The Nature Conservancy
CALIFORNIA | GROUNDWATER

CASE STUDY

Sacramento County | Making Room for Recharge: Cosumnes River Levee Removal and Floodplain Restoration

Summary: Reconnecting rivers to floodplains can facilitate groundwater recharge. A recent project along the Cosumnes River is one of the first to intentionally demonstrate this recharge benefit. While this project was expensive and more complex than many forms of recharge, public funding paid for the project and a partnership with UC Davis is improving the understanding of groundwater-surface water interactions and basin groundwater conditions. In 2014, The Nature Conservancy piloted this concept by selectively removing portions of a private levee system along the Cosumnes River to enhance floodplain processes and restore approximately 500 acres of riparian habitat. The levee removal project offers multiple environmental benefits, including increased groundwater recharge in the floodplain.

Program: Groundwater pumping in the Cosumnes subbasin has resulted in a cone of depression forming at the center of the basin. Under SGMA, the GSA will need to bring the basin into balance and prevent undesirable results from occurring. Enhancing groundwater recharge in the Cosumnes subbasin by reconnecting floodplains to aquifers can be an effective way to increase water supply to depleted aquifers.

The lower Cosumnes River Floodplain Restoration Project (Project) included strategically located levee breeches and restoring over 500 acres of critical riparian habitat. The levee breeches reconnected a portion of the historic Cosumnes floodplain to the river and the restored habitat is designed to create much needed riparian floodplain habitat for the benefit of associated wildlife, including fall run Chinook salmon that utilize the Cosumnes River. Targeted levee breaches, creating drainage swales, and lowering the floodplain for more frequent inundation, improved connectivity between the Cosumnes River and its floodplain.

A scientific monitoring program, largely funded by an Ecosystem Restoration Program (ERP) grant that was administered by California Department of Fish & Wildlife, supported research on a wide array of bird, fish, and plant responses to the Project, including groundwater recharge. Other sources of funding for the project are summarized below.

Fund Source	Amount	Purpose
Dept. of Fish and Wildlife Ecosystem Restoration Program grant	$2,055,022	Ecological (vegetation, bird, hydrochory, fish) and biophysical (groundwater recharge soil carbon, geomorphology) monitoring.
Easement Proceeds	$2,160,095	Planning, permitting, and implementation.
NRCS American Recover and Reinvestment Act grant	$75,000	Planning, permitting, and implementation.
USFWS Partners	$25,000	Environmental education to area schools.
Elk Hills	$377,350	Planning, permitting, and implementation.
Total	$4,692,467	

Researchers at the UC Davis Center for Watershed Sciences monitored a series of groundwater wells in the Project area to estimate groundwater recharge in the reconnected floodplain. Those researchers estimate that annual recharge on 165 acres of the Project floodplain ranged between 700 to 5,280 acre feet per year during monitoring years from 2014 to 2017. These are preliminary estimates. Since the study occurred during the drought, groundwater recharge is likely to be higher in wetter years with higher precipitation and surface runoff. The partnership with UC Davis exemplifies how research partners can help a GSA gain a better understanding of groundwater conditions and contributing significantly to the state of knowledge for the basin.

TNC and its research partners will continue to study the multiple benefits of the Project to help inform other riparian floodplain restoration throughout California and beyond.

Status: Levee removal was completed in 2014 and the establishment period for native plantings installed in the project area ends in fall 2018. The Nature Conservancy and its research partners (e.g., UC Davis, UC Mercecd, Point Blue Conservation Science) are continuing to monitor the effects of the floodplain restoration project, including groundwater recharge rates.

Additional Resources:

Cosumnes Subbasin Groundwater Sustainability Agency:
http://cosumnes.waterforum.org/sustainable-groundwater-management-act-sgma

Cosumnes River Preserve:
http://www.cosumnes.org/

Lower Cosumnes River Floodplain Restoration Project:
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ca/home/?cid=NRCSEPRD327436

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