



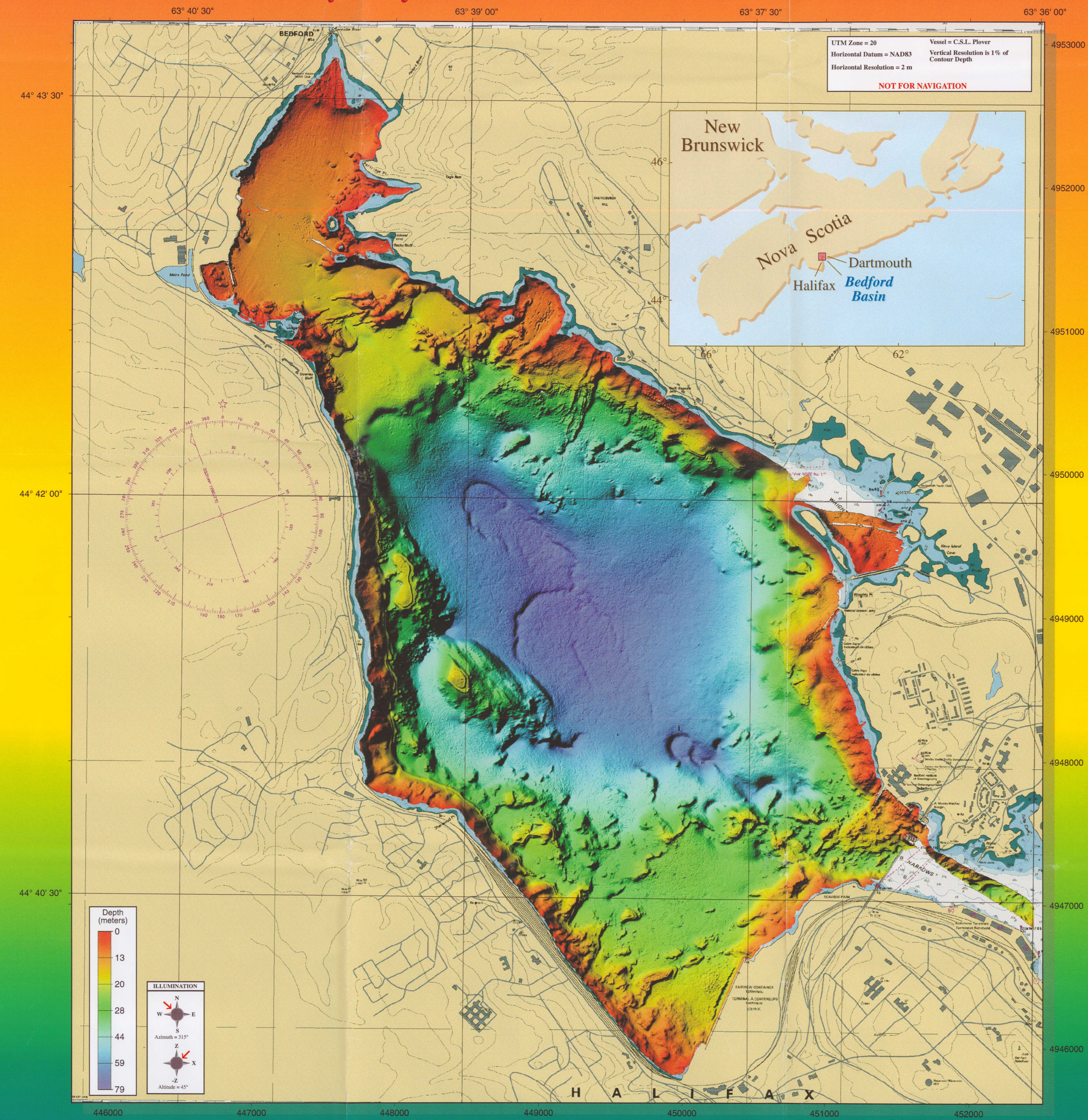
Bedford Basin, Nova Scotia: An interpretation of seabed features, materials, and processes based on geophysical and geological surveys and multibeam bathymetry



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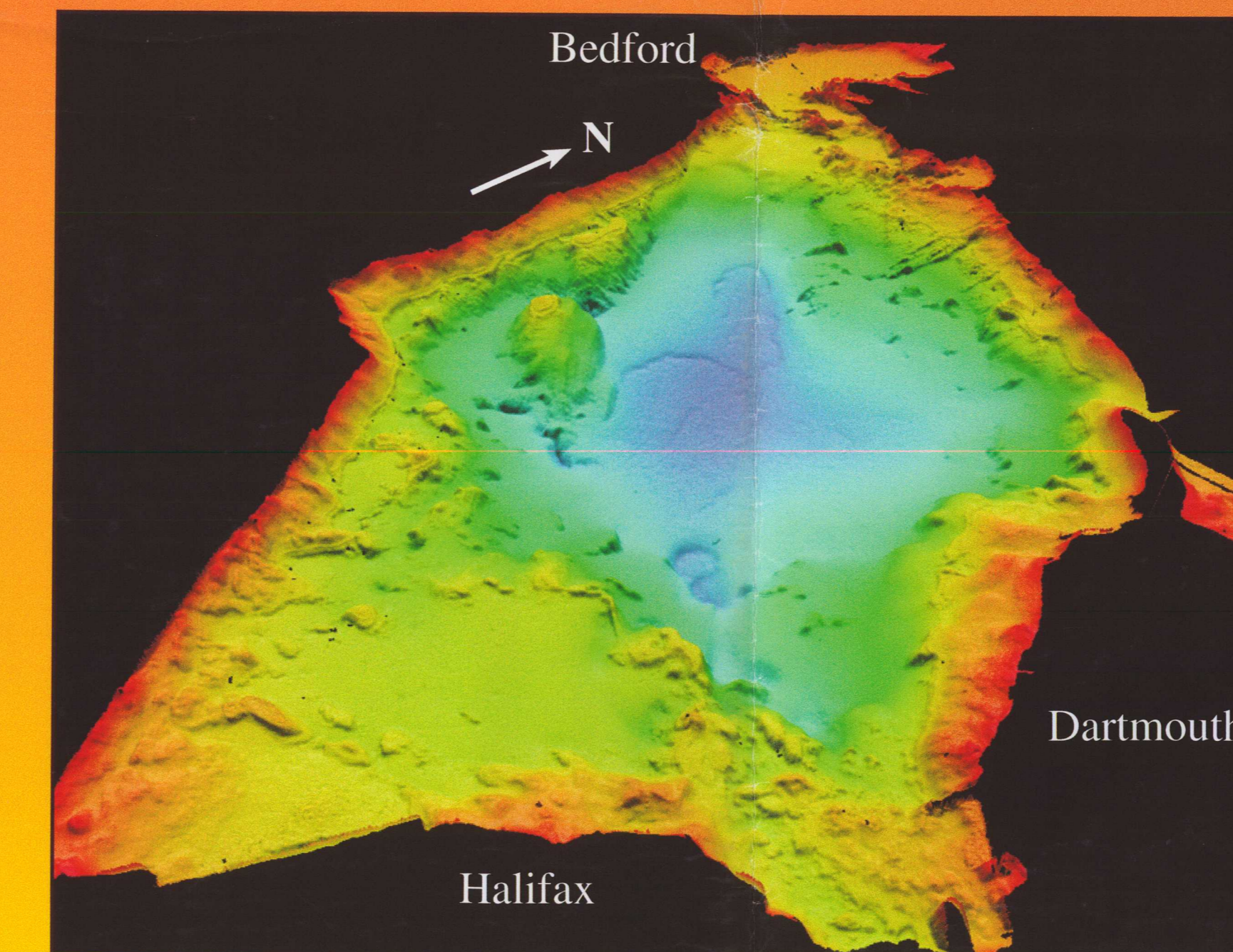
(A) Multibeam Bathymetry



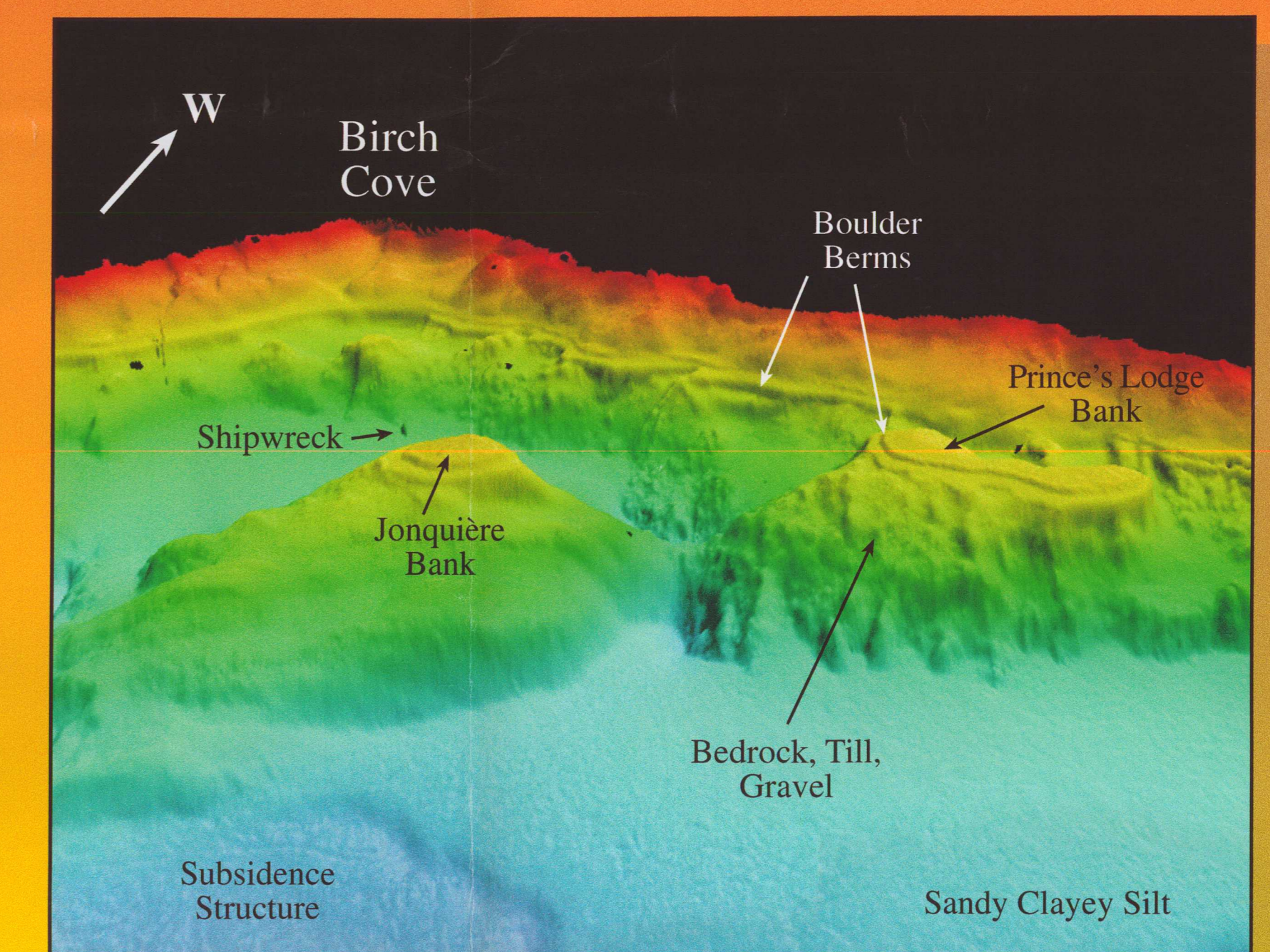
(B) Multibeam Bathymetry with Interpretation



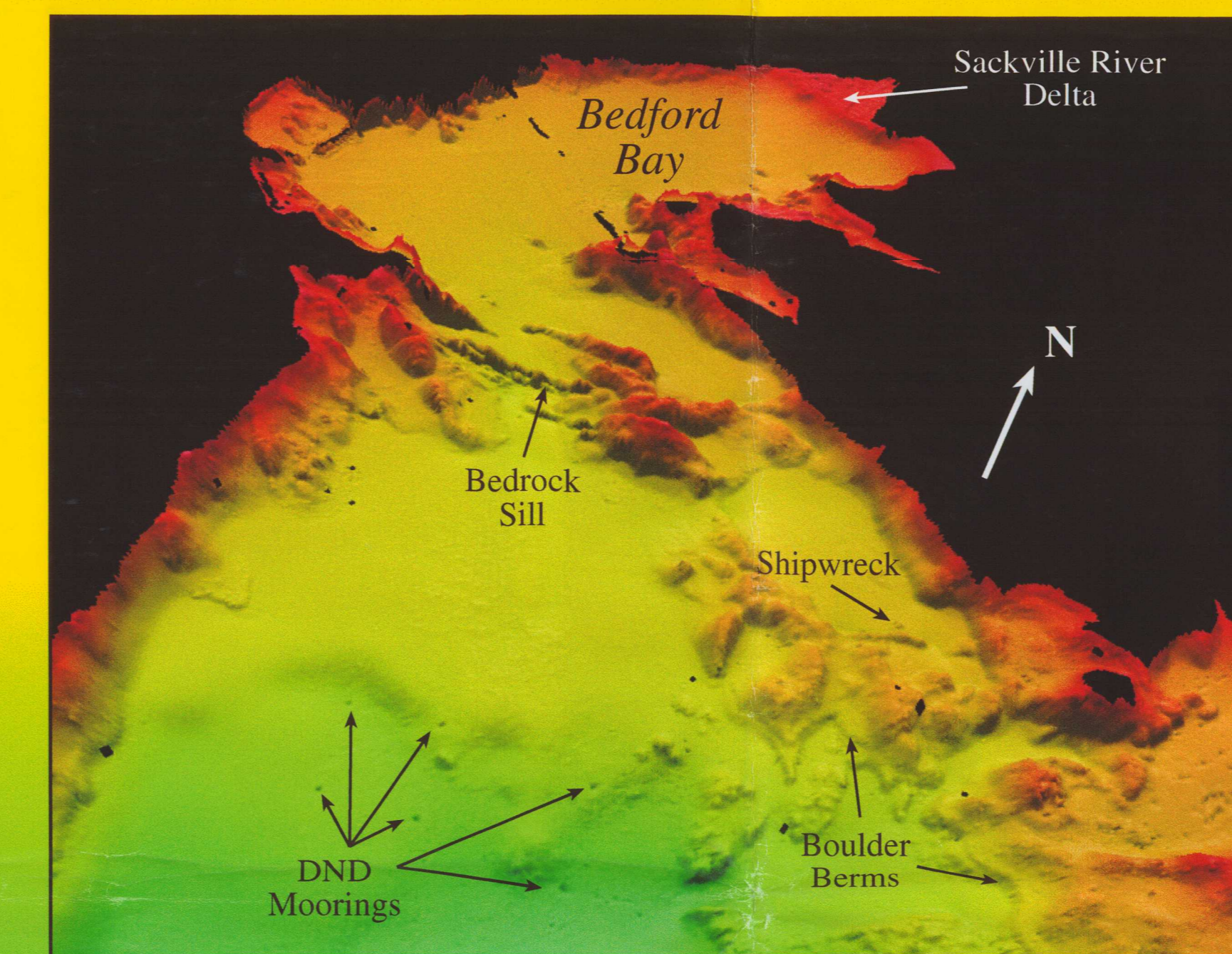
(C) 3-D Perspective Views of Bedford Basin



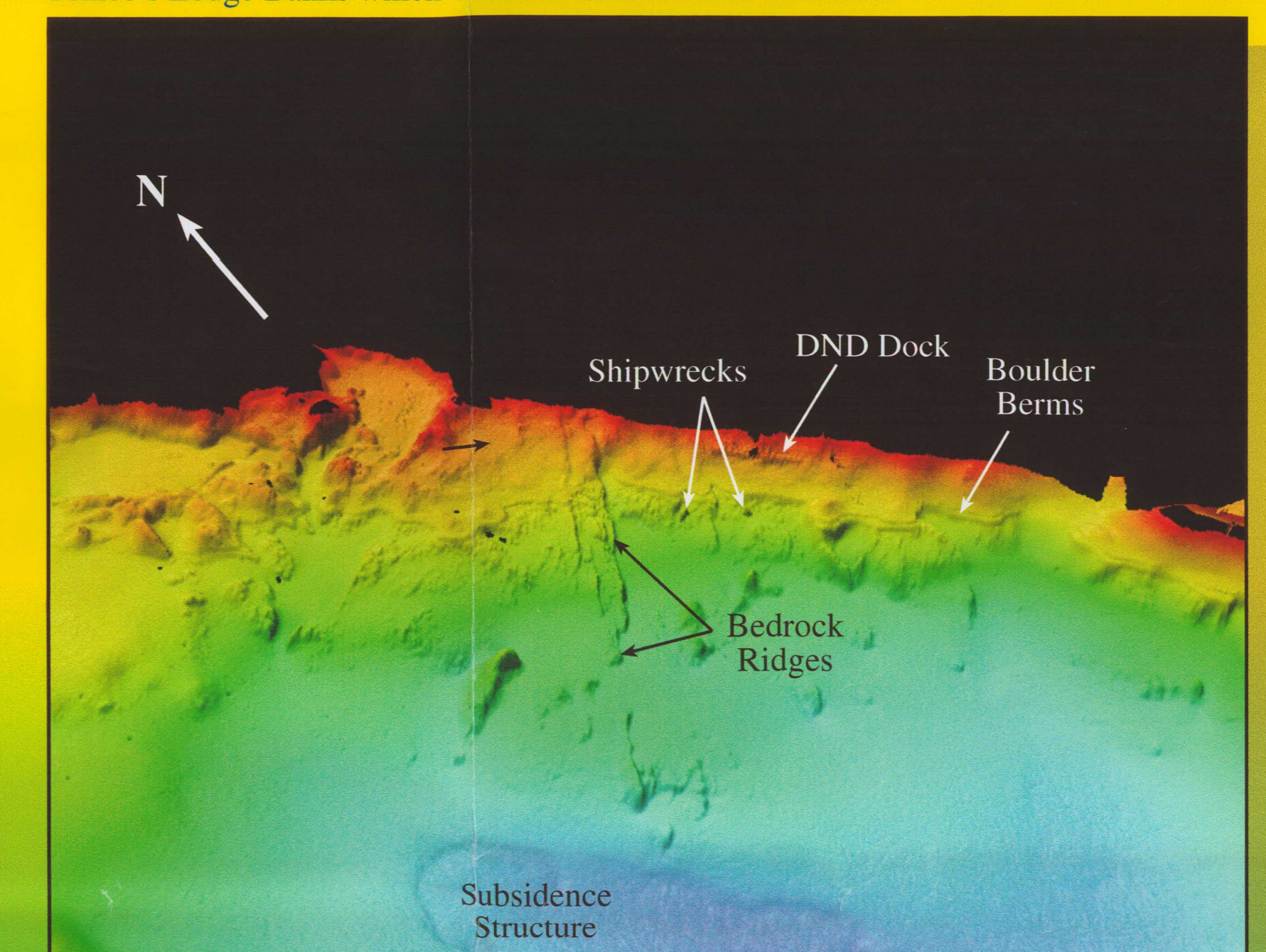
View of Bedford Basin from southeast to northwest.



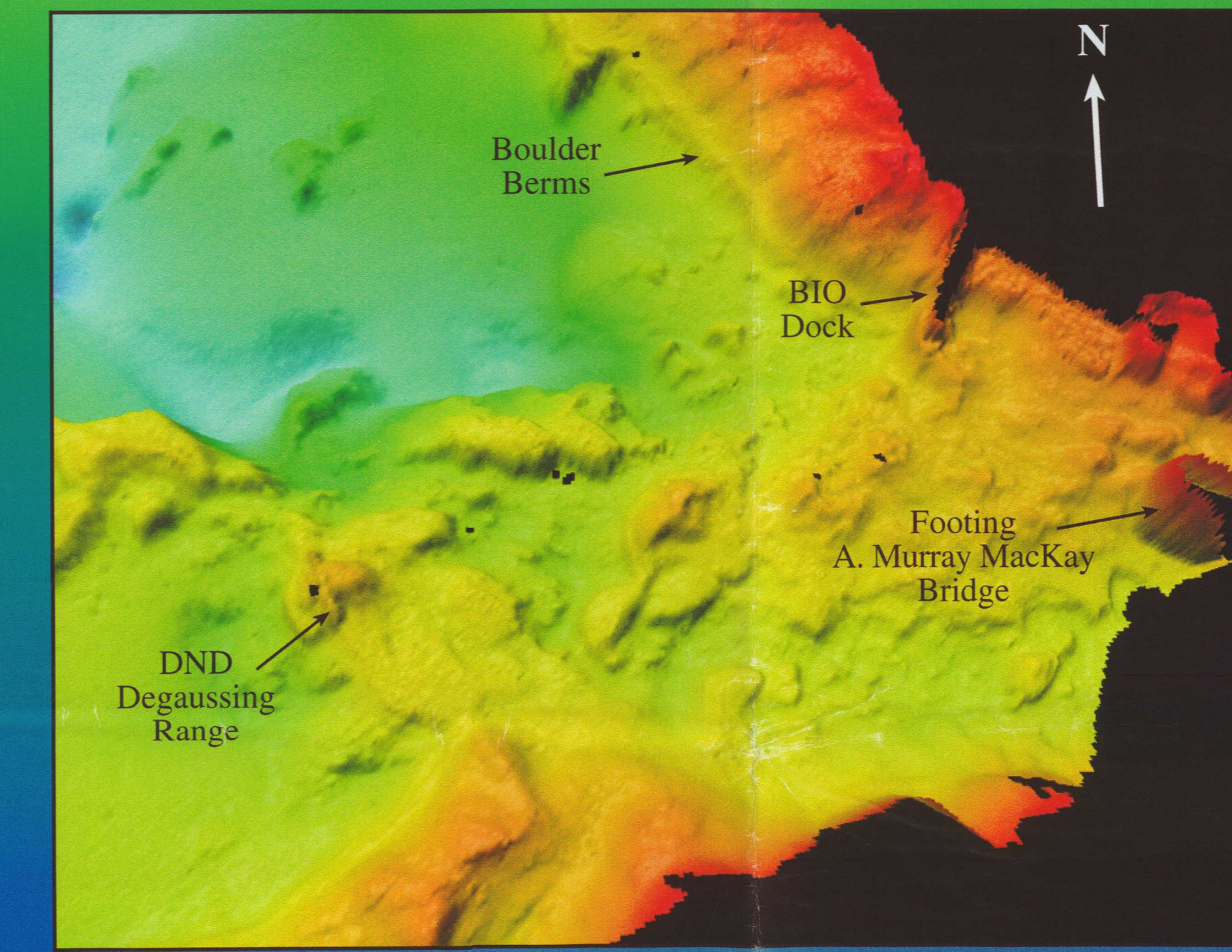
View to the west from the centre of Bedford Basin. The boulder berms show as continuous ridges and mark the former lake level at ~23m water depth. They ring Jonquière and Prince's Lodge Banks which were former islands in the Basin.



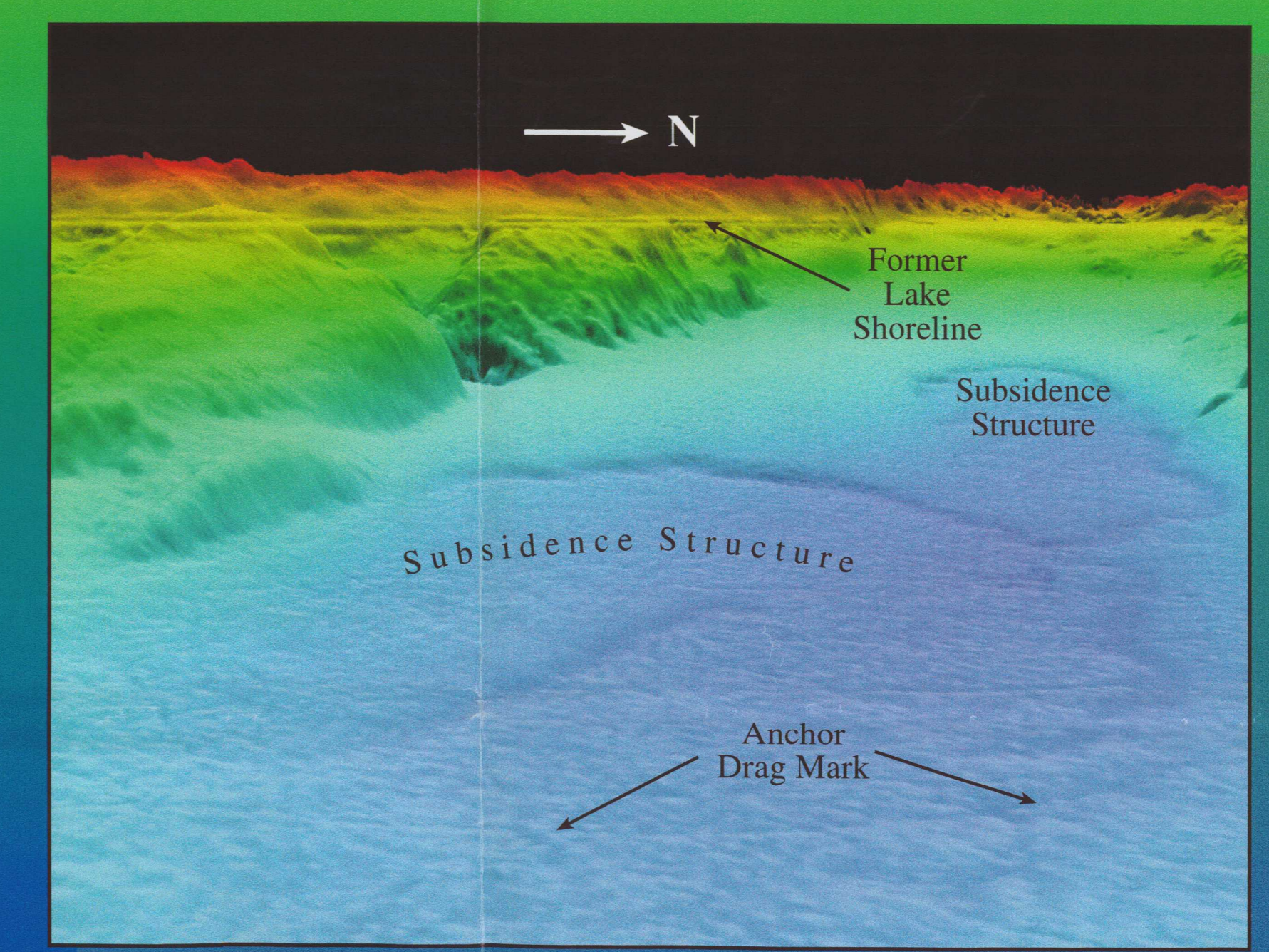
View to the north of northern part of Bedford Basin and Bedford Bay. The sill at Wellesley Ridge is almost continuous between Bedford Bay and the Basin proper. The course of an ancient Sackville River formed a waterfall over the bedrock ridge.



View to the northeast from the centre of Basin. Many isolated and linear bedrock ridges protrude through the muddy sediments.



Downward view of the southeast area of Bedford Basin at the junction with The Narrows. The seabed is rough and irregular, and bedrock controls the relief.



Low level view to the northwest. This image shows the uniform level of the boulder berms on the western side of the Basin. The large subsidence structures clearly show in the deep water.

This poster presents a multibeam bathymetric map (A) of the seabed of Bedford Basin, (B) an interpretation of seabed geology and processes, together with an assessment of natural and anthropogenic features, and (C) selected 3-D perspective images. The interpretation is based on a study of the Basin conducted over a 10 year period between 1988 and 1998 using sidescan sonar systems, seismic reflection profilers, cores, sediment samples, submersibles, bottom camera video and still photography. The multibeam data were collected by the Canadian Hydrographic Service in December 1998 / January 1999 using a Simrad EM 3000 system and provides an integrated morphologic framework for the interpretations. The resolution of the image is approximately 2m.

The bathymetric imagery was generated using software provided by the Ocean Mapping Group of the University of New Brunswick. Processing was carried out by the OMNI (Ocean Mapping and Navigable Imagery) Group of CHS Atlantic.

Multibeam bathymetry has become a standard tool for marine geologists in the study of seabed morphology, materials, features and processes. It has matured technologically, gained wide acceptance by practitioners, and is an important tool to help direct future survey efforts.

Multibeam bathymetry provides 100% seabed coverage, giving morphologic images of the seabed similar to aerial photographs of land areas, minus the interference of vegetation and urban development. This allows the confident connection and correlation of information from widely-spaced tracks of seismic and sidescan data to correctly orient structural trends and features. The manipulation of the digital bathymetric data by techniques such as varying vertical exaggeration, artificial illumination of the image at a variety of altitudes and azimuths, and the application of colour, allows subtle aspects of seabed relief to be enhanced and clearly visualized. These subtle aspects, which result from complex interactions of currents, waves, geological processes, and anthropogenic activities, can be interpreted to understand the evolution of the seabed environment.

Some of the unique and unusual features of Bedford Basin include: 1) the presence of ringed boulder berms at 23 m water depth which formed as ice-push ridges when the Basin was a lake 5800 years ago, 2) large horseshoe-shaped depressions on the deep-water floor of the Basin resulting from subsidence of the seabed from leaking biogenic methane gas or water, 3) the presence of numerous former islands in the west emerged when the Basin was a lake, 4) widespread anchor marks, and 5) a variety of shipwrecks and debris, largely unidentified.

An understanding of seabed materials, processes and a geological history of the Basin provides essential knowledge for management of this resource, including engineering activities, fisheries habitat management, the location of waste-water treatment outfalls, archaeological explorations, and military applications.

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