

Monarch Environmental Preferences and the Efficacy of Habitat Restoration Projects

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Abstract

This study examines the spatial relationship between monarch butterfly (*Danaus plexippus*) observations and various landscape types in California, with particular focus on evaluating the effectiveness of any local pollinator habitat restoration or conservation projects. Per the Xerces Society, monarchs have declined by more than 80% since the 1990s from central Mexico and by more than 95% since the 1980s in coastal California. The reasons for this sharp decline lie primarily in the issues of habitat loss, urban development, agricultural intensification, pesticide use, and climate change. Our research uses geospatial analysis to compare monarch and milkweed (*Asclepias* spp.) observations across three distinct landscape categories: restoration project areas, agricultural lands, and urban environments.

Using datasets from the Western Monarch Milkweed Mapper and USFWS Pollinator Restoration Projects, we employed intersection overlays to quantify monarch presence within each landscape type. Results indicate varying degrees of monarch presence across these environments with notable patterns emerging between monarch sightings and specific habitat characteristics. Our findings might suggest that while restoration projects show promise in supporting monarch populations, the data primarily skewed towards the majority of current monarch sightings to be in cropland/urban areas.

We identified potential sampling bias in urban areas, where citizen science observation density is higher, which may be a factor in skewing distribution of the data. This research would still contribute to the growing body of knowledge on monarch habitat preferences in California and could provide quantitative metrics for assessing restoration project outcomes. These findings offer valuable insights for conservation practitioners seeking to optimize restoration efforts for this iconic pollinator species amid ongoing environmental challenges.