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LANDSCAPE DEPENDENCE OF HYDROLOGIC PATTERNS IN LOWER COASTAL PLAIN DEPRESSION WETLANDS

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ABSTRACT

In the forested landscapes of the United States Atlantic Coastal Plain, depression wetlands contribute significantly to vegetation diversity and provide critical habitat for sensitive wetland animals such as pond-breeding amphibians. Duration and depth of water ponding are major determinants of depression vegetation and habitat suitability for wetland fauna. Therefore, understanding what properties regulate depression hydrology can provide a more informed basis for management. Within the Francis Marion National Forest on the South Carolina Lower Coastal Plain, we used a stratified study approach to characterize depression hydrologic patterns across physical landscape settings defined by soils and geomorphology. Nineteen wetlands were monitored biweekly for changes in pond stage over a two-year period spanning both wet and dry years. Depression hydrology was driven by variation in rainfall, as water levels changed similarly in response to climate seasonality and extreme rain events. However, individual wetlands did not exhibit a common hydroperiod pattern; rather, annual ponding ranged from semi-permanent to temporary. Inherent differences among wetlands were more apparent in the dry year and were partly predictable from depression landscape setting, soil type, and size. On loam and clay flats with fine-textured soils, wetlands had either seasonal or semi-permanent ponding, and hydroperiod was correlated with wetland size (area). On sandy ridges with coarse-textured soils, depression hydroperiods ranged from semi-permanent to temporary; the variation was not strictly a function of wetland size but was possibly related to interactions with basin morphology, topographic position, or local groundwater inputs. Plant community diversity and impacts of upland fire management were correlated with these landscape-dependent hydrologic patterns. Soil landscape settings may provide a useful framework for integrating upland and wetland management, and for predicting how depression hydrologic diversity may respond to future climate change.

KEYWORDS. depression wetland hydrology, Carolina bay hydrology

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