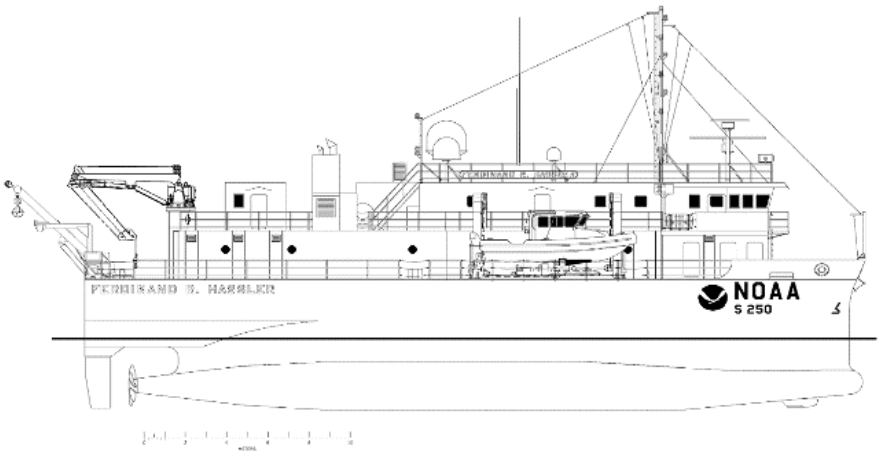
# *Ferdinand R. Hassler*
# Creating CUBE Surfaces in Caris
Standard Operating Procedures




**Revision History**

| Date | Revision Description (Reason/What) | Updated by |
|---|---|---|
| ? | Original SOP from NOAA Ship FA | NOAA Ship FA personnel |
| 05/23/2021 | Reviewed for FH | ST Tigges |
| 7/11/2023 | Reviewed | LT Debroisse |
| 7/27/2024 | Updated, added bag using HDR Boost | LT Debroisse |

## Creating CUBE Surfaces in Caris

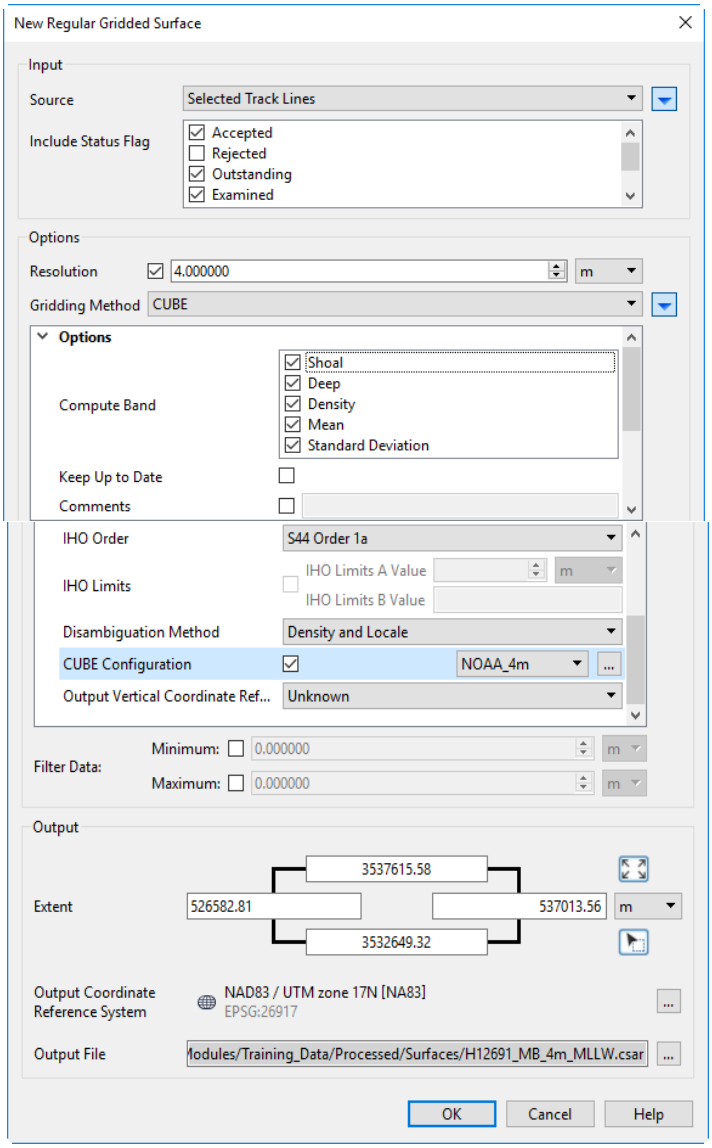
This document outlines how to create a CUBE surface in Caris. Section I explains the procedure for single resolution surfaces. FH does not currently use VR surfaces due to questions about their processing, but the information is left here just in case there is some sort of need.

**** You will need to select the left-facing arrow to expand the options in all of the windows in Caris. Don't forget to scroll down in the options window, either! The screenshots below are cut and combined to view the settings linearly.**

## I. Creating Single Resolution Base CUBE Surfaces

Open your sheet's .hips project in Caris. Ctrl+A to select all of the lines, or use your cursor to select specific lines or groups of lines.

Click the *New Single Resolution Surface* icon  in the main toolbar.




Input: **Source** > **Selected Track Lines**
Click on the left facing arrow to expand the window titled "Include Status Flag".
Check **Accepted**, **Outstanding**, and **Examined**. Leave **Rejected** unchecked.

Options: Check **Resolution** and enter the resolution of the surface you are creating (1, 2, 4, 8, and 16)

**Gridding Method** > **CUBE** click on the left facing arrow to expand the gridding method options.
**Compute Bands** > check **Shoal, Deep, Density, Mean, Standard Deviation**.
Uncheck **Keep Up to Date,** if you leave this checked, the surface will be recomputed every time you make a change which can be a time sink

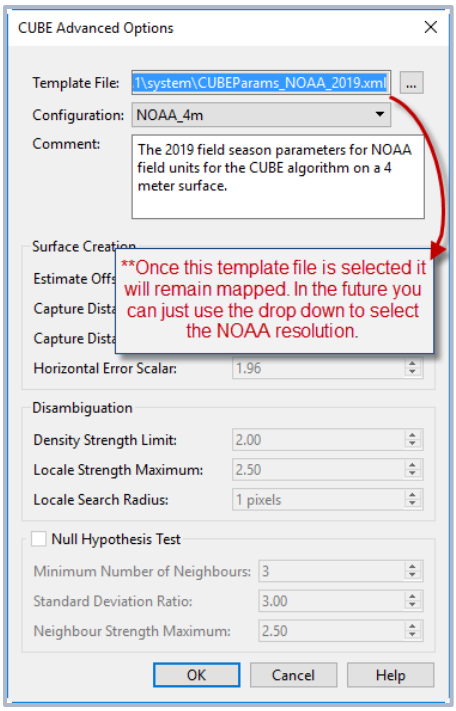
**IHO Order** > **S44 Order 1a**
**Disambiguation Method** > **Density and Locale**
Check CUBE Configuration then select the ellipsis. In the **CUBE Advanced Options** window select the ellipsis next to Template file and navigate to C:\Program Files\CARIS\HIPS and SIPS\11.1\system and select the **CUBEParams_NOAA_20XX.xml** file.
Under **Configuration**, select the **NOAA_Xm** of the resolution of the surface you're creating. Click ok.

Back in Options, leave Output **Vertical Coordinate Reference** as **Unknown**.

Under Output select the  to automatically set the extents of your surface based on what's loaded into CARIS display screen. If you need to zoom in or out to adjust the extents in the display screen, select  then adjust your display screen, then click and drag a box around the extents you wish to capture for surface creation.

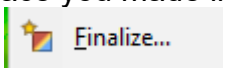
**Output File** > Select the Ellipsis, browse to your surfaces and save the in the appropriate folder
Give your surface a name including both H number and resolution.
HXXXXX_MB_Xm_MLLW_XofX

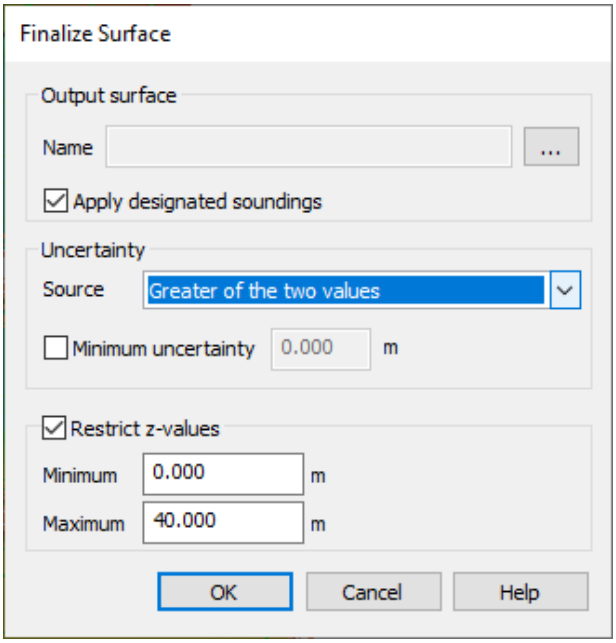
Click OK and you're finished!




## II. Finalize Your Base Surface

**ONLY DO THIS STEP ONCE YOU ARE CERTAIN YOU ARE DONE CLEANING**

Select your Base surface you made in step I in the layers window. Then go to Tools ➔ Coverages ➔ Modify ➔ Finalize 


Set your Output name to the Processed-Grids folder for your project and name it HXXXXX_MB_XXm_MLLW_XofX_Final

Check apply designated soundings

Source should be greater of the two values

Check restrict z-values. Look at 2024 HSSD section 6.4 to determine the bounding values based on depth. This is only true for General surveys. Critical and Exceptional surveys have fixed resolutions.

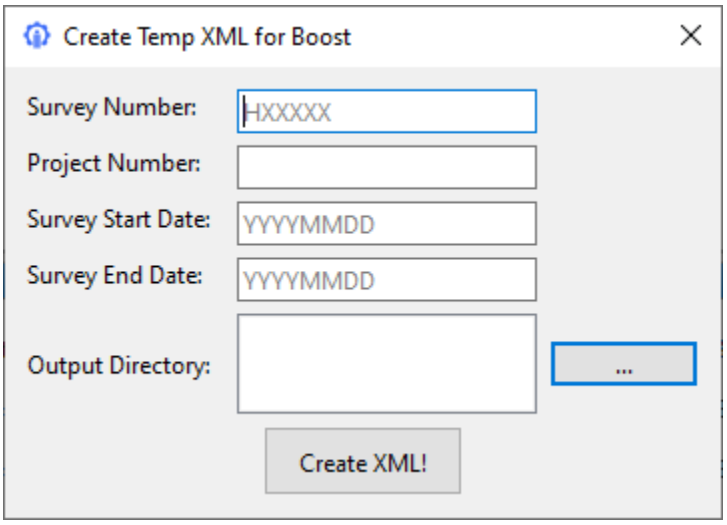
Hit OK

## III. Create your required BAG Surface

New in 2024, we are required to create and submit a Bathymetric Attributed Grid (BAG) surface. Caris can do this, but to ensure your surface meets the metadata requirements, and to get some additional QC done on it, use Pydro's Boost tool. This is a branch tool, but can be used to save you time and energy on this step.

Open Pydro, expand Deliverables and double click Boost.

First, you need to make a Temp XML for metadata. Click the Temp XML tab at the top.




Fill in Survey Number: HXXXXX of FXXXXX based on the PIs

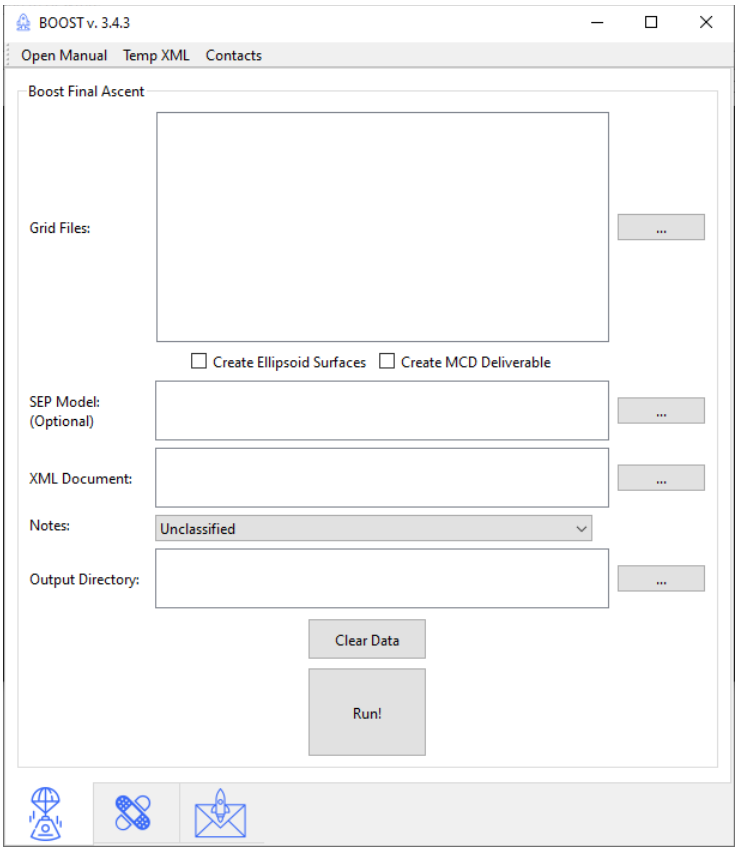
Fill in Project Number: OPR-XXXX-FH-XX from the PIs

Survey Start Date is the first day we acquired data. This should be the same as reported in your Survey Report

Survey End Date is the last day we acquired data and should be the same as is in your Survey Report.

Set your output directory to be the Processed- Grids folder for your Project.

Create XML




Select the ellipsis next to grid file and point it to the finalized .csar (or csars) you have made. They should live in Processed-Grids

Leave the two check boxes unchecked

Select the ellipsis next to SEP Model and point it to the sep model for your project. It should be in Processed-Vertical_Datum_Correction

Point XML document to the XML you just made

Notes will usually be unclassified

Set Output Directory to the Processed-Grids Folder

Hit Run!

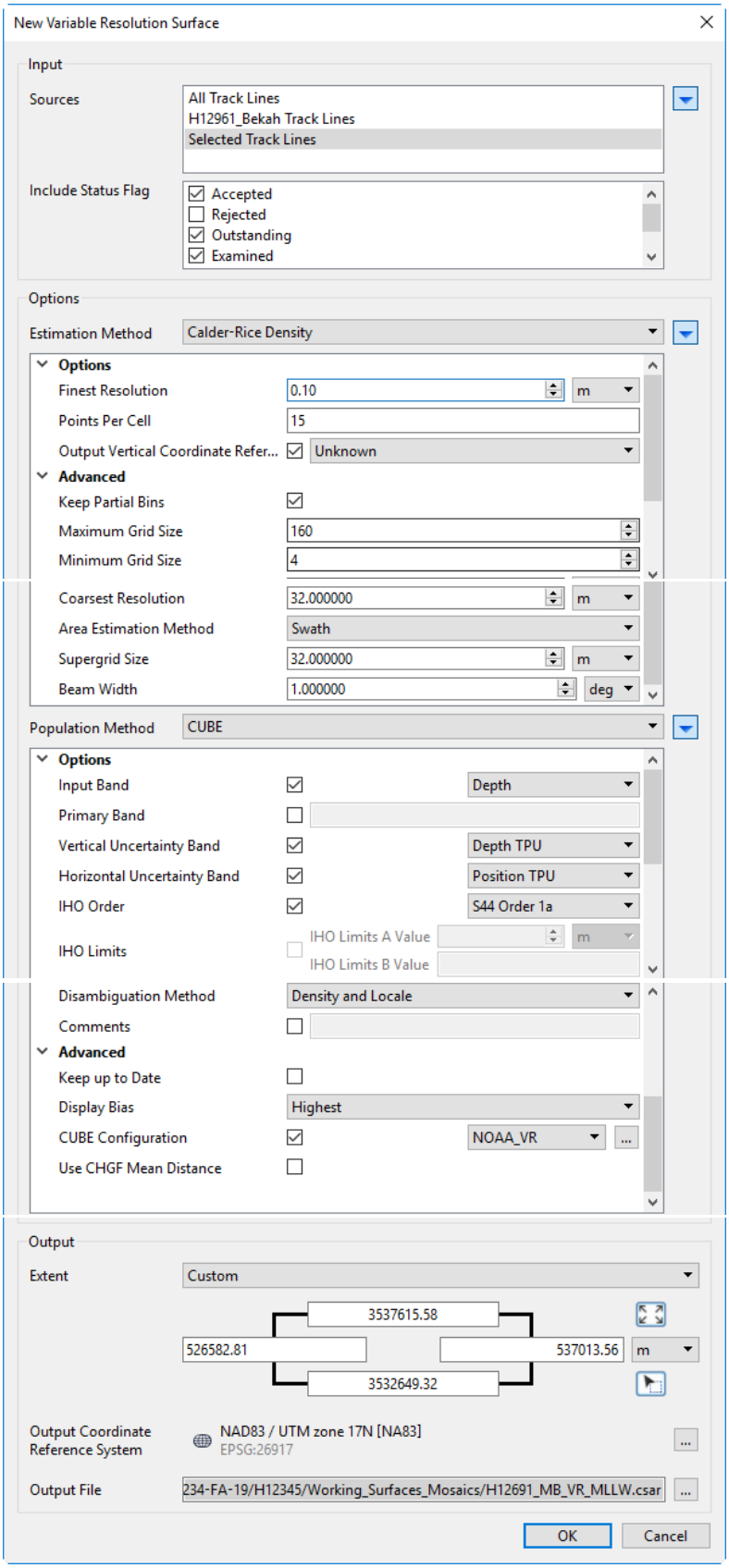
This will create the BAG file, a Boost Process Log, and a folder which contains a PDF Bag Check. Open that bag check and look for any errors or failures. Warnings are generally OK, but look into them to see if they are easily fixed.

Make sure you have done sections 1-3 of this SOP for all of the required surfaces. You will likely only have one surface for Critical and Exceptional Surverys, but may have more for a general survey.

Once complete, you have finished all of your required surfaces.

## IV. Create a Variable Resolution Surface – Calder – Rice

Click the  icon in the main toolbar.




Input: **Sources** > **Selected Track Lines**
**Include Status Flag** > Check **Accepted, Outstanding, Examined**

**Estimation Method** > **Calder-Rice Density**
Options: F**inest Resolution** > **0.10m**
**Points Per Cell** > **15**

Advanced:
Check **Keep Partial Bins**
**Maximum Grid Size** > **160**
**Minimum Grid Size** > **4**
**Coarsest Resolution** > **32.0m**
**Area Estimation Method** > **Swath**
**Supergrid Size** > **32.00m**
**Beam Width** > **1.0 deg**

**Population Method** > **CUBE**
Options:
**Input Band** > **Depth**
**Vertical Uncertainty Band** > **Depth TPU**
**Horizontal Uncertainty Band** > **Position TPU**
**IHO Order** > **S44 Order 1a**
**Disambiguation Method** > **Density and Locale**

Advanced:
Uncheck **Keep up to Date**
**Display Bias** > **Highest**
**Check Cube Configuration** > **NOAA VR**
(unimportant for VR surfaces, any of the configurations will work)

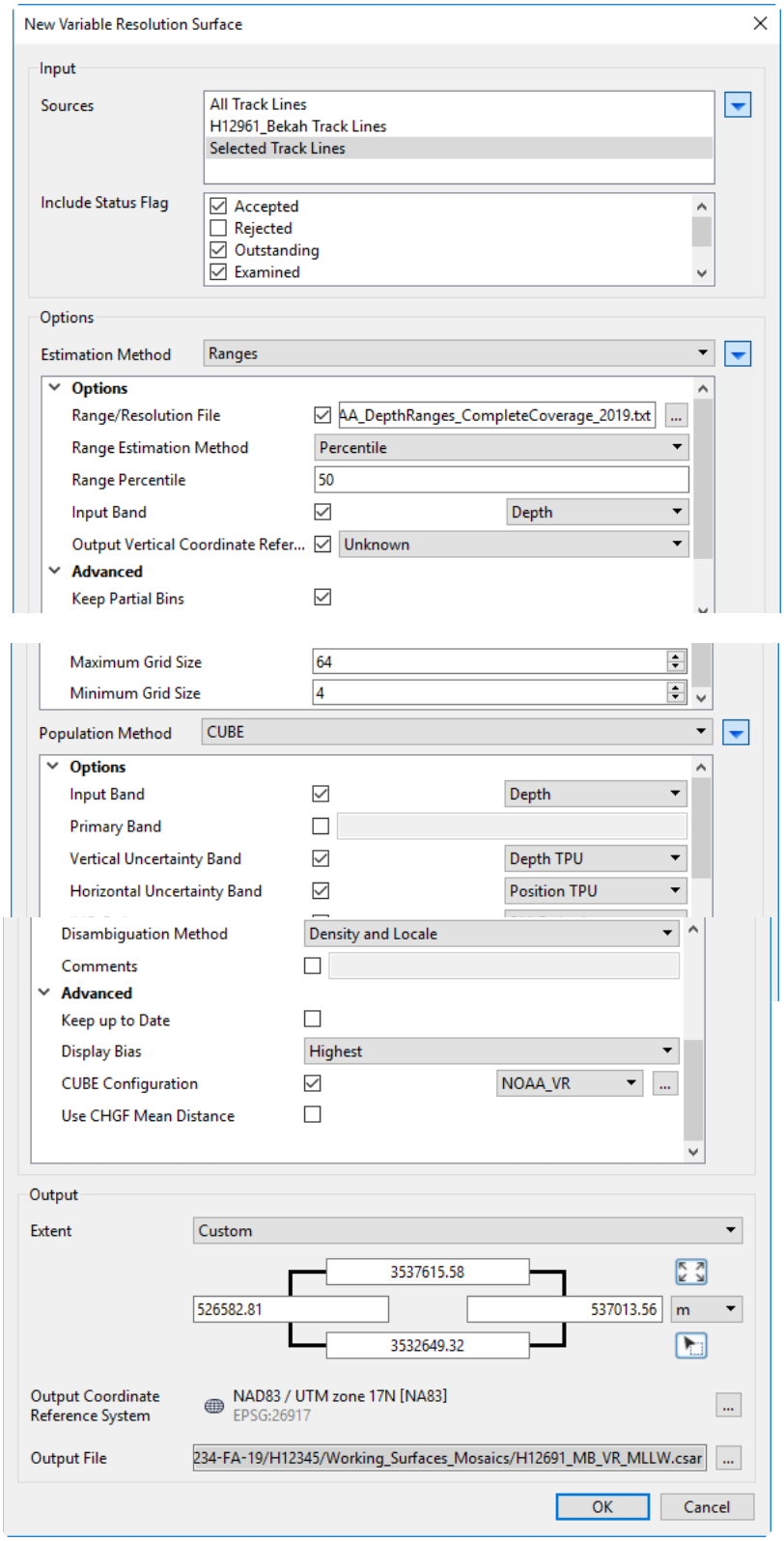
Output select the  to automatically set the extents of your surface based on what's loaded into CARIS display screen.
Set the **Output Coordinate Reference System** to the correct zone using the ellipsis

**Output File** > Select the Ellipsis, browse to S:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Working_Surfaces_Mosaics\Bathymetry
and save the surface as **HXXXXX_MB_VR_MLLW**.

Click ok and you're finished!

## V. Creating a Variable Resolution Surface – Ranges

Click the  icon in the toolbar.




Input: **Sources** > **Selected Track lines**
**Include Status Flag** > Check **Accepted, Outstanding, Examined**

**Estimation Method** > **Ranges**
Options: **Range/Resolution File** > navigate to the appropriate file based on survey requirements
C:\CARIS\Caris_Support_Files_2019v0\HIPS\Grid_Parameters11_1\NOAA_DepthRanges_CompleteCoverage_2019
C:\CARIS\Caris_Support_Files_2019v0\HIPS\Grid_Parameters11_1\NOAA_DepthRanges_ObjectDetection_2019
**Range Estimation Method** > **Percentile**
**Range Percentile** > **50**
**Input Band** > check > **Depth**

Advanced: Check **Keep Partial Bins**
**Maximum Grid Size** > 64
**Minimum Grid Size** > 4

**Population Method** > **CUBE**
Options: **Input Band** > **Depth**
**Vertical Uncertainty Band** > **Depth TPU**
**Horizontal Uncertainty Band** > **Position TPU**
**IHO Order** > **S44 Order 1a**
**Disambiguation Method** > **Density and Locale**

Advanced:
Uncheck **Keep up to Date**
**Display Bias** > **Highest**
**Check CUBE Configuration** > **NOAA VR**
(Unimportant for VR surface, any of the configurations will work)
Output select the  to automatically set the extents of your surface based on what's loaded into CARIS display screen.
Set the **Output Coordinate Reference System** to the correct zone using the ellipsis
**Output File** > Select the Ellipsis, browse to S:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Working_Surfaces_Mosaics\Bathymetry and save the surface as **HXXXXX_MB_VR_MLLW**.

Click ok and you're finished!