

## St Monans Geological Trail



R.E. Garton & J.A.F. Allan

### Fossils and folds

*Explore the fascinating world of the local geological heritage.*

*See fossil trees, coal seams, trace fossils and evidence of life on an ancient seafloor.*

*See the results of earth forces which twisted and contorted rocks over 300 million years ago, at a time when Fife lay close to the equator and was covered by tropical swamps, seas and lakes.*



Regionally Important Geological & Geomorphological Sites  
c/o British Geological Survey, Edinburgh EH9 3LA

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## About RIGS

RIGS are Regionally Important Geological (and Geomorphological) Sites. The scheme was devised by Scottish Natural Heritage to encourage local involvement in the identification, designation and monitoring of sites of local and national educational and scientific importance.

Fife RIGS is concerned with identifying and publicising sites in order to increase public awareness of Fife's rich geological heritage.

If you would like to join a small group of dedicated amateurs and professionals to continue this work, then please contact

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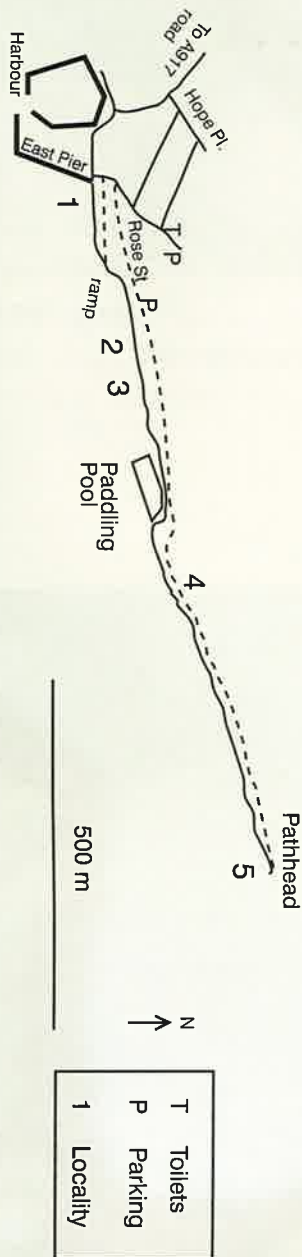


*Other RIGS Geological Trails:*  
St Andrews - Rock & Spindle

*Related Interest:*  
Geological Wall, Bow Butts, St Andrews  
Jurassic Garden, Kinburn Park, St Andrews

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## GEOLOGICAL TRAIL MAP



T	Toilets
P	Parking
1	Locality

The trail starts at the harbour. Parking is available via Hope Place, or Rose Street by the coastal path. Total walking distance: 2 km (1.25 miles). Allow 2 hours for the whole trail. The rocks are best seen at low tide. Tide times are available from a local Tourist Information Centre (Crail or Anstruther - open Easter to October; Kirkcaldy or St Andrews - open all year) or from the local press (East Fife Mail). Sturdy footwear with a good tread is recommended. Hammering the rock outcrops is NOT permitted.

**THIS TRAIL INVOLVES SCRAMBLING ON A BOULDER-STREWN BEACH AND ROCKY SURFACES.  
YOU FOLLOW THE TRAIL AT YOUR OWN RISK.**

>>From the East Pier walk east following the narrow road next to the shore<<

## Locality 1

### EARTH'S FORCES



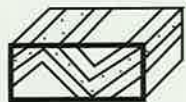
Look out to the foreshore left of the pier wall where you can see rocks arranged in layers. They were formed by the deposition of sand and mud 350 million years ago and are called sedimentary rocks. Here they form an inverted "V" shape in plan, having been squeezed by great forces within the earth's crust into a downward fold or syncline.

Later, crustal movements caused the syncline to tilt. After many millions of years of erosion, these rocks are exposed in this distinctive shape. The aerial view on the front cover shows the syncline at its best.

ROCKS BEFORE FOLDING



FOLD



TILT



>>Continue east along the shore road to a concrete ramp.  
Walk down the ramp then continue  
130 paces eastwards along the beach until you  
reach the first rock outcrop<<

## Locality 2

### WARM TROPICAL SEA Scotland on the equator

Look for the smooth, light-brown coloured rock. This is a limestone. On some surfaces are curved sweeping lines which are believed to be impressions of horizontal feeding burrows of marine worms.



>>Now walk east following the rock formations until you are beneath the 6th house (next to the gap in the terrace)<<

See evidence of trees which grew 350 million years ago in tropical swampy jungles.

After they partially decayed to peat, they became buried and eventually were transformed by pressure and heat into coal.

This is how Fife's vast coal reserves were formed. In this view, a coal seam is overlain by a thinly layered sandstone.

Below the coal, a tree root can be seen emerging from it. The root is now coated with a thin layer of coal.

### HOT SWAMPY JUNGLE





# Locality 3

>>Walk eastwards along the top of the low cliff until it reaches the pebbly beach. Walk westwards along the beach on the seaward side of the cliff until you are below the penultimate house in the terraced row<<



## BEACH LIFE 350 MILLION YEARS AGO



Here there is a creamy-coloured sandstone forming the low cliff. About 1m above the shingle beach are dark vertical strands in the rock. These represent fossil worm burrows. The soft-bodied worms are not preserved but the burrows which they dug out are. These sandstones were deposited in shallow sea water, in a near-shore, estuarine or delta environment.

>>Walk eastwards past the old swimming pool and stop by the restored wind-engine and the excavated remains of the old salt pans<<

# Locality 4

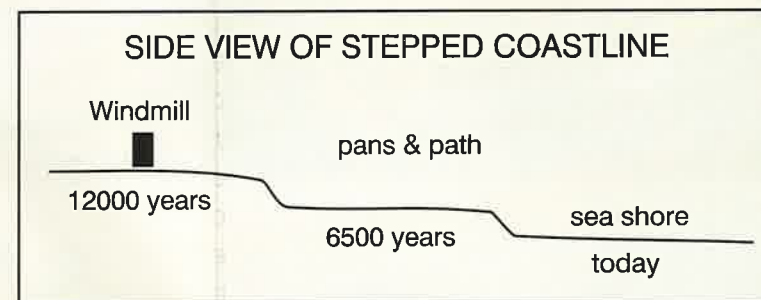


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Windmill and salt pans

## AFTER THE ICE AGE - NEW BEACHES FROM OLD

Ice sheets, sometimes as thick as 1km, have covered Scotland several times in the last two million years. The last ice sheets covered Fife between 27,000 and 14,000 years ago. As the ice receded the land rose in response to the unloading and relative sea level dropped. It did so in stages, and created different beach levels - "raised beaches" - which now look like steps across the coastline.





The windmill here stands on the highest local raised beach which formed about 12,000 years ago. The salt pans lie on a lower beach formed about 6,500 years ago and on which the coastal footpath is built. A further drop in sea level led to the formation of the present wave cut platform, seen at low tide. Present erosion is damaging this important industrial archaeology site.

Sea water was pumped up by the windmill into salt pans. The pans were heated, using local coal, to evaporate the water and leave behind salt. Salt was a crucial commodity for preserving fish and other perishable foods in the days before refrigerators.



Close-up of an excavated salt pan

>> Regain the footpath and walk eastwards until you reach Pathhead Farm; the buildings can be seen at the top of the cliff.  
Descend to the shingle beach and look for the white rock<<

## Locality 5

There are two limestone beds exposed on this beach. The upper limestone has a blocky appearance. It has been broken up by its close proximity to a fault. This is why geologists called it the St Monans Brecciated Limestone!



↑ Brecciated limestone

↖ White limestone

## TROPICAL SEAS AND CORALS

The lower outcrop, of white limestone is distinctive because of a brown coloured band in the centre. This is due to alteration to dolomite, a magnesium-rich limestone.

Look in the white part for clusters of tube-like fossils - these are colonies of corals which lived in a warm shallow sea 330 million years ago.



Colonial coral: Syphonodendron

