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Sounding Better!

XYZ MANAGER Bordering

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WHY THE XYZ MANAGER?

This tool maintains a database of time-based soundings. Sounding data sets collected at a point in time are added periodically added to the master soundings list. The tool produces a 'final' XYZ file containing the most recently surveyed soundings over an area. This is, in effect, a mosaic of soundings based on date containing the most current survey data for any particular area covered by the output file.

IT'S ALL ABOUT BORDERS!

Border files are simply closed line loops or polygons defining an area of interest. One may use the HYPACK® BORDER EDITOR to easily create and modify such a feature. The border file may then be used to restrict the final XYZ file produced by the XYZ MANAGER to an area of interest. Soundings outside of the border are simply discarded from the output. In the absence of a border file, the output would be the same as if a border file covering the extents of every sounding in the database had been specified.

PROGRESSIVE CLIPPING

Each data set in the database, thus each sounding, has an associated border. It is the interaction of these borders which allows the mosaic to be produced.

The logic is fairly straightforward. All the soundings from the most current survey data will end up in the output except where the points are discarded when comparing against a restricting output border. Using the border associated with that data set, the next most current data set is then processed. Its soundings are compared against the borders of any data set already processed. If the sounding happens to fall within the border of one of these sets it is discarded from the final output. Why? Because we know a more recent survey at this point has been performed! This progressive clipping continues until all the data sets have been processed.

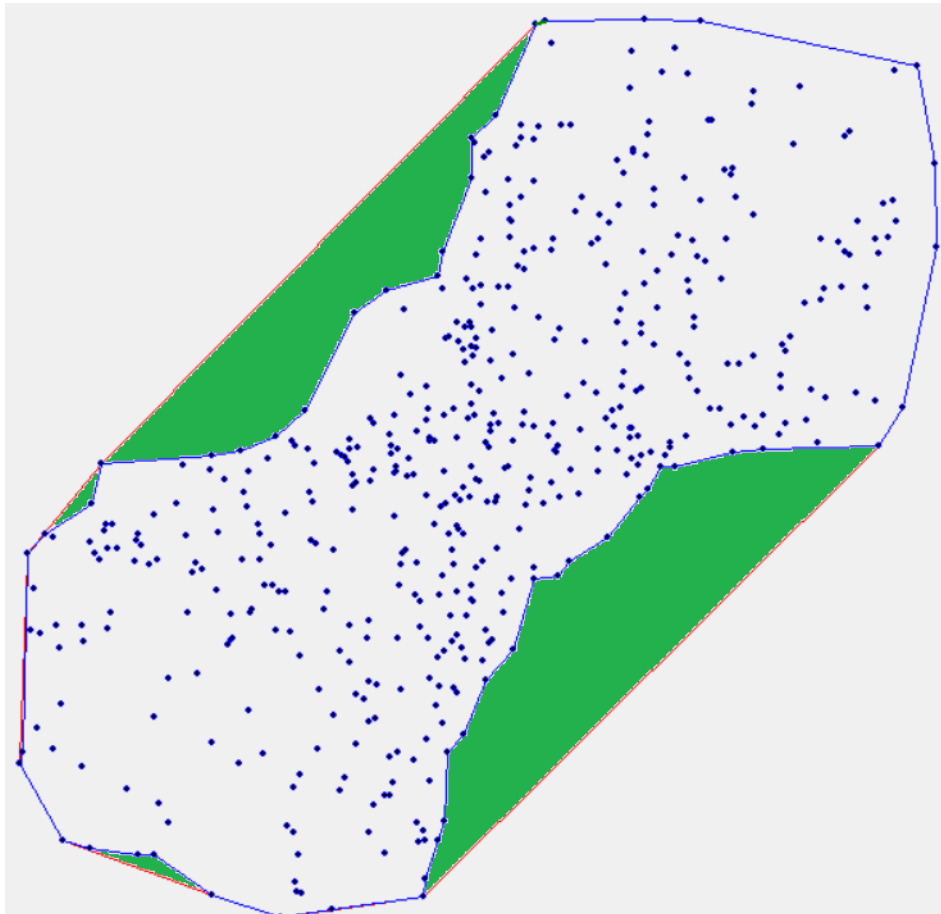
DATA SET BORDER

The output is thus strongly influenced by the border surrounding each data set, but what exactly is the true border for a given set of points? The answer is infinitely many (simply

imagine successively larger circles covering the same set of points). A more useful approach would be the use of a convex border. This is well defined mathematically as the smallest border enclosing all the points where any line drawn through the border will intersect only 2 edges. This is easy to calculate and is, in fact, what was used in the last version of the XYZ MANAGER. It has a problem, though, in that it can include a lot of 'empty' area. That is area which could be updated with actual survey data.

Figure 1 shows an example of where this is true:

FIGURE 1. *Sample Data Set*



- **Blue dots** are actual soundings.
- The **outermost border** (red) is the convex border.
- **Blue line** is a concave border, which more tightly fits the data set.
- **Green fill** shows the area that would be excluded by using a concave border vs a convex border.

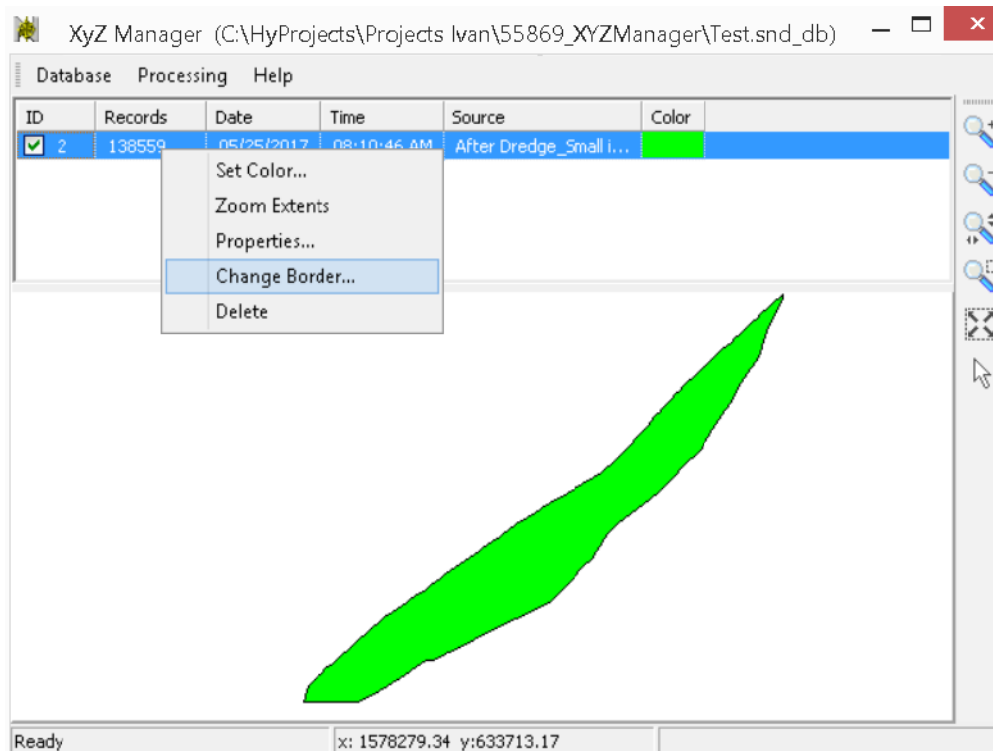
ALPHA SHAPES: CONCAVE BORDER TO THE RESCUE

An **Alpha Shape**, for our purposes in bordering an XYZ data set, is a concave border around the points which more intuitively represents the 'true shape' of the data. This intuitive shape is

often much tighter than the one generated by calculating the convex hull, and thus makes more area available around the data set. The result is a much tighter mosaic of soundings in the final output; think fewer and smaller gaps in the output.

In a manner similar to the 2016 XYZ MANAGER, the new bordering engine uses a Max (Maximum) Leg value for control during border generation. The default value is a Max Leg of 200 units, as it was in 2016.

FIGURE 2. Accessing the Right-click Menu



A new feature we have added is a visual border tool (Figure 3). Here, you may adjust the Max Leg to visually see how the border relates to the actual survey soundings. The value used to generate the border you're comfortable with will be stored in the database and used for border creation the next time the database is accessed.

1. Right-click on a data set and select the Change Border... menu item.
2. Simply adjust the Max Leg value and click [Update Concave Border].
3. When you're satisfied, click [OK] to save changes in the database.

FIGURE 3. *The Visual Bordering Tool in XYZ MANAGER—an Easy Tool to Adjust a Data Set Border*

