The Rising Tide

Report on Fieldwork November 2010

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Western shores of the Bay of Firth across to Damsay, showing skerries at Coubister emerging at low tide.

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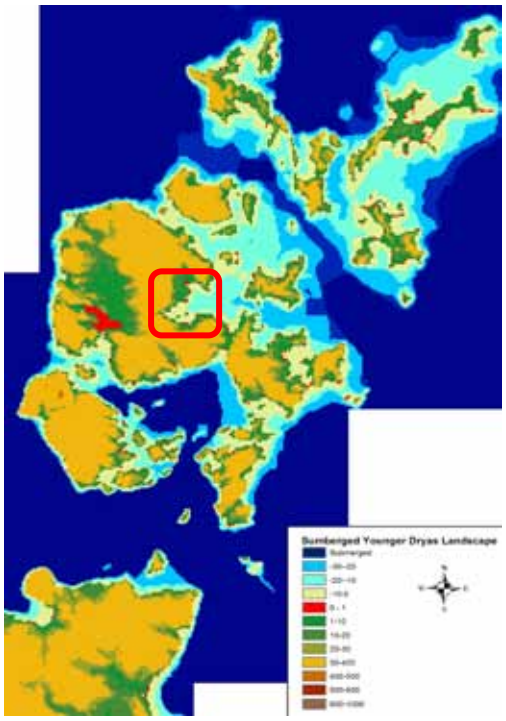
Introduction

The Rising Tide is a project into the changing environment of Orkney and its impact on the past settlement of the islands. In particular research is being conducted on the rising relative sea-level since the Early Holocene and the possibility that once-terrestrial sites may be preserved on the seabed.

The third season of field research in 2010 comprised a week of fieldwork in the Bay of Firth (Illus 1) from 11th November. The field research team comprised Caroline Wickham Jones (archaeology - Aberdeen University), Sue Dawson (geography - Dundee University), Richard Bates (marine geophysics - University of St Andrews), Martin Bates (environmental archaeology – University of Wales, Trinity St David) and Steven Birch (archaeology and diving).



Illus 1: GIS reconstruction of the submerged landscape of Orkney in the Younger Dryas. Red box marks the location of the Bay of Firth.

Aims

1. To enhance and expand the bathymetric survey of the bay floor
2. To examine further reaches of the intertidal zone in order to identify in more detail the presence of potential archaeological remains.

Objectives

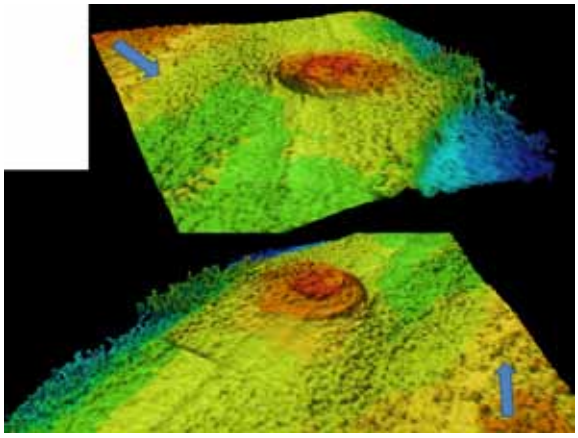
1. To gain a better understanding of the topography (bathymetry) of the bay floor with the aim of understanding possible palaeo-landscapes
2. To identify targets for future diver or ROV survey that may be of anthropogenic origin.
3. To subdivide the bay floor into hard rock and soft sediment zones in order to identify targets for coring on the sea bed.
4. To identify (if possible) features within the intertidal zone that project into the off-shore area surveyed in the bathymetric survey in order to obtain a seamless survey from dry to wet conditions.

Background

The Bay of Firth lies at the heart of the archipelago and is a protected, shallow bay with water depths of 3-12m. It has been selected for detailed survey because of its sheltered position, geophysical structure, and strong ethno-archaeological record. Within the bay lie two islands, Damsay and Holm of Grimbister. While Holm of Grimbister is joined to the mainland by a tidal causeway Damsay lies further out, but local ethno-archaeological information suggests the presence at one time of a causeway to the west, across a stretch of shallow water and existing skerries.

During 2009, geophysical surveys were conducted in the bay using a SEA SwathPlus High frequency sonar. The sonar recordings were acquired mainly around the island of Damsay. In March 2010 ground truth information was acquired on a number of geophysical targets using a diver-based survey. Analysis of both the geophysics and the diver-based survey revealed a number of potential target types (Bates *et al* 2010) including:

- Mounds (Illus 2),
- isolated blocks,
- linear features
- complex scatterings.



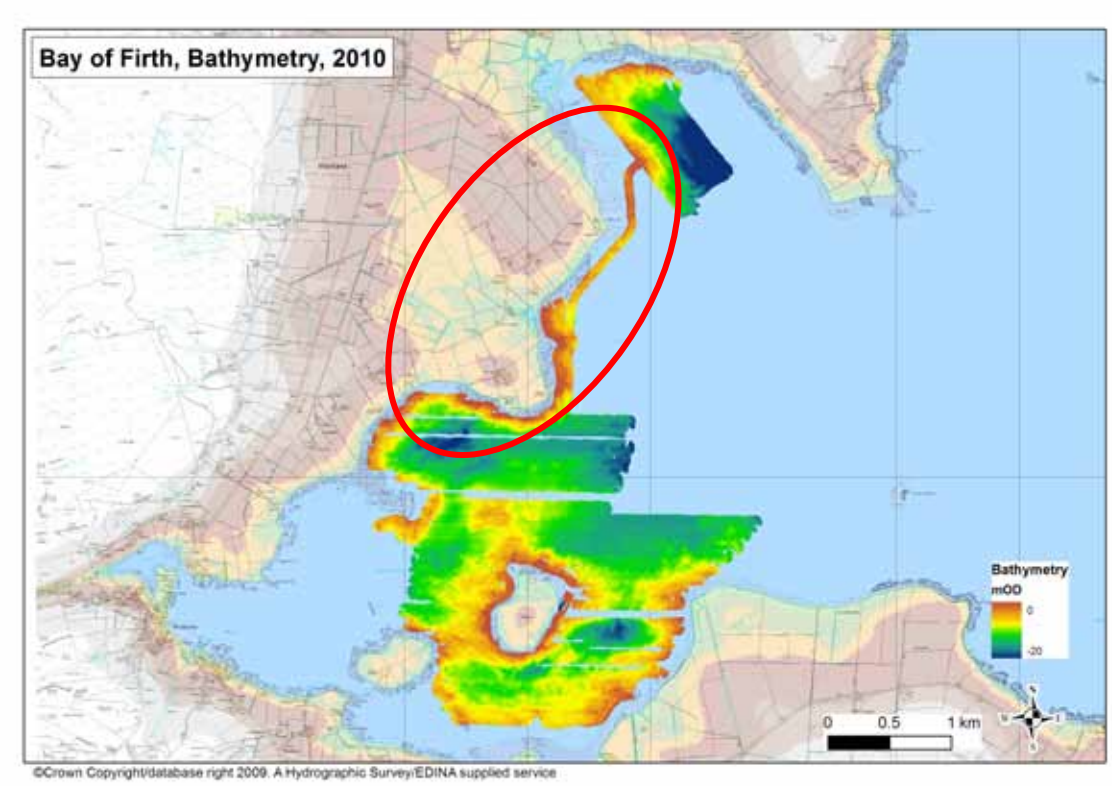
Illus 2: Circular mound anomaly: potential archaeological site.

Methods and Activities

Work in November 2010 combined intertidal and bathymetric survey.

Intertidal Work

Two main areas of intertidal foreshore were examined on the northern margins of the bay (Illus 3). The first of these areas was located along the foreshore at Quatquoy (BNG 338167, 1015758). Here a series of ephemeral structures including linear walls running at right angles to the beach (Illus 4) were identified. Interestingly the structures appear to have been cut into pre-existing organic sediments that are locally preserved beneath the beach at this location. Further along the beach stone structures were noted in the actively eroding cliff (Illus 5). Finally at the eastern end of the beach walls associated with the eroding broch at Burness were seen (Illus 6)).



Illus 3: Bay of Firth November 2010: extent of bathymetry and foreshore survey

Illus 4 (a – c): Stone walling at Quatquoy showing relationship to local organic sediments

Illus 5: Quatquoy: feature in eroding cliff

Illus 6 (a – b): Broch at Chapel Knowe, Burness: walling exposed on the foreshore and stone outlier emerging at low tide.

A second stretch of intertidal foreshore was examined along the south side of Isbister Bay (BNG 339661, 1017033). Here a number of linear features was found (Illus 9). At the point at Black Taing a series of walls potentially delimiting some form of fishing structure, comprising two cleared rectilinear areas at angles to one another, c. 25m x 8m, were located (Illus 7)), they did not reach low water mark. Immediately to the north a long, sinuous wall form was located (Illus 8). This extended down and below low water mark.

Illus 7: Cleared rectilinear area at Black Taing.

Illus 8: Sinuous walling running below low water mark at Black Taing.

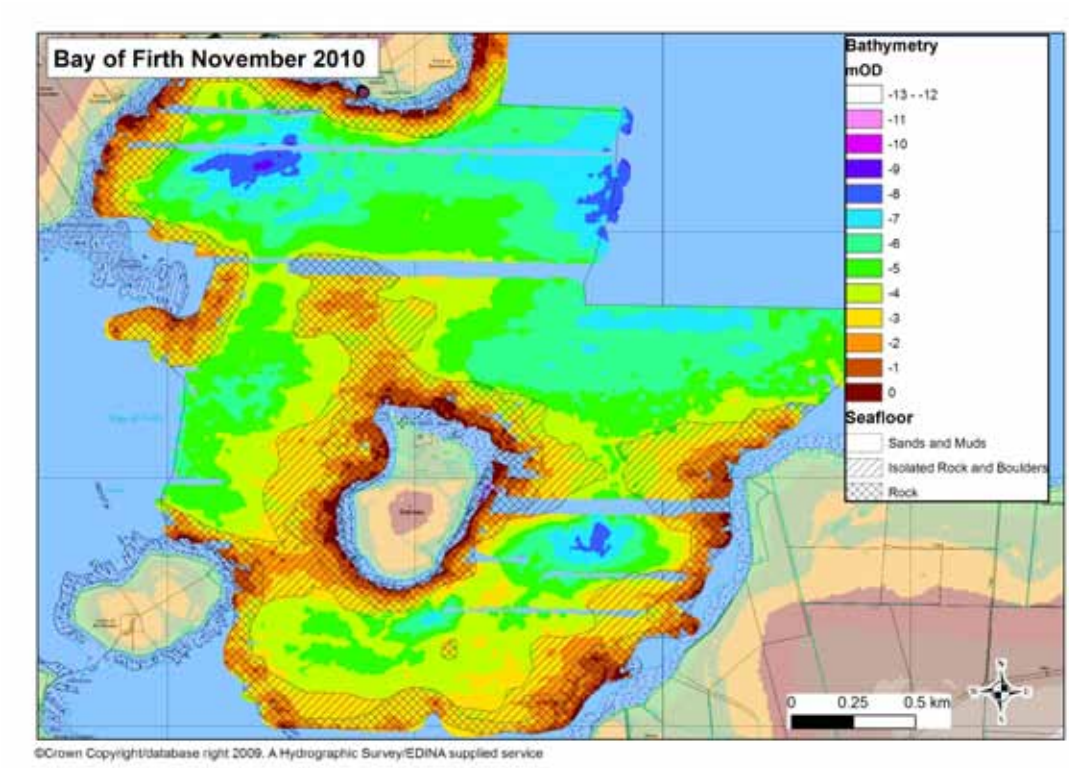
Illus 9: Features in the intertidal zone, Black Taing

To the north of Black Taing, at Couba, a feature, or series of features, was recorded. This comprised pairs of small upright stones set tightly against one another to make circular formations and it lay within the intertidal zone.

Illus 10 a & b: Couba, stone features.

Bathymetric survey

A bathymetric survey was conducted using a 468kHz SEA SwathPlus bathymetric sidescan. The survey was conducted along east-west lines separated by 50m with an average sonar swath width of 80m thus ensuring overlap between surveys. Survey lines were acquired to the south and north of Damsay and also in the bay of Isbister (Illus 11).



Illus 11: Bay of Firth, November 10: Bathymetry and seafloor cover.

Discussion

The intertidal survey clearly demonstrated the survival of substantial and likely significant archaeological features in this part of the bay. Furthermore, the apparent absence of comparable material in the south and east of the bay suggests that structural material like this might be more common on the northern side of the bay than the south.

Significant differences were noted in the nature of the construction of the stone built features. For example the walling structure of the stone walling at Quotquoy (Illus 4b) differed considerably from the broch walling seen at Burness (Illus 6 a & b) and this also contrasted with the walling to the north of Black Taing (Illus 8). The nature of bedrock was also notably different in the northern part of the bay where the thick slabs of near horizontally bedded sandstone that outcrops along the shoreline in the south bay area were replaced by thinner bedded, shale and siltstone units (Illus 12). This difference in bedrock type has implications for ground truth studies of submerged material, in particular those using observations from divers and ROVs. These preliminary investigations suggest that different characteristics for the identification of natural vs. anthropogenic features may need to be identified for different areas of study. This observation, while apparently intuitive, is one of the reasons that submerged archaeological landscape investigation has not progressed in the same manner as maritime wreck studies over the last ten years.

Illus 12: Thinner bedded shale and siltstone units predominate towards the north of the Bay.

The bathymetric survey now provides a baseline data set at a suitable resolution to begin to understand the bathymetry of the bay floor that once was a land topographic surface, as well as to identify and contextualise potential anomalies on this surface. The bathymetric map (Illus 11) clearly identifies undulating topography on the seabed that in part reflects rockhead topography as well as zones of sediment accumulation. The detail of the evidence remains to be fully evaluated; however, an example of the level of potential of this work includes the rock and shingle isolated ridge recorded as extending to the east of Damsay towards the mainland (Illus 11). This ridge contains a narrow central gap at approximately 4m below current sealevel. Behind the ridge lower ground is surrounded by higher ground in all directions (including between Damsay and Grimbister) implying a low lying area that may have been filled by a lake at times of lower relative sea-level. This ridge is also reflected in a similar feature funning to the north-west of Damsay towards the shore at Coubister. In this location added interest is provided by ethno-archaeological accounts of a causeway by which Damsay could, at times, be accessed by dry land.

With the existing data sets it has also been possible to outline a map of the nature of the seabed (Illus 11) for use in developing future strategies of work. Basic information relating to the location of sands and muds as opposed to rock and boulders is important for deciding the location of sediment cores to study past changes in sea-level and environment. In addition, it is clear that the archaeological potential and problems of the submerged land surface within the bay varies considerably according to geographical position and likely period of the remains. Work to date has focussed on the possibility of identifying upstanding Neolithic remains, due partly to the nature of the recorded anomalies, ethno-archaeological record, and existing, land based, archaeology of Orkney. Nevertheless, there is also the more ephemeral Mesolithic record, from earlier prehistory, to be considered. Mesolithic sites leave little footprint and are less likely to be recognised on the seabed, though they do occur in other parts of Britain and Europe. In Orkney, the growing body of data suggests that a palaeo-landscape approach to identify and investigate areas of likely Mesolithic activity might be more appropriate. At the same time, the isolation of specifically anthropogenic stone built features of likely Neolithic (or later) date as opposed to natural bedrock features requires its own set of ground truthing responses.

Conclusions

While the Bay of Firth is not large, it presents a complex submerged topography with considerable potential for the elucidation of the use of this landscape at two significant periods in prehistory: Mesolithic and Neolithic. Remains from the intertidal zone make it clear that human activity extends across the foreshore, both in the past at times of different environmental conditions and in the present.

Recommendations for future work and management

1. Complete bathymetric analysis and produce a geo-archaeological assessment map of the bay survey area.
2. Use geo-arch map to identify areas for field investigation including potential areas of Mesolithic activity to be tested by coring.
3. Survey transects of seabed using push coring to remove cores for micro-artefact sieving to identify areas of archaeological and other potential.
4. Sub-bottom profiling of key areas to address buried sediment architecture etc.
5. Preliminary analysis of sediments from core samples for palaeo-environmental data including pollen, ostracods...
6. Archive work on the oyster fishery to be tied in to possible archaeological pens at Black Taing.
7. Classification and analysis of stone settings and walling on land to include dimensions and orientation.
8. Continue work on assessment of likely stone features (anthropogenic and natural) on the seabed.

Illus 13: Survey vessel, the Envoy, passing as intertidal survey takes place

Outreach

Lectures since June 2010

Orkney Science Festival	Lecture	September	SD/CWJ
Mesolithic in Europe Conference Santander	Lecture	September	CWJ
MASTS/MREDS, Stromness workshop	Lectures	October	SD/CWJ
WHS Orkney (HS/OIC) workshop	Lecture	November	SD/CWJ
SAGES	Note	November	AD

Collaboration

Current discussions relating to possible collaboration include: Orkney College, HS Technical Conservation Group, BGS, The Crown Estate, Seasearch, ESRI Coleraine.

Publications

Wickham-Jones CR, Dawson S & Bates CR 2009, The Submerged Landscape of Orkney. *Archaeological Journal*, 166 (supplement: Orkney guide), 26-30.

Wickham-Jones CR, Dawson A, Dawson S, Bates R, Bates M, Nayling N forthcoming Transition Zone Prehistory: studying Early Holocene sea-level change in Orkney. *Orkney Archaeology Society Newsletter*.

Paper on initial sediment analysis being finalised

Paper on Methodology in preparation for submission to *Journal of Archaeological Science*

Website

http://www.st-andrews.ac.uk/tzp/

Reference

Bates R, Bates M, Dawson S, Nayling N, Wickham-Jones CR 2010 *The Rising Tide Report on Fieldwork, June 2010*.

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