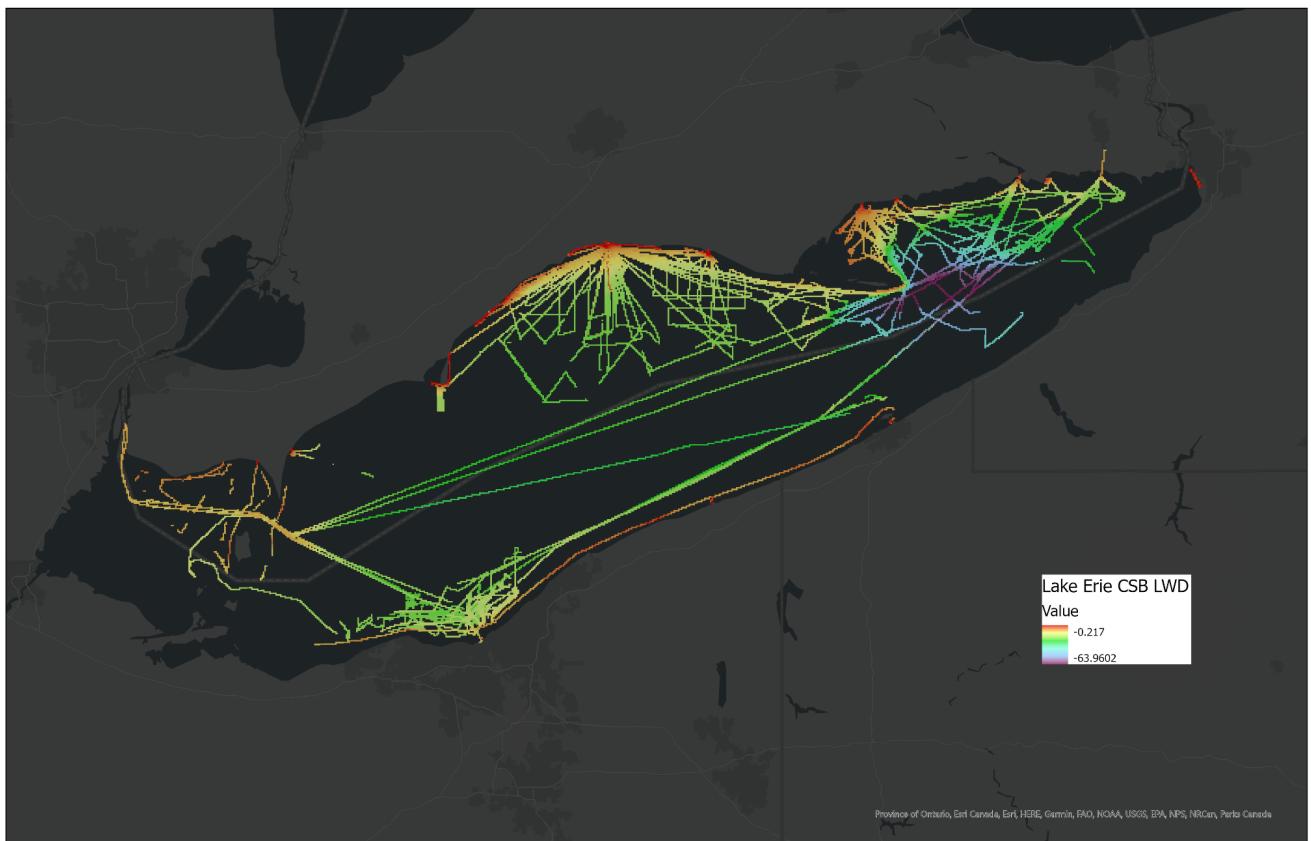


SOP for using the Pydro CSB Processing Tool

Correcting for tides and transducer drafts of crowdsourced bathymetry data from IHO's Data Centre for Digital Bathymetry



Contact Anthony Klemm anthony.r.klemm@noaa.gov for any questions regarding this tool

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Revision Date:

Procedure Number: **TBD**

Approved: **TBD**

1. Overview and Scope

This tool processes crowdsourced bathymetry from the International Hydrographic Organization's Data Centre for Digital Bathymetry (IHO DCDB). The input format of the data it supports at this time is only CSV data from their CSB point store, and not the original json data files. It corrects for water levels/tides and data-derived vessel transducer offset values. *Note: This is the first iteration of this tool, and is intended to provide users reconnaissance information from existing CSB data.*

The screenshot shows a window titled "CSB Processing Input Files". It contains five input fields with labels and browse buttons:

- 1. Title of CSB Data (do not use spaces between words) [Input Field] [Browse Button]
- 2. Raw CSB data in *.csv format [Input Field] [Browse Button]
- 3a. Use Automated BlueTopo Download... or, [Input Field] [Browse Button]
- 3b. Input BAG or GeoTiff file for comparison bathymetry [Input Field] [Browse Button]
- 4. Tide Zone file in *.shp format [Input Field] [Browse Button]
- 5. Specify output folder [Input Field] [Browse Button]

At the bottom right is a "Process" button.

2. Inputs and Outputs

Inputs:

1. Raw CSB data from the IHO DCDB website in CSV (point store) format
2. Intersecting reference bathymetry (BAG or GeoTiff), if the auto-download option of BlueTopo tiles option is not selected or available
3. Tide Zone polygon shapefile

Outputs:

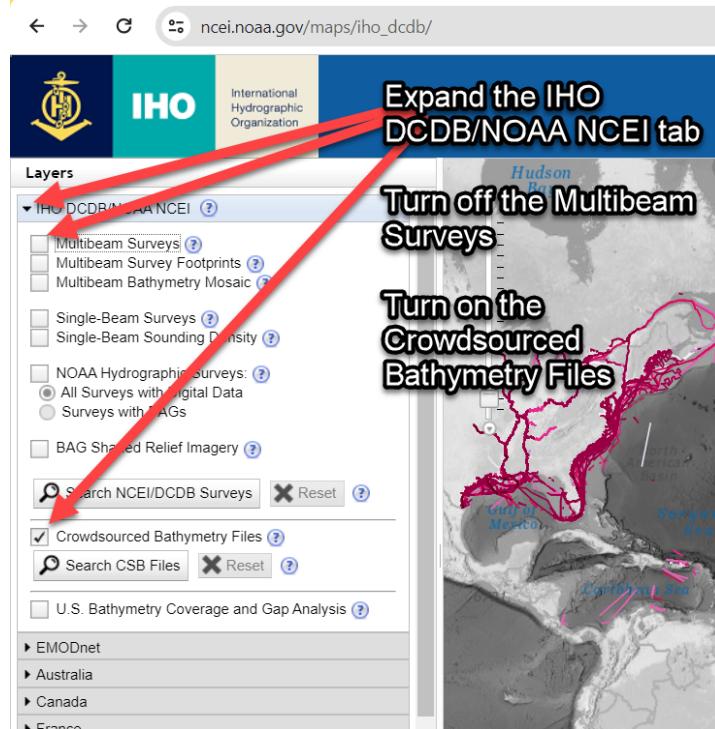
1. Shapefile of corrected CSB points
2. Quick-look low-resolution raster (geotiff) of CSB points

3. Procedure

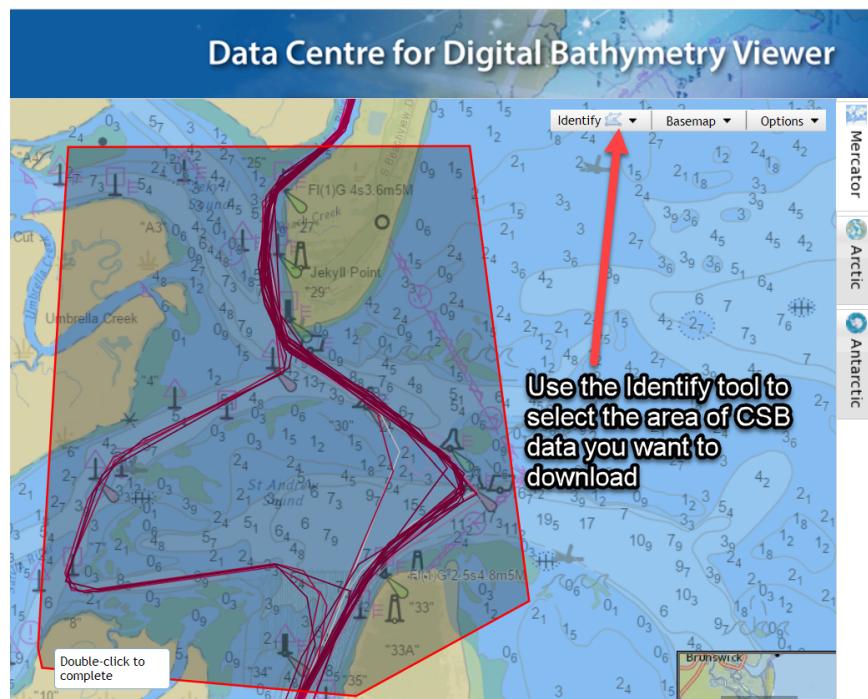
- I. Download CSB Data of your interested area from the IHO DCDB

<https://www.ncei.noaa.gov/maps/ihodcdb/>

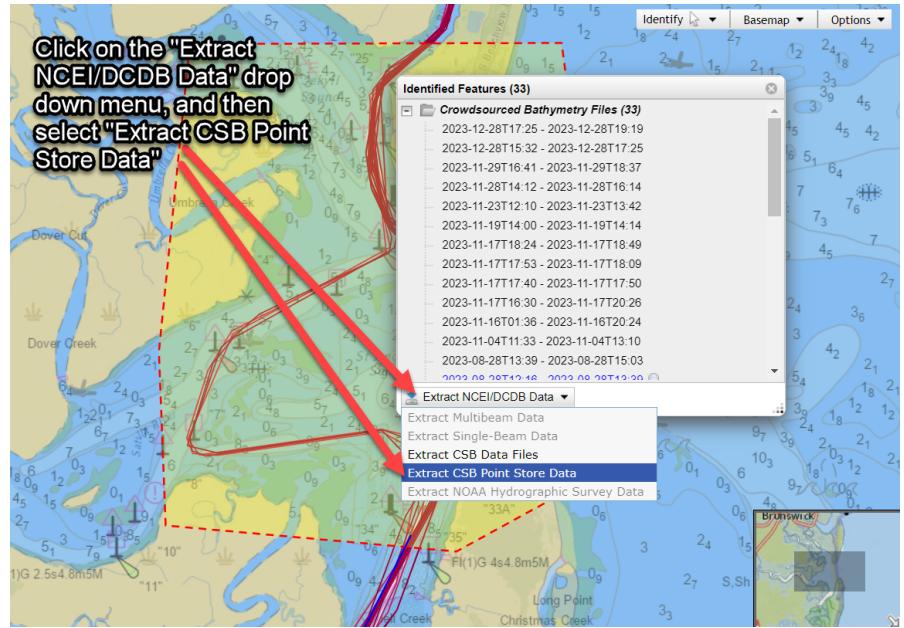
- A. Start by expanding the IHO DCDB/NOAA NCEI Tab on the left-hand side of the screen
 1. Turn off the Multibeam Surveys layer
 2. Turn on the Crowdsourced Bathymetry Files layer



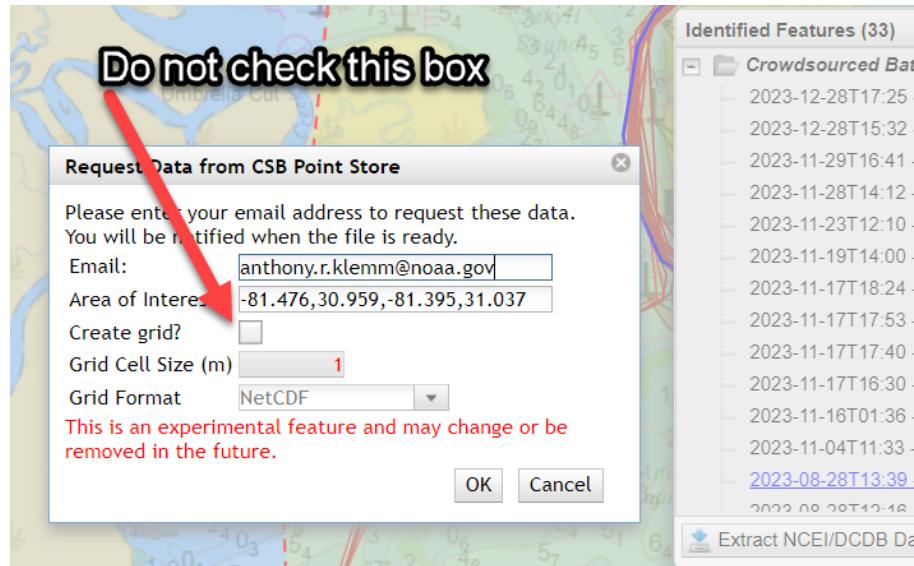
- B. Zoom to your area of interest. The webmap has various options for basemaps as well as an ENC viewer for convenience. Once you have found your area of interest, use the Identify tool at the top right of the webmap and draw a box or polygon around your interested area.



- C. Put in an order to download the raw CSB data by clicking on the “Extract NCEI/DCDB Data” drop-down menu, and selecting the “Extract CSB Point Store Data” option.



- D. Enter your preferred email address when requested, and then wait for NCEI to process your request. Leave all the other options blank. A download link will be emailed to you.

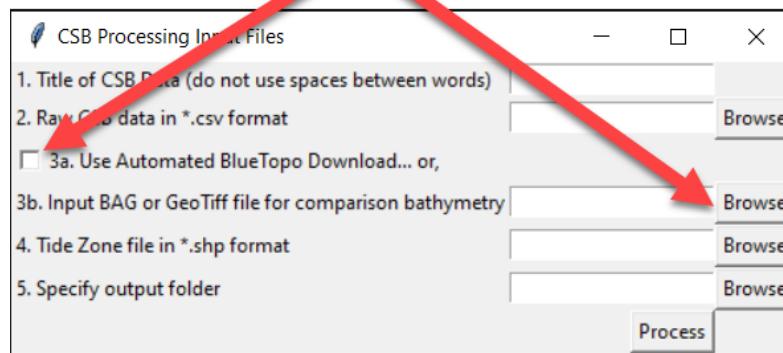


II. Downloading comparison bathymetry

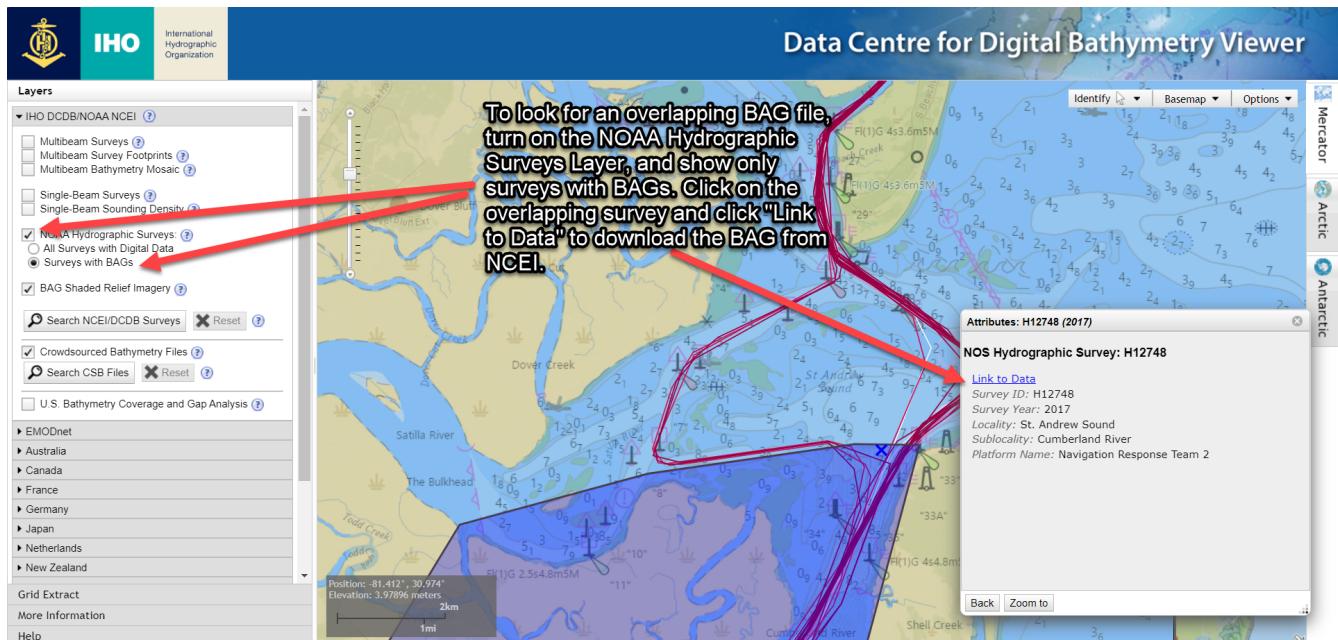
- A. This tool provides two options for the comparison bathymetry. The first option is by clicking on the “Use automated BlueTopo download” checkbox. This is the preferred option, but at the time this document was written, the BlueTopo bathymetry model is not available everywhere. **If you are using this option, you do not have to manually**

search and download comparison bathymetry and can skip to Section III. If you choose an area outside of the BlueTopo model availability, continue to the next Step B.

If you select 3a,
you do not need
to fill in 3b.

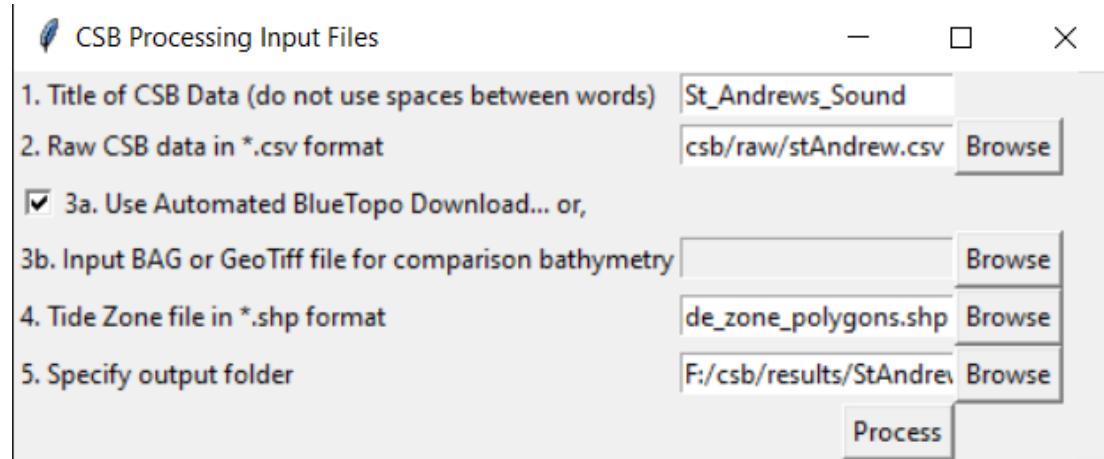


- B. You will need to search for an available bathymetry surface (in BAG or Geotiff format). You can use the IHO DCDB webmap to also download BAGs that overlap your area of interest. ***IMPORTANT NOTE*** To ensure best performance of the tool, you should choose a BAG that overlaps with your selected CSB data, preferably in a bottle-neck area where most or all of your vessels transit across. This is crucial for being able to estimate the transducer draft of each contributing vessel.



III. Using the CSB Processing Tool

- A. Now that you have retrieved all required input data, open the tool in Pydro.



- B. Input the required fields. For “Title,” choose a descriptive name for the data. Since my data in this example is in St. Andrew’s Sound, I chose “St_Andrews_Sound.” Make sure there are no spaces between words in the title.
- C. Browse to the raw CSB data you downloaded from the DCDB.
- D. Click the checkbox to use the automated BlueTopo Download option for your comparison bathymetry if BlueTopo is available in your area of interest. It will gray out the Browse option for 3b and you do not need to point to a specific BAG file. If you are not using the Automated BlueTopo Download option, make sure the option is un-checked, and point to your BAG file you downloaded from NCEI.
- E. Tide Zone Polygon selection: A Tide Zone polygon shapefile is located in this directory: C:/Pydro22/NOAA/site-packages/Python38 svn_repo/HSTB/CSB_processing/tide_zones_polygons.shp
1. *****IMPORTANT NOTE*** There are many gaps in the publicly available tide zone polygon model published by NOAA’s Center for Operational Oceanographic Products and Services (CO-OPS). If a tide zone model is not available in your area of interest, this tool will not produce any results. You may want to view the shapefile in your GIS software of choice (i.e. QGIS or ArcGIS) to see if model coverage is available.**
 2. If polygons are not available in the model, but there is a local NOAA tide prediction station near your area of interest that you believe would be representative of the tides for your data, you could modify the tide zone polygon

shapefile to make your own custom zones. The workflow for this can be found in the Appendix of this SOP.

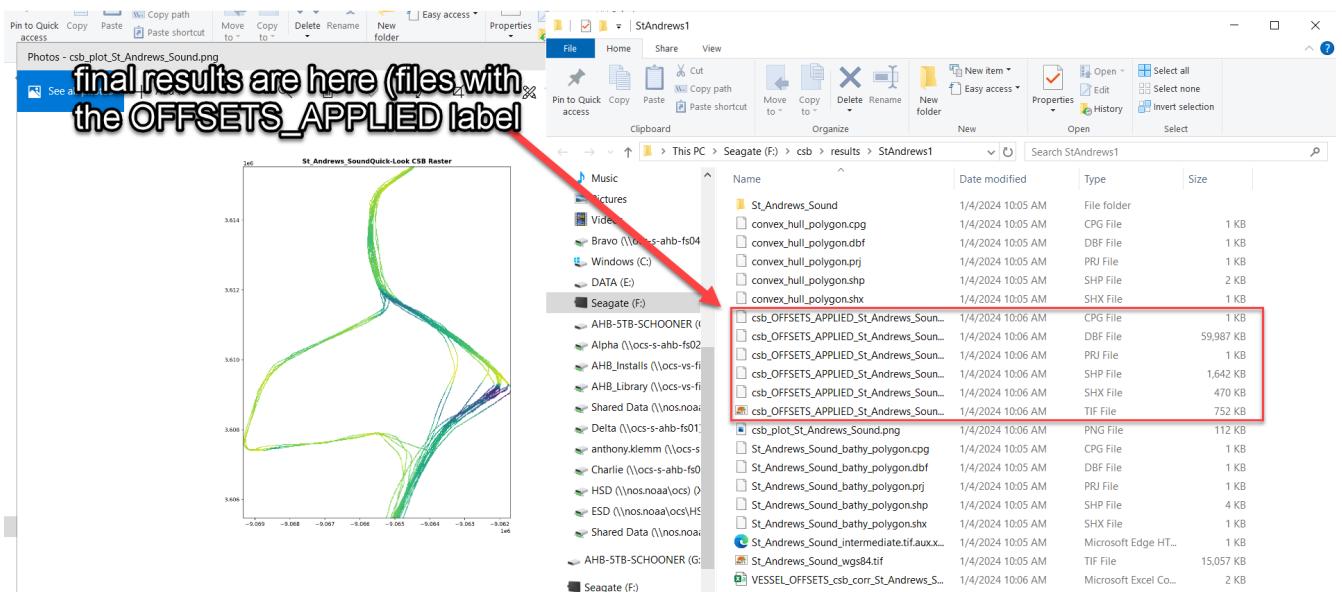
- a) Alternatively (in beta testing... Use at your own risk) you can use the tide zone polygon in the beta testing folder here:

C:\Pydro22\NOAA\site-packages\Python38\svn_repo\HSTB\CSB_processing\BETA_subordinate_tide_zones that includes auto-generated tide zones that fill in the gaps of the official tide zone model by creating Voronoi/Thiessen polygons around the point locations of all available subordinate tide prediction stations. These polygons were auto-created and were not QC'd, so errors and erroneous zones exist throughout.

- F. Choose an output folder directory for your results, and press the “Process” button. Make sure to pay attention to the console window to review the progress of the processing tool.

IV. Reviewing the Results:

- A. Once the tool is done processing, two windows should pop open. One is the Windows Explorer window of your results directory, and the other is a PNG image file with a “quick-look” rasterization of your results. The final point file is named csb_OFFSETS_APPLIED_ (plus whatever you chose for the Title). The resulting shapefile will have many attributes, but the final corrected depth is named ‘depth_fina.’ The shapefile is in WGS84 (unprojected). You may use your favorite GIS software for additional post processing, such as data cleaning, gridding, or interpolation.



4. References

US Hydro 2023 paper on Crowdsourced Bathymetry:

https://github.com/anthonyklemm/Crowdsourced_Bathy_Processing/blob/main/Klemm_CSBUHYD_R023.pdf

IHO Guidance Document on Crowdsourced Bathymetry (B-12):

https://ihonet.int/uploads/user/pubs/bathy/B_12_CSB-Guidance_Document-Edition_3.0.0_Final.pdf

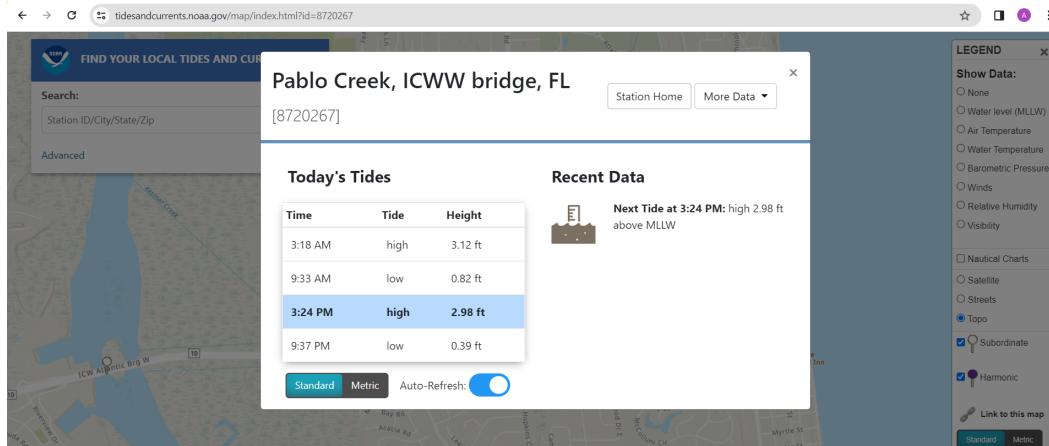
5. Appendix

Procedure for modifying/customizing the tide zone polygons

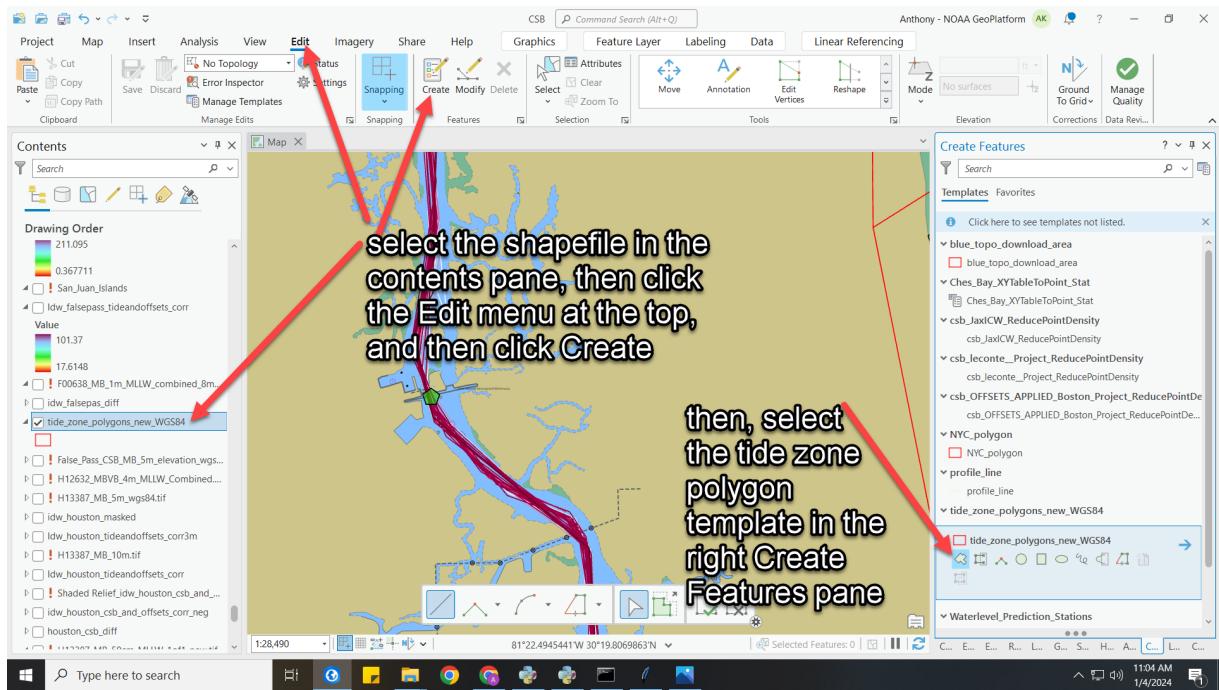
Overview:

If there is a gap in coverage in the official tide zone polygons from CO-OPS, you may wish to create custom zones around the immediate area of existing tide zone prediction stations (either harmonic or subordinate stations). Only create a zone of the immediate area around the station, as the farther away your data is, the less accurate your tide correction will be.

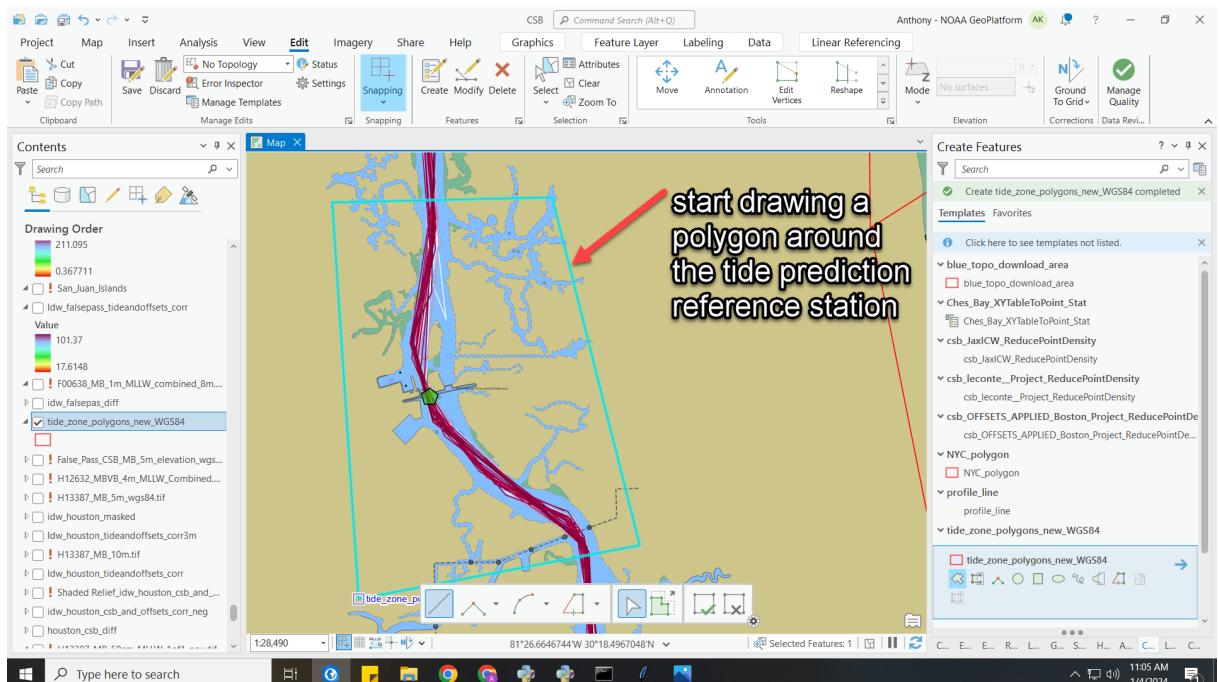
- Open the tide zone polygon shapefile in your favorite GIS software. I will use ArcGIS Pro for this example, but it is just as easily modified in QGIS.
- Find the Control Station number of the tide prediction station you are interested in. You can use the NOAA CO-OPS website to look for tide station locations [CO-OPS Map - NOAA Tides & Currents](#) (the Control Station number for this example is 8720267).



- With your tide zone shapefile layer open in ArcGIS Pro and selected in the table of contents pane on the left, click the Edit menu banner at the top of the window.

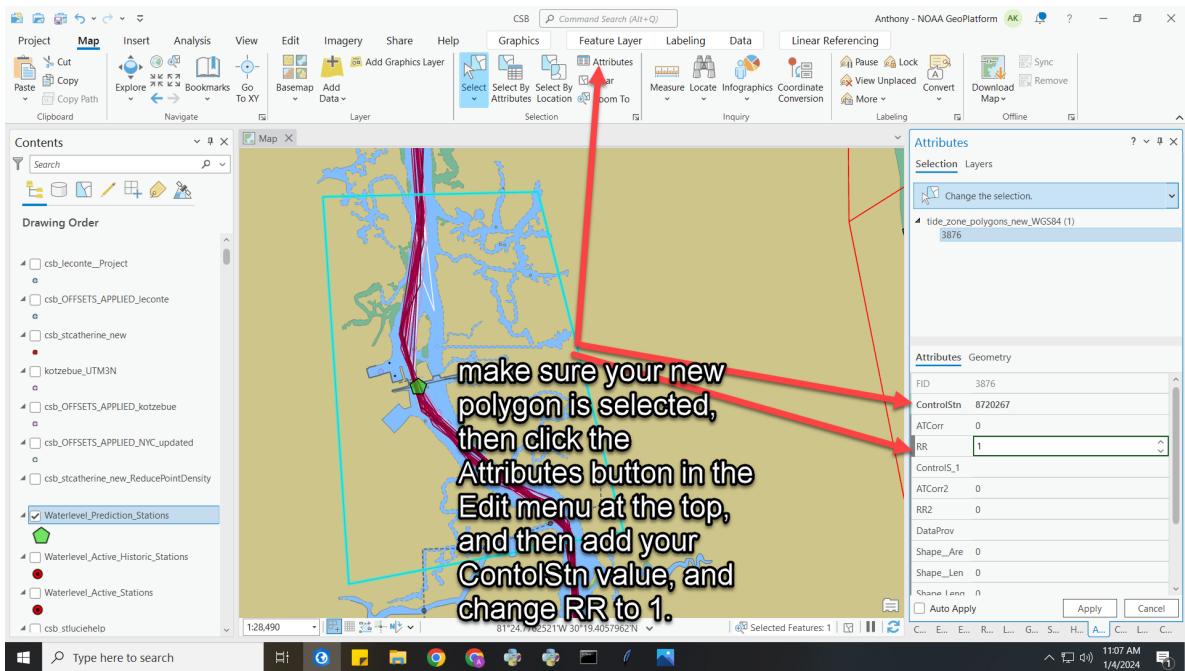


- Then, start drawing the new zone polygon in the map window around the location of your chosen tide prediction reference station.



- When finished with the drawing (it might take a double-click to finish), click on the Attributes menu in the Edit pane, and type in the Control Number in the CtrlNum attribute on the right, and

then change RR to 1 (you leave ATCorr as 0).



- Then, click Save in Edit menu pane, and then you are ready to use your modified tide zone polygon shapefile in the CSB Processing Tool.

