Date: 7/28/2023

Dewberry's Topobathymetric DEM Generation Process

NOAA expressed concerns that the delivered DEMs did not appear to extend to all classified bare earth points (Figure 1). Dewberry acknowledges the DEM does not extend to the very sparse points along the terminal edges of the topo-bathy ground coverage.

Dewberry's process for generating the final topobathymetric DEMs includes using LASTools ('blast2dem' function) to generate DEMs from the final classified lidar points in bare earth classes—class 2 for bare-earth ground, class 40 for submerged topography (bathymetry), and class 43 for submerged objects. At this step, every point classified as 2, 40, or 43 is used and represented in the interim DEM (Figure 2). A density grid is then generated to identify pixels intersecting the input lidar points (classes 2, 40, and 43). Pixels which are Null/NoData and do not intersect or contain an input lidar point are then identified and aggregated to build the void polygon, which is used to enforce voids/limit interpolation in the final DEMs. The initial void polygon then goes through a cleaning and smoothing process to eliminate jagged edges and close small holes within the void polygon.

It is during the smoothing and cleaning process that grounded lidar points, typically along the terminal edge of bathymetry, become aggregated within the final void polygon, resulting in their omission from the final topobathymetric DEMs (Figure 3). Typically, it is individual, non-aggregated pixels which are removed from the final DEMs.

Dewberry's process utilizes the 9 square meter threshold in both the minimum void size enforced in the final DEMs and as the threshold for eliminating small holes within void polygons. Dewberry's process does allow for manipulation and change of several parameters, including an internal gap measurement between points, the small hole fill within void polygon threshold, and the overall minimum void size threshold, all of which could be modified.

Dewberry's preference would be to continue utilizing the current parameters for the remaining IRL delivery blocks as this maintains consistency across this current project. If NOAA would like to discuss changes to this approach for upcoming/future projects or to see examples of varying parameters that will diverge from the typical 9 square meter threshold, Dewberry is happy to provide those and schedule a meeting to discuss.

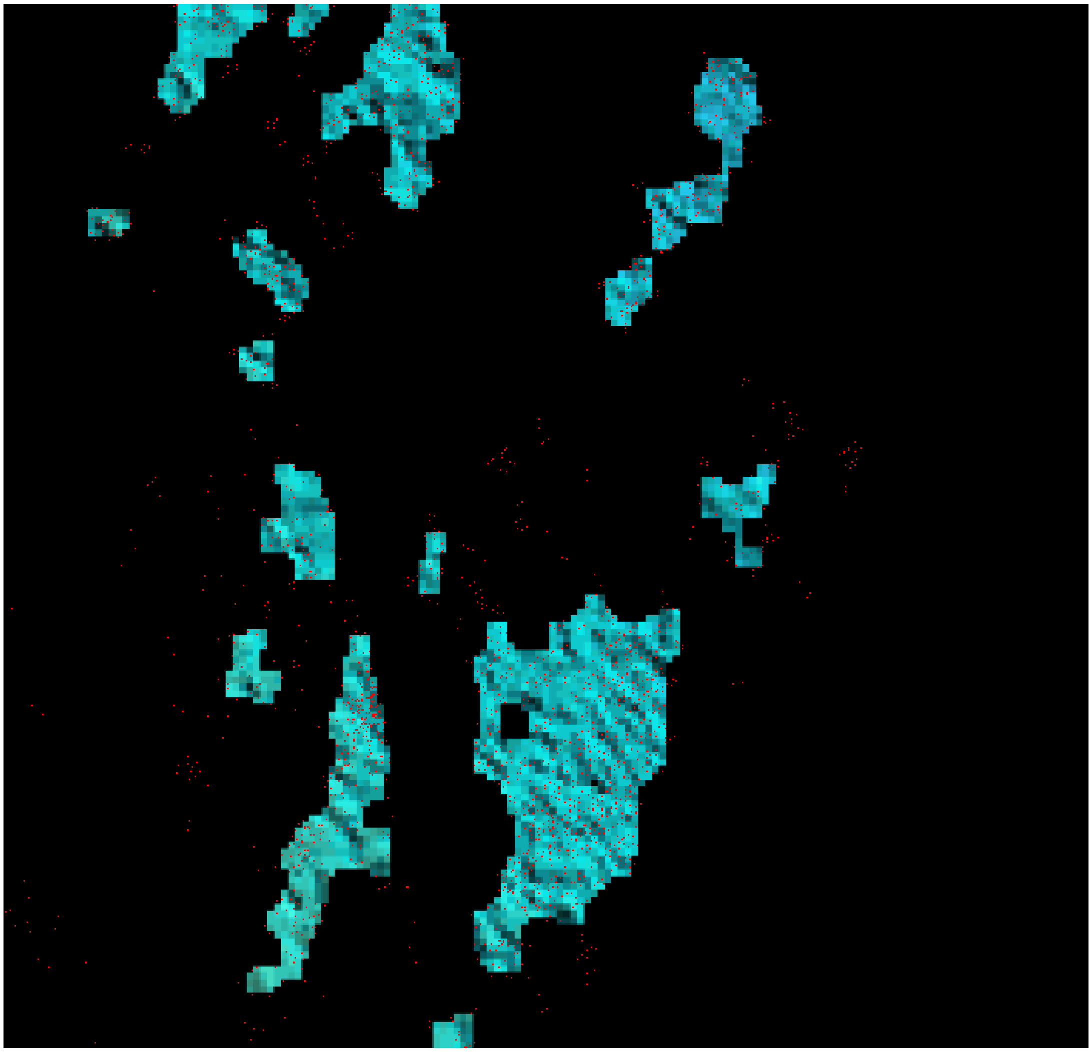

Figure 1 -NOAA's call that DEM does not appear to extend to all classified bare earth points.

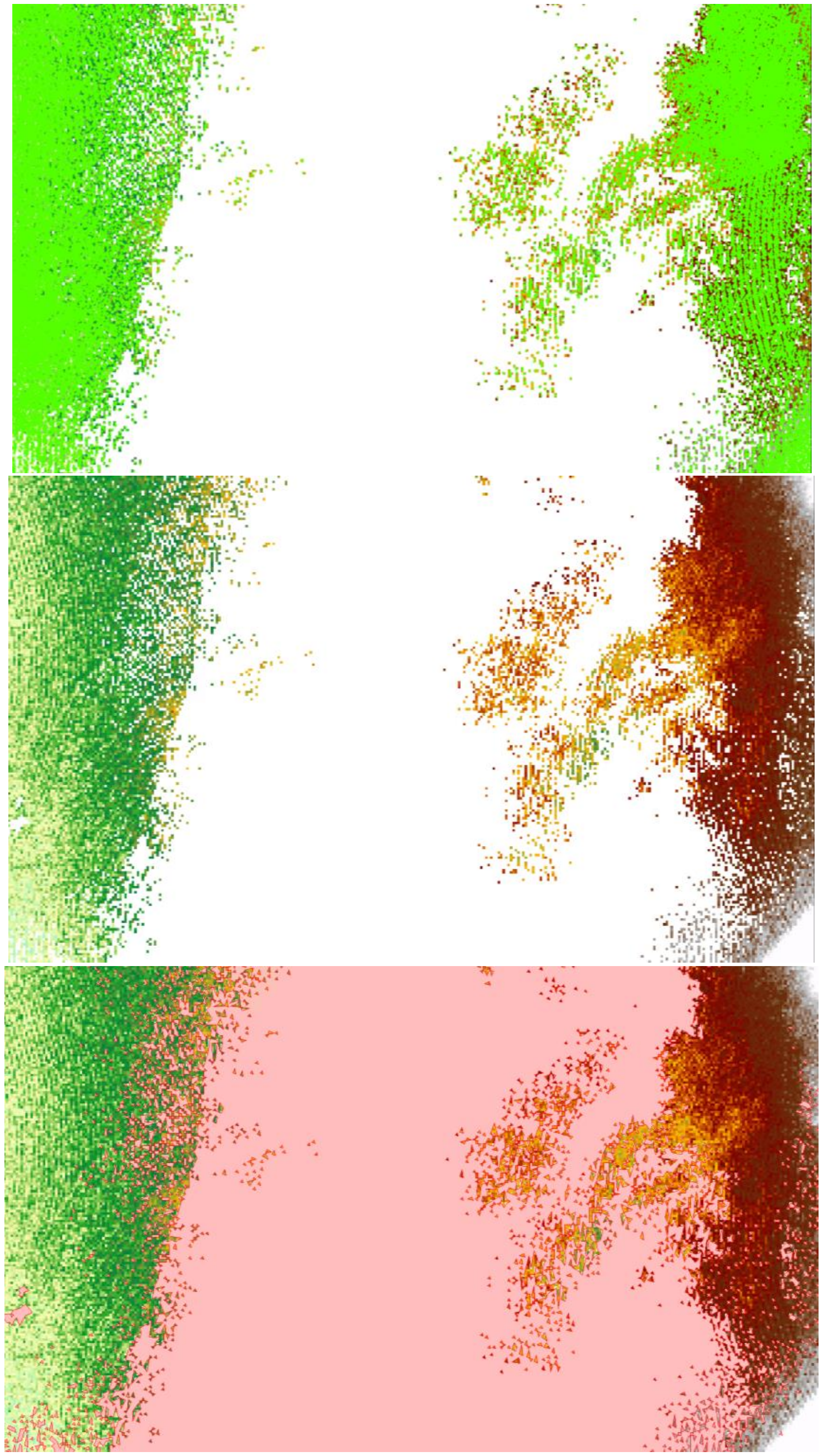

Figure 2-Top image shows our interim topobathymetric DEM, generated utilizing every single lidar point classified to classes, 2, 40, and 43, and overlaid with the grounded lidar points (shown all as green). Middle image shows the interim topobathymetric DEM, without the lidar points overlaid, highlighting individual pixels which are generated from those sparse/isolated grounded lidar points. Bottom image shows interim topobathymetric DEM, overlaid with the initial (non-cleaned and non-smoothed) void polygon (pink fill with red outline).

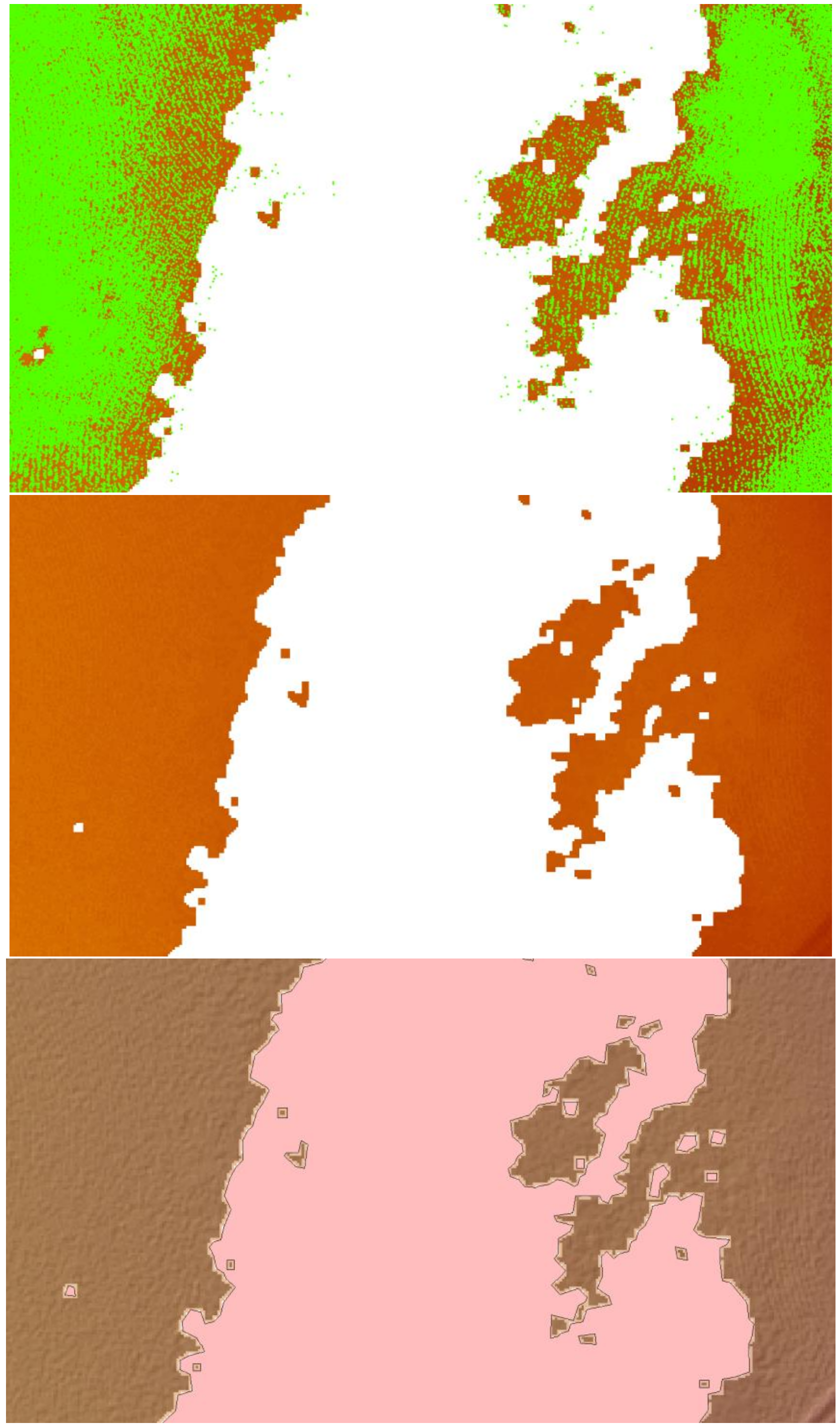

Figure 3-Top image shows our final/delivered topobathymetric DEM, overlaid with the grounded lidar points (class 2, 40, and 43 all shown as green)-lidar points along the terminal edge of bathymetry are now voided in the DEM due to their location within the cleaned and smoothed void polygon. Middle image shows the final/delivered topobathymetric DEM, without the lidar points overlaid, highlighting many of those individual pixels from the interim DEM are now voided. Bottom image shows final/delivered topobathymetric DEM, overlaid with the final (cleaned and smoothed) void polygon (pink fill with black outline).