WATER LEVEL VARIABILITY CONTROL OF INVASIVE PLANT COVER AND WATER BIRD POPULATIONS IN THE PALO VERDE WETLAND, COSTA RICA

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The global extent of wetlands is estimated to have declined sharply. The associated reduction in freshwater biodiversity is chiefly attributed to habitat degradation, pollution, flow regulation, water extraction, fishery overexploitation, alien species introductions as well as climate change. The Palo Verde National Park and Ramsar Site in Costa Rica is formally considered under threat. It is also an informative model system for investigating how changes in ecological integrity influence delivery of ecosystem services to different sectors of society and how these sectors can in turn help accelerate restoration of these vital biomes. Restoration objectives in Palo Verde are linked to the number of water birds harbored. Habitat suitability for several priority species is suggested to depend on water levels and vegetation density in the seasonal lagoons. However, the effectiveness of controlling invasive plants has not been studied relative to the inter-annual variability of these concurrent habitat needs. Also, the combined effects of invasive plants and water level at the landscape scale have yet to be used as dual predictors of abundance in water bird species distribution models. We used wetland stage measured at hydrological stations and invasive vegetation cover classified from drone-acquired imagery to develop spectral identification rules for satellite data of the wetland area connected to the Park. Overall water bird counts from citizen-science reports were extracted at sub-wetland and regional levels to account for population dynamics and species habitat use. The time series thus obtained were fed into a Random Forest model to first measure variable relative importance of wetland stage and extent on the accuracy of classification of water bird abundances for priority species at the sub-wetland level. This model will be incorporated into an assessment of ecosystem services for the area as the basis to evaluate the sensitivity of alternate restoration decisions to uncertainty.

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