
River Findhorn at Randolph's Leap, Moray

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Highlights

Randolph's Leap on the River Findhorn is the most narrowly constricted bedrock reach on a major Scottish river. The site registered its highest flood stage during the storm of 4 August 1829 which produced the most severe regional floods ever recorded in Scotland.

Introduction

Randolph's Leap is an extremely narrow slot gorge set in a bedrock section within the lower reaches of the River Findhorn, one of the most powerful rivers in upland Scotland. The river is noted for its extremely flashy runoff regime, particularly in response to summer frontal storms (Green, 1958, 1971; Black, 1992) and has a well-documented history of major floods extending back into the 18th century (Lauder, 1830; Lamb and Frydendahl, 1991).

Description

Randolph's Leap on the lower River Findhorn is a former meltwater gorge cut into schist bedrock. The gorge extends over 400 m and typically is 8 m wide and 18 m deep. However, at its upstream end it narrows significantly such that at its minimum point it is only 3 m wide. This has the effect of ponding the flow during floods, thereby generating a dramatic change in river stage under these conditions. Given the size of the river and its average flow, this meltwater gorge provides the most severe bedrock confinement recorded on any major river in Scotland.

The most striking example of the effect of this constriction was during the catastrophic flood on 4 August 1829 when the river attained a flood level of 50 ft (c. 15 m) at Randolph's Leap ((Figure 2.7); Lauder, 1830). An estimated peak flow of $1450 \text{ m}^3\text{s}^{-1}$ with a return period of between 500 and 1000 years has been calculated for the flood at this site (Werritty and Acreman, 1984). The Moray Floods of 1829 are the most extreme historic floods ever recorded in Scotland and Randolph's Leap represents the most accurate contemporary record of these floods, since in addition to Lauder's account there are also two flood stones in place at the upper and lower sections of the gorge. Further geomorphic evidence for the severity of the 1829 flood is a large accumulation of 1–2 m diameter, lichen-covered boulders immediately upstream of the entrance to Randolph's Leap. It is likely that these boulders comprise some of the bed material transported in 1829 and deposited here because of local ponding of the flood flow. It is also noteworthy that on 16 August 1970 another major flood was recorded on the River Findhorn, but with a lower peak stage at Randolph's Leap than that of 1829. This 1970 flood was gauged as $2402 \text{ m}^3\text{s}^{-1}$ at Forres, c. 10 km downstream of Randolph's Leap (NERC, 1975).

In terms of noteworthy geomorphic features within the gorge, there is a low-flow inner channel with polished bedrock surfaces and localized rapids between the exposed bedrock ribs ((Figure 2.8); Lewin, 1981b). These ribs are in turn partially dissected by well-developed potholes at levels substantially above those of normal flows. The potholes take on a variety of forms including both rectangular and circular shapes and reflect differential erosion of local bands and lines of weakness within the schist. The general strike of the bedrock is at right angles to the flow and this has the effect of producing bedrock ribs, again reflecting local erosional contrasts within the underlying schists.

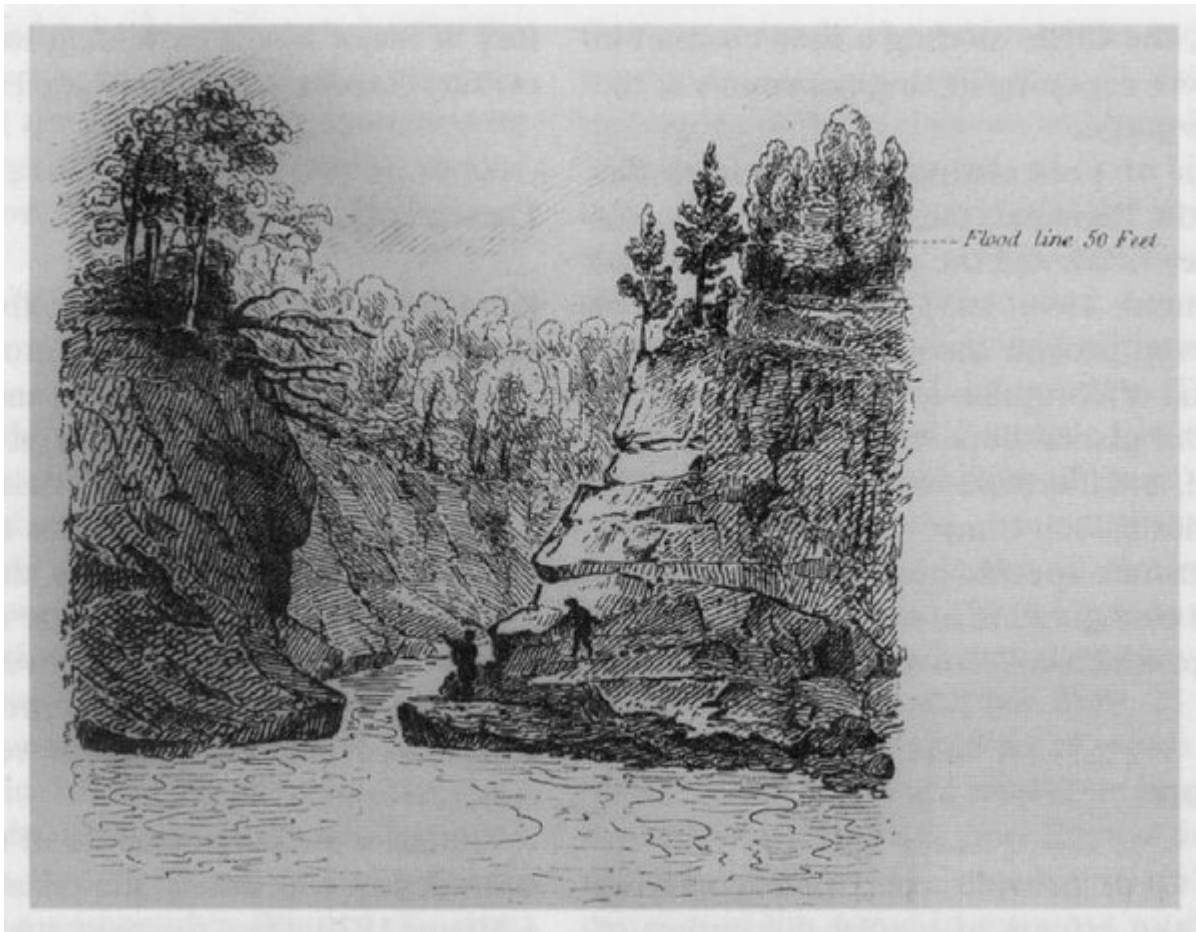
Interpretation

Randolph's Leap is noteworthy in two respects. Firstly, it constitutes a unique bedrock constriction within the lower reaches of a major Scottish river and displays fine examples of many of the minor scale features to be found in bedrock gorges (potholes, bedrock ribs and polished bedrock surfaces). Secondly, the impact of this constriction has been to exacerbate flood levels at this site. This has resulted in the stage of the 1829 flood being precisely recorded here. Reconstruction of the flood flow by Werritty and Acreman (1984) provides an important record for inclusion in UK maximum flood envelope curves (Acreman, 1989).

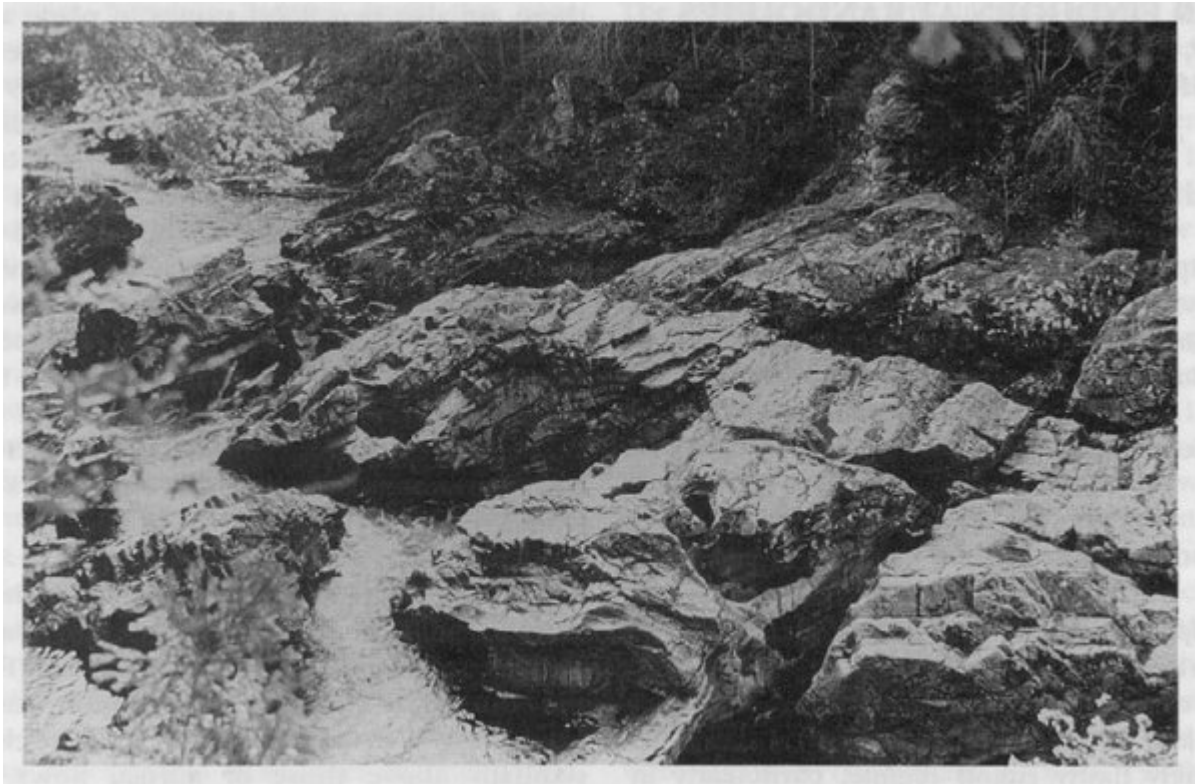
Conclusion

The bedrock gorge at Randolph's Leap is a remarkable slot gorge eroded by glacial meltwaters into the underlying schists. It displays many of the classic minor scale features of such gorges: bedrock ribs, potholes and polished rock forming an inner channel. The upstream end of the gorge is unusually narrow (3 m) resulting in ponding during floods. The most spectacular example of the effect of this constriction occurred on 4 August 1829 when one of the largest floods ever recorded on a Scottish river registered a peak stage 15 m above normal levels and an estimated discharge of $1450 \text{ m}^3\text{s}^{-1}$. The evidence in support of this reconstruction is found both in a contemporary account (Lauder, 1830) and in two flood stones erected at the site.

References



(Figure 2.7) The flood stage on 4 August 1829 on the River Findhorn at Randolph's Leap. The river rose 15 m above its normal level at the entrance to this severely constricted bedrock gorge. (Source: Lauder, 1830.)



(Figure 2.8) The River Findhorn at Randolph's Leap: the inner channel cuts into schist, displaying polished bedrock surfaces, potholes and bedrock ribs. (Photo: A. Werritty.)