

# Modeling Land-Use Change for Solar and Conservation on Predicted Retired Farmland in the San Joaquin Valley

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## Environmental Problem

Over the next 20 years, land in the San Joaquin Valley (SJV) will undergo its most extensive change since it was first converted into irrigated farmland. California's Sustainable Groundwater Management Act (SGMA), which was passed in 2014 to reduce groundwater overdraft, will lead to temporary fallowing and permanent retirement of hundreds of thousands of acres of irrigated agricultural land. Many landowners will be making difficult decisions about transitioning their land to alternative uses, and while many of these lands may no longer be suitable for irrigated agriculture, they hold great potential for habitat restoration and utility-scale solar energy (USSE). The Nature Conservancy (TNC) has the goal of protecting 50,000-80,000 acres of upland species habitat; the state also has ambitious decarbonization goals that will require significant amounts of utility-scale solar energy (70 GW), much of which will need to be sited in the Valley.

In this project, we conduct a literature review, stakeholder interviews, and a spatial-economic analysis to:

- 1) evaluate the viability of new solar development and habitat conservation as alternative land uses for degraded or formerly irrigated lands in the SJV; and
- 2) assess potential strategies for TNC and other conservation organizations to leverage new solar development to achieve upland species conservation goals. Our results provide insight into changes coming to the SJV and offer TNC additional information to pursue their upland species conservation goals.

from converting retired land to USSE or habitat conservation, our results suggest that the majority of this land will likely convert to utility-scale solar (~130,000 acres) and about one fifth of the acres will likely be conserved for habitat (~41,000 acres) (Figure 1). In some instances, neither USSE nor habitat would provide value to the landowner (~43,000 acres).

## Group Findings

Approximately 214,000 acres of land in the SJV is conservatively estimated to be retired by 2040. In assessing the economic value a landowner could expect to receive

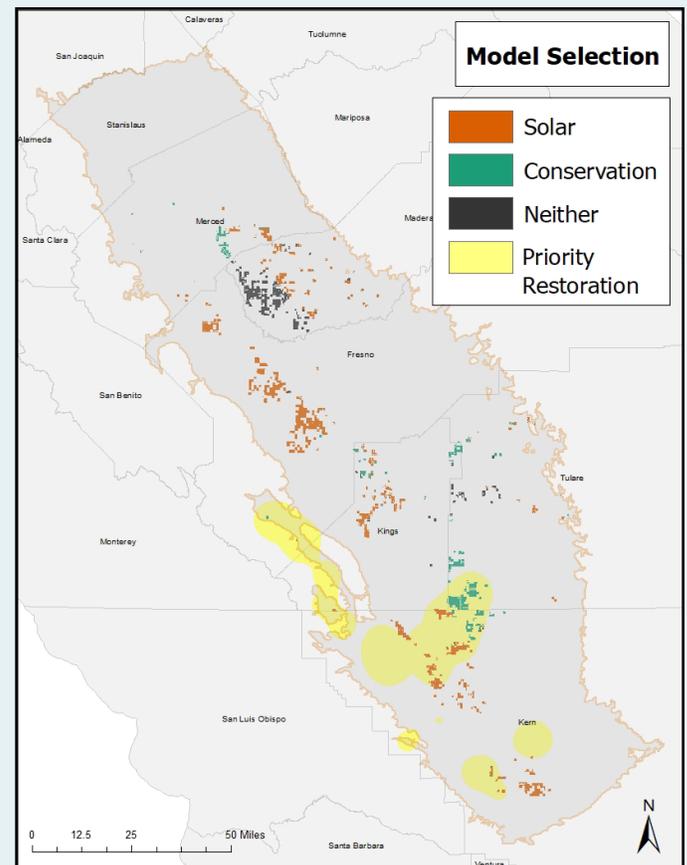
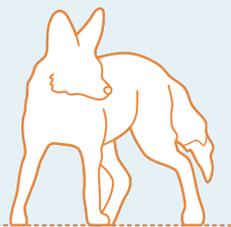


Figure 1. Spatial distribution of predicted retired farmland conversion across the entire San Joaquin Valley.



Further, when compared to California energy goals and TNC habitat goals, our model indicates neither will be fully achieved solely on predicted permanently retired agricultural lands. Our model predicts roughly 45% of the SB-100 solar capacity goal and 51-81% of TNC's habitat goal will be achieved (Table 1).

*Table 1. Model results compared to California solar goals and TNC habitat goals.*

	Goals	Model Results	Results as % of Goals
TNC Upland Habitat	50,000 - 80,000 ac	40,556 ac	50.70 - 81.11%
SB-100 Solar Capacity	70 GW	31.25 GW	44.64%

### Recommendations

The results of our analysis led us to recommend the following:

- Safe Harbor Agreements should be applicable to permanently retired agricultural lands with USSE to eliminate penalties to landowners and solar developers that create/allow habitat on their parcels.
- Landowners that have leased land for USSE should be allowed to establish permanent conservation easements and claim an upfront charitable income tax deduction if the solar company signs an agreement to create and maintain habitat under elevated panels on permanently retired agricultural parcels during the term of the lease.

### Environmental Impact

A coordinated management approach for retired lands should include incentives for solar development on degraded agricultural lands as well as habitat conservation in regions where species-focused restoration could provide the most benefit. There are more than a dozen federally listed threatened and endangered species in the southern San Joaquin Valley. Much of the habitat for these species has been converted to agricultural uses, and ongoing practices such as disking and the spraying of herbicides continue to harm populations. These practices also contribute to poor local air quality, which is a major problem for residents who already experience respiratory illnesses at much higher rates than the rest of the state's population. Thus, the expected fallowing and retirement of cropland has implications for human and environmental health. This study provides a foundation for identifying opportunities to protect critical species habitat and minimize airborne dust; integrating these results with strategic coordination across the SJV from all stakeholders is crucial to achieve these outcomes.



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