
Falls of Dochart, Stirling

[NN 571 324]

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Highlights

The Falls of Dochart comprise a unique site in Scotland in which a wide and shallow bedrock reach generates a series of small interconnected waterfalls separated by bedrock islands. The detailed configuration of the Falls is determined by the local geological structure and by glacial and fluvial processes operating during and since the Devensian and Loch Lomond Readvance ice sheets.

Introduction

Bedrock-controlled reaches have generally been neglected in the study of different channel types within the British Isles (Ferguson, 1981; McEwen, 1986). Nevertheless, they comprise a significant proportion of the river systems within Scotland (Werritty *et al.*, 1994). The Falls of Dochart constitute a noteworthy example of a bedrock-controlled reach within what is otherwise a predominantly alluvial channel. The specific geomorphological features of this reach comprise the outcome of glacial and fluvial processes operating on the underlying schists.

Description

The Falls of Dochart are located at Killin, 1 km upstream of the site at which the River Dochart flows into the western end of Loch Tay. This bedrock-controlled reach (Figure 2.9) is approximately 270 m long and exhibits a local widening of the channel of up to 80–90 m before narrowing once again below the bridge at Killin. Since the channel gradient steepens considerably at this point, the reach has the appearance of a knickpoint which has been retarded in working its way further upstream. Immediately upstream of the Falls, the channel is narrower and gentler in slope, whereas downstream the River Dochart in conjunction with the River Lochay forms a large, low-angle delta at the head of Loch Tay. This type of channel confinement is in marked contrast to that recorded by other forms of bedrock control in Scotland where typically the channel becomes narrower because of its confinement (e.g. the Corrieshalloch Gorge in Wester Ross and the River Findhorn at Randolph's Leap).

The detailed form of the Falls of Dochart is controlled by the joints in the underlying bedrock. This produces a stepped series of small waterfalls where the flow is deflected obliquely across lines of weakness within the schist. A large tree-covered island (Garbh Innes) of more resistant rock divides the main flow. On being reunited, flow within the channel is then deflected left and then right in a 'zig-zag' manner in a series of small waterfalls (less than 1 m high) and rapids caused by differential erosion. These small features are drowned out during high flows. Good examples of both joint-bounded, irregular potholes and classic circular potholes are evident at a variety of scales downstream of Garbh Innes. Many have boulders and cobbles still in place, causing the margins of the pothole to be scoured during floods.

There is also evidence of the high competence of the floods which pass through this reach. The steep gradient coupled with a marked increase in depth will produce high shear stresses at this site during floods. As a result, large individual blocky slabs (> 1 m intermediate axis) have been deposited in an imbricate fashion on the bedrock surfaces adjacent to the low-flow channel. These are aligned at right angles to the flow and appear to have been transported during recent floods.

Interpretation

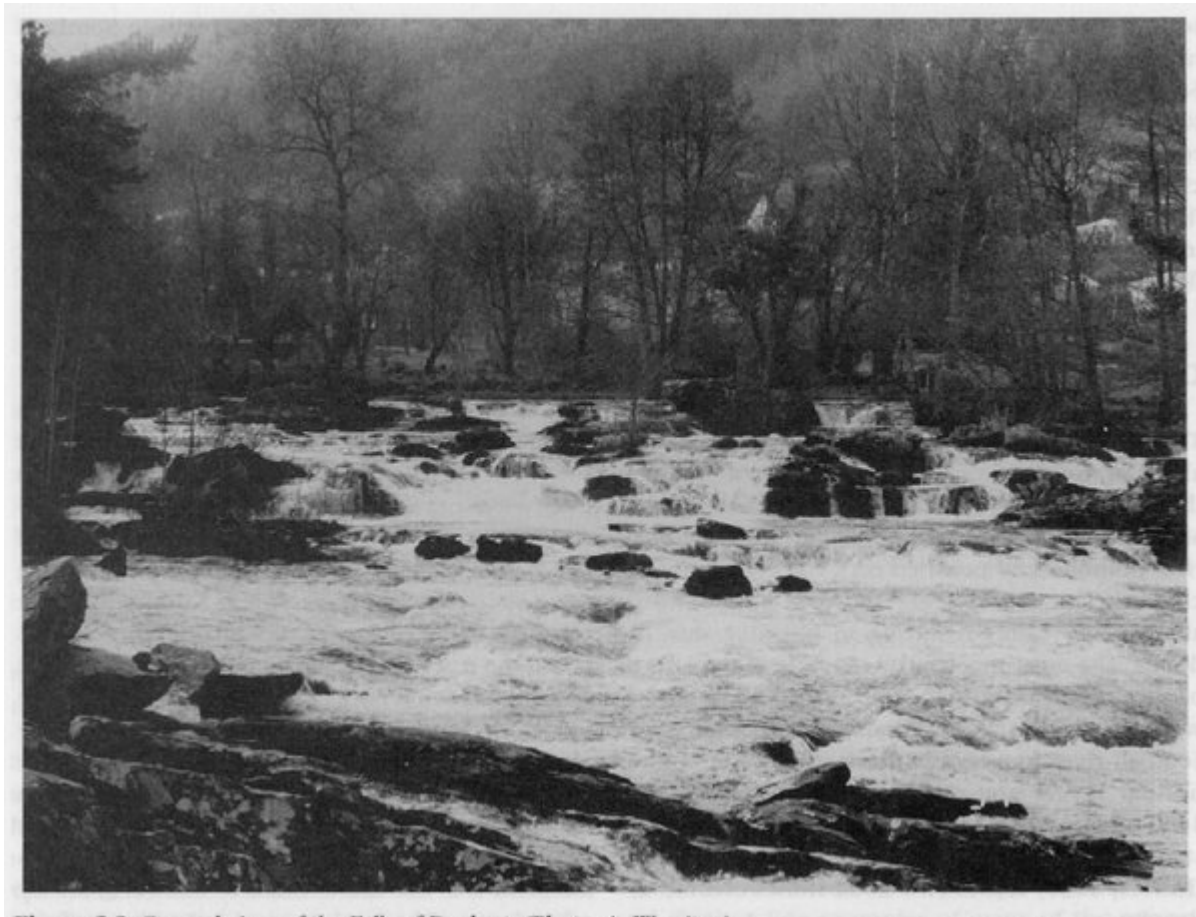
The Falls of Dochart provide a noteworthy example of a wide, relatively unconfined bedrock reach in which the River Dochart rapidly descends over a complex series of major rock bars. The local bedrock schist controls the detailed configuration of individual falls, producing a noteworthy 'zig-zag' series of rapids.

It is not possible to give a definitive date for the origin of the Falls, but it is likely that they were partly formed subglacially during the Dimlington and/or Loch Lomond Stadials (18 000–13 000 BP and 11 000–10 000 BP respectively). Given the existence of Loch Lomond Readvance moraines at the eastern end of Loch Tay (Thompson, 1972), it is probable that the major erosional features in the Falls date from that time.

Conclusion

The Falls of Dochart are typical of many shallow, wide bedrock-controlled reaches which serve as knickpoints or local base levels within the long profile of upland rivers in Scotland. The detailed topographic form of these Falls comprises an island and channels formed from multiple small bedrock steps. The subsequent embroidery of these small waterfalls by potholes has been determined by the different ways in which glacial and fluvial processes have eroded and etched the underlying schist bedrock.

References



(Figure 2.9) General view of the Falls of Dochart. (Photo: A. Werritty.)