Point Blue Publication Brief

Determining long-term versus real-time habitat suitability for shorebirds

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Conservation planning often involves determining where to create, restore, or maintain habitat for wildlife. In the Central Valley of California, shorebirds are of particular conservation interest due to declining populations. Migratory shorebirds are highly mobile and can use different parts of the landscape from one week to the next. Specifically, shorebirds are most likely to occupy flooded landscapes (e.g., managed wetlands and flooded rice) at specific times of year (fall through spring). The availability of flooded habitat changes dramatically both within and among years in the Central Valley. Hence, recent conservation efforts have focused on the creation of temporary habitat during the time of the year when habitat is most needed and during years affected by drought. These efforts are improved by specific information (modelled habitat suitability) on where and when shorebirds are likely to use flooded habitat.

To date, most models of bird-habitat suitability rely on the long-term average of rapidly changing environmental conditions (e.g., climatic averages) and stable landscape features (e.g., slope, elevation, cover type). Currently, satellites capture images of the whole California Central Valley every two weeks. We can use these satellite images to observe rapid changes in water availability, an influential determinant of shorebird habitat use. To improve on-the-ground conservation actions, our goal was to compare bird-habitat suitability models built on long-term average water availability to models built on real-time satellite observations of water availability.

We found that models built with either real-time or long-term average environmental conditions both performed well in predicting when and where American Avocets, Black-necked Stilts, Dunlin, and Long- and Short-billed Dowitchers were likely to be on the landscape. Models that included both types of data performed best. Across spatial predictions built with long-term average and real-time satellite observations of water availability, locations of high suitability were largely consistent across models. Overall these results highlight that shorebirds are likely responding to both long-term average conditions and dynamic changes in habitat availability.

Subtle differences across spatial predictions occurred in regions where there were fewer bird observations, specifically, in the southern half of the valley. Thus, while both types of data provide accurate predictions, practitioners must still decide which type of data to use, depending on their specific conservation question. Models built with long-term average data identify locations that provide long-term, optimal suitability, supporting permanent habitat conservation decisions; whereas models built with real-time data provide the optimally suitable sites given current conditions, supporting temporary habitat decisions.

Main Points

Shorebird habitat suitability was well predicted using both long-term average water conditions as well as real-time conditions.

Real-time data are likely to be preferable for deciding where to put temporary habitat; whereas, long-term average water conditions are preferable for decisions regarding permanent and semi-permanent habitat.

Overall, in the Central Valley where habitat is both consistent and dynamic, tracking water in both near-real time and across many years provides the critical data to make confident water management decisions.

Conlisk, E, G Golet, MD Reynolds, BA Barbaree, K Sesser, K Byrd, S Veloz, ME. Reiter. 2021. Both real-time and long-term environmental data perform well in predicting shorebird distributions in managed habitat. *Ecological Applications*. volume: page numbers. Publication number 2302.