MICROWATERSHED ANALYSIS AND MANAGEMENT: FLORIDA RESIDENTIAL LAKE CASE STUDIES

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There has been much attention in the last few decades to the damage to freshwater sources due to algal-bloom driven eutrophication, much of this focus has been on vectors driven by agricultural, industrial and stormwater drainage into the major watersheds, the everglades and emptying into gulf. However, there are more than 30,000 freshwater lakes in Florida alone that exist within isolated micro-watersheds.

The use of aerial and bathymetric drone technology can provide local communities with the data the required to manage the health of their local lakes. The Lake Cane Restoration Society (LCRS) has taken leadership in demonstrating to local communities how they can improve lake management and share their experiences between different communities in Florida.

Early in 2021, five Florida Lakes (Lake Cane, Lake Horseshoe, Like Minnie, Lake Hiawassee and Lake Chapman) took part in a case study to utilize drone technology to map the local micro-watershed topography to centimeter-level accuracy, map the lake bottom topography using single and dual-band sonar to capture both the hard bottom and softer silt bottom surfaces. The drone also collected temperature, turbidity, dissolved oxygen, and pH levels. Infrared measurements captured NDVI vegetive vigor and identified thermal anomalies for subsurface water migration from local septic systems or hot spring sources. Unlike prior state of the art this effort captured hundreds of data points to model a digital twin of the lakes.

Design deliverables included detailed DEM and contour maps for mapping watershed and identifying best active measures to control and filter runoff from impervious surfaces. Additional analytics were NDVI vigor maps and detailed HD photos for identification of high nutrient pathways from runoff and to support invasive species mapping. GIS was used to map spot measurements taken by the bathymetric drone that will be used to measure trend data with future data collection efforts.

PRESENTER BIO: Stephen Curless, System Analyst for CCI Engineering services, has been the led the data collection and analysis for the Florida Lake Case Study development in partnership with the LCRS. Stephen has over 20 years of experience in data analysis, simulation, imaging, GIS and database engineering.