



**Topic & title of Project:** Use of LANDFIRE Data in Bee Pollination Study

**Date:** 2011

**Background:** The college of Natural Resources (CNR) at UC Berkeley addresses Biological, Social and Economic challenges associated with Protecting Natural Resources and the Environment. As such, the CNR set out to explore a method for estimating the economic value of wild bee pollination services for California agriculture. The study focused on the amount and location of natural habitats relative to California’s agricultural production areas. Results from field studies were used that established the relationship between natural habitat and wild pollination services in California’s Central Valley. Those results were extrapolated to other crops and agricultural landscapes in California using spatial landcover data to generate both a statewide estimate and a map of this ecosystem service.

**Key points:**

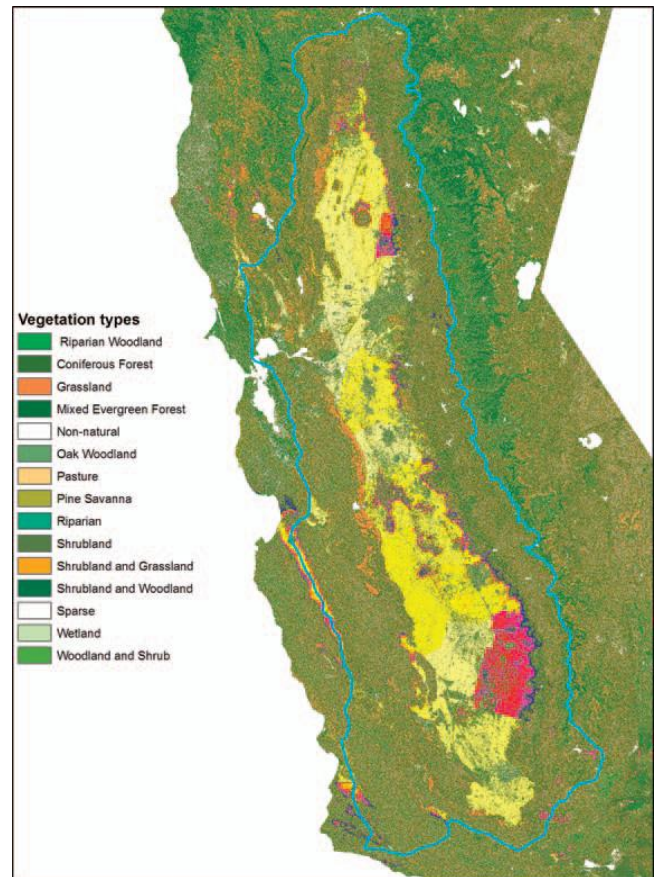
Description of analysis:

- The study classified California crops according to their dependence on pollinators, and multiplied this by county commodity value data to obtain a pollination value for each crop. Our goal was to partition this total pollination service value into the values attributable to managed and wild bees; it is the wild bee contribution that constitutes the ecosystem service derived from nature. In order to select pollinator-relevant habitat, this study used the National LANDFIRE Existing Vegetation Type (EVT) (Fig 1.) dataset to create our pollinator-relevant natural habitat map.
- The LANDFIRE land cover map from existing vegetation types was converted to a binary grid (relevant pollinator habitat 1 and irrelevant habitat 0). This grid was used to model the delivery of pollination services across all agricultural habitats and calculate the total current value of wild pollinators to California agriculture.

Improved methodologies:

LANDFIRE data enabled a more accurate classification of potential habitat for pollinators and refined the typical non-spatial valuation of pollination services.

- The NatureServe documentation that accompanies the legend for the LANDFIRE dataset allowed a determination of pollinator relevance for each EVT.



**Figure 1.** Map of pollination service value provided by wild pollinators overlaid on coarse categories of vegetation types (as delineated by LANDFIRE). Grasslands are shown in orange, and they border much of the agricultural area receiving pollination services. Different types of forest are shown in various shades of green. The blue boundary shows the priority conservation acquisition area for the California Rangeland Conservation Coalition which encompasses much of the habitat important to providing pollination services to farmland.

- For forest and woodland vegetation types, cover data from the LANDFIRE Existing Vegetation Cover (EVC) datasets were used as an additional variable to determine habitat suitability for pollinators.

**Data Viability:** The LANDFIRE National data products, specifically Existing Vegetation Type, Height, and Cover datasets were chosen because;

- *Current.* The Existing Vegetation (EV) datasets published in 2006 were the most current data available. Recent data is needed for accurate modeling with current conditions that can be used for decision making purposes in the future. LANDFIRE refresh and subsequent updates will establish greater data currency and further enhance data products to more accurately reflect existing conditions.
- *Height spatial resolution.* The EV datasets have a pixel size of 30x30 meters which is the finest spatial resolution available for the entire extent of California and needed in order to target small patches of agriculture and natural habitat.
- *Seamless.* The EV datasets are a national product, and include coverage of the entire state of California and surrounding states.
- *Detailed.* The EV datasets have a very high thematic resolution, in that the land cover attributes, or classification scheme, is very detailed.
- *Documented.* The LANDFIRE Team provides online access to documentation on the methods, modeling process and accuracy assessment performed.

**Results/Summary:** LANDFIRE data was vital to assessing the value of pollination to California agricultural crops. The model informed by LANDFIRE data suggested that wild bees provide 35 – 39% of total pollination services in California, which is substantially greater than previously estimates. Much of the natural vegetation that provides these pollination services can be found in rangelands (Fig. 1). LANDFIRE data provide key information for identifying areas of highest ecosystem service value, which can be important in management decisions for conservation and restoration. The integration of ecological, economic, and geospatial data such as LANDFIRE is necessary for habitat management to maximize the provision of ecosystem services.

**Recommendations:**

- **Data quality and timely updates:** The importance of data quality and timely updates cannot be overstated. In order for LANDFIRE data to continue to be of value to the user community, it is critical that data accuracy continues to be enhanced and updates are made on a regular basis.

**References:** UC Berkeley News Center, College of Natural Resources - June 20, 2011  
Journal for the Society of Range Management – June, 2011 issue

