Site 9 Philorth valley, Fraserburgh

The concealed sediments within the Philorth valley, on Sheet 97, include a sequence of estuarine deposits and interbedded peat. This sequence provides important evidence of the pattern of relative sea level change in north-east Scotland during the Holocene. Because of the marginal setting of the Philorth valley relative to the centre of postglacial isostatic rebound in the western Highlands, these deposits preserve a more detailed record of sea-level movements than is recognised from most other coastal localities (Smith et al., 1982; Smith, 1993).

The Water of Philorth is a small stream that drains north-eastwards to reach the coast 3 km south-east of Fraserburgh (Map 4). The estuarine deposits there are concealed beneath brown silty clay and blown sand at the northern end of the valley [NK 011 635], west of Milltown. The buried sequence records changes in relative sea level during the middle and late Holocene, including a transgressive episode not recognised elsewhere in Scotland. Mapping, levelling and coring by Smith et al. (1982), proved a succession of sands and gravels overlain by peat, with interbeds of grey sand and micaceous sandy silt, beneath the brown silty clay (Figure A1.12).

The most detailed study of the organic sediments was done on cores from Milltown and Philorth Home Farm. Smith et al. (1982) undertook pollen analysis and ^{14}C dating of the deposits at the latter site and nine radiocarbon dates were obtained from the study area (including two from a core at Milltown and five from a core at Mains of Philorth). These analyses showed that the basal peat, grey sand, and the peat below the micaceous sandy silt are both of early Holocene age. Pollen from the sequence indicates scattered stands of birch and pine, with hazel and willow in the general area. The valley floor was subjected to a fluctuating water table, which resulted in the development of a variety of communities typified by sedges, grasses and aquatic plants.

Pollen from the top of the peat above the grey sand layer, in the overlying micaceous sandy silt and in much of the peat above it, indicates an increase in the occurrence of oak and alder; the silt is associated with high values of pine and oak. The top of the peat and the overlying brown silty clay yielded pollen indicating birch-oak woodland, with alder and local freshwater aquatic communities.

The grey sand layer recorded in cores from the lower end of the Philorth valley was deposited by one of a series of tsunami waves that struck the east coast of Scotland some 7000 years ago. The tsunami resulted from the second of three huge submarine landslides, known as the Storegga slides, which occurred on the continental margin at the southern end of the Norwegian Sea (Long et al., 1989; Smith and Dawson, 1990).

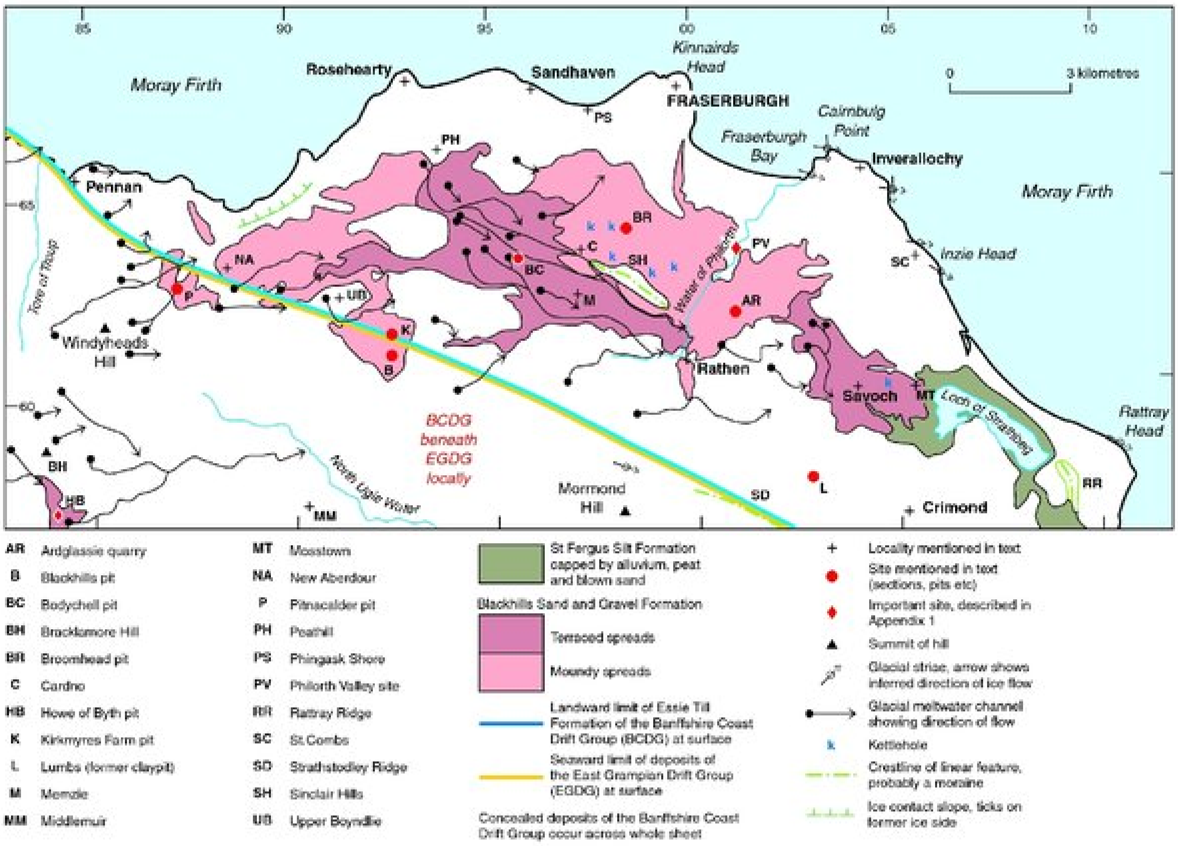
The age of the micaceous sandy silt is constrained by both the pollen and the radiocarbon dates, which indicate deposition during the middle Holocene (Table A1.7). The association of *Plantago maritima* pollen, together with the increase in representation of pine and oak, is characteristic of a littoral depositional environment (Traverse and Ginsberg, 1966) and indicate that the silt is of marine-estuarine origin. Smith et al. (1982) suggest that this deposit represents local expression of the Main Postglacial Transgression (when sea level was relatively higher than at present). They interpret the radiocarbon evidence as showing that the transgression was underway in the area by 6300 ± 60 ^{14}C years BP and that it culminated after 6096 ± 75 ^{14}C years BP. Surface peat growth had recommenced by 5700 ± 90 ^{14}C years BP. These dates are somewhat later than those proposed for this event from sites farther to the south (Smith, 1993) and may be taken as evidence that the transgression was diachronous and resulted in the formation of a time-transgressive shoreline. The brown silty clay present at the surface began to accumulate at about 4760 ± 60 ^{14}C years BP as the result of a second rise in relative sea level, again to above present OD.

(Table A1.7) Radiocarbon dates from sites in the Philorth Valley (after Smith et al., 1982)

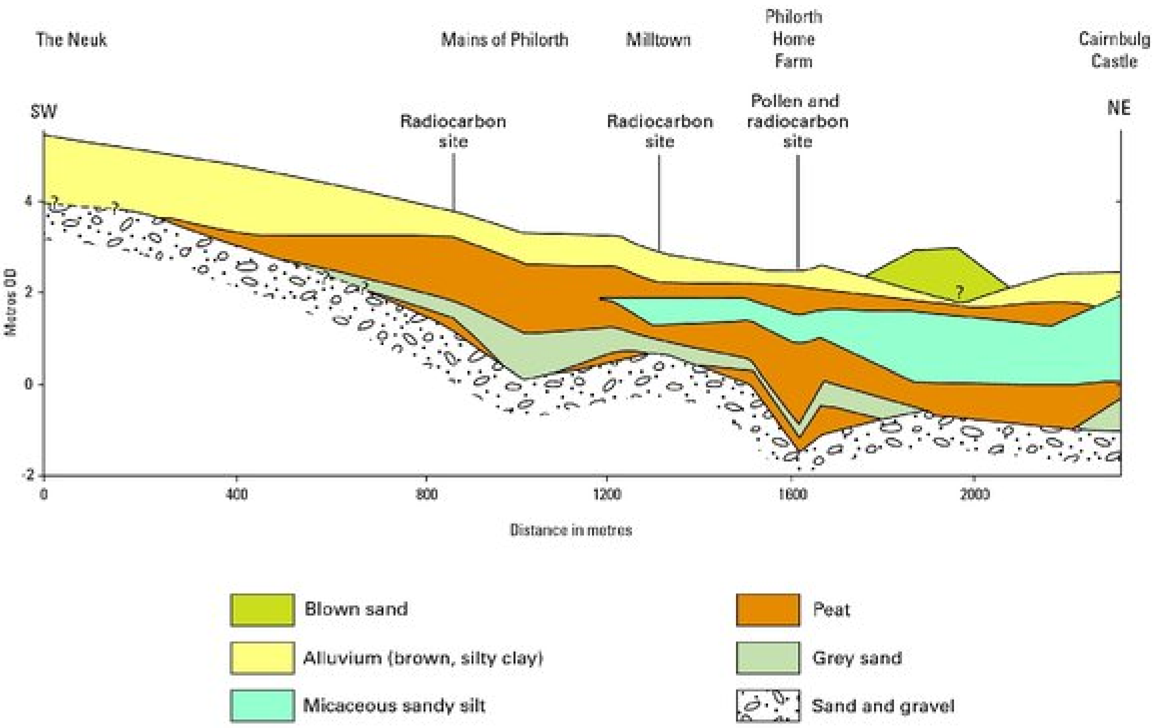
Location	Details of sample	Altitude (metres OD) of sample at contact with minerogenic layer	Age (^{14}C years BP)	Laboratory number

Philorth Home Farm	Bottom 2 cm of peat above micaceous sandy silt	1.48	5700 ± 90	SRR-1660
Philorth Home Farm	Top 2 cm of peat below micaceous sandy silt	0.82	6300 ± 60	SRR-1661
Milltown	Bottom 2 cm of peat above micaceous sandy silt	1.81	5140 ± 60	SRR-1686
Milltown	Top 2 cm of peat below micaceous sandy silt	1.11	6095 ± 75	SRR-1687
Mains of Philorth	Top 1 cm of peat below brown silty clay	2.59	4760 ± 60	SRR-1655
Mains of Philorth	Bottom 2 cm of peat above grey sand	1.51	6150 ± 250	SRR-1656
Mains of Philorth	Top 2 cm of peat below grey sand	1.47	6885 ± 90	SRR-1657
Mains of Philorth	Bottom 2 cm of peat above grey sand	1.40	7510 ± 120	SRR-1658
Mains of Philorth	Top 2 cm of peat below grey sand	1.34	8465 ± 95	SRR-1659

References



(Map 4) Glacial and glaciofluvial features and the distribution of glacigenic deposits on Sheet 97 Fraserburgh.



(Figure A1.12) Generalised transect along the lower Philorth valley showing radiocarbon and pollen sites used in the construction of the local Holocene sea level curve (after Smith et al., 1982).

Location	Details of sample	Altitude (metres OD) of sample at contact with minerogenic layer	Age (^{14}C years BP)	Laboratory number
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