

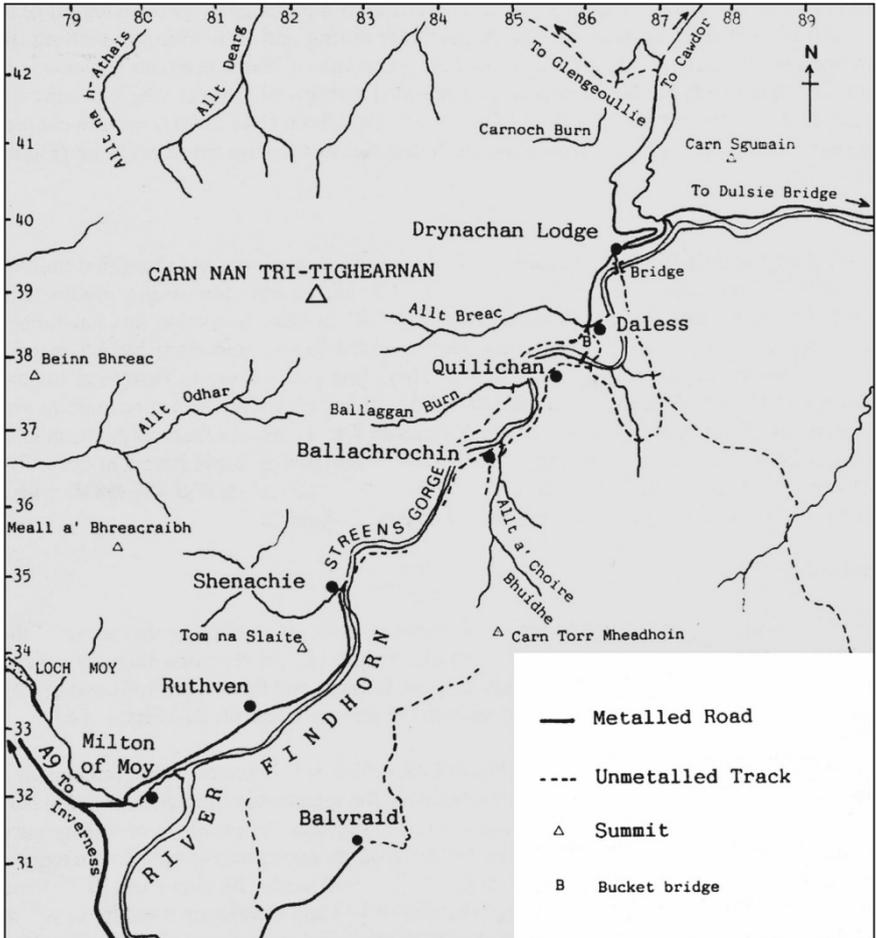
## The Daless Viewpoint in the Middle Findhorn Valley

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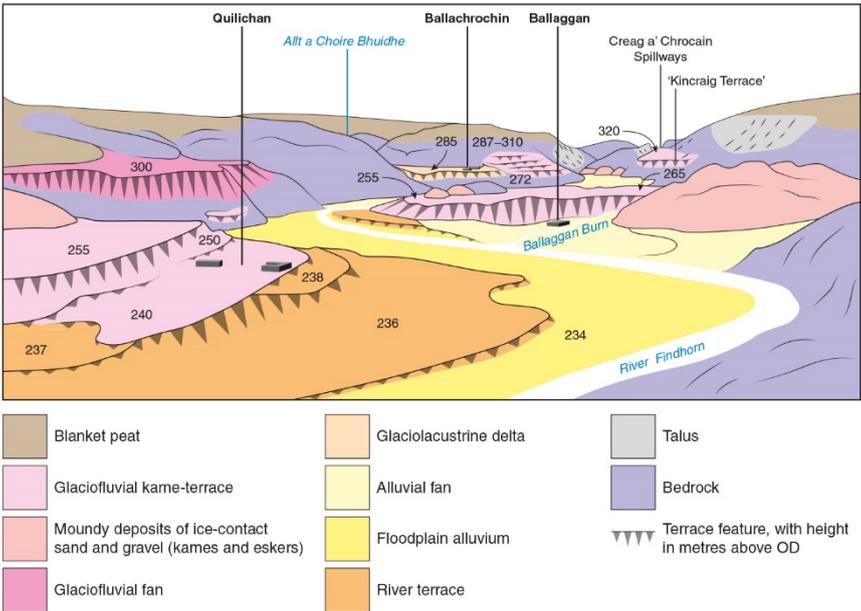
The Findhorn valley, downstream of the Streens Gorge (Fig. 107), contains a particularly good assemblage of glacial features and deposits formed during, and following, the melting the last ice-sheet. This remote area is located 30 km south of Nairn, upstream of Drynachan Lodge [NH 865 397]. It is notable for a series of glaciofluvial and fluvial terraces that occupy the lower part of the north-west-facing slope of Carn Torr Mheadhoin (543 m OD), together with extensive glacial and glaciofluvial deposits found within the valley between Daless and Creag a' Chròcain (McEwen and Werritty, 1993).

The Daless viewpoint [NH 858 383] can be reached on foot. It is at a curve in the unmetalled track that runs southwards from the end of the public road at Daless [NH 860 385,] on the western side of the Findhorn Valley. There is room to park vehicles beside the public road near Daless, before walking across the Allt Breac, along the track, which climbs the mounded topography for a distance of c. 350 m to overlook the river valley (Fig. 108).

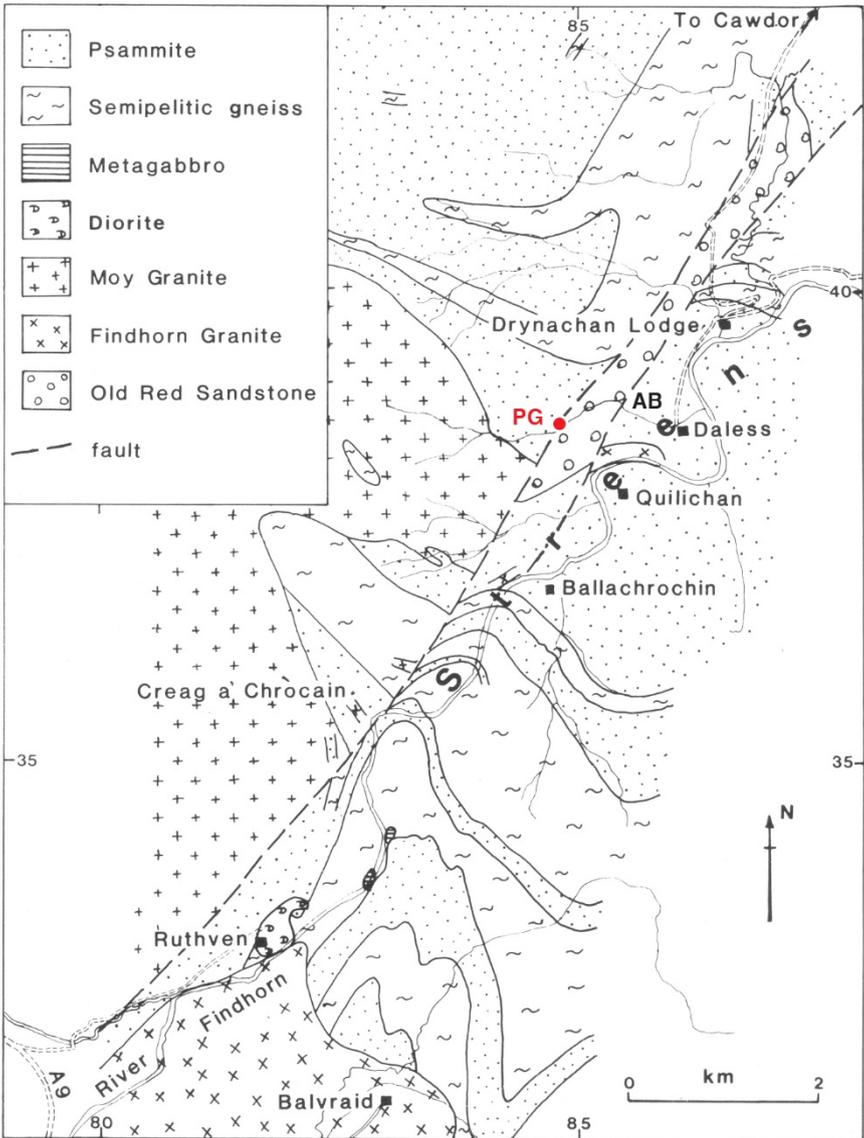
The trend of the valley of the River Findhorn for several miles upstream of Drynachan Lodge has been claimed to have been influenced by the NNE-SSW alignment of a pair of faults that form a graben within which Middle Old Red Sandstone strata occur (Figs. 2 & 109) (Horne, 1923; Bremner, 1939) (see **Bedrock Geology**). It is more probable, however, that increased intensity of jointing in the Central Highland Division metasedimentary rocks adjacent to the faults was responsible for the river following its present course, rather than the existence of a formerly more extensive, down-faulted outlier of ORS. For example, the higher of two spillways on the Creag a' Chròcain follows a zone of shattering along the line of a major fault (Auton, 1990). The jointing may have influenced the initial pattern of drainage, which is thought to have developed during the Palaeogene and Neogene (Bremner, 1942; Linton, 1951) (see Jarman chapter).



**Figure 107.** Locality map of the Middle Findhorn Valley showing principal sites (from Auton, 1990a).



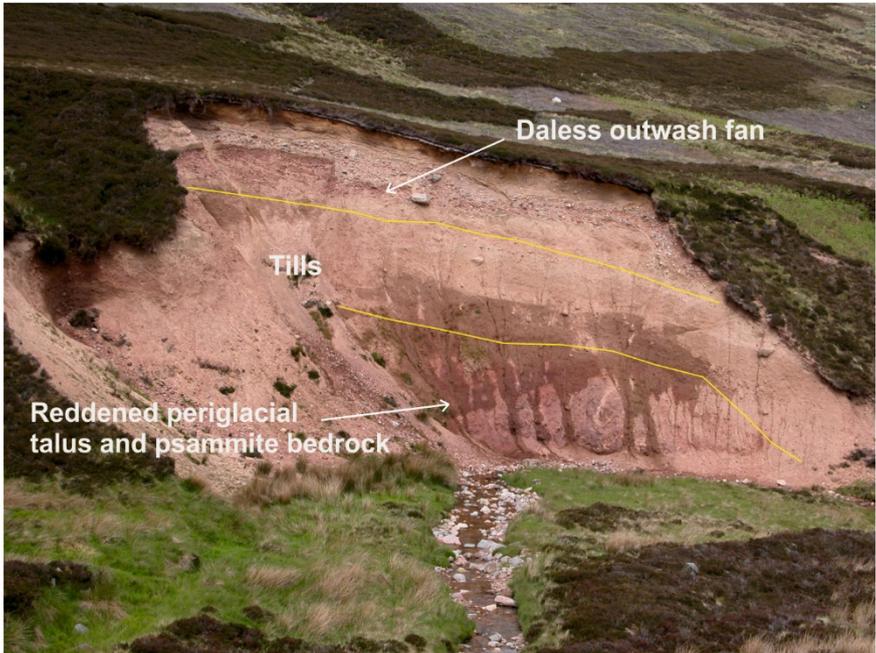
**Figure 108.** The Middle Findhorn Valley looking south-westwards (upstream) from the viewpoint at Daless. Elevations of features are given in metres above OD.



**Figure 109.** The bedrock geology of the Streens area; modified after Robertson (1990). AB – Allt Breac; PG – periglacial talus site.

A remnant of the Devonian strata within the graben (Middle ORS Daviot Conglomerate) is exposed in a narrow gorge of the Allt Breac at [NH 854 388]. The reddened, shattered metasandstone that lies unconformably below the ORS is exposed in the stream bed some 60 to

80 m upstream. The shattered metasandstone passes upwards into an angular gravel, composed entirely of metasandstone clasts, at the base of a river cliff on the northern side of the Allt Breac at [NH 8487 3884] (Fig. 110). The gravel is overlain by three till units; the lower two are reddish brown in colour and contain numerous tabular clasts of sandstone. The upper till, which is dark yellowish brown in colour and contains a preponderance of metasandstone and granitic clasts, is overlain by a coarsening-upward sequence of sands and gravels.



**Figure 110.** Reddened periglacial talus and metasandstone bedrock, overlain by tills and the ‘Dales outwash fan’; exposed in a river cliff on the northern side of the Allt Breac in 2004.

The sequence exposed in the valley of Allt Breac is described in more detail by Auton (1990a), who interpreted the sands and gravels as deposits laid down as an outwash fan (the ‘Dales outwash-fan’). He interpreted the sandstone-rich tills as being correlatives of the sandstone-rich tills at **Dalcharn** (Phase 1 glaciation) and the upper till as being laid down by ice from inland (Phase 2 glaciation). The angular, reddened metasandstone gravel was interpreted as a periglacial talus deposit (gelifractate) that formed prior to the onset of glaciation by Phase

1 ice. It is clear, however, that the red-brown coloration of the matrix of lower tills is due, in part, to inclusion of reddened material from the talus deposit and the underling bedrock at this locality. This reddening is characteristic of metamorphic rocks and Devonian strata close to the unconformity at the base of the ORS sequence. It was a result of prolonged subaerial exposure of the basement topography prior to the deposition of the overlying Devonian sediments (see **Bedrock Geology**).

Horne (1923) identified eleven terrace levels around Ballachrochin [NH 846 368]. More recent mapping (Fletcher et. al., 1996) has identified benches at twelve levels (365-240 m OD) above the floodplain on the eastern side of the valley and benches at two further levels (320- 240 m OD) on the western side of the valley, near Kincaig (Fig. 111). The benches at 245 and 240 m OD are Holocene terraces sloping at up to 18 m/km downstream. The succeeding three benches (262-275 m OD) are terrace fragments, which exhibit down-valley gradients of 35-50 m/km. These terraces locally abut a flat-topped bench at 285 m OD on the eastern side of the valley. Sections reveal that this flat-topped feature comprises 1.0 m of clast-supported, well-rounded gravel underlain by 1.5 m of horizontally laminated, low-angle cross-bedded, silty, fine-grained sand. This sand in turn passes down into 2.0 m of finely interlaminated sandy silt and clay with dropstone cobbles (Fig. 112), and sparse interbeds of diamicton.

Above the flat-topped bench, on the eastern side of the valley, succeeding benches stand between 287 and 310 m OD, with the feature at 305 m OD including a small steep-sided circular kettlehole, 5 m deep. By contrast, the bench at 340 m OD is cut into bedrock; one of the two features at 310 m OD (east of Ballachrochin) is also cut in bedrock, whereas the other (south-west of Ballachrochin) has a thin covering of cobble gravel resting on the bedrock surface. The sequence terminates at 365 m OD with a small outwash fan on the western side of the Allt a'Choire Bhuidhe.





**Figure 112.** Sand and silt rhythmites with dropstone cobbles within the glaciolacustrine deltaic sequence south of Ballachrochin.

The upper surface of the terrace fragment immediately to the west of Kincaig, the ‘Kincaig Terrace’ (Fig. 111), declines in altitude from 320 m OD (at its southern end) to 310 m OD at its northern end (with a gradient of 1 in 30). The terrace surface also slopes at an angle of 6-8° towards the river. At its northern end, a degraded cliff, about 25 m high, shows that the Kincaig Terrace is underlain by stratified sand and gravel. The cliff section reveals approximately 5 m of rounded, clast-supported cobble gravel overlying about 20 m of poorly stratified, medium- to coarse-grained sand, interbedded with coarse and medium gravel. This thickness of sediment contrasts with the predominantly thinner sequences of cobble gravel and pebbly sand seen in scattered exposures in the bluffs of several of the other terrace features.

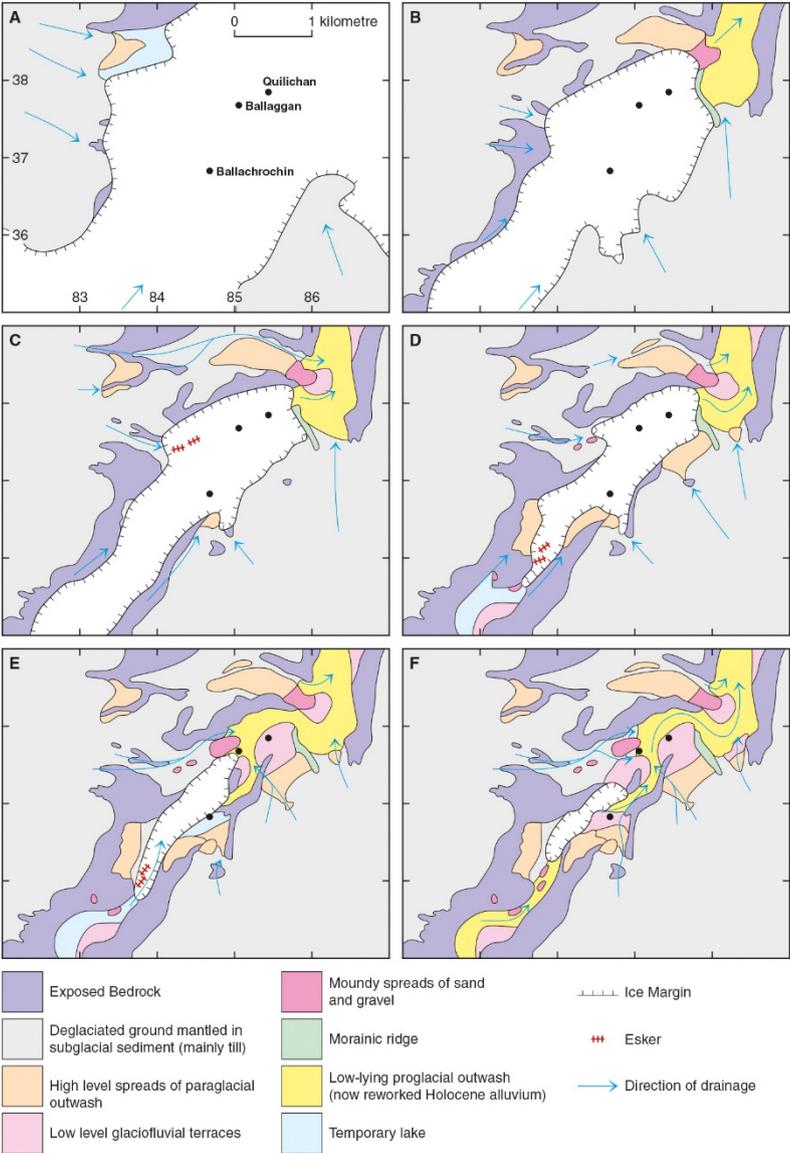
These landforms and sedimentary sequences, as well as comparable features present in the valley downstream of Ballachrochin (around Ballagan and Quillichan), are described and interpreted in more detail by Auton (1990a).

### **Interpretation**

Horne (1923) interpreted the terraces and benches around Ballachrochin as fluvial features, although accepting that some of those at higher levels were probably glaciofluvial in origin. Young (1980) interpreted most of them as 'eskers'. Auton (1990a) interpreted the benches between 262 and 275 m OD as glaciofluvial terraces, close to, but not in contact with, the remnants of decaying ice within the valley. In contrast, many of the higher benches have been interpreted as kame terraces laid down in contact with decaying ice, thus being closely related to the down-wasting of an isolated mass of stagnant ice within the valley. Similar origins have been proposed for most of the terraces and benches between Ballagan and Quillichan, apart from the large sloping terraced feature at 300 m OD south of Quillichan that is interpreted as a glaciofluvial fan. Exposures in the moundy features that flank the valley of the Ballagan Burn have been interpreted as kames (Fig. 111) and the linear ridges south of Kincaig as degraded eskers.

A key part of the sequence is the terrace at 285 m OD, which is interpreted here as the remains of a glaciolacustrine delta. Such an interpretation is not new, having already been anticipated in part by Horne (1923). However, this reconstruction clearly requires the presence of a temporary glacial lake. Young (1980) claimed that the higher terraces are eskers and as such do not require the existence of a glacial lake anywhere within the Middle Findhorn valley, as had been suggested earlier by Bremner (1939) and Charlesworth (1956). Auton (1990a) rejected Young's interpretation and developed a model (Fig. 113) in which most of the landforms in the Middle Findhorn valley, and in particular the terrace sequence at Ballachrochin, developed in response to successively lower base levels controlled, at least in part, by a stagnating ice mass in the valley between Streens Gorge and Daless. This ice steadily down-wasted during deglaciation, and in so doing created ephemeral glacial lakes. In the area between Creag a' Chrocain and Daless, successive ice margins have been reconstructed at 460, 400, 380-350 and 340-300 m OD. The six-stage deglaciation model is described fully in Auton (1990a)

and summarised in Fig. 113. Evidence of further glacial ponding, downstream of the Daless-Ballachrochin area, is presented at the **Banchor** site, below.



**Figure 113.** Model of the deglaciation of the Middle Findhorn Valley between Streens Gorge and Daless (after Auton, 1990).

All the major river valleys in upland Scotland possess sets of terraces and benches that are of fluvial and glaciofluvial origin. It is unusual, however, to find staircases of terraces and benches that extend 80 m above the valley floor and include 14 identifiable levels. This part of the Findhorn valley is notable on both accounts and the flight of terraces is one of the highest and most remarkable in Scotland.