

## CASE STUDY:

# **BENTHIC HABITAT MAPPING OF SHALLOW CORAL ENVIRONMENTS IN THE CARIBBEAN**

There has been an alarming reduction in fish stocks in the world's oceans in recent years. Governments are beginning to realize the importance of protecting fish habitats, especially spawning areas, so that we may continue to use fish as a source of food in the future. Little is known about most of the designated conservation districts in terms of their benthic habitat and the interaction between different fish species in these habitats. A first step would be to carry out surveying of these areas to assess the resource and to allow research to be carried out in the future.

In spring 2003, Geophysics GPR International Inc. was commissioned to undertake marine surveys for fisheries habitat mapping purposes. The aims of the marine survey were to provide high resolution bathymetry and side-scan sonar maps of the seabed in order to produce detailed maps of the benthic habitat at several designated conservation areas.



Data acquisition was carried out aboard a 50-ft Grand Banks cruiser. The vessel was fitted out with an electric winch, the swath echo-sounder and the positioning system installed, as well as data processing / backup facilities on-board.

Preliminary data processing was carried out on-board the vessel, allowing maps to be produced as the project proceeded. The final bathymetry product was a series of digital terrain models (DTMs) of 1 nautical square mile each. The resolution of the final processed data was 1 meter. The final maps show an extremely complex seabed environment, with a rich variety of different coral structures present.

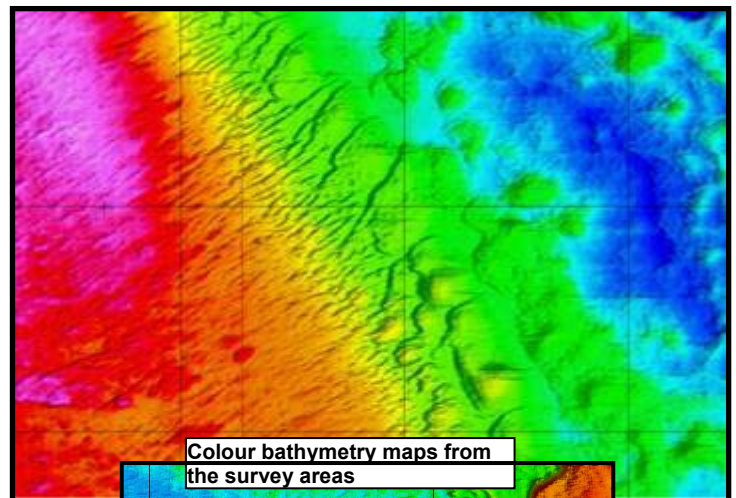


The instruments employed for the survey work were a Geoacoustics Geoswath 250kHz swath echo-sounder and a Klein 595 high resolution side-scan sonar system combined with a digital SonarWiz acquisition system. Positioning was carried out using a Trimble 5700 RTK system, allowing centimeter level precision to be obtained up to 25km offshore from a base station on-shore.

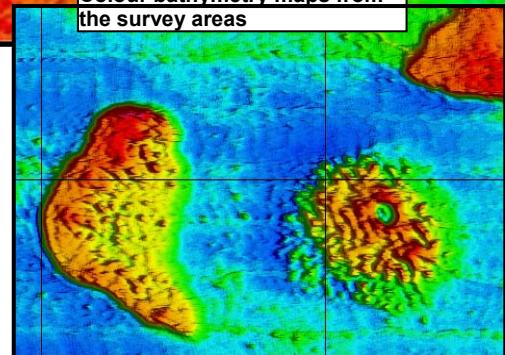
Three different survey areas were covered for a total of 15 square nautical miles of 100% bottom coverage using the sonar and the swath echo-sounder.



The bathymetry and sonar data were acquired simultaneously. The water depth varied from 13 to 60 meters. The data acquisition was carried out over a period of one month.



Colour bathymetry maps from the survey areas



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2545, RUE DELORIMIER  
LONGUEUIL (QUÉBEC)  
CANADA J4K 3P7

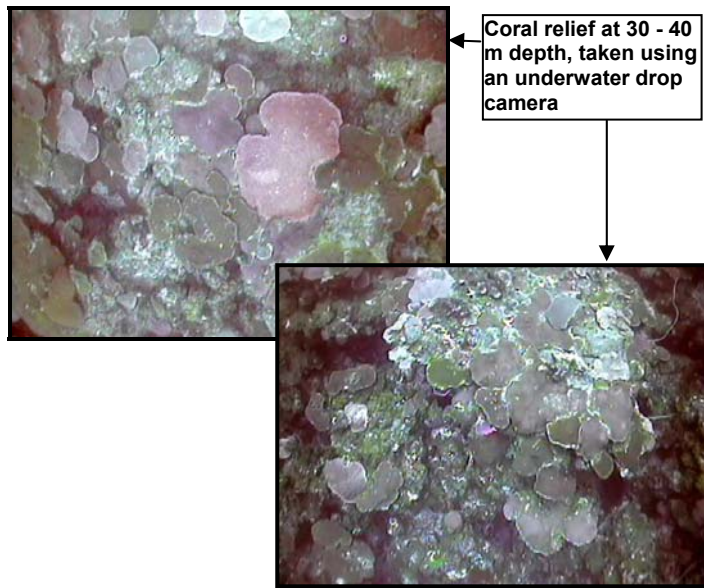
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The side-scan sonar data was processed using SonarWeb (Chesapeake Technology Inc.) and this allowed a series of 1 nautical square mile mosaics, at a resolution of 0.2 meters, to be created as geotiff images containing positional reference.



Together with ground truthing information from a drop camera, the sonar data was classified in terms of the different benthic habitats present, using a visual classification system. A total of eleven habitat types were identified in the study area, including continuous corals, coral patch, Gorgonian plains, algae & invertebrates, sand invertebrates.



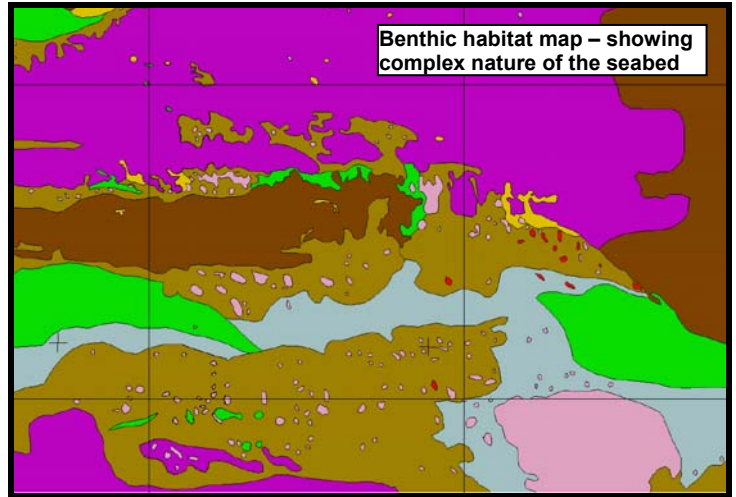
Over the course of the survey, several interesting features were detected, including an unidentified underwater cable which was traced for several kilometres using the sonar, as well as some interesting topographic features resembling craters approximately 10 m deep, and with a diameter of around 80 m.



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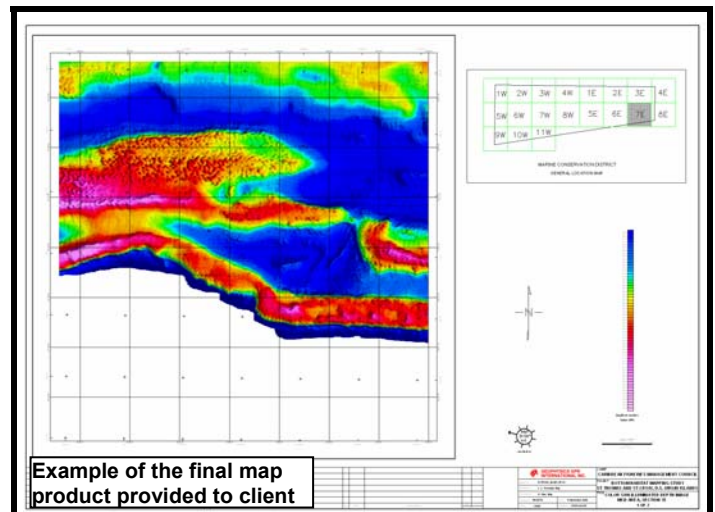
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In addition to over 100 large scale maps, a GIS database with vector polygons was produced as a final product, allowing fisheries researchers to know exactly what kind of habitat exists in a given area. This dataset is the first of its kind for public access in the Caribbean, and will continue to benefit the fisheries research community for some time to come.

The clients have expressed their entire satisfaction with the way GPR handled the project, both in terms of sticking to the budget, as well as the time schedule. They were also more than satisfied with the results provided by the project. There are many designated conservation areas which are in need of a similar study in order to assess the resources available, as well as to provide data to help with fisheries research.



In the future, GPR hopes to carry on with similar projects in the same area, as well as in more remote parts of the world. Working in partnership with fisheries agencies around the world, it is hoped that the current trend in fish stocks can be halted and even reversed in the near future, through the application of the techniques mentioned above.