Bathymetry of Eureka Slough

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INTRODUCTION

Figure 1: Locator Map of the Eureka Slough.

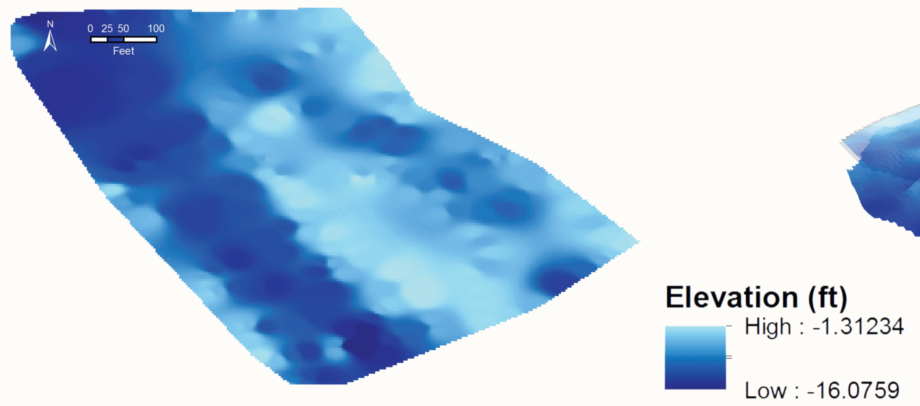
Bathymetric surveys are essential components to nautical navigations (Basu, 2002). Advances in remote sensing technology has allowed for the advent of Light Detection and Ranging (LIDAR). Bathymetric LIDAR typically makes precise measurements of sea floor and riverbed elevations surfaces (NOAA, 2015). The area of interest doesn't have readily available LIDAR data to analyze the features of the Eureka Slough located in Northern California. For this purpose a more accurate model was compiled through the use of a Hand Echosounder and a GPS unit. The results were visualized through the use of 3D modeling of the slough bathymetry. To adjust for accuracy surface modeling, interpolation methods were used to aid the surface visualization.

Figure 2: Eureka Slough, CA.

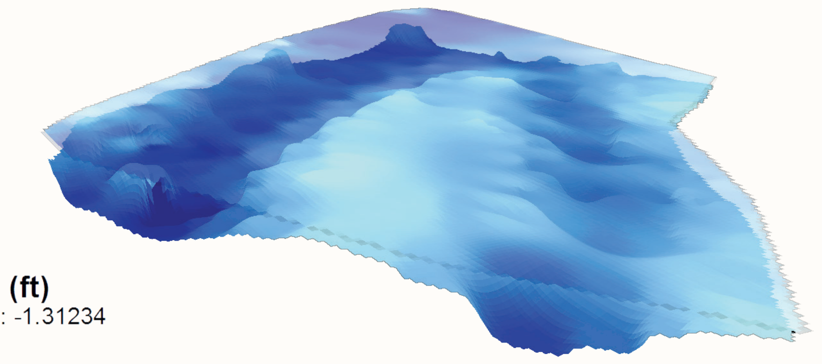
RESULTS

Inverse Distance Weigthed

2D Model

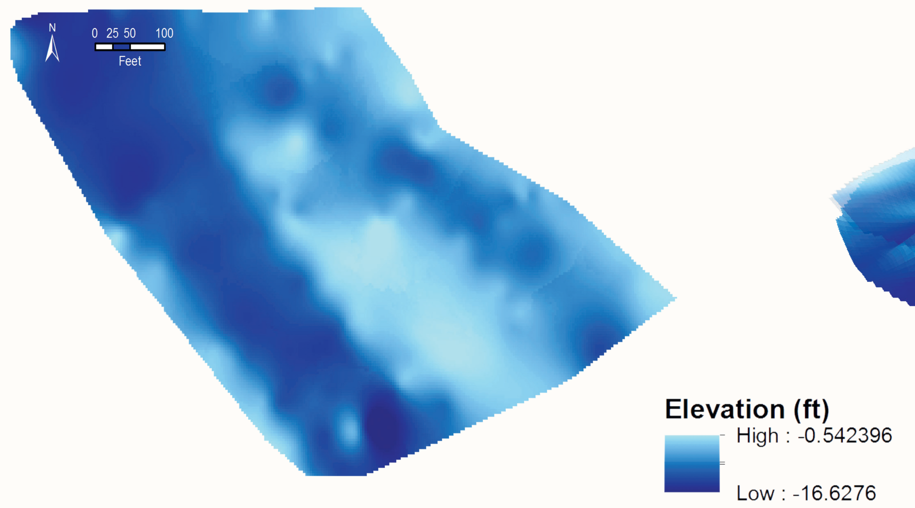


3D Model

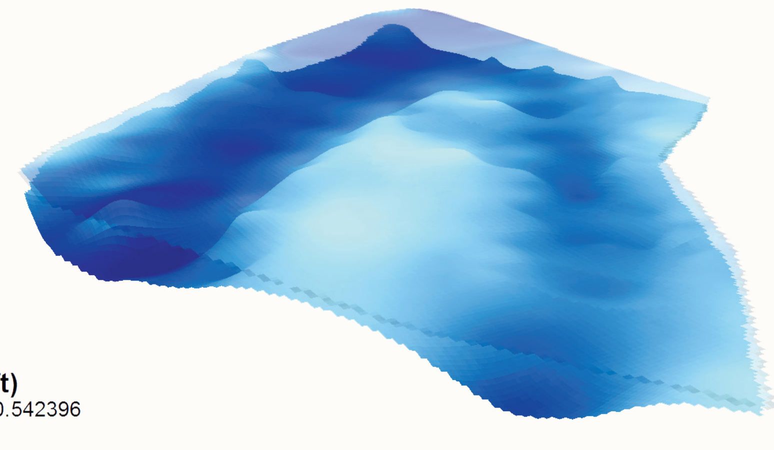


Spline

2D Model

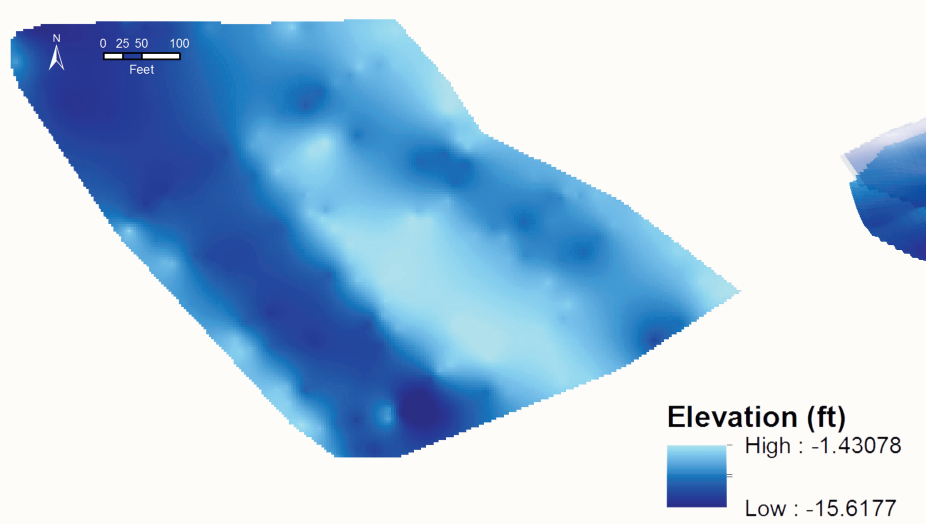


3D Model

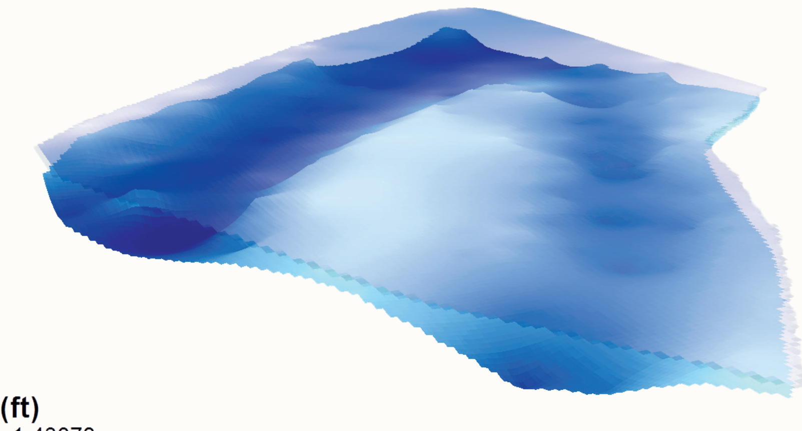


Kriging

2D Model



3D Model



METHODS

A canoe was rented from the Humboldt State University Center of Activities to access the slough. A Sonar unit was used to obtain the Z value of each sample point while the X and Y values were obtained with a GPS Unit. Based on the continuous nature of bathymetry, the interpolation method was used in order to estimate Z values across the slough. The surface values were interpolated through the use of 3 several interpolation techniques.

Inverse Distance Weigthed	
Neighborhood Type	Standard
Maximum Neighbors	20
Minimum Neighbors	5
Sector Type	1 sector
Angle	0
Major semiaxis	30
Minor Semi Axis	50
RMSE	1.9154

Table 1: Values for the IDW method.

pline	
Kernel Function	Spline with Tension
Kernel Parameter	0.129303609
Maximum Neighbors	16
Minimum Neighbors	1
Sector Type	1 sector
Angle	0
Major semiaxis	70
Minor Semi Axis	70
RMSE	1.4982

Table 2: Values for the Spline method.

Kriging	
Type	K-Bessel (Smoothing =0)
Root-Mean-Square Standardized	0.708995993889
Mean Standardized	0.00435641029
Average Standard Error	2.3875078786
Root-Mean-Square	1.6892

Table 3: Values for the Kriging method.

REFERENCES

Basu, A. & Shivani, M."Error detection of bathymetry data by visualization using GIS". ICES *Journal of Marine Science*, 59: 226–234. 2002