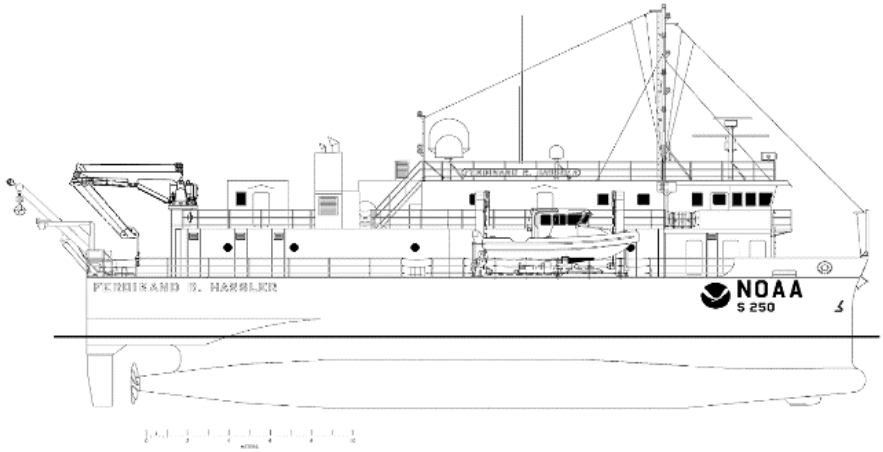
Ferdinand R. Hassler Line and Polygon Planning Overview

Standard Operating Procedures



Revision History

Date	Revision Description (Reason/What)	Updated by
02/05/2014	Original Draft	HSST Moehl
05/21/2021	General Review and Update	ST Tigges
11/19/2023	Review	LT Debroisse

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1. OVERVIEW

Efficient line and polygon planning is critical for ensuring that projects are completed within the allowable field days. This document will outline the process but does not give step by step directions. More detailed instructions for sheet planning, line planning, polygon planning, and other types of planning can be found in the other planning SOPs located in P:\Survey_Storage\04_SOPs\1_Planning.

Careful attention to detail will save many hours of needlessly collecting too much overlap or running additional holiday acquisition. All line and polygon plans shall be reviewed by the FOO or HSST before starting acquisition.

2. PROCEDURE

Before starting to draw lines and/or polygons, take the following into account.

- Coverage Requirements (Full MBES, SSS, Object Detection MBES, etc. – From the PIs)
- Depth of water (Prior surveys show usually show more detail than charts)
- Expected traffic patterns (From the chart)

The answers to the above will determine what strategy is most likely to be utilized. We have found that because of our dual-hull MBES system design the SSS is not the champion of swath as it is on the mono-hull vessels. SSS still has its merits, though, especially if the water chemistry allows for a wide range scale.

3. WORK INSTRUCTIONS

<u>LINE PLANNING –</u>

Hypack is primarily used for planning lines. There are a few ways to create line plans; either draw a line and make offset lines, or you can fill a region with lines. Try to draw your lines so that they run parallel with the contours. Exceptions to this are if the project includes high traffic scenarios and/or separation schemes. Plan these lines to run parallel with the traffic pattern, regardless of topography.

Determining your line spacing can be a difficult process. To help with your decision use the *Line Planning and Density Calculator* spreadsheet located in P:\Survey_Storage\01_Administration\01_Project Planning. In addition to line spacing, this calculator shows the density that we will achieve for certain resolution grids at different speeds. Typically we are okay with density when acquiring at 8kts (often faster) except on the deeper cusps of object detection requirements (20m for the 50cm, 40m for the 1m; for these areas we need to slow down to about 6kts). Keep in mind that these values are calculated from MLLW and if you are in an area with a large tide range, significant overlap may result. Take your time and play with the spreadsheet to understand what the values are reporting. User specified values are in black font while calculations are in red.

Reqired Resolution	MLLW (Ftm)	MLLW (ft)	**MLLW (m)**	DUK (m)	Θ =	OB 1/2 swath	Full Swath Width	range swath	Effect Sw Wdth	Single Head SW	Range	Range Setting	Ping Rate	Along Track	Across Track	Ave Density (snd/Xm^2)	Low Density	~~%low~~	Bruce's Share	Line Spacing
0.5	6.2	37.2	11.3	7.5	135	23	61	72	61	38	24	30	18	2.36	6.74	15.92	12.00	~~n/a~~	11.40	50

When you have a good idea of what the line spacing should be for certain areas of the survey, open Hypack and begin to make the line plan. There is really no wrong way to create a line plan (don't try to prove me wrong), but there are definitely some tricks that you can pick up. If this

is your first time, or if you have an undulating seafloor, ask questions from a senior member of the team.

POLYGONS-

Using a real-time coverage map, decisions of where to drive are made on the fly. When it works it is the most efficient way to gather data, but it can be taxing on the helmsman (Cox'n) and the survey crew.

Polygons are most easily created using CARIS. Create a .hob file and create every polygon to be a closed area "Breakline" feature. Attributes do not matter, though the mandatory ones must be filled out even with just a place holder. The size of the polygon will be dependent on the vessel to acquire the data. For example, ship polygons will be significantly larger than launch polygons due to many factors such as vicinity to shore or dangerous shoals, turning times, and expected seafloor depths. A good rule of thumb is to plan a launch polygon to last approximately two hours (finishing a polygon is a great reminder to conduct a CTD cast). Similar to line planning, try to orient polygons so that their long sides run parallel with the contours. The purpose of the polygon is to give the boat crew a box to fill; when that box is full they can move on to another. It is especially useful when coordinating between multiple vessels. This means that polygon usefulness may be limited aboard the mighty FH, but real-time coverage will not be.

4. NEXT STEPS

Depending on the sheet, your personal preferences, and the preferences of the crew, you have a couple of options to move forward with your sheet plans. Use the other SOPs located at P:\Survey_Storage\04_SOPs\1_Planning to start reviewing and planning for the sheet in Caris, to plan lines in Hypack or ArcMap, or to plan polygons. If the sheet involves bottom samples, shoreline, maritime boundary points, or involves any other special aspects, start looking at the SOPs for those as well.

5. REFERENCE DOCUMENTS

- Line_Planning_and_Density_Calculator.xlsx