

# Impact of extreme drought and incentive programs on flooded agriculture and wetlands in California's Central Valley

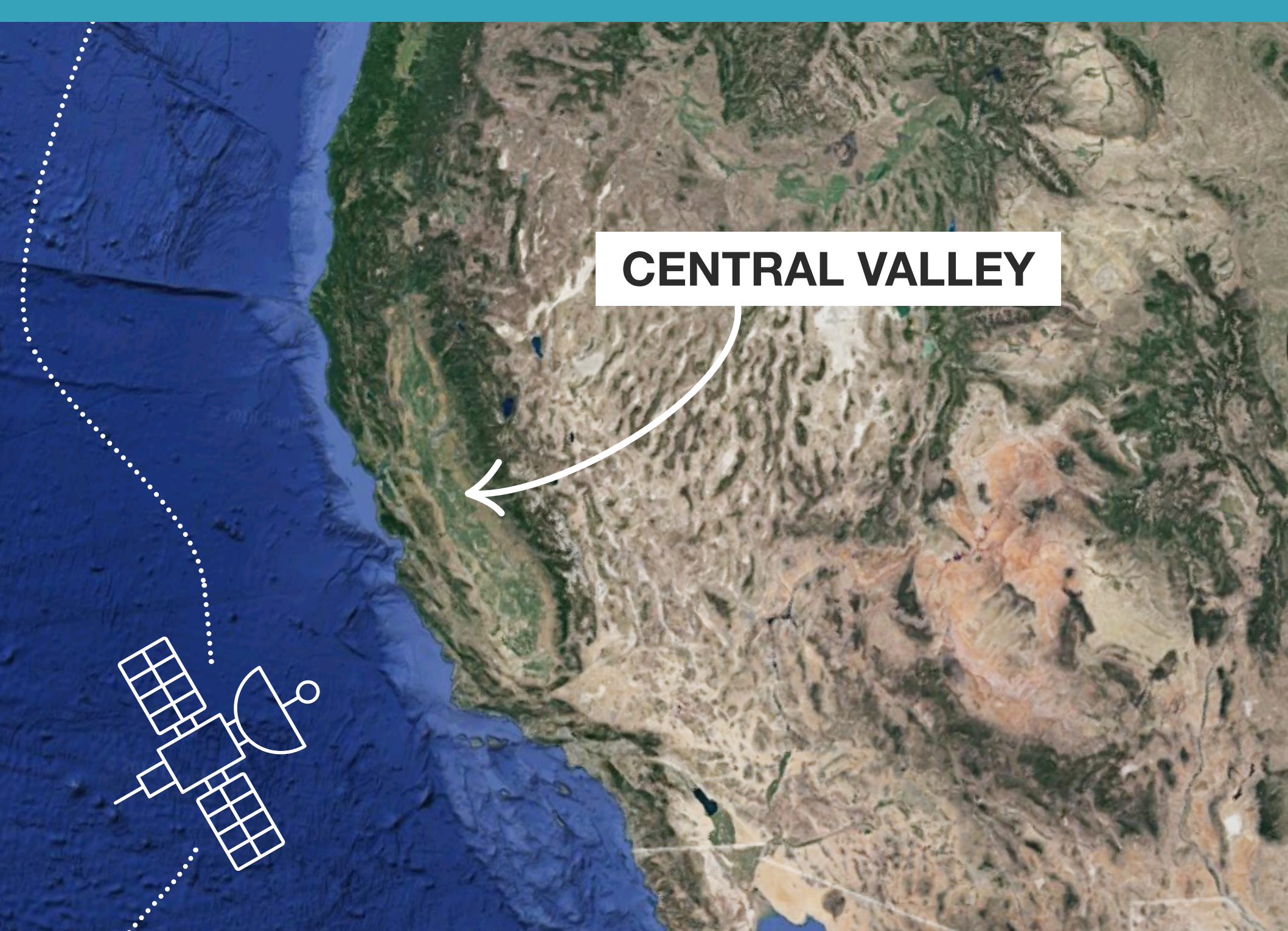


## BACKGROUND

The Central Valley of California is a **region of hemispheric importance for waterbirds**. With 90% of the historically occurring natural wetlands in the Central Valley gone, agricultural crops that are flooded post-harvest and hydrologically-managed wetlands are essential resources for migratory waterbirds.

## METHODS

We used **satellite data to evaluate the impact of extreme drought and two different incentive-based habitat programs** on waterbird habitat in the Central Valley of California.

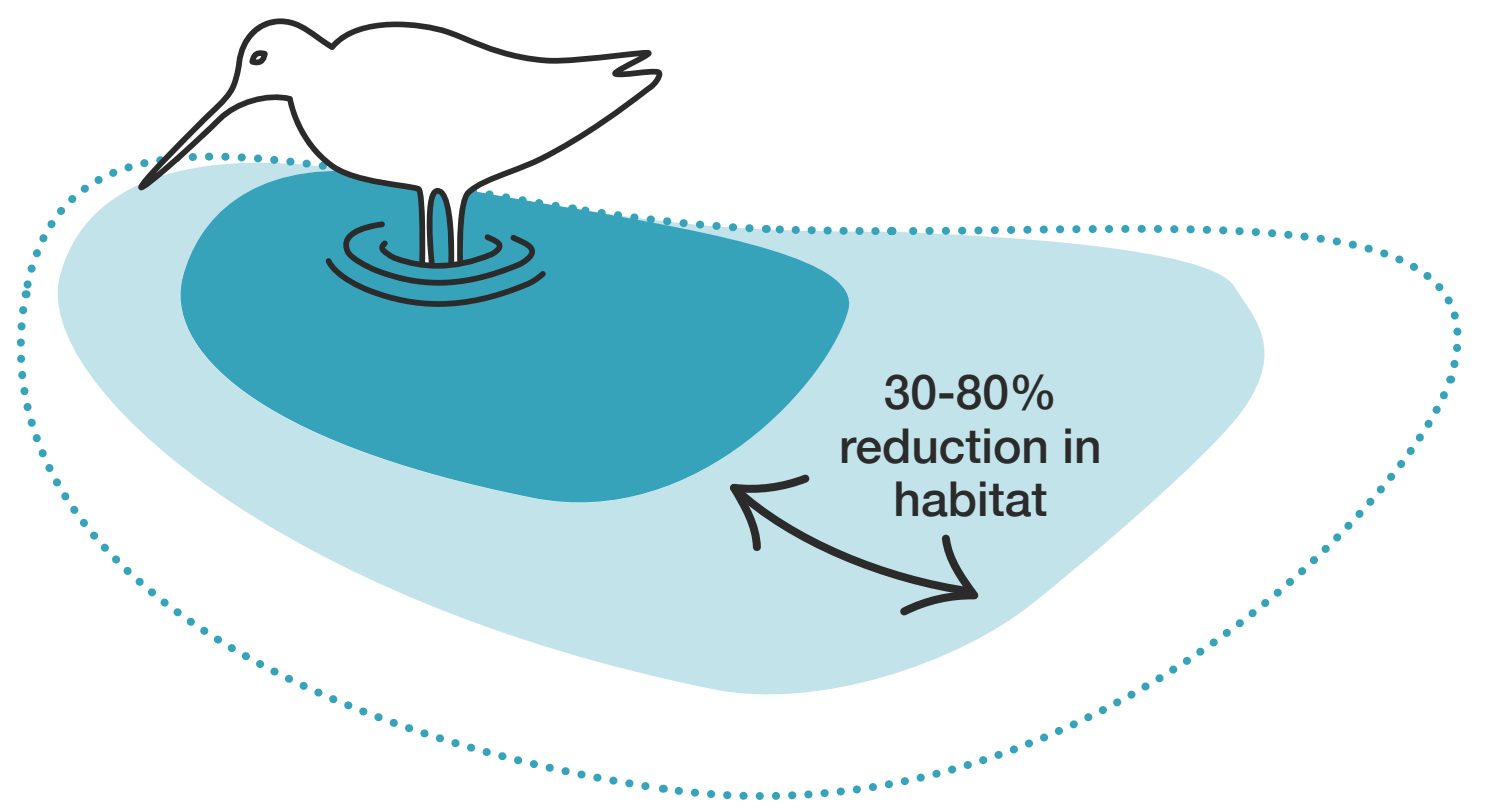


## RESULTS

We found that the **2013-2015 drought in the Central Valley was more severe** than previous drought years between 2000 and 2011.

### REDUCED HABITAT

This recent extreme drought significantly **reduced waterbird habitat in flooded agriculture and wetlands by 30-80%**.



### NORTH VS. SOUTH

Declines in water occurred across the entire Central Valley but seasonal wetlands and agriculture showed **larger declines in the south** (San Joaquin Valley) than in the north (Sacramento Valley).

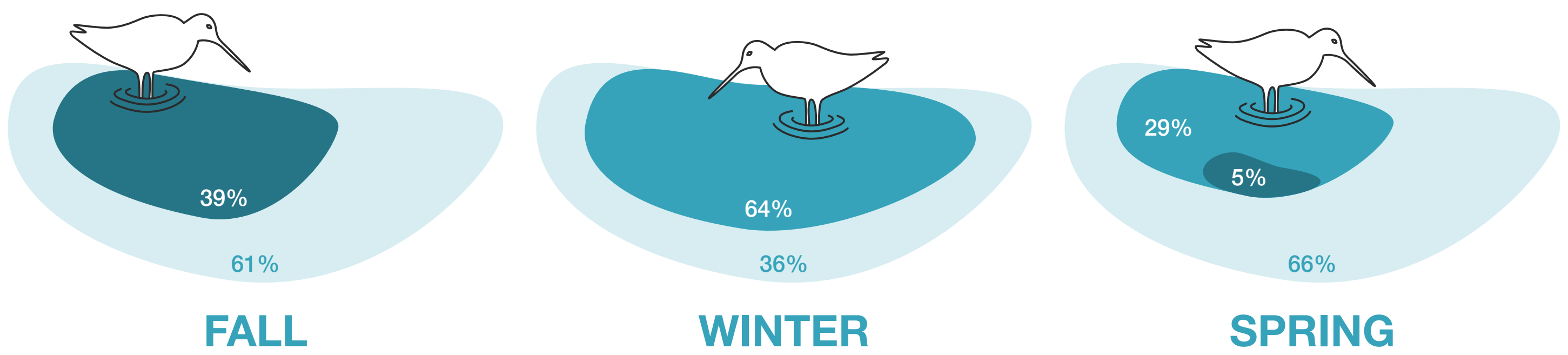


### INCENTIVE PROGRAMS

Incentive programs on average **provided 35% of the available habitat on the landscape during the drought** and up to 100% of the habitat on some days.

#### PROPORTION TOTAL OPEN WATER IN RICE

No incentive
  Waterbird Habitat Enhancement Program
  BirdReturns



## CONCLUSION

Our study highlights **the need to maintain programs that incentivize the creation of wetland habitat** in the face of increasing frequency and severity of drought in order to sustain waterbirds in the Central Valley.

**Image credits:**  
 • Wetland (top image): R. DiGuadio  
 • Longbilled Dowitcher (circle top image): T. Grey  
 • Satellite map data: Google, SIO, NOAA, U.S. Navy, GEBCO, LDEO-Columbia, NSF, INEGI, Landsat/Copernicus, IBCAO  
 • Longbilled Dowitchers in flight (circle center image): T. Grey

