



Southern Colorado Plateau

INVENTORY & MONITORING NETWORK

Publication Brief - Birds

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Title: Breeding birds of high-elevation mixed-conifer forests have declined in national parks of the southwestern U.S. while lower-elevation species have increased, with responses to drought varying by habitat

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Full Article: [BioOne Digital Library](#)



Yellow-breasted Chat/
Mike Thompson
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Parks Included in this Brief: [Canyon de Chelly National Monument](#)

Legacy Data Overview: From 2007-2018 the [Southern Colorado Plateau Inventory and Monitoring Network](#) conducted bird surveys at six parks to determine status and trends in species composition and abundance as well as improve our understanding of breeding bird habitat relationships.

Management Implications

- After controlling for climate effects, only one of three riparian specialist species showed supported population trends, with Yellow Warbler increasing in density at Canyon de Chelly National Monument (CACH) over the timeseries. Across all modelled parks, seven of 14 generalist species modelled at CACH showed supported increases in density, and three showed supported declines.
- There was no support for an effect of drought on riparian specialist birds, though model uncertainty was high. Generalist birds breeding at CACH generally benefited (8 of 14 species) or were unaffected by spring and summer drought. This may be due to earlier, and more successful, breeding in years with earlier snowmelt.
- Two of three riparian specialist bird species showed higher breeding-season densities in years with earlier monsoon rainfall, and the same was true for seven of 14 generalist species breeding at CACH. However, four species showed negative effects of earlier monsoon rains on density. These differing effects may be best explained by where and when a species molts. Birds that undergo a stopover molt in the monsoon region of Mexico appear to benefit from earlier rains, while those that molt on the breeding grounds or further south are unaffected or negatively affected.
- At the park scale, there were three species with supported declines in density and seven species with supported increases. These changes may be due changes to the vegetation structure within the park after removal of invasive plants, as species which prefer forest edge (Blue-gray Gnatcatcher, Chipping Sparrow) and open, park-like woodland (Plumbeous Vireo, House Finch) showed increased densities. Wetter years later in the time series might also have allowed higher densities of some species to nest in nearby pinyon-juniper woodland (Ash-throated Flycatcher, Western Tanager) instead of in the riparian woodland.

Overview: [Climate change](#) is a major driver of bird population declines and is feared to be negatively affecting species abundances in the drought-stricken southwestern United States. Changes to the timing and amount of precipitation can not only result in direct mortality of breeding birds, but also negatively affect aspects of their habitat that are crucial for breeding. Complicating this picture is the fact that the [Colorado Plateau](#) contains a diversity of habitat types across a wide elevational span which may respond differently to climate change. In this work, we analyzed twelve years of bird monitoring data (2007-2018) from six national parks and monuments on the Colorado Plateau to obtain habitat- and park-specific, breeding-season population trends and understand how they are influenced by two important climate variables: spring and summer drought and the timing of the North American monsoon (an important regional pulse of rainfall from July-October). We examined population trends and climate effects

in four distinct habitat types that encompass the full elevational gradient: grassland-shrubland, riparian woodland, pinyon-juniper woodland, and mixed-conifer forest.



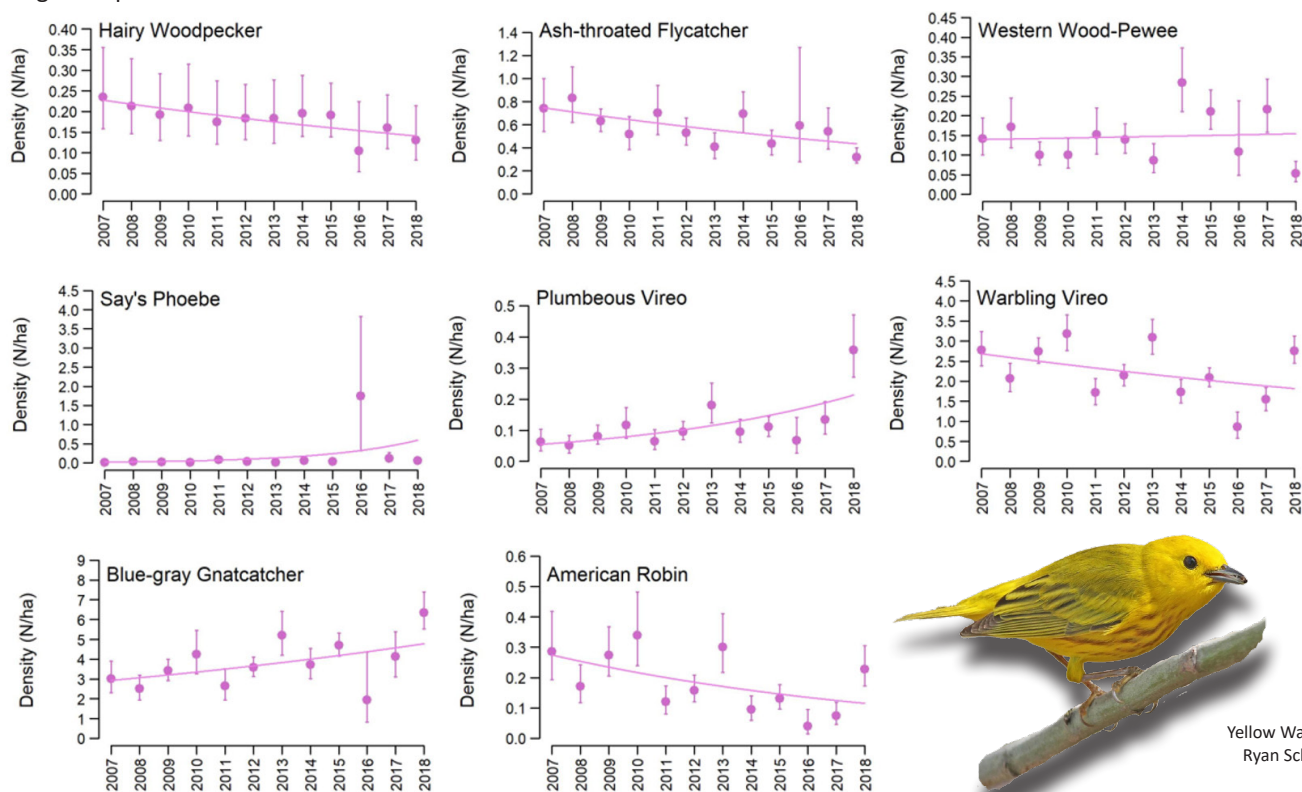
Lazuli Bunting/Doug Greenverg CC BY-NC

Overall, we modelled the trends in breeding-season densities of fifty bird species and compared them to reported trends for the Colorado Plateau as a whole. Trends in the parks correlated closely and significantly with those from the regional Breeding Bird Survey. We found more species with increasing population trends (18) than decreasing ones (13), though population trends were habitat specific. Low- and mid-elevation species of grasslands and pinyon-juniper woodlands tended to be increasing or showed no change, while high-elevation mixed-conifer forest species showed declines, likely due to negative effects of drought-related tree die-off and high-severity wildfire events.

Both drought and monsoon timing showed effects on breeding-season bird densities. The effects of drought were habitat-specific and changed over the elevational gradient. High-elevation mixed-conifer forest species benefited from spring and summer drought, likely because earlier snowmelt leads to earlier breeding and greater reproductive success. By contrast, middle-elevation species were relatively unaffected by drought, and low-elevation grassland-shrubland birds suffered negative effects. The effects of monsoon timing were also habitat-specific: grassland-shrubland species populations responded negatively to earlier (July and August) monsoon rainfall, while mixed-conifer bird populations preferred earlier monsoon rains. Species that undertake stopover molts in the monsoon region of northwestern Mexico also showed positive effects of earlier monsoons, regardless of habitat. These species may suffer from mistimed molts (phenotypic mismatch) in years when the monsoon arrives late.



Park-Specific Trends: Figure 1 scatterplots show annual density estimates for the 17 species that were analyzed for breeding-season population density from 2007-2018. These are species associated with riparian habitat in Canyon de Chelly National Monument (CACH). We only estimated densities of species with > 50 detections at a park over the timeseries. Please refer to figure caption for more detail.



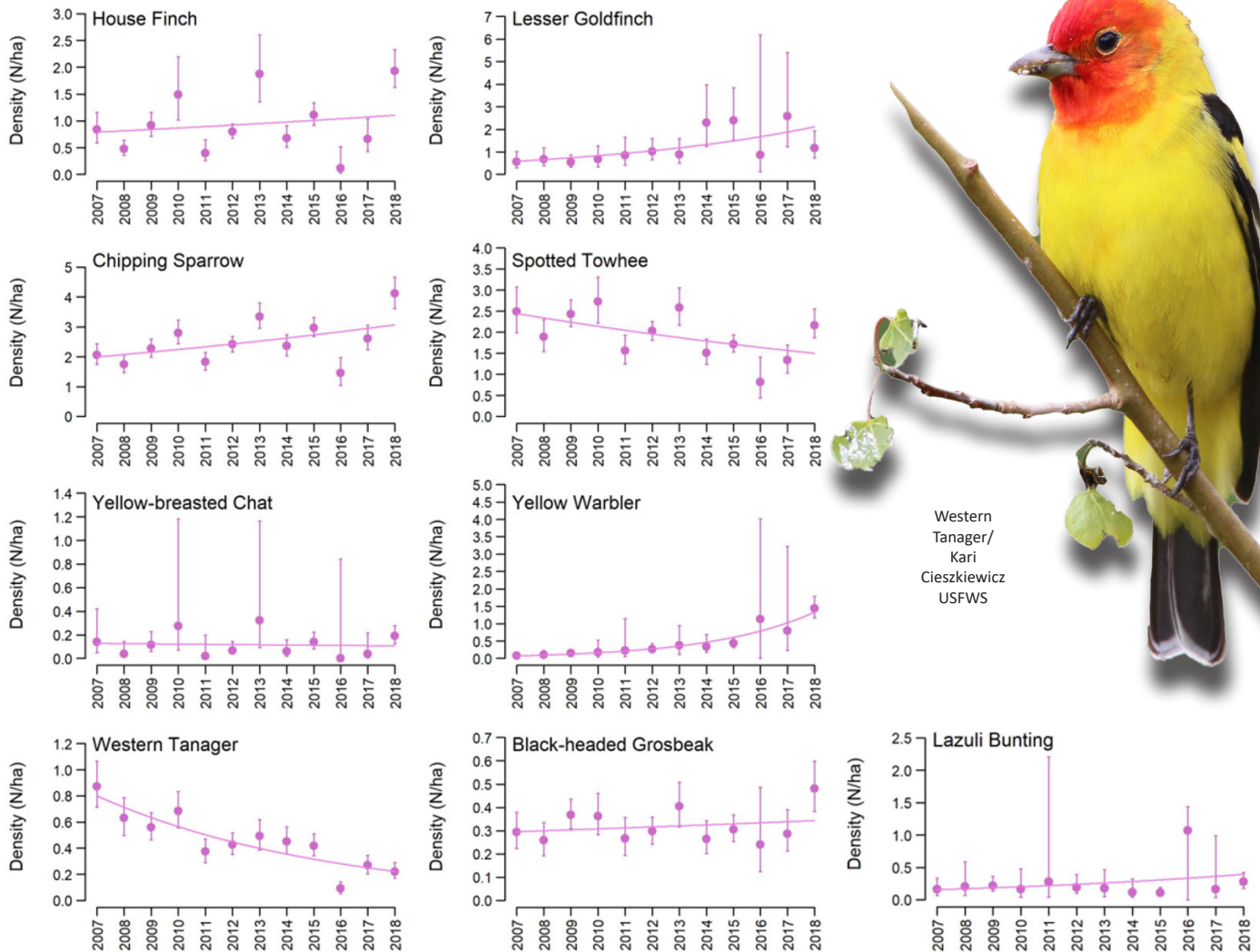


Figure 1. Yearly densities of grassland-shrubland bird species at Canyon de Chelly National Monument (CACH). The points and error bars represent the median and 95% Bayesian credible interval (a range with a 95% probability of containing the true value) of the estimated breeding-season density at each park in each year. Trend lines represent Poisson regressions of year against density. Species are listed in taxonomic order following the American Ornithological Society's 2023 checklist.

WHY IS THIS STUDY IMPORTANT? This study indicates that human-induced climate change in the Southwest is already impacting bird populations, marking the beginning of a new climate era. As we start to grasp how wildlife is being affected, long-term monitoring becomes increasingly crucial. It serves as an early warning system for the changes we're witnessing and helps us understand the underlying causes.

Canyon de Chelly National Monument/NPS

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