

# Raised beaches, Pleistocene and Recent, Northern Highlands of Scotland

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[Jump to navigation](#) [Jump to search](#)

Johnstone, G S and Mykura, W. 1989. British regional geology: Northern Highlands of Scotland. Fourth edition. Keyworth, Nottingham: British Geological Survey.

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## Contents

- [1 Raised beaches, introduction](#)
- [2 Late-glacial beaches](#)
- [3 Post-glacial beaches](#)
- [4 Selected bibliography](#)

## Raised beaches, introduction

The eustatic lowering of sea level caused by the abstraction of water to form the great continental ice-sheets was more than offset in Scotland by the isostatic depression of the land caused by the weight of its ice-cap. In late- and post-glacial times, isostatic recovery sometimes failed to keep pace with the eustatic rise in sea level as the water was returned to the oceans. Consequently raised beaches and associated marine deposits are now found well above Ordnance Datum around much of the Northern Highlands. Isostatic uplift was greatest where the ice load was at its maximum, as a result of which the beaches tend to be tilted towards the coast, and beaches of the same height in different places are not necessarily of the same age. The raised beaches are divisible into a late-glacial series formed sometimes adjacent to retreating ice, and a lower post-glacial series, separated in time by a period of relatively low sea level ([P216056](#)).

## Late-glacial beaches

Because of the rapidly changing sea level caused by the disappearance of the ice there are few erosional features in solid rock associated with the earlier late-glacial beaches. Such beaches are usually accumulations of gravel which sometimes rest on a platform cut in drift. They reach a height of nearly 45 m near Arisaig on the west coast, and heights of 24 to 27 m are common both there and in the eastern area around Beaully, Cromarty and Inverness. Perhaps the most spectacular marine features to which a late-glacial age has been attributed are the raised rock platform and cliff in the Firth of Lorn- Loch Linnhe area, mentioned earlier (p.163). Northwards, the marine limit is much lower, and there is disagreement about whether late-glacial beaches occur on the north coast.

In the Dornoch Firth area, there is evidence that sea level was falling rapidly as the ice retreated up the Firth, so that the later beach features near Bonar Bridge are much lower than those in the Tain area. Though the late-glacial shorelines are known to be tilted, there are few areas where records are as yet continuous enough to define gradients. At Inverness, however, a gradient of 0.12 m per kilometre has been reported (Synge, 1978).

# Post-glacial beaches

Following a period of relatively low sea level, which is as yet little documented in the Northern Highlands, a marine transgression took place, reaching a culmination (by analogy with other parts of Scotland) about 6700 BP (Sissons, 1976). This highest post-glacial beach (the 25 ft beach of many older Geological Survey publications) is widespread and commonly takes the form of a gravel storm beach; in sheltered estuaries, silt and clay predominate. In places there is a rock platform and cliff, but this is usually a modification of one of the older marine benches mentioned earlier. Lower beaches occur below the main beach in places. Though few detailed and accurately surveyed measurements have been published, it has long been known that the highest postglacial beach is tilted, reaching its greatest altitude within the Northern Highlands near Fort William (about 12 m OD), falling off to the north and west, to a metre or two above OD in Caithness. A gradient of 0.05 metres per kilometre has been calculated for the highest beach in the Firth of Lome area. No raised beach of this age is known with certainty in the Outer Hebrides, though beach gravels slightly above the modern beach have been reported (Richie, 1971). Near Beaully the deposits of the transgression are known to rest on peat, formed during the preceding period of low sea level (Haggart, 1982).

## [Selected bibliography](#)

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[Category:](#)

- [Northern Highlands of Scotland](#)

## Navigation menu

### Personal tools

- Not logged in
- [Talk](#)
- [Contributions](#)
- [Log in](#)
- [Request account](#)

### Namespaces

- [Page](#)
- [Discussion](#)

### Variants

### Views

- [Read](#)
- [Edit](#)

- [View history](#)
- [PDF Export](#)

□

## More

## Search

## Navigation

- [Main page](#)
- [Recent changes](#)
- [Random page](#)
- [Help about MediaWiki](#)

## Tools

- [What links here](#)
- [Related changes](#)
- [Special pages](#)
- [Permanent link](#)
- [Page information](#)
- [Cite this page](#)
- [Browse properties](#)

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- [About Earthwise](#)
- [Disclaimers](#)

