Identification of Roadways At Risk from Sea Level Rise
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ABSTRACT TEXT: The effects of sea level rise on transportation infrastructure in Florida’s coastal areas have already become apparent. Fair-weather flooding of streets during “king tides” has become a common occurrence in the City of Miami Beach. According to current projections, similar overtopping of state roadways by coastal flooding on mainland Miami-Dade County is decades away. However, long before the roadway surface is inundated the roadway base may be compromised by elevated groundwater levels. In 2016, Florida DOT District Six sought to identify which state roads were at risk of violating the Roadway Base Clearance standards set out in the FDOT Flexible Pavement Design Manual based on a projected future Design High Water (DHW) elevation of 1.0 feet NAVD88. A GIS-based screening analysis using recent 10-foot resolution LIDAR-derived Digital Elevation Model (DEM) data was conducted for all state roadways in the part of Miami-Dade County that fell within the zone of tidal influence east of the Salinity Control Line. A total of 41.1 miles (28.4%) of the 144.6 miles of state roads within this area were identified as being at-risk for not meeting the FDOT DHW base clearance criteria under the chosen future groundwater elevation scenario. In 2018, the same GIS screening technique was applied to US-1 through the Florida Keys, mainland Monroe County and southern Miami-Dade County using a 10-foot resolution LIDAR-derived DEM. The analysis found that 57.2 miles (41%) of the total 138.3 miles of US-1 in that region was at-risk of DHW base clearance issues, assuming a future groundwater elevation of 1.6 feet NAVD88. ArcGIS Online web maps were developed to allow exploration of the two scenarios, in addition to the static map series provided in the final reports. These preliminary results provided the FDOT with specific sections of roadway to analyze in greater detail with the aim of guiding future roadway planning and design decisions.
Spatiotemporal Quantification of Multibenefit Floodplain Restoration
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ABSTRACT TEXT: California's Sacramento-San Joaquin Delta is the water wheel of an elaborate engineered water transfer system, but is inherently challenged by poorly constructed levees, sea level rise, degraded water quality, and compromised ecosystems. Increasingly floodplain restoration and reconnection to the region’s rivers and streams, through the use of setback levees and levee breaching, is touted as a soft-path approach to lessening flood hazard risk, enhancing ecosystem functioning, improving water quality and recharging local aquifers. Recent advances in spatial data fusion of high spatiotemporal resolution multispectral imagery and UAV-borne LiDAR, combined with hydrodynamic modeling and hydrologic time series, have resulted in unique data outcomes that can help guide future floodplain restoration efforts in planning and practice. Using the Cosumnes-Mokelumne River corridor as a case study, this analysis showcases the power of spatiotemporal data fusion to quantify restoration benefits in multiple domains.

Web Application to Report Future Drought Streamflow Probabilities
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ABSTRACT TEXT: An interactive map application was developed using ArcMap and the Esri ArcGIS platform to display drought probabilities for selected Northeast region rivers and streams using equations that were recently published by Austin and Nelms. Maximum likelihood logistic regression was used to estimate summer month streamflow, drought probabilities as a function of streamflow from previous winter months, identifying probable summer month streamflow, 5 to 11 months before their occurrence. The application provides an interactive display of these projected drought probabilities. Current drought probabilities for selected Northeast region stream gages are calculated using a python script, and custom symbology developed in ArcMap is used to display three summer month streamflow drought probabilities for each stream gage. The application displays vulnerable river segments with high drought streamflow probabilities and allows the user to visualize and anticipate water availability during potentially critical low-flow periods. Water-resources managers can use the application to improve planning, decision-making, and management of water resources particularly during intervals when streamflow may be low.