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# John o'Groats, Caithness

[ND 380 735]–[ND 407 735]

Potential ORS GCR site

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## Introduction

The John o'Groats GCR site is already accorded protected status on account of its Mid-Devonian fish fauna, preserved in the John o'Groats Fish Bed. This is the best site for the highest Mid-Devonian fauna in Caithness and is described in the companion GCR volume on the *Fossil Fishes of Great Britain* (Dineley and Metcalf, 1999). The following account summarizes the account of Dineley (in Dineley and Metcalf; 1999) and incorporates important Old Red Sandstone sections to the east at Ness of Duncansby and Duncansby Head (Figure 2.49). The area provides the type locality of the John o'Groats Sandstone Group, the highest Middle Devonian unit of Caithness. The John o'Groats Fish Bed crops out on the foreshore 365 m north-east of the John o'Groats Hotel. Since the first reported discovery of *Microbrachius dicki* by Peach (1868), the bed has yielded complete fish remains, although in less rich concentrations than the earlier fish beds in the Caithness Flagstone Group (Westoll, 1948). Trewin's (1993) field guide to the section and to the outcrops at Ness of Duncansby and Duncansby Head provides the basis of this account. Donovan (1978) gave a summary.

## Description

Red sandstones of the Last House Formation (Foster, 1972; Donovan *et al.*, 1974) dominate the lowest outcrops, seen immediately east of the harbour [ND 380 735]. They occur in beds up to 50 cm thick, in which trough and planar cross-bedding, parallel lamination with primary current lineation and ripple cross-lamination are seen. Soft-sediment deformation de-watering structures are common (Astin, 1985). Green to grey, thin-bedded sediments 100 m east of the harbour contain arrays of polygonal desiccation cracks, as well as wave- and current-rippled beds and lenticular cracks of subaqueous origin. Dineley (1999a) gives a detailed section. Three thin, dark grey, calcareous, varved siltstone laminites with pale carbonate concretions contain scattered fish fragments. The lowest of these is the 0.25 m-thick John o'Groats Fish Bed, which has yielded *Pistichopterus alatus*, *Pentlandia macroptera*, *Microbrachius dicki*, *Watsonosteus fletti* and *Dipterus* sp.. The fauna of this fish bed is typical of the Eday Group of Orkney, and although fish fragments occur elsewhere, this is the only known bed to yield whole specimens in the 610 m-thick John o'Groats Sandstone Group. The beds are displaced by a small NE-trending fault in a notch on the foreshore, and are only visible at low tide. Red sandstones and grey-green laminites with fish scales crop out to the east.

Permian volcanic rocks intrude the John o'Groats Sandstone Group in the axial area of a syncline at Ness of Duncansby [ND 390 739]. There are two exposures, but it is not clear if they represent a single vent or two separate ones. Nepheline basalt dykes cutting the vent agglomerate have been K–Ar whole-rock dated at around 270 Ma (Macintyre *et al.*, 1981; Stephenson *et al.*, 2003).

To the east of Ness of Duncansby, sandstones and laminites lie on the eastern limb of the syncline, dips increasing to 40° in the Bay of Sannick. A dark grey laminite visible at low tide here may be the John o'Groats Fish Bed. To the east, the John o'Groats Sandstone Group is faulted against the Mey Subgroup (Upper Caithness Flagstone Group), the latter forming Duncansby Head [ND 405 735]. The fault is marked by a gully, and, on the foreshore, a zone of fractured rocks. The John o'Groats Sandstone Group here comprises high-energy, channelized fluvial sandstones with trough and planar cross-bedding and low-angle planar bedding, and lacks the lacustrine fades seen to the west. Fining-upward cycles commence with flat-bedded, fine- to medium-grained sandstones with large-scale planar and trough cross-bedding. Intraformational mudstone clasts line the bases of units, which overlie erosion surfaces. The cycles end with thinner-bedded parallel- and ripple-laminated sandstones passing up into red and pink mudstones. The trough cross-bedding indicates consistent north-east palaeocurrents. Individual sandbodies are wedge-shaped and up to 1 m

thick and 10 m wide. The Stacks of Duncansby offshore preserve more continuous sheet-like bodies up to 1 m thick. The Mey Subgroup comprises the typical grey-green, thinly bedded flagstones.

## Interpretation

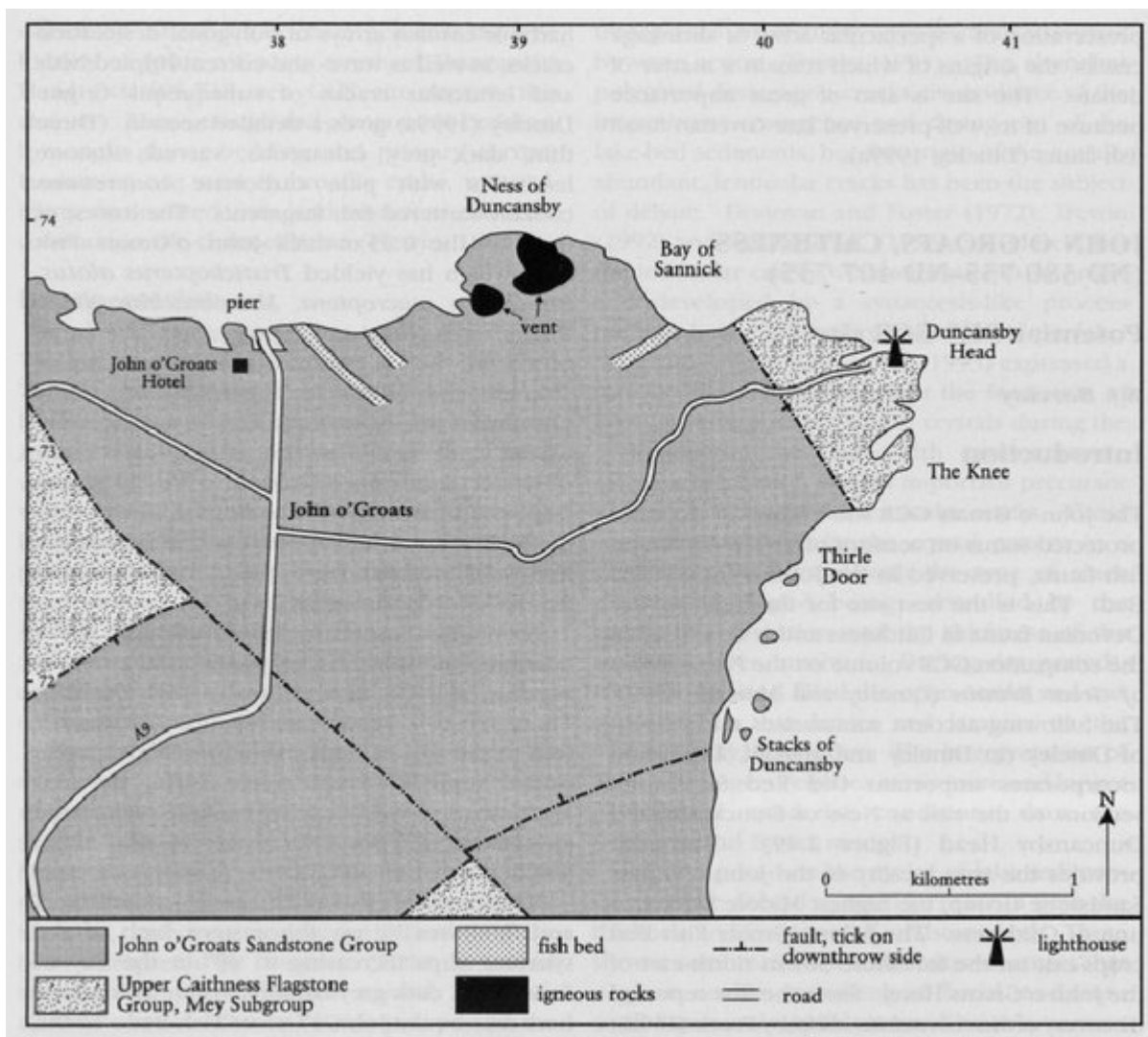
The John o'Groats Sandstone Group is interpreted as the deposits of shallow, braided or low-sinuosity streams on a broad, low-angle alluvial fan (Foster, 1972) that was subject to periodic inundation by lake waters. The John o'Groats Fish Bed has yielded fewer species than the earlier fish beds of the Orcadian Basin, suggesting to Dineley (1999a) that the fluvial-dominated environments were less suitable for some fish groups and that a long period of climatic stability may have given way to more aridity and only punctuated lacustrine lake development and fish habitation during cooler and/or wetter periods. The dark grey, fish-bearing laminites record periods of more permanent, deeper lacustrine conditions.

There appears to be a substantial amount of strata cut out by the fault separating the Mey Subgroup from the John o'Groats Sandstone Group east of the Bay of Sannick. The John o'Groats Sandstone Group is correlated with the Eday Group of Orkney (Astin, 1985), and on the basis of their respective fish faunas, it appears that all of the *Asterolepis orcadensis* Zone (Watson, 1935) is absent in Caithness (Dineley, 1999a).

## Conclusions

The John o'Groats site is protected because of the presence of the John o'Groats Fish Bed, the best occurrence of a latest Mid-Devonian fish fauna in Caithness. It allows comparison with the richer faunas of Orkney and shows that lake development here was sporadic, with alluvial deposition being predominant. The outcrops around and to the east of the site are also important in providing the type locality of the John o'Groats Sandstone Group and the most easterly outcrops of the Mey Subgroup on the Scottish mainland.

## [References](#)



(Figure 2.49) Map of the John o'Groats-Duncansby Head area. Based on British Geological Survey 1:50 000 Sheet 116 (Scotland), Wick (1985) and Trewin (1993).