



Effects of USDA Wetland Conservation Programs in the California Central Valley Region

Wetland functions (i.e. pollutant mitigation, carbon sequestration, and support of habitat biodiversity) recover upon wetland restoration, however, potential management mediated trade-offs may occur.

The California Central Valley (CCV) Regional Wetland Conservation Effects Assessment Project (CEAP) is one of several USDA CEAP Wetlands regional assessments undertaken to collect and interpret data on ecosystem functions provided by wetlands restored through USDA conservation programs. The CCV is an agriculturally dominated landscape that has experienced extensive wetland losses and hydrological alteration. Restored habitats in the CCV should provide a variety of ecosystem services, but little was known about the actual benefits afforded. The Wetland Reserve Program (WRP) is intended to assist landowners in restoring, protecting and enhancing wetlands on agricultural lands. In California, NRCS has focused WRP on restoring freshwater wetlands that have seasonal or semi-permanent water regimes. In 2011 there were over 26,700 ha of WRP in the California Central Valley (CCV).

Humboldt State University, in collaboration with USGS and NRCS, surveyed 97 WRP sites and 16 National Wildlife Refuge sites in the CCV to estimate ecosystem services provided. Study sites were selected along three primary gradients; (1) restoration age, (2) management intensity, and (3) latitude (climate). The management intensity gradient included information about the type and frequency of conservation practices applied at each site, which was then ranked into three categories that differentiated sites primarily along a hydrological gradient. Information collected was used to estimate the following ecosystem services: Soil and vegetation nutrient content, and avian, amphibian, and pollinator use and habitat quality.

Study results indicate that although WRP in the CCV provides a number of natural resources benefits, there may be management mediated trade-offs to consider among ecosystem services when planning or managing a restoration project.

Wetland Conservation and WRP in the California Central Valley Region

- California's Central Valley is an elongated sedimentary basin about 650 km long, 120 km wide and covers an area of 108,800 square km.
- The climate is Mediterranean, with warm, dry summers and mild, wet winters. Air temperatures vary little but annual precipitation exhibits a distinct north-south gradient.
- CCV wetlands provide critical ecosystem services, including the provision of freshwater, regulation of pollutants (nutrients, pesticides) and hydrological flows, as well as support for biotic communities, which in turn enhance the provision of multiple natural resources benefits.
- Regional conservation practices included wetland restoration (657), wetland wildlife habitat management (644), wetland enhancement (659), upland habitat wildlife management (645), prescribed burning (338) and other practices.

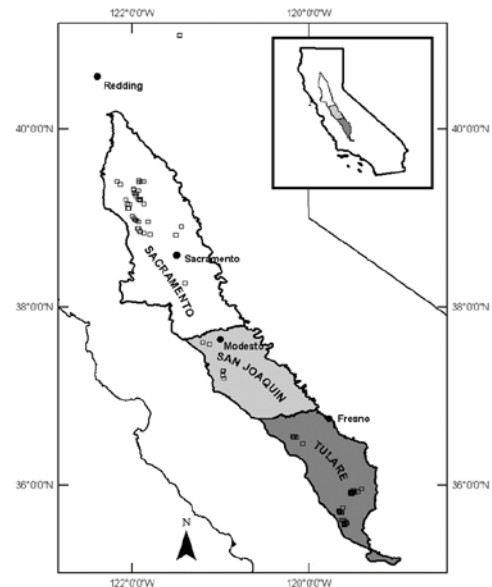


Figure 1. CCV CEAP-Wetland study locations

Wetland Restoration Effects on Wildlife Habitat Quality

- Hydrology in the CCV has been heavily modified and WRP wetlands are managed primarily to support wintering waterfowl.
- The most actively managed WRP wetland sites are located in the northern CCV where water availability is more predictable, although most of the wetland sites located in the southern CCV receive less hydrological manipulation due to severe water shortages.
- Access to water is the primary factor determining habitat composition. Less actively managed sites contain greater proportions of upland vegetation areas and actively managed sites have greater proportions of wetland vegetation zones.
- Actively managed sites also tend to experience greater disturbance regimes than unmanaged sites due to activities such as grazing, mowing, disking, and burning to control vegetative growth. These activities have both positive and negative impacts on ecosystem service delivery.

Wetland Restoration Effects on Soil Nutrients Storage

- Soils in all WRP wetlands surveyed in the CCV had relatively low organic carbon and nutrient concentrations that did not increase through time.
- Annual seasonal hydrological drawdown (natural and artificial) results in long periods of drying causing oxidation of sediments and the decomposition of organic matter. Active management practices such as mowing, disking and burning also reduce organic matter accumulation.

Effects of Wetland Restoration on Vegetation Biomass and Nutrient Storage

- WRP wetlands in the CCV were estimated to store between 3,000 and 400,000 metric tons of biomass in the shallow marsh zone alone. Inclusion of upland zones would yield higher estimates.
- Average carbon storage on WRP generally was higher than average carbon storage of California crops, but lower than perennial crops.
- Carbon and biomass storage was positively correlated with precipitation, and tended to be higher in the northern CCV.
- Carbon and biomass storage tended to decrease in older actively managed sites, likely the result of practices such as mowing, disking, grazing, and burning.
- Nitrogen and phosphorus storage decreased over time in sites under low or intermediate management but intensive management increased storage of these two nutrients.

Effects of Wetland Restoration on Potential Wildlife Habitat

- Actively managed WRP wetlands were found to support more waterfowl than sites under low or intermediate management, which is consistent with intended programmatic goals.
- Despite reported water shortages, greater upland and un-restored acreage in the southern CCV, WRP wetlands are providing critical waterfowl and shorebird habitat, particularly in the early fall months.
- Only four species of amphibians were detected using WRP wetlands in the CCV (American bullfrogs, pacific tree frogs, western toads, and western spadefoot toads). Most amphibians were observed using older actively managed sites which tend to receive regular hydrological inputs and are less disturbed by activities such as disking and mowing.
- Pollinator species were most abundant in the southern CCV and the presence of native pollinators was positively correlated with the proportion of upland habitat. Like amphibians, pollinator species may benefit from less disturbance.