistle

☐ Soil Compaction

☐ Water Runoff

☑ Low Water Holding Capacity

☐ Low Water Quality

☑ Low Soil Fertility

☑ Low Wildlife Habitat

Raptors

☐ Low Pollinator Habitat

☑ **Fire Risk**

☑ **Regulation**

limits on time of herbicide use, mowing, prescribed fire

Advantages   **Site Advantages**

The site had high productivity, and supported high densities of pollinators from May through June. Erosion was low due to flat terrain.

☐ **Low Erosion**

☐ **High Production**

☐ **High Forage Quality**

☐ **Plant Diversity**

☐ **Low Invasive Plants**

☑ **High Native Success**

Blue wild rye

☐ **Low Compaction**

☐ **Low Water Runoff**

☐ **High Water Holding Capacity**

☐ **High Water Quality**

☐ **High Soil Fertility**

☑ **High Wildlife Species**

Deer, ground squirrels

☐ **High Pollinator Habitat**

☐ **Low Fire Risk**

Surrounding landscape   Surrounding areas have high densities of fennel and poison hemlock. The site is part of a 23-mile corridor along the American River, providing high connectivity for wildlife.

Other site info

Management goals:

Management goals, and their relative priority are entered via a pulldown menu platform

Their reporting is seen as below:

← Back

ARP post-burn | ARP

Project Overview   Contacts   Sites   Goals   Export

Management Goals

Goal	Ranking	Short or long term?	Current Status	Desired Status	Action
Carbon sequestration	3: Secondary goal (nice to acheive, but not the focal goal)	Long Term	Unclear	Enhance	Delete
Erosion control	4: Important goal, but not the highest priority	Long Term	high gully formation in big storms	eliminate formation of gullies, restore current gullies	Delete
Forage production	4: Important goal, but not the highest priority	Long Term	500 g/m2	20% increase	Delete
Forage quality	4: Important goal, but not the highest priority	Short Term	dominated by unpalatable species, medusahead	increase cover of filaree and legumes	Delete
Invasive species and noxious weed control	4: Important goal, but not the highest priority	Long Term	dominance by goatgrass and yellow starthistle	decrease cover to less than 20%	Delete
Livestock production	5: Highest priority goal	Long Term	production has decreased by 30% over time	increase by 20%	Delete
Native plant conservation	3: Secondary goal (nice to acheive, but not the focal goal)	Long Term	have patches of Stipa pulchra	Maintain	Delete
Native plant restoration	3: Secondary goal (nice to acheive, but not the focal goal)	Long Term	increase native forbs	increase cover to at least 30%	Delete
Other	4: Important goal, but not the highest priority	Short Term	Lack of trails	Build 5 mile loop trail	Delete
Plant diversity	3: Secondary goal (nice to acheive, but not the focal goal)	Long Term	currently have 20 species across a 100 ha ranch	increase to 40 species	Delete
Resilience	5: Highest priority goal	Long Term	poor recovery from fire	ability to have 80% cover in year after fire	Delete
Resistance	5: Highest priority goal	Long Term	60% decrease on forage production in response to drought	20% forage production in response to drought	Delete
Soil compaction alleviation/prevention	3: Secondary goal (nice to acheive, but not the focal goal)	Short Term	Ponding water	alleviate ponding, allow infiltration	Delete
Soil fertility	4: Important goal, but not the highest priority	Long Term	low production, yellowing forage	increase legumes to enhance fertilty, and enhance production by 20%	Delete
Water quality	3: Secondary goal (nice to acheive, but not the focal goal)	Short Term	high sediment load	Increase clarity	Delete
Water storage in soil	4: Important goal, but not the highest priority	Long Term	little water storage to support spring growth	support plant growth through May	Delete

Management practices: This section is still under development. It is split into a few different types of approaches to help users search for case studies that most match their own, and to aid in categorizing case studies for analysis.
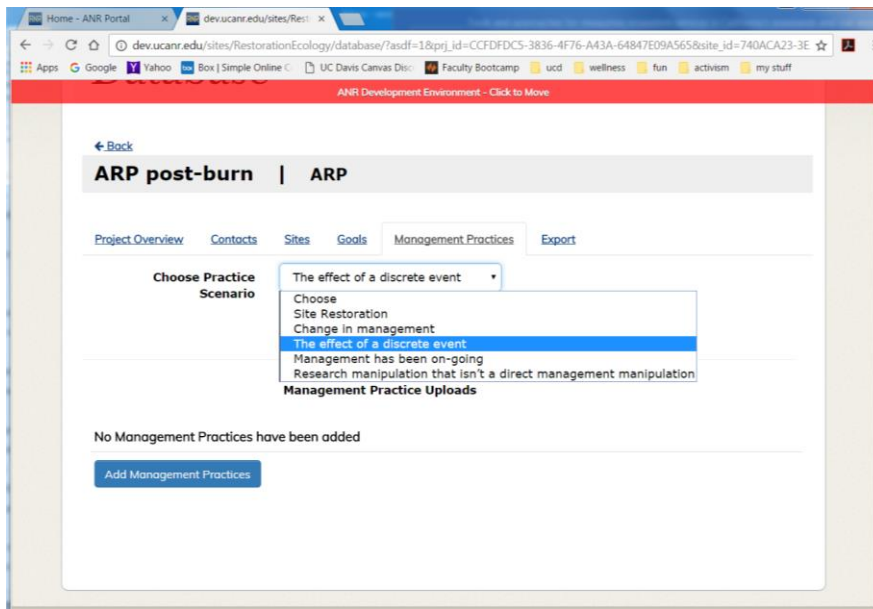
The many different options possible in this section has made this the most challenging for the database development team. They plan to have a fully developed set of specific drop down prompts (parallel to other sections, such as goals) with discrete questions associated with many of the potential management practices. Estimated completion for this section is September 2018. But in the mean time, a simpler text description or upload option is being used.
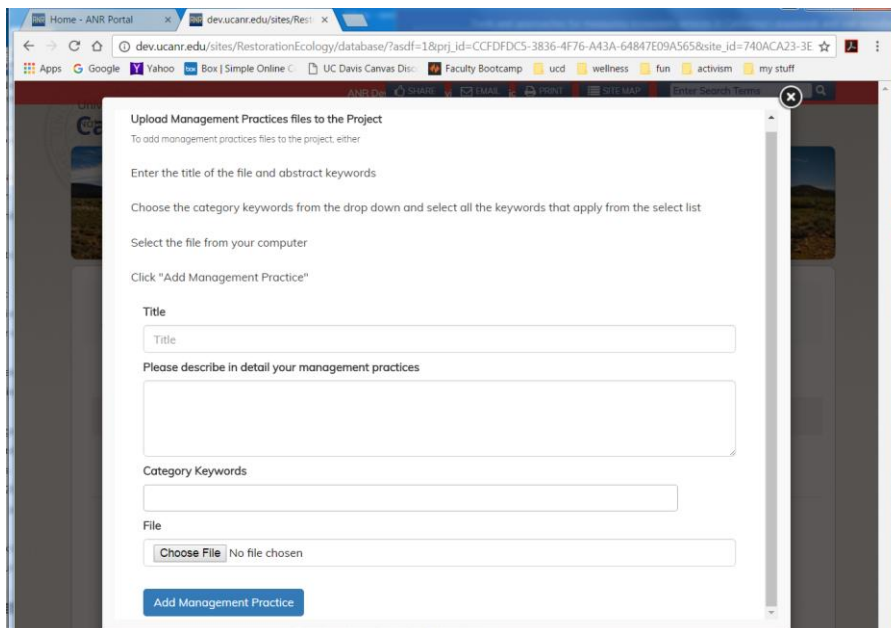
Monitoring approaches and data:

Monitoring approaches are inputted through a question box format, and a drop-down menu is being developed.

The module for uploading data will be further developed (to mirror the goals section, above), but is available now in by uploading files:
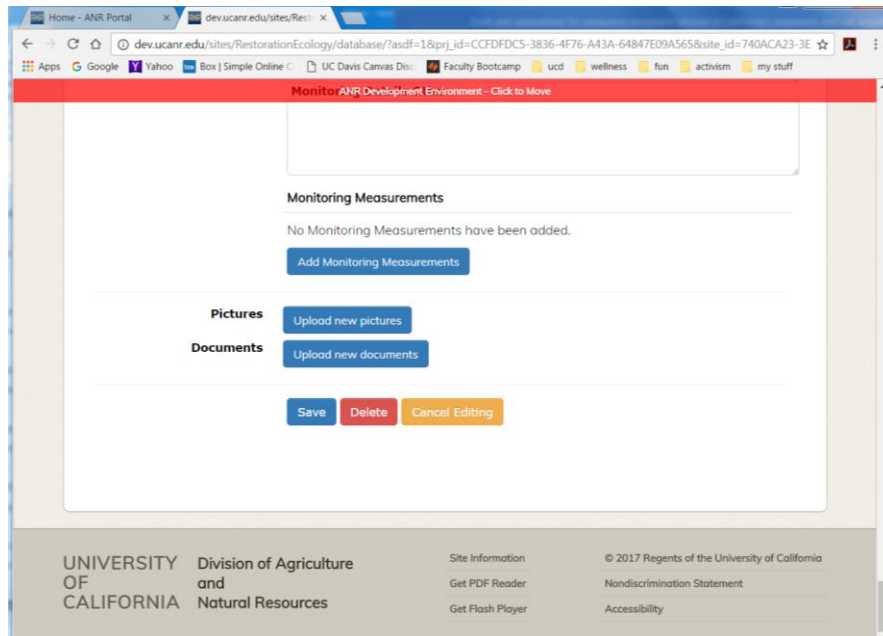
Uploading of case study data:

- A few case studies have been entered thus far to test the existing database. Once the last two sections have been fully developed (management practices and data), the CSIT will populate the database with the existing case studies (over 1,700 sites) through an excel upload, so that they don't have to be individually entered.

Maps, fact sheets and producer trainings:

The factsheets and maps depend on a synthesis of the data from the database, so will be completed within a few months after the database is complete and has the case studies uploaded into it (allowing us to do the synthesis maps that the fact sheets are based on). This is expected to occur December 2017-April 2018, when the PI (Eviner) will be on a local sabbatical that is focused on the analyses of this database and outreach based on the database.

The producer trainings on the database and ecosystem services monitoring tools will likewise be scheduled once the database is public (we are currently scheduling this for the Fall 2017-Spring 2018 growing season).

During the course of the project, articles in stakeholder publications related to this project include:

Eviner, VT. 2014. Effects of weather variations on species composition and production in California's grasslands. Grasslands 24:2-7.

Eviner, VT. 2014. Database of management trials to provide site-specific tools for more effective management. California Invasive Plant Council News 22: 10-14.

Eviner, VT. 2013. Database of management trials to provide site-specific tools for more effective restoration. Grasslands Winter 2013.

Eviner, VT, J Heraty, J Baty, C Malmstrom and K Rice. 2013. Impacts of native vs. exotic grassland vegetation. California Invasive Plant Council News 21: 13-14.