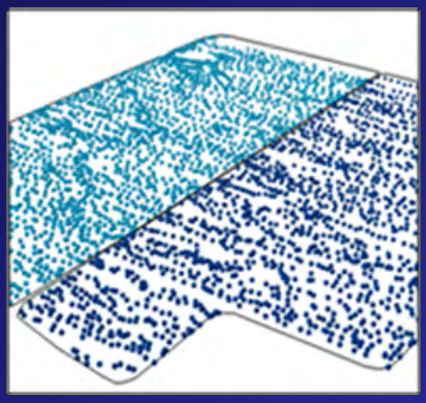
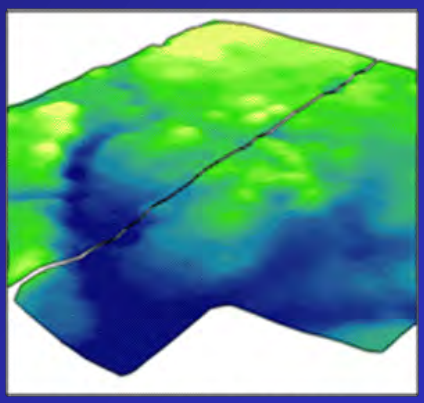
MDC Resource Science

Shallow Bathymetric Mapping of Floodplain Wetlands to Assist Management Decisions

Science Notes



Water Depth Waypoints



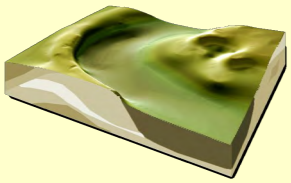
Digital Elevation Model

Cooperation Across Divisions

Estimated Flood Coverage and Depth

Shallow Bathymetric Mapping of Floodplain Wetlands to Assist Management Decisions

By Frank A. Nelson



SUMMARY

Wetlands, by nature, are relatively "flat" compared to the surrounding landscape; therefore, topographic information is often lacking. Topographic relief within these areas is often less than 3 feet. Identification of topographic features and heterogeneity within wetlands help understand how these areas function. This knowledge helps match management to ecological requirements.

Objective: Obtain topographic information in a timely, cost-effective manner to inform water management decisions.

Units 8 and 9 at Coon Island CA consist of bottomland hardwoods, which are managed for migratory and wintering waterfowl. Topographic surveys were not completed when the units were developed in 1993. Levees were placed across natural contours and have contributed to water management challenges. By knowing the elevations within the units, biologists can estimate the distribution and acreage of water as they flood or dewater allowing waterfowl and timber management decisions.

We recorded water depths at 4,200 GPS locations across both flooded timber units. Measurements were taken approximately every 25 m or if water depths changed more than 4 inches. These water depths were interpolated into a surface or digital elevation model (DEM) with ArcMap's Spatial Analyst extension. The DEM was verified by examining the location of the estimated water lines as water was being drawn down.

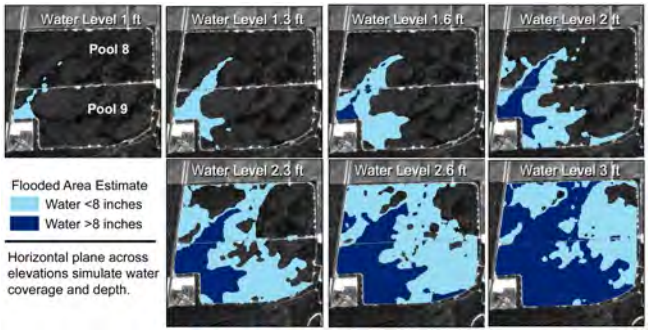


Figure 1. Simulated water coverage and depth across the DEM.

Photo stations were used to compare elevations and water coverage simulated in ArcMap and ArcScene. Additional water depths were collected if features, such as a narrow slough, had not been mapped in the original effort. These additional points increased the accuracy of the DEM.

Once the DEM was verified and updated, we simulated a flood at 4-inch increments across the surface (Figure 1). We calculated the area covered with water depths below and above 8 inches to estimate habitat available for foraging waterfowl. This information can be used to manage water levels for migratory waterfowl, potentially reduce pumping costs, and identify higher, drier locations for timber management. By using topographic data we can better link wetland ecology to management.

Implications: With a little bit planning and coordination with regional staff, much information can be collected in a short amount of time. Results of this effort can be insightful for future wetland management decisions.

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