

Hydroclimate Variability in the Duck Factory of North America

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Responsible for producing 50-80% of North American ducks, the Prairie Pothole Region (PPR) of the Northern Great Plains is an often overlooked, yet incredibly vital, ecosystem. From regulating groundwater hydrology to storing carbon to supporting a billion dollar hunting industry, these wetlands provide an abundance of ecosystem services to our society. However, the PPR has been subject to extreme environmental degradation, with over 85% of wetlands drained in Iowa and Minnesota alone. Understanding environmental variables and their impact on the region is therefore of great import to a diverse group of stakeholders and land managers. Prior work has shown that PPR wetlands are highly sensitive to climate variability, so we employed the latest data sets to explore the historical relationship between PPR wetlands, duck populations, and seasonal hydroclimate, and then projected future changes using the CMIP5 coupled-climate models. Previous studies have noted a strengthening in the precipitation gradient across the PPR over the past century, but we show that this is predominantly due to natural variability and therefore could reverse. Only in winter were large scale climate drivers found to have significant impacts, with El Niño conditions leading to decreased precipitation in the Northwest PPR and increased temperatures throughout the PPR. Due to climate change, precipitation is expected to increase in winter and spring, suggesting a positive influence on waterfowl habitat. However, this is largely canceled out by increased evapotranspiration from higher temperatures. Incorporating the calculations presented here will improve wetland hydrology models essential to guiding land managers in making complex conservation decisions.