

Acoustic Imaging Technical Note

Assessment of Port Stanvac 2020 Seabed Provinces

Rev 1.0
August 2020

Introduction

The Department of Environment & Water SA (DEW) contracted Acoustic Imaging in August 2020 to assess available geophysical data (surface and subsurface) in advance of a geotechnical coring program for suitability of sand dredging operations. As such, the scope of the work was limited to identifying areas across the 2020 survey region deemed most suitable to successful dredging operations but with further confirmation by the forthcoming vibracoring program.

This report builds upon the geophysical interpretation presented as part of the Precision Hydrographic Services report *PHS-20-033-R001 Survey Report_Rev 0.PDF* as provided by DEW.

The interpretation was not focussed on a detailed habitat mapping objective. Instead, it took a seabed province approach by employing a simple classification scheme as follows:

- Areas with seagrass.
- Areas with exposed or thinly covered rock/reef.
- Areas exhibiting a “simple” sand unit with minimal internal reflectors.
- Areas exhibiting a more “complex” sand unit with internal reflectors that might hinder vibracoring/dredging.

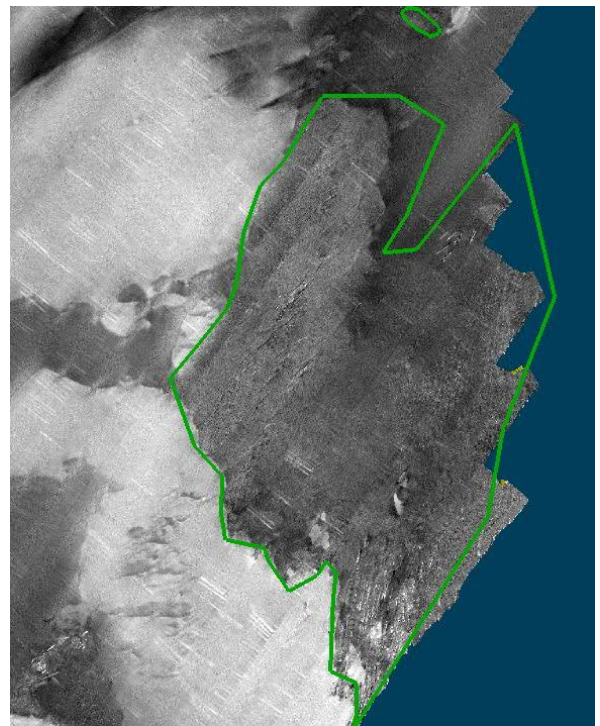
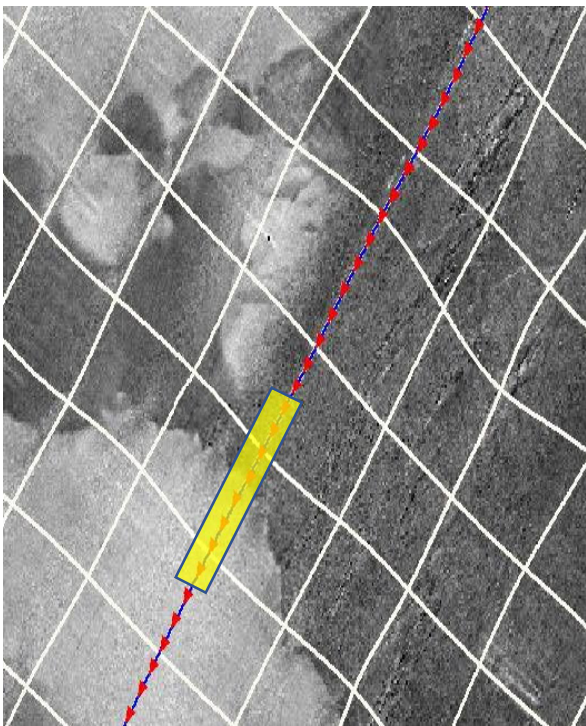
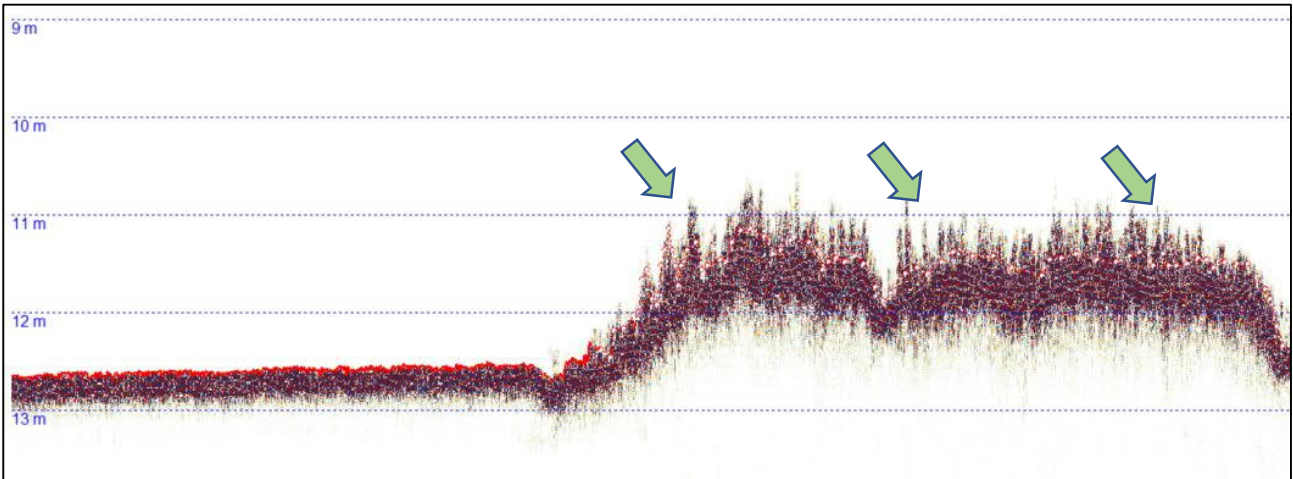
Each of these provinces is discussed in more detail in the following sections.

Seagrass Province

Seagrass areas were largely identified from analysing the high frequency subbottom profiler (SBP) data. The presence of seagrass is illustrated in the figure below (green arrows). In the backscatter data these areas may link with lighter shades of grey but further analysis is required of that data set.

NOTE: The "seagrass" label is applied in a general sense here. The submarine vegetation may be more akin to kelp but we aren't differentiating the two.

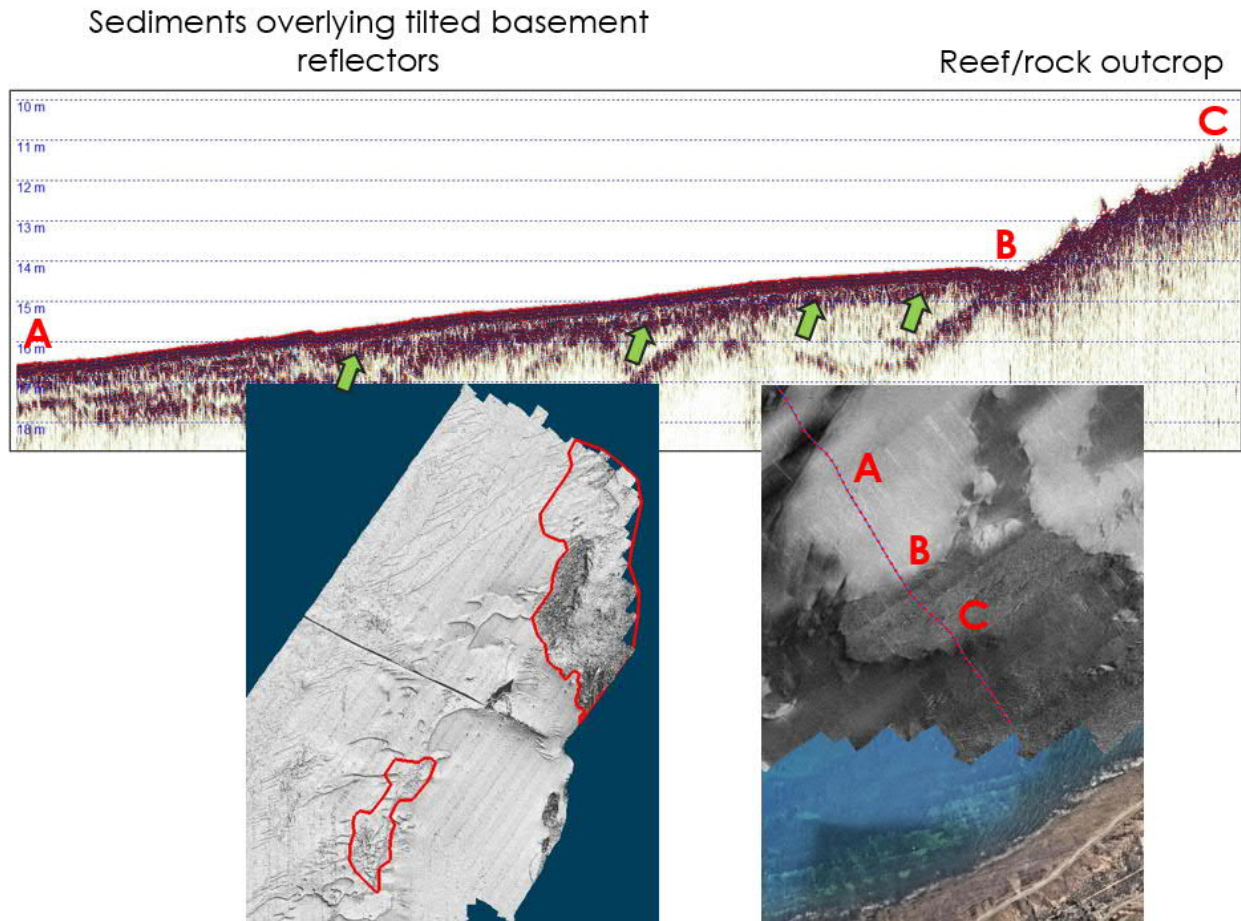
For the most part the attached seagrass fields are restricted to the SE corner of the 2020 survey area. Obviously, these areas are unsuitable for dredging.



Rock/Reef Province

The Rock / Reef Province largely overlaps the Seagrass Province areas as the vegetation appears to cluster across the more stable surface. Rock / reef areas were identified using both the low frequency subbottom profiler (SBP) data and the bathymetry data as exposed rock exhibited a rougher texture in the latter data. The location of the rock/reef areas are shown in the figure below. Green arrows mark the top of the rock unit as shown in the SBP data.

A large area of exposed rock / reef exists in the SE corner of the 2020 survey area. Another smaller area resides to the SE of the outfall pipe. Obviously, both of these areas are unsuitable for dredging.



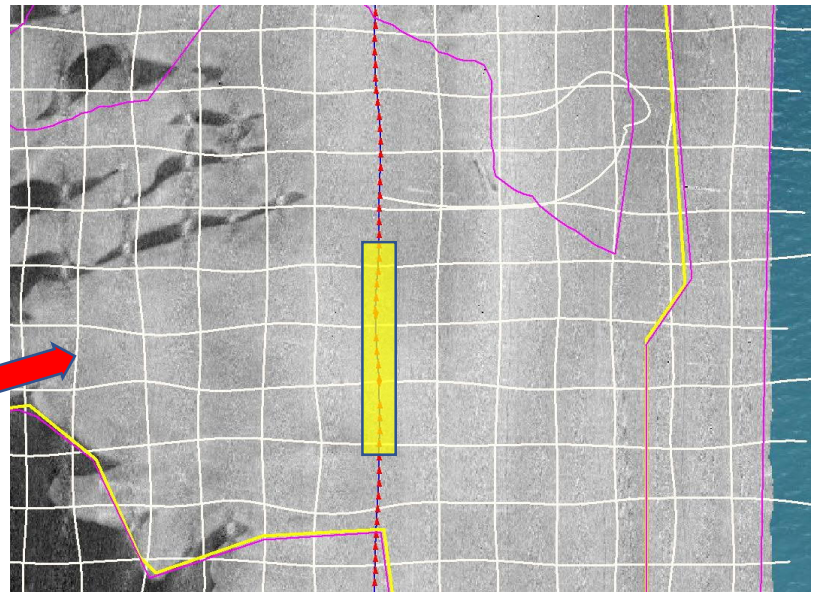
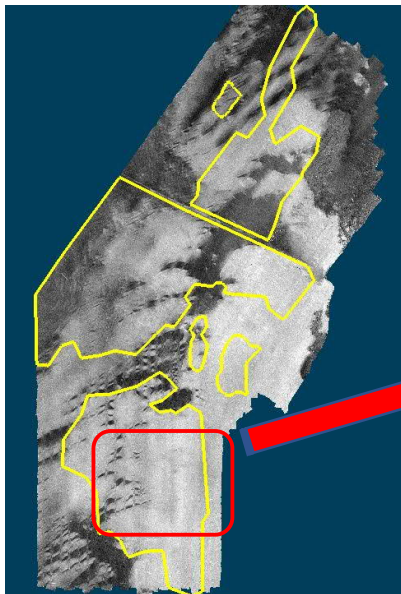
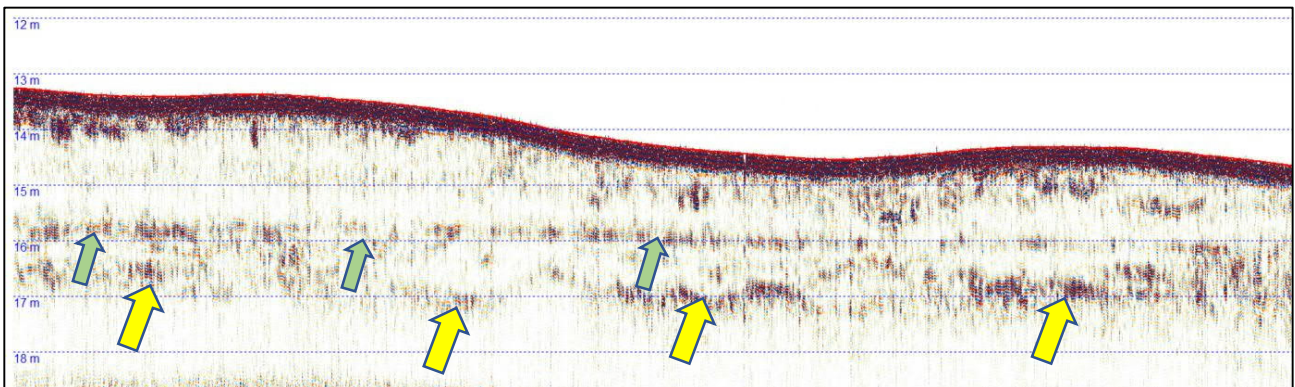
Simple Sand Unit Province

The Simple Sand Unit Province was defined from the low frequency SBP data as follows:

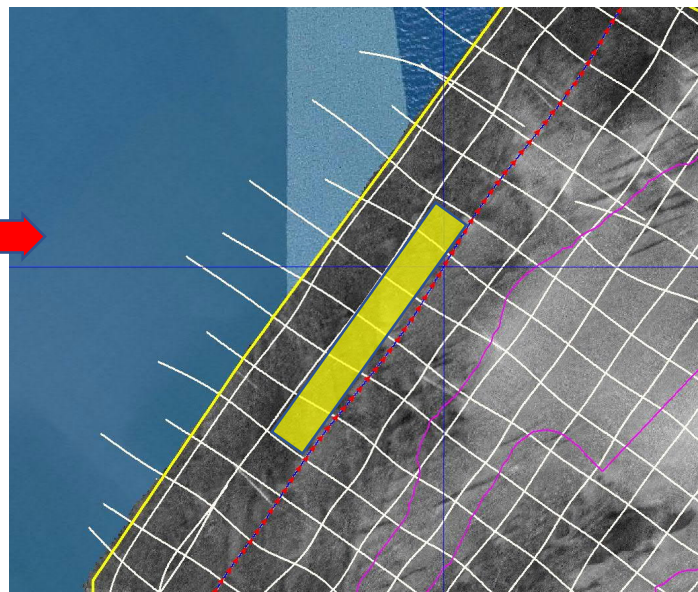
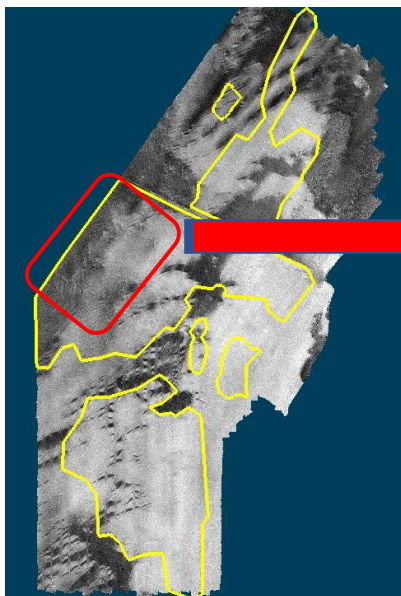
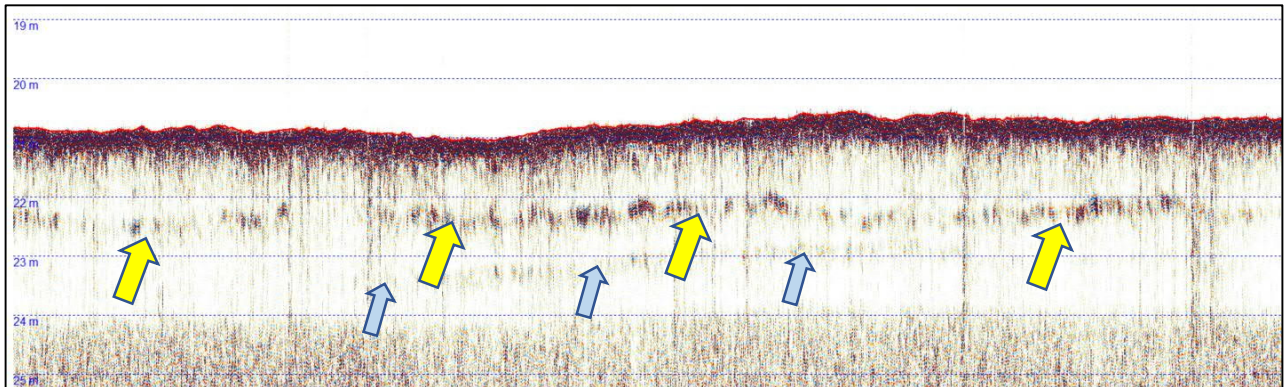
- Thickness of 1m or greater
- Absence of internal reflectors deemed a hindrance to dredging / vibracoring operations

Polygons for this seabed province were created and are shown in the figures below. Small areas of more complex stratigraphy exist within some of these polygons but for the most part these are the areas with most promise for dredging operations (as assessed prior to further core data being available).

A pair of SBP transects for nearshore and offshore are also shown to illustrate the internal structure of the sand unit. The nearshore example below shows a well-defined base reflector (yellow arrows) with a minor internal reflector (green arrows). This particular polygon captures an area of the seabed dominated by low backscatter sediments.



In the offshore region shown below, the seabed exhibits a wider variety of backscatter characteristics. The sediments are expected to be coarser here (or across the higher backscatter regions in the mosaic) but the sand unit still appears to be homogeneous within the SBP data. Along this particular line the vibracorer may penetrate the reflector marked by yellow arrows to a slightly deeper reflector faintly visible in the image below (blue arrows).

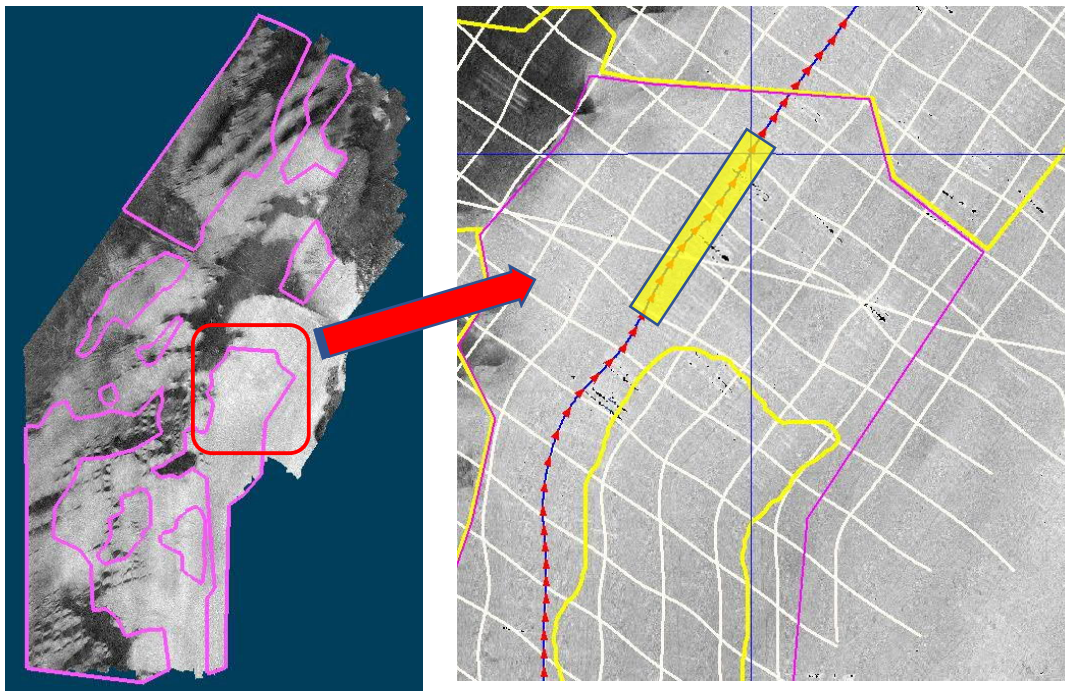
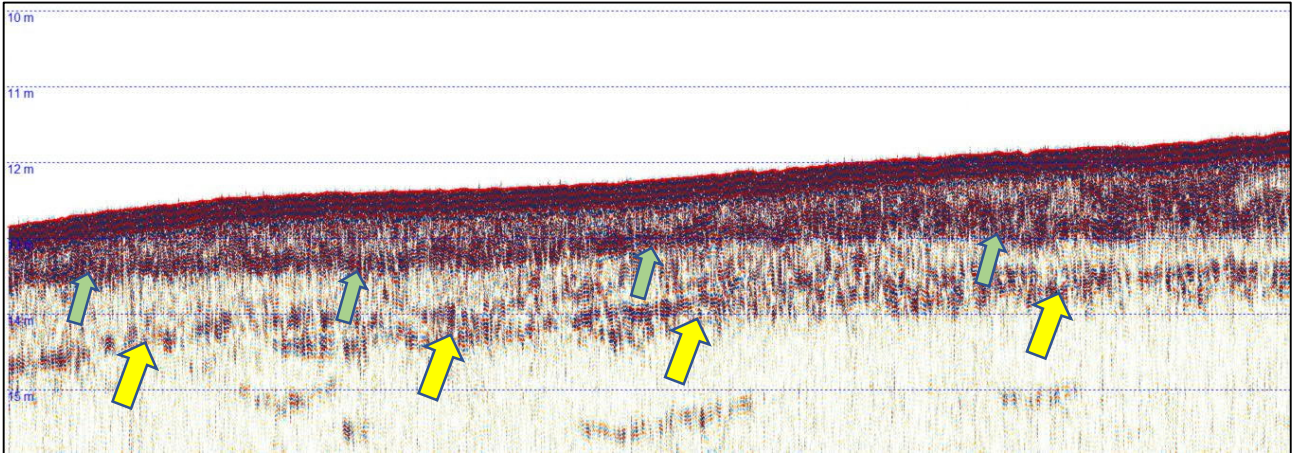


Complex Sand Unit Province

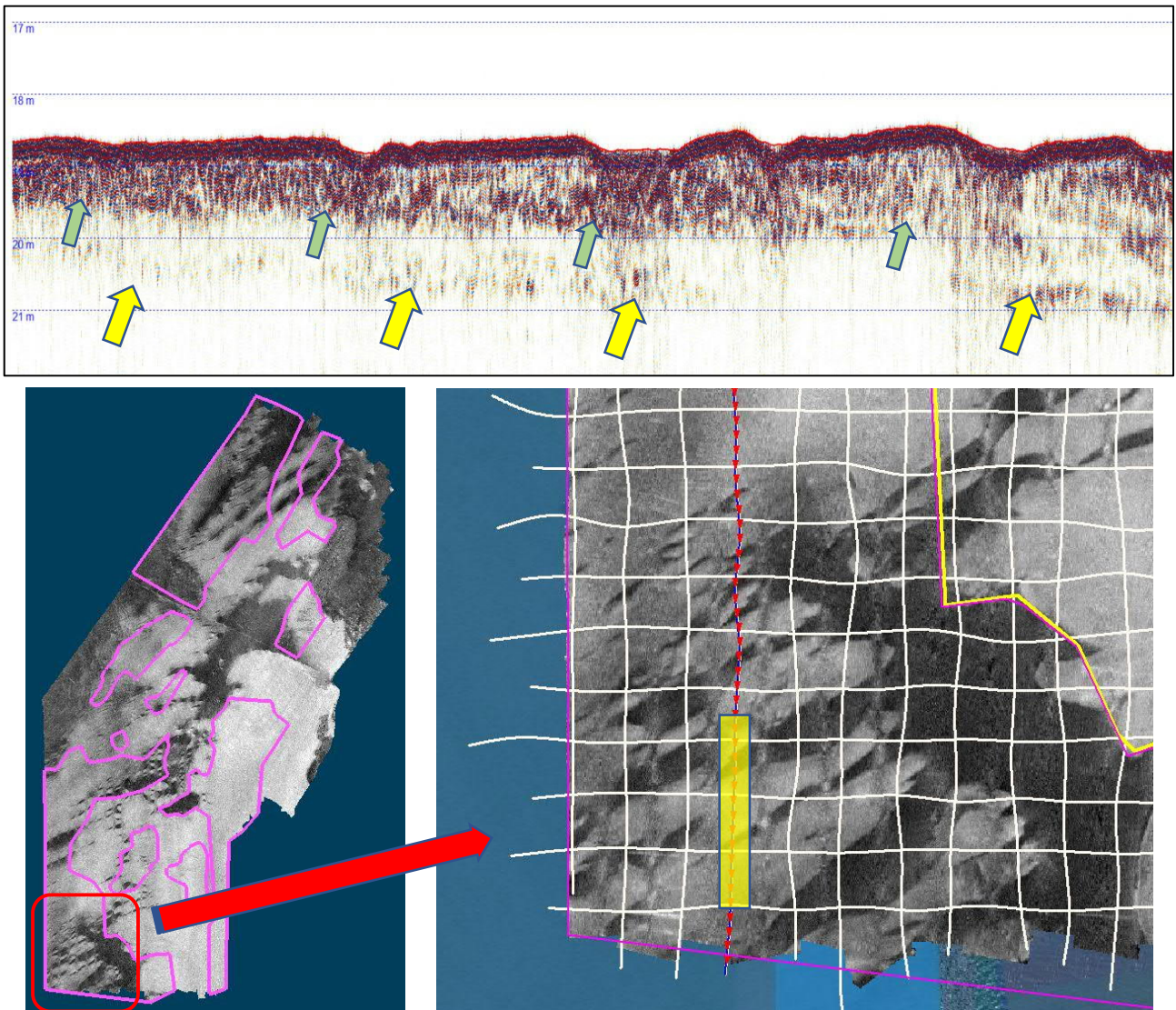
The Complex Sand Unit Province was defined from the low frequency SBP data as having internal reflectors deemed a possible hindrance to dredging / vibracoring operations.

Polygons for this seabed province were created and are shown in the figures below. Small areas of simpler stratigraphy exist within some of these polygons. Further definition of what the internal reflectors represent is dependent on additional core data.

A nearshore SBP transect example shows a well-defined base reflector (yellow arrows) overlain by another sediment unit with higher acoustic intensity characteristics. (base of which is marked by green arrows). This may simply be a coarser sand unit overlying a finer sand unit.



An offshore example from the SW corner of the 2020 survey area is shown below. In this case the polygon captures an area of seabed that shows variation in the backscatter intensity.



The associated SBP transect shows a weak base reflector (yellow arrows) with a progressively thickening overlying sediment unit with higher acoustic intensity characteristics. (base of which is marked by green arrows). Again, this may simply be a coarser sand unit overlying a finer sand unit but it's unclear if cementation / consolidation exists within the uppermost sediment unit.

Summary

The seabed provinces identified at this stage in the Port Stanvac project are preliminary interpretations based on subjective criteria identified in the bathymetry, backscatter, and subbottom profiler data. Further refinement of polygonal boundaries can and should be made with additional core data.

The interpretations have not factored in video/camera stills, nor incorporated a more in-depth analysis of the bathymetry or backscatter data (e.g., rugosity, angular intensity response of the seabed, etc.). DEW may want to consider the extent to which derived data products are relevant to their current and future operations across this survey area.