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THE EFFECT OF LOW PRECIPITATION ON PHYSICAL, CHEMICAL AND BIOLOGICAL PROPERTIES OF VERNAL POOLS IN SOUTHERN CALIFORNIA

Southern California is widely recognized as a global biodiversity hotspot, and also an area where natural habitats are at greatest risk. Precipitation-fed vernal pools in southern California are a major contributor to this diversity, as they support an unusually rich endemic flora and fauna. We compared 25 years of hydrology, soil and water chemistry data from vernal pools in San Diego County with a recent short-term study of pools in California's Central Valley. Vernal pools in both regions occur on the same soil type, with a clay-rich surface horizon over an iron- and silica-cemented duripan. The primary environmental differences between these sets of pools is climatic, with Central Valley pools receiving more than twice the average annual precipitation of San Diego and pools ponding more frequently. Because of the sparse and unpredictable precipitation in San Diego, it is difficult to identify reliable indirect indicators for characteristic vernal pool flora and fauna, particularly those that are accessible or visible during all years and seasons. This skewed, irregular ponding regime presents serious challenges for understanding key pool processes, and especially the rapid assessment of vernal pool functions. We examined potential rapid assessment variables (e.g., maximum potential pond depth, surface soil cracks and cobbles, landscape modifications) to determine which are reliably associated with the presence of pool-dependent species. Because many pool endemics have narrow habitat tolerances, relatively minor anthropogenic alterations to pool hydrology, networks and other physical-chemical conditions may impact their population sizes and stability.