QUANTIFYING THE EFFECTS OF NATIONAL WATER MODEL PREDICTION ERROR ON NEARSHORE HYDRODYNAMIC FORECASTS IN SOUTHWEST FLORIDA

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Observed streamflow data serve many scientific and social purposes, including as a validation of predictive hydrological and ecological models. The majority of stream reaches in the continental United States (CONUS) remain ungauged, however, constraining the development of models and analyses that require streamflow data. In the absence of flow data, the National Water Model (NWM) provides simulated streamflow over the CONUS at ~2.7 million stream reaches. The NWM has been validated with data from ~7000 USGS gauges, but its predictive performance can vary widely based on geographic region and drainage area. Critically, the impact of poor NWM performance depends strongly on the intended use of flow predictions. In this work, we assess NWM predictions in the context of their impact on simulations of a Coupled Ocean Atmospheric Wave Sediment Transport (COAWST) model developed to forecast coastal hazards in southwest Florida, where harmful algae blooms (HABs) have become more frequent and severe in recent years. Medium-range (72-hour) NWM forecasts for stream reaches discharging to Charlotte Harbor were compared to corresponding USGS streamflow gauges, and model skill was assessed using the Nash-Sutcliffe Efficiency (NSE), Percent Bias (PBIAS), and Pearson's correlation coefficient (r) during wet and dry seasons. NSE ranged from 0.11 to 0.61, PBIAS ranged from -53.7 to 55.3, and r ranged from 0.60 to 0.86 for available stations. Streamflow predictions were generally more accurate for high-discharge rivers and during wet seasons. Using observed rather than NWM-simulated streamflows as inputs into the COAWST model of the Charlotte Harbor Estuary, yielded improved model goodness of fit, especially for salinity and flow stratification in the dry season, which can be critical for estuarine biogeochemistry and ecology. These results highlight the importance of developing improved freshwater flow predictions for both gauged and ungauged streams draining to the coast in support of coastal hazard modeling.

<u>PRESENTER BIO</u>: Nicholas Chin is an Environmental Engineering PhD student working in the Watershed Ecology Lab. His interests include using machine learning and mechanistic modeling to study coastal watersheds.