



VDatum Coverage Maps – How to Create Them

By Joe Burnett

As much as I'd like to create a Coverage Map for each of the 37 VDatum zones in HYPACK®, knowing the correct Horizontal Datum (UTM, State Plane NAD27 or NAD 83) and Units (US Survey Feet, Meters, etc.) that you would need them in, would cause me to have to create approximately 200 or more maps.

So... I am going to give you the tools to create them, by a couple of different methods.

CONFIGURING YOUR GEODETIC PARAMETERS USING VDATUM

You have to understand that each VDatum zone covers only a limited area, mostly along the shoreline of the coastal waters. They do come inland for a short distance, but only to the shoreline. If you are sitting outside of the VDatum zone, even by just a few feet, the VDatum values will not be applied, nor will HYPACK® calculate a tide correction value, even though a VDatum Zone has been selected in the GEODETIC PARAMETERS program.

FIGURE 1. VDatum Settings in the GEODETIC PARAMETERS Program

In the GEODETIC PARAMETERS window, do the following:

1. **Select your Grid, Zone, and Units.**
2. **Under RTK Tide Calculation, select 'N from Geoid Model, K from VDatum'.**
3. **Select your Geoid Model, VDatum Zone, and Chart Datum.**
4. **Click [OK] to close GEODETIC PARAMETERS.**

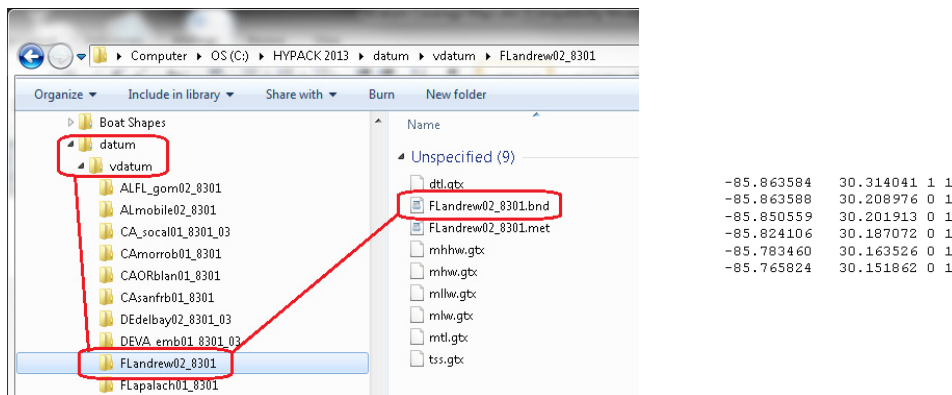
CREATION METHOD #1 - IMPORTING THE BND FILE

This is the quickest and lowest resolution of all of the methods, but if you need something in a hurry, this will work.

The *.BND file resides in the directory for each VDatum zone. This file contains a list of Latitude/Longitude values that *roughly* define the VDatum area.

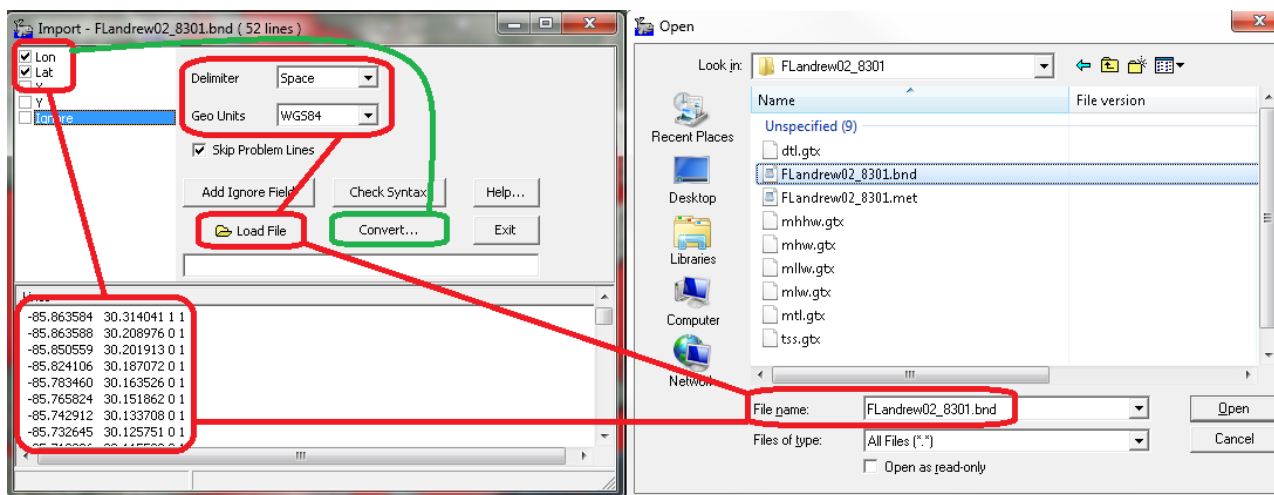
In this example, I am going to use the BND file for the **Florida – St Andrew Bay...** VDatum zone.

FIGURE 2. The VDatum BND File—Where to Find It (left) and a Sample File (right)



1. Use the Import function in the BORDER EDITOR program to import the *.BND file. Select FILE-IMPORT and enter the following settings:
 - Set the Delimiter to Space.
 - Set the Geo Units to WGS84.
 - Select Lon and Lat in the variable list then click and drag them to the top of the list in the order shown. in Figure 3.

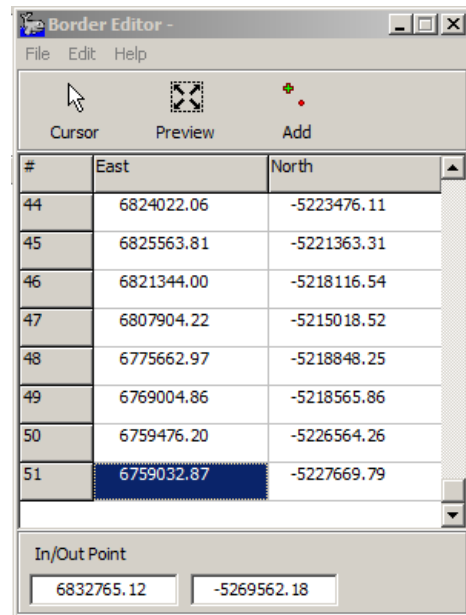
FIGURE 3. Importing the BND File to the BORDER EDITOR



2. Click [Load File] and select your *.BND file. (Change the Files of Type field to *.*.)

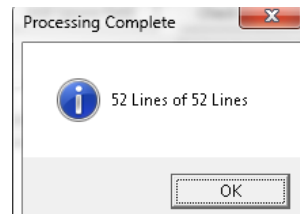
3. **Click [Convert]** A message window will appear to report the number of points converted.
4. **Click [OK]** to close the message window.
5. **Click [Exit]** to close the Import window.

FIGURE 4. The BND File Points in the BORDER EDITOR



#	East	North
44	6824022.06	-5223476.11
45	6825563.81	-5221363.31
46	6821344.00	-5218116.54
47	6807904.22	-5215018.52
48	6775662.97	-5218848.25
49	6769004.86	-5218565.86
50	6759476.20	-5226564.26
51	6759032.87	-5227669.79

In/Out Point
 6832765.12 -5269562.18



6. **Click [Preview]**. On the HYPACK® Area Map, you will now see the 'rough' boundary of this VDatum Zone.

FIGURE 5. The VDatum Zone Boundary



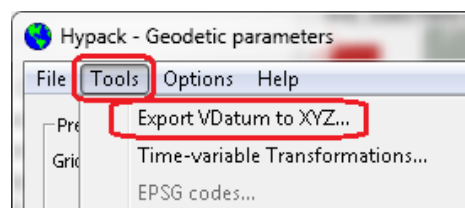
7. **Save your border file.** Select FILE-SAVE AS and enter the name of the VDatum zone. (In this example, we use 'St Andrews Bay Datum.brd'.)

Note: IMPORTANT! This is a 'rough' boundary of the VDatum zone. The actual boundary will be along the shoreline that falls inside this border file as we will see in the next setup.

CREATION METHOD # 2

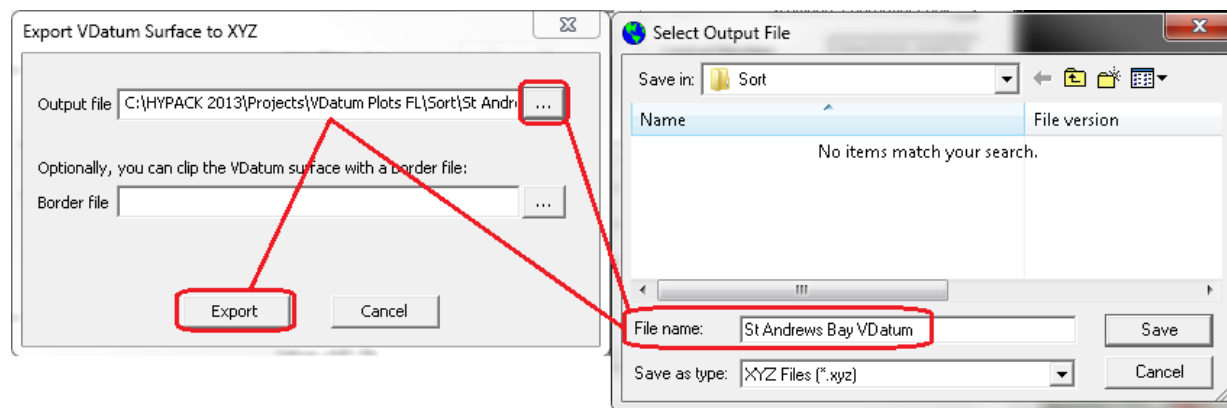
In this method, I am going to use a new tool in the GEODETIC PARAMETERS program in HYPACK® 2013.

The '**Export VDatum to XYZ...**' tool takes the data from the *.GTX files and converts them to an (ASCII) XYZ file. It is important to select the correct Chart Datum (Mean Lower Low Water, etc.) if you want to see this XYZ file or use it to verify the VDatum is correctly shifting the WGS84 Vertical Height.



1. In the GEODETIC PARAMETERS menu, select **TOOLS-EXPORT VDATUM TO XYZ**.

FIGURE 6. Exporting the VDatum to XYZ in GEODETIC PARAMTERS



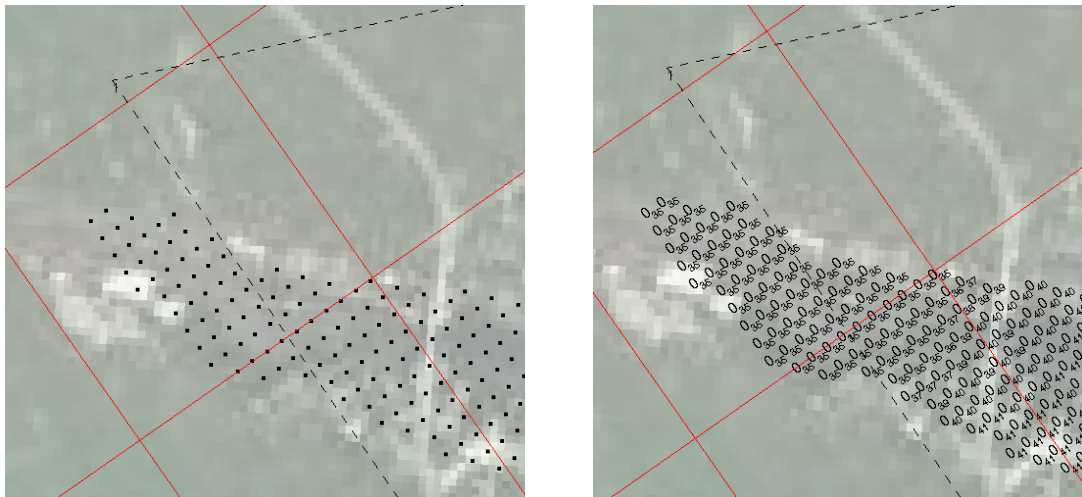
2. Click on the button for the 'Output file'.
3. Select the Directory and Enter File Name and click [Save].
4. Click [Export]. The XYZ file is now created in your selected hard drive location, and can be displayed on the HYPACK® Area Map.

The exact boundary limits of the VDatum zone can now be seen. The XYZ points can be displayed however you wish—as pixels or numeric depths.

FIGURE 7. The Output XYZ File Displayed in HYPACK®



FIGURE 8. Displaying the VDatum XYZ File As Pixels (left) and As Chart Datum Values: (right)



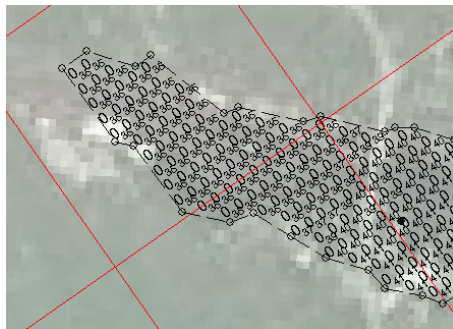
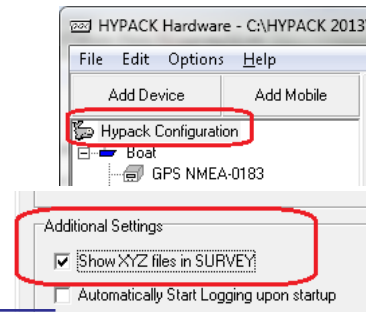
DISPLAYING THE XYZ VDATUM DATA IN SURVEY

Now, the question arises: “How do I display this XYZ file in the SURVEY program, so that I can see the VDatum zone boundaries?”.

OPTION # 1: HYPACK® HARDWARE CONFIGURATION

1. In HYPACK® HARDWARE, highlight 'HYPACK Configuration' in the device tree to display the System tab.
2. Under the 'Additional Settings' area, select 'Show XYZ files in SURVEY'

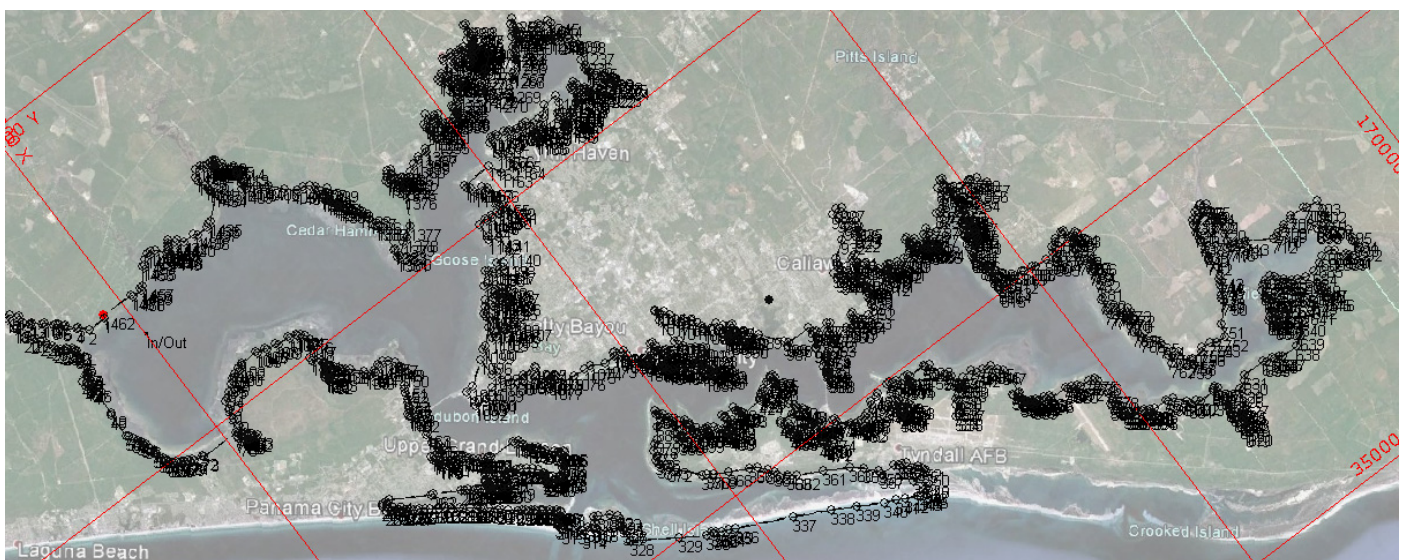
FIGURE 9. Displaying XYZ Files in SURVEY



OPTION # 2: MANUAL DIGITIZING IN THE BORDER EDITOR

With the VDatum XYZ on the HYPACK® Area Map as your guide, use the cursor in the BORDER EDITOR to very meticulously 'digitize' the boundary of the VDatum zone. This Border file may be brought in as a Background file in SURVEY, but it could prove difficult to see.

FIGURE 10. Displaying the BRD File in SURVEY



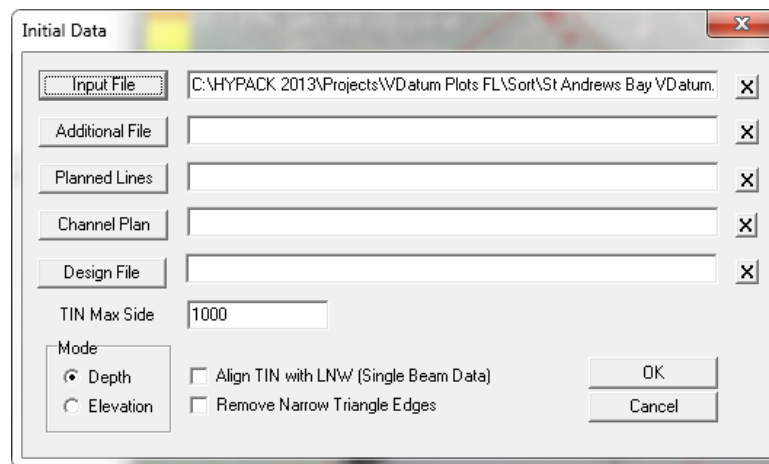
CREATION METHOD # 3: TIN THE XYZ

Using this method, you must be aware that the TIN Max Leg distance could triangulate across areas that it shouldn't. If you have to set the TIN Max Leg to a distance that will do this, use the TIN EDITOR to remove the extra triangles.

Tip: You can do this easily using the border file from Creation Method #2 to clip the TIN model. Either way, you will have some work to do.

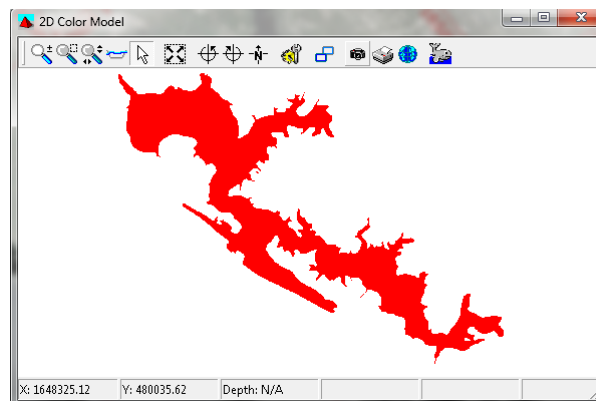
1. **Load the XYZ file into the TIN MODEL program.** (Notice the large TIN Max Side necessary to get a complete TIN.)

FIGURE 11. Loading the VDatum XYZ File into the TIN MODEL Program



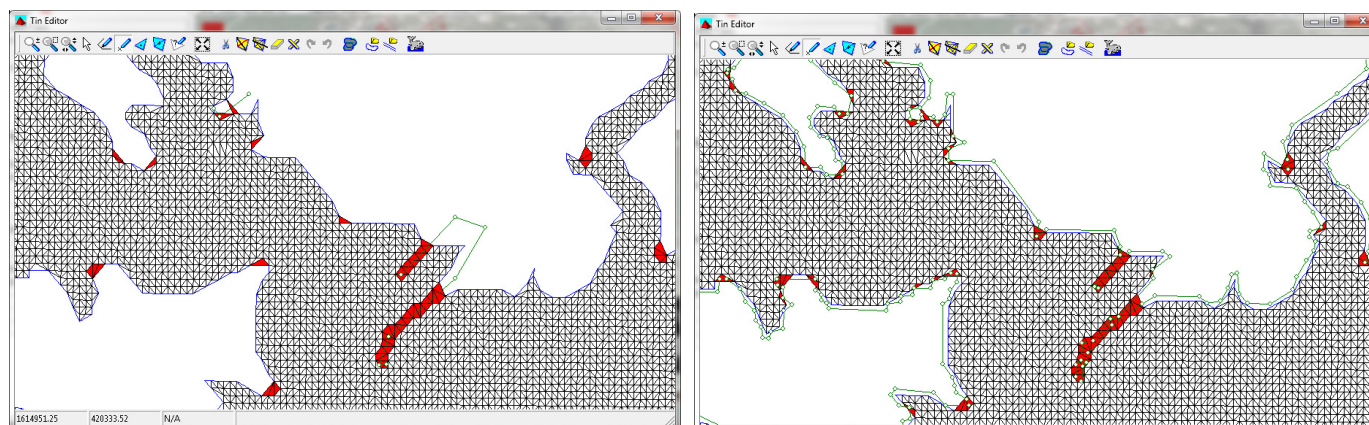
2. **Select 2D MODELS-FILL AREA and verify there are no holes in the TIN.**

FIGURE 12. Inspecting your TIN Model for Completeness



3. **Use the TIN EDITOR to remove triangles generated across areas not covered by the VDatum.**
 - a. **Select MODIFY-EDIT TIN.**
 - b. **Select the triangles to be removed** using either the Manual Editing Tools  or the Border File .

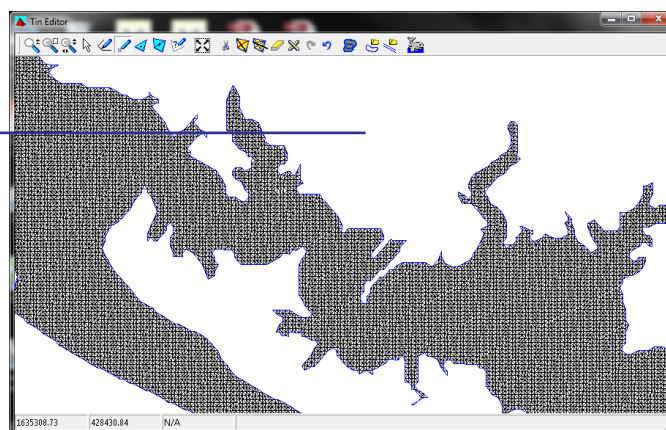
FIGURE 13. *Clipping the TIN with Manual Tools (left) or BRD File (right)—Before*



- c. **Remove the unwanted triangles.** 
- d. **Close the TIN EDITOR.**
4. **Regenerate your 2D Fill display.**
(Select 2D MODELS-FILL AREA.)

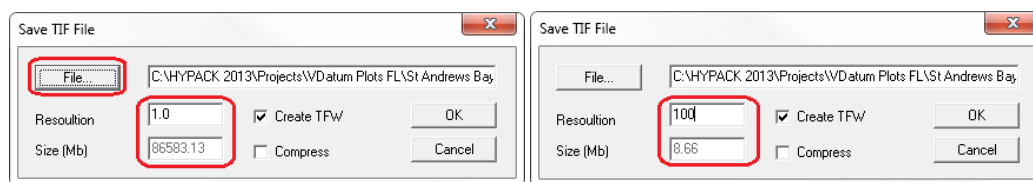
FIGURE 14. *The Clipped TIN*

5. **Export the display to a geo-referenced TIF chart.**
 - a. **Click the Create Geo Tiff icon.** 
 - b. **Click [File...] and enter the path and name of the TIF file.**



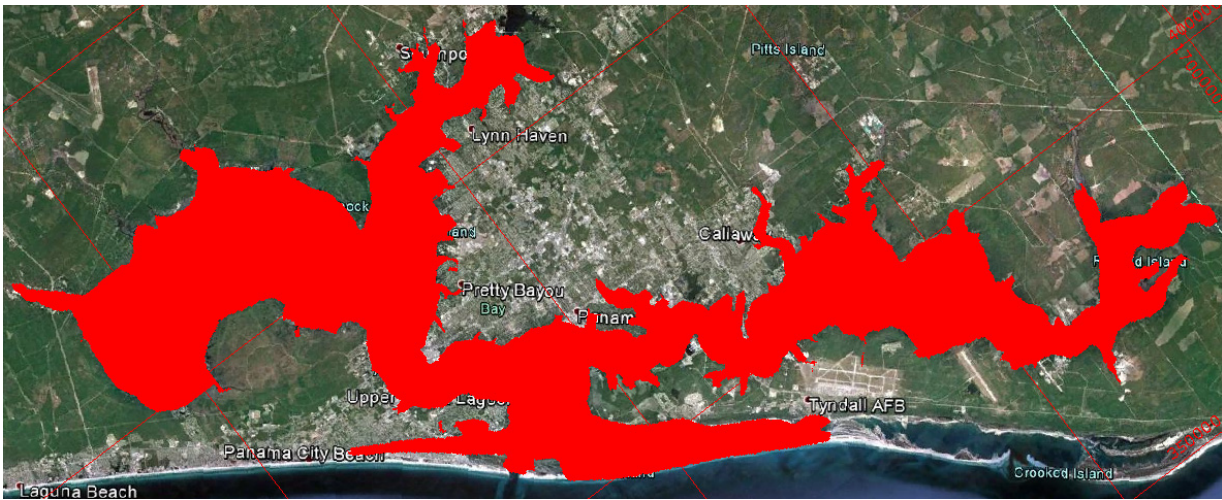
Note: Pay close attention to the Resolution and Size. Reduce the resolution (increase the value) until the file size is manageable and won't be taxing on the SURVEY program.

FIGURE 15. *Saving your Geo-TIF—Resolution of 1 (left) vs 100 (right)*



6. **Display the Chart in SURVEY (Figure 16).**

FIGURE 16. *Displaying the Geo-TIF*



CUSTOMIZING THE VDATUM GEO-TIF DISPLAY

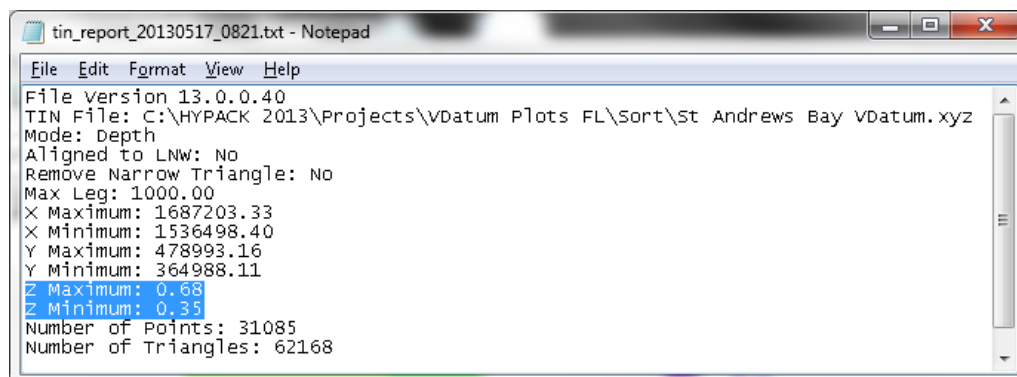
CUSTOM COLORS

You can create a TIF that is one solid color (Figure 16), if you are only interested in showing the area that the VDatum Zone covers, but you can also change the colors that are shown in the TIF you create. This can be especially useful if you want to know where the VDatum conversion makes significant shifts.

Note: If you decide to create colored TIFs, remember that you will need to create one for each of the available Chart Datums.

1. **In TIN MODEL, view the range of the Z-values for the VDatum zone.** Select EXPORT-VIEW REPORT.

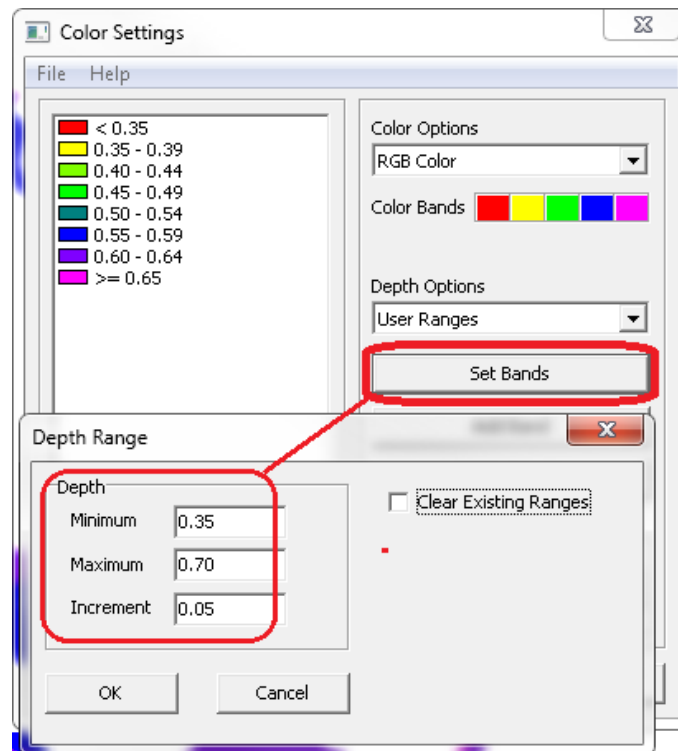
FIGURE 17. *Checking the Range of Z-values.*



2. **Set the TIN Colors.**

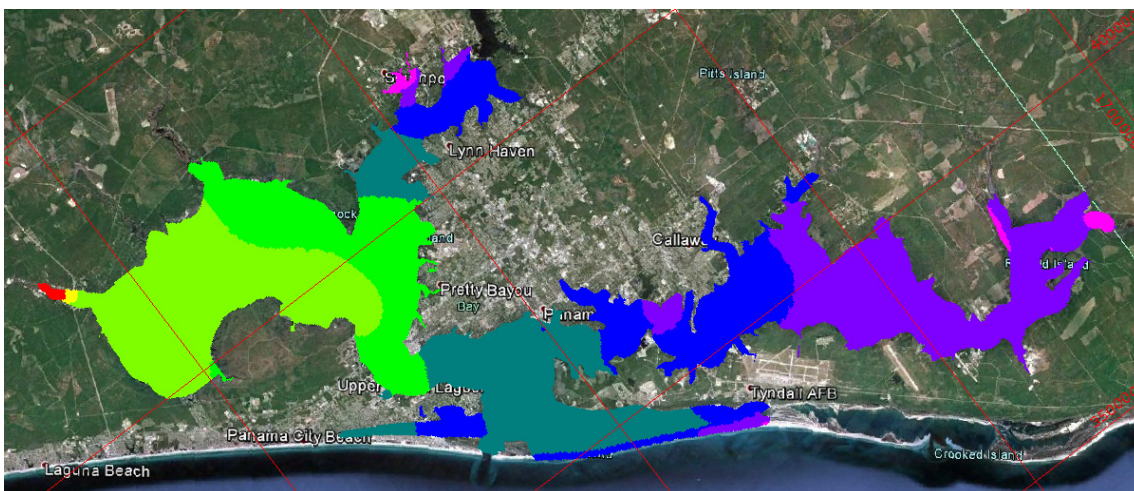
- a. **Open the Colors dialog in the TIN MODEL.** 
- b. **Set the Depth Bands according to the Z-Min and Z-Max values.**
- c. **Set the Increment to a notable value.**

FIGURE 18. Setting the TIN Colors



3. **Regenerate your geo-TIF from the 2D Color Fill display.**

FIGURE 19. The VDatum Geo-TIF Displayed in HYPACK®



TRANSPARENCY

You can change the Transparency of the geo-TIF display in HYPACK® to allow simultaneous viewing of other Map display items with the VDatum geo-TIF.

1. **Right-click on the geo-TIF file name in the Background Files list and select Transparency.**
2. **Use the slider to set the transparency that you want.** This will 'lighten' the geo-TIF in the SURVEY program Map Window.

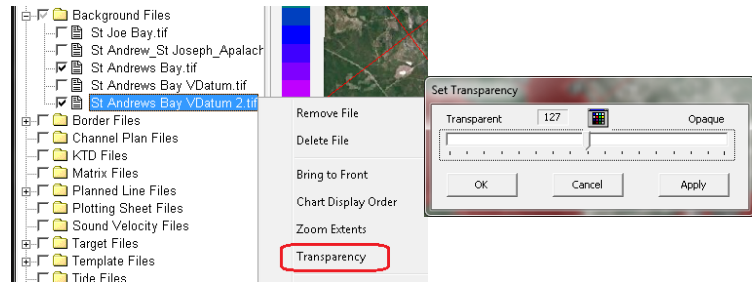


FIGURE 20. Transparent Solid Color (left), Transparent Color-coded Coverage (right)



If there are areas that are not covered by a VDatum zone, you can contact NOAA to find out if and when they are planning on expanding the coverage areas. Otherwise, you must create your own **KTD** file in HYPACK®.