INFLUENCE OF HYDROLOGIC CONNECTIVITY ON THE NATURAL FLOW REGIME OF ARCHETYPAL WETLAND COMPLEXES

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Headwater wetlands and streams are connected by dynamic hydrologic flowpaths, and function as integrated hydrologic networks at the watershed scale. Headwater wetlands perform a variety of hydrologic lag, sink, and source functions, the latter including flow generation and thereby contributing to the natural flow regimes of downstream waters. These wetlandscapes have typical physical configurations, including the number, size, and spatial configuration of the headwater wetlands and flowpaths. Modifications to this physical configuration likely alters flow generation and therefore the natural flow regime and the related integrity of downstream waters. We investigated this within wetlandscapes in which depressional wetlands and streams are connected to one another and thereafter to downstream waters. We specifically investigated whether and to what degree changes to physical configuration affects flow to downstream waters. We adapted a one-dimensional flow routing model to simulate flow within an archetypal wetlandscape, using surface water dominated vernal pool wetlandscapes to characterize and parameterize the model. We varied the physical configuration in the model by adjusting the number and spatial arrangement of wetlands and flowpaths. Downstream hydrograph evaluation showed that altering the physical configurations in the archetypal wetlandscape strongly affected flow generation, and therefore the natural flow regimes of downstream waters. Moving wetlands downstream in the watershed increased magnitude of flows, and decreased frequency and duration of flows. Clustering wetlands closer together increased magnitude of flows produced relative to non-clustered wetlands. Combining individual wetland volumes into a singular larger wetland increased magnitude of flows produced relative to both clustered and non-clustered wetlands. The frequency and magnitude of flows to downstream waters were highly sensitive to changes in the model catchment area and amount of runoff entering the individual wetlands and flowpaths. These results have implications for the study and management of hydrologic flows and associated ecological functions within headwater wetland settings.

PRESENTER BIO: Leanne Stepchinski is a Ph.D. candidate in Ecohydrology at the University of South Florida. Ms. Stepchinski's research focuses on investigating the presence, nature, and influence of hydrological connectivity between headwater wetlands and the surrounding hydrological landscapes, including downgradient wetlands, streams, and other waters.