

# How to find the Water of Leith



*Slateford Bridge*

## 6 Recent History

Today many of these geological processes still occur and they are producing new material that may one day become rock. In April 2000, the Water of Leith flooded dramatically (estimated to be a 1 in 200 year flood). When the river was in full spate it carried more material and also larger items than it normally does. When the flow returned to normal the river deposited this material in the form of flood-gravels. These can be seen in the river bed by the Water of Leith Visitor Centre in Slateford when the river is low enough.



**Opening times:** The Water of Leith Visitor Centre is open every day 10am to 4pm.\* Closed Christmas and New Year

\*core hours may extend seasonally

**DISABLED ACCESS THROUGHOUT**

**How to find the Water of Leith Visitor Centre:** The Centre is on Lanark Road 3 miles to the west of Edinburgh city centre. Limited parking is available. Visitors are encouraged to use public transport. Lothian buses 44, 34 and 20 stop outside the centre and Slateford Station is a few minutes' walk away.

The exhibition is free and open daily. The Centre also offers river and walkway information and light refreshments.

Water of Leith Visitor Centre, 24 Lanark Road, Edinburgh EH14 1TQ

Tel: 0131 455 7367 Fax: 0131 443 1682

Email: [admin@waterofleith.org.uk](mailto:admin@waterofleith.org.uk)

Website: [www.waterofleith.org.uk](http://www.waterofleith.org.uk)

The Water of Leith Conservation Trust is a charity registered in Scotland: charity number: SC000015

**Acknowledgements:**

Text: Emma Skelley, The University of Edinburgh

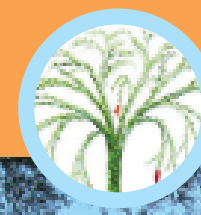
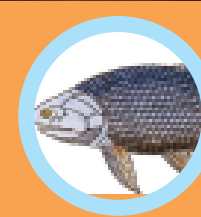
Designed by Derek Munn

Water of Leith map by Stuart Horsburgh, British Geological Survey

Pictures: Devonian landscape, Silurian fossils, Carboniferous tree and fish from Euan Clarkson and Brian Upton's book "Edinburgh Rock: The Geology of Lothian."

Photographs by Emma Skelley, Mike Browne, Angus Miller, Bryce Morrison.

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## The Geology of The Water of Leith



## Edinburgh



Lothian and  
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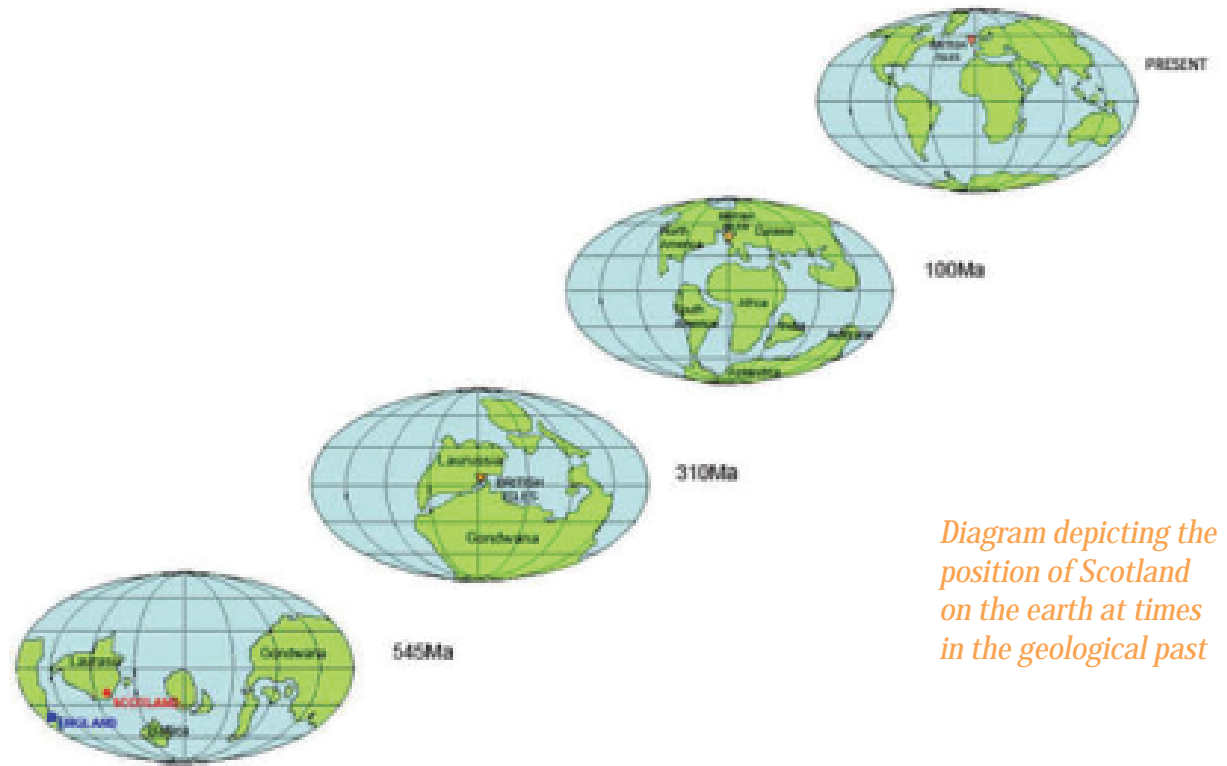


# 1 Introduction

The Water of Leith is the main river running through Edinburgh. Its drainage basin has an area of 150km<sup>2</sup>, with its source in the Pentland Hills to the south. But why does it flow the route that it does? Why are some parts of the valley floor flat and others characterised by steep-sided rocky gorges?

The answers lie in the varied geological history of the Edinburgh area and its past environments at times hundreds of millions of years ago.

The story that these rocks reveal shows that Scotland has not always been located where it is today. Scotland has slowly drifted northwards from just south of the equator to its present location over a period of 550 million years!

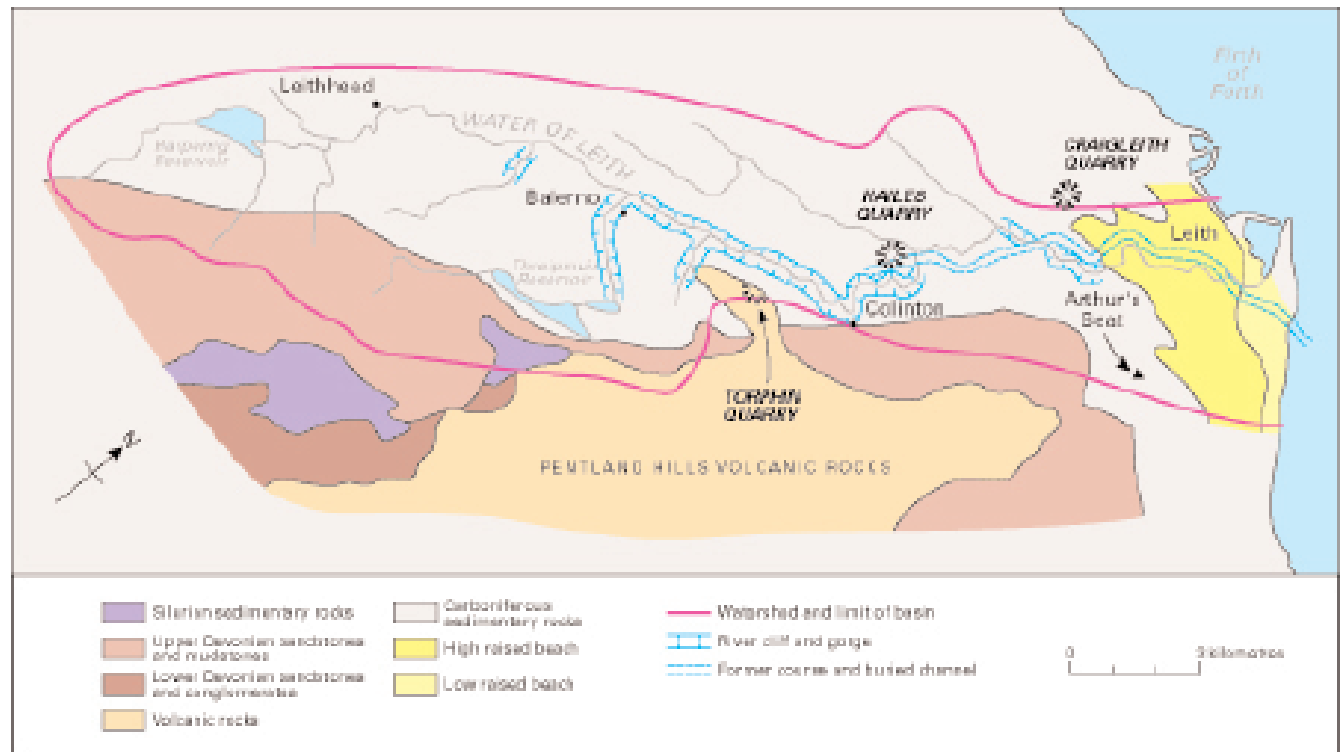


*Diagram depicting the position of Scotland on the earth at times in the geological past*



## 2 Deep Seas

Let's travel back in time 430 million years to a time called the Silurian (named after a Welsh tribe). You are swimming in a deep ocean, and the climate is warm and getting warmer. The ocean you are in is gradually becoming shallower as sediment fills the basin. A few million years later and you are standing in shallow tropical seas, like those in the Bahamas today. The sea is full of life, including sea-lilies, corals, starfish and shellfish. Now let's return to the present day. Those animals and plants that you saw 430 million years ago are now fossils and can be found in sandstones and mudstones in the Water of Leith drainage basin just to the south of Threipmuir Reservoir in the Pentland Hills.



## 3 Deserts and Volcanoes.

Let's do some more time travelling; this time we'll go back 415 million years to the beginning of a period called the Devonian (named after Devon where rocks of this age were first studied). You are now standing on dry land and there are eroding mountains to the north and south and numerous erupting volcanoes.



(above) The Devonian landscape

(left) Silurian fossil - a solitary coral.

*Simplified geological map of the Water of Leith*

It is very hot in fact at 360 million years ago it's very much like a desert, a bit like the present day Sahara. Erosion is hard at work having almost reduced the mountains and volcanoes to low lying level plains. Flash floods and associated wet hollows with mosses and dwarf trees are common.

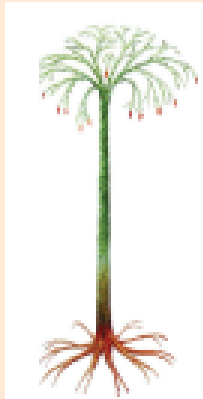
Back in the present day, the volcanoes have formed some of the hard igneous rocks that can be found in the south flank of the Water of Leith drainage basin and in the Pentland Hills. The desert continued into the Carboniferous period and all of its sediment has now been consolidated into mainly red sandstones as seen in the Dreghorn Link Road by the Edinburgh Bypass.



#### 4 Lakes, Trees and Swamps.

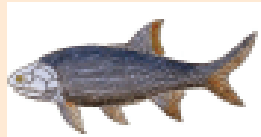
Ready for some more time travelling? Let's go back 300 to 345 million years to the period known as the Carboniferous (meaning coal-bearing).

Everywhere you look, you see many trees all densely packed together. You're also near the coast and the land is relatively flat. As well as forests there are huge muddy brown swamps and extensive lakes.



*Carboniferous tree around 50m tall*

There's a battle on; it's a fight for supremacy between the land and the sea. The sea has flooded the land and is providing shallow tropical waters for the growth of coral colonies and other marine plants and animals. But the land is fighting back, and large rivers are building deltas out into the open sea and



into inland lakes. All is settled until the sea floods back and the whole cycle starts again.

*Lower Carboniferous fish, around 20cm long*

Let's return to the present now. The Water of Leith is flowing over rocks that include sandstones that were formed from sands on the deltas, organic rich mudstones that formed in the lakes, and limestones that formed in the coral seas. Those swamps and the many dead and rotting trees have now formed peat and, with burial and the earth's heat, have turned into coal, such as the seams that were mined at Stockbridge and Wardie Shore.

The Carboniferous period produced many rocks that have economic importance. These have been mined and quarried nearby, as at Hailes Quarry Park where sandstones were quarried for building stone and flagstone. Mudstone was extracted to make brick. Over 70 mills, most of which were built from Carboniferous sandstone, harnessed the power of the Water of Leith to produce paper, snuff, flour and fabric.

#### 5 Ice Ages

This time we will only travel back in time 25,000 years – bring your coat though! You are now standing on what looks to be a never-ending field of ice like the Antarctic. It is extremely cold and the ice you are standing on covers the whole of Scotland and extends out beyond our present coastline!



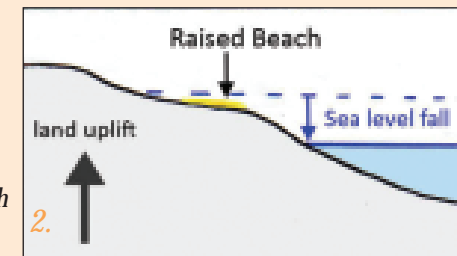
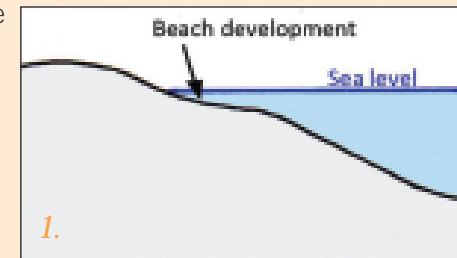
*Meltwater channel above Balerno, cut 15 thousand years ago.*

At the base, the power of the ice is so immense it acts like sandpaper to grind out a rocky landscape and deep rock scours. However, 8,000 years into the future and it is starting to warm up causing the ice to melt. The meltwater is very erosive and powerful and is cutting large channels which transfer water from the Water of Leith drainage basin to that of the River Esk's and out towards the distant sea. As the ice melts it is leaving behind all of the unsorted material that has been collected, which is known as glacial till.

Back to the present day now. Parts of the old course of the Water of Leith have been blocked up by all of that material left by the glacier. A buried channel now lies just south of Murrayfield. The ice cut out deep rock gorges such as the one upstream from Balerno, and then the meltwater was directed down it and deepened it further, creating the steep valley sides present today.

Think where the sea level is today. Well as the ice melted, the land began to rise because the weight of the ice had been removed. Back then, the sea level was 30 to 40m higher so it formed beaches just like those forming today. These beaches are now raised at levels up to 35m above that of the present sea-level. They are built over in northern parts of Edinburgh around Leith. Around 5500 years ago the sea level was still 8 or so metres higher than today's, and more beaches were formed. The northern parts of Leith are built on one of these raised beach flats.

As the sea-level continued to fall, the Water of Leith had to cut down deeper and deeper. In Colinton Dell you can see terraces formed of river sand and gravel in the banks of the river. These were formed as the river cut down to adjust for falling sea level. You can see terraces particularly well near the walled garden at Redhall.



*(right) Raised beach development*

*Carboniferous sandstone showing cross-bedding - Colinton Dell*