The Lower River Spey, Moray

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Highlights

The lower River Spey, below Fochabers in Moray, provides an unusual fluvial environment as the channel planform is actively braided right down to the river's mouth. The neighbouring floodplain possesses numerous palaeochannels, which can be related to both recent channel activity and the past geomorphic impact of extreme floods.

Introduction

Extremely braided channel planforms are rare in Britain, particularly in the lower reaches of major rivers. The lower River Spey is a highly divided and active river, characterized by rapid rates of lateral migration and abandonment of palaeochannels, and as such is atypical of British rivers in their lower reaches.

Description

The designated reach on the River Spey, approximately 5 km in length and on average 1 km in breadth, forms one of the most extensively braided rivers in Britain. With highly erratic changes in the location of the main channel (Hinxman, 1901), this site provides the closest approximation in the UK to a high-energy, sandur environment. Sediment size is highly variable throughout the site, ranging from sand to coarse cobbles, with the b-axis of bed material > 256 mm common near the mouth (Lewin and Weir, 1977). The margins of this recently formed valley floor comprise coarse fluvioglacial deposits of Late Pleistocene age, which have been terraced and are locally undercut by actively migrating channels.

Although, in terms of floodplain morphology, three distinct zones were identified by Lewin and Weir (1977), only two of these occur within the designated area (Figure 2.22). These zones are categorized on the basis of their proximity to the present active channel. The first zone comprises the present active sinuous channel, characterized by emergent gravel bars. The second incorporates a zone of scrub and woodland, which has been either re-occupied or reworked by the river over the past 200 years. The present channel thus has a sinuous to irregular planform with good examples of a variety of bar types at a range of scales, each type having a history of rapid reworking (Figure 2.23). These different types have been studied from aerial photographs by Lewin and Weir (1977), who identified a predominance of rhomboid to asymmetric elongated bar forms. There is considerable local variation in sediment size within the braided channels, as seen for example in the cross-section beneath the River Spey viaduct.

The River Spey floods regularly; notable major floods affecting the lower river having occurred in 1829, 1956, 1970 and 1993 (see Lauder, 1830; Green, 1958, 1971).

Interpretation

The lower River Spey possesses a number of distinctive characteristics which account for its unusual planform. These include unusually steep slopes for a river close to its marine limit, a wide floodplain within which the river can migrate and rework its valley floor, and high velocities associated with a highly variable runoff regime.

Substantial sediment inputs from a variety of sediment sources (channel, banks, floodplain and terraces, but also from gullies south-east of Fochabers; Grove, 1955) are also readily available.

The degree of braiding present at the site in zone one (the currently active sinuous channel; Lewin and Weir, 1977) is highly stage-dependent, with low-stage emergent bars drowned out at higher flows. However, as the stage continues to rise, the degree of braiding once again increases as old flood channels proximal to the present channel become re-occupied. The second woodland zone is inactive under normal flow conditions, although it is known that this whole area was reactivated during the catastrophic 4 August 1829 flood (Lauder, 1830). Many of the older palaeochannels, distant from the present channel, may have been initiated at this time.

This second zone is also important as the focus for reconstructing channel changes (especially fluctuations in the intensity of braiding over the last 200 years) from map sources. All of the maps and plans from the 1870s and 1880s showed increased braiding (particularly differences in the type of braiding present and more larger gravel bars) in comparison to the present channel pattern (Lewin and Weir, 1977). The reduced active area at present has been attributed to increased constraints on channel activity during the 20th century, such as afforestation of the floodplain and artificial confinements imposed on the river in order to protect floodplain interests. Changes in catchment runoff, flood frequency and sediment availability are other possible explanations which require further investigation.

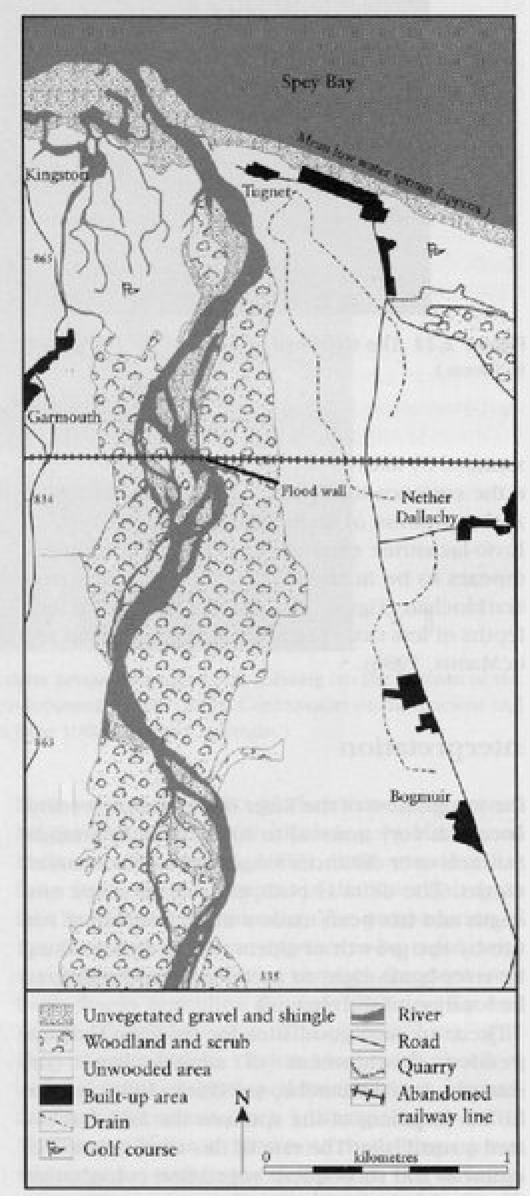
Lewin and Weir (1977) estimate that the River Spey has reworked approximately half its valley floor over the past 100 years but, despite the large amounts of sediment flushed through the system, they found that the actual level of the floodplain has altered little. The large throughput of sediment to the sea is reflected in the repeated necessity to dredge the mouth of the Spey below the designated area (see Inglis *et al.* , 1988). There is on-going research into the dynamics of the lower Spey both as a sediment source for coastal processes and also in terms of potential flood alleviation schemes at Garmouth (see Aberdeen University Engineering Services Consultancy Report, 1994).

This reach therefore warrants more detailed study into the nature and periodicity of channel pattern adjustment in response to floods of different magnitudes and frequencies. Any geomorphic assessment needs to evaluate changing floodplain stability over time in response to human intervention. Historical studies such as that pioneered by Lewin and Weir (1977), together with more general palaeohydraulic reconstructions, may provide further insights into the process-form relationships in this unique environment.

Conclusion

The Lower River Spey provides a highly unusual fluvial site in Great Britain, due to the scale and intensity of braiding on a river near its mouth and, as such, allows study on an unsurpassed scale of large-scale channel adjustment in a braided river environment. The high intensity of channel subdivision is induced by atypical controls (high slopes, large sediment size) for a lowland river system. The resultant planform is exceptional in both the scale of braiding and the extent of its palaeochannel network. Records of periods of planform expansion both in response to catastrophic floods (such as that of August 1829) and to changes in catchment controls (e.g. afforestation) make this a site at which rapid channel change has been registered over the past 200 years. Present rates of planform change and associated bar and floodplain reworking can thus be viewed within a longer historical perspective.

References



(Figure 2.22) The geomorphology of the Lower Spey.

(Figure 2.23) The dissected diagonal bar within the highly-active braided channel of the lower River Spey. Many of the smaller-scale sedimentological features (chutes incised within the bar and marginal sand sheets) are very ephemeral, being formed and destroyed by successive floods. (Photo: U. McEwen.)