



Drought reduces interior shorebird populations while coastal wetlands serve as refugia

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Shorebirds move long distances to take advantage of reliable, seasonal fluctuations in resources across vast networks of wetlands. Shorebirds must also respond to climatic cycles, including multiyear drought.

In the Central Valley of California, drought poses a critical threat to shorebirds because competition with humans for fresh water is on the rise, and a warming climate will likely cause future droughts to be more severe (more frequent and last longer). Coastal wetlands, which are less impacted by drought because of reliable saltwater influence may serve as refugia for shorebirds displaced by drought. However, to what extent shorebirds move to the coast during drought is not clear.

In this study, which was enabled by data from the [Pacific Flyway Shorebird Survey](#), we investigated the effects of a historic drought period on shorebirds in California's Central Valley and nearby coastal regions of San Francisco Bay and Point Reyes. Annual

surveys during early winter from 2011-2016 included three years when the intentional flooding of habitats for waterbirds in the Central Valley was increasingly limited due to drought.

We documented around 25% fewer shorebirds during drought years (2013-2015) when compared to non-drought years in the Central Valley. As the drought intensified, shorebirds increasingly relied on remaining flooded habitats in northern portions of the Central Valley. Of six focal species, Dunlins, and to a lesser extent Least Sandpipers, used coastal habitats as drought refugia, while population declines during drought years for both Greater Yellowlegs and Long-billed Dowitchers were documented within both interior and coastal regions of central California.

Our study suggests that there were around 50,000-75,000 fewer shorebirds in the Central Valley during drought years, if we assume that populations during our study were of similar size to the early 1990s.

Managing dynamic habitat availability in the interior with the more stable habitat on the coast will help ensure that the needs of shorebird populations are met and population targets for conservation remain in reach.

Main Points

Drought poses a critical threat to shorebird populations, especially those that rely on freshwater wetlands.

An extreme drought (2013-2015) reduced shorebird abundance and flooding of wetland and agricultural habitats in California's Central Valley.

Some species shifted their distributions to nearby coastal habitats and to other regions of the Central Valley in response to drought, while others did not.

The management of both interior and coastal wetlands must consider drought response plans to effectively conserve populations of nonbreeding shorebirds in central California.

Barbaree B. A., M. E. Reiter, C. M. Hickey, K. M. Strum, J. E. Isola, S. Jennings, L. Max Tarjan, C. M. Strong, L. E. Stenzel, W. D. Shuford. 2020. [Effects of drought on the abundance and distribution of non-breeding shorebirds in central California, USA](#). PLoS ONE 15(10): e0240931.