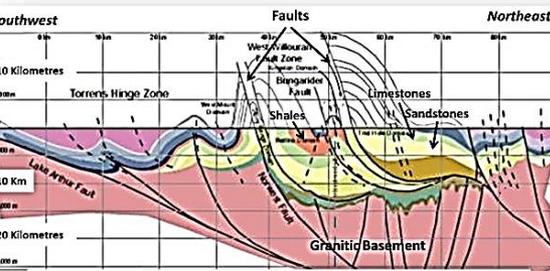
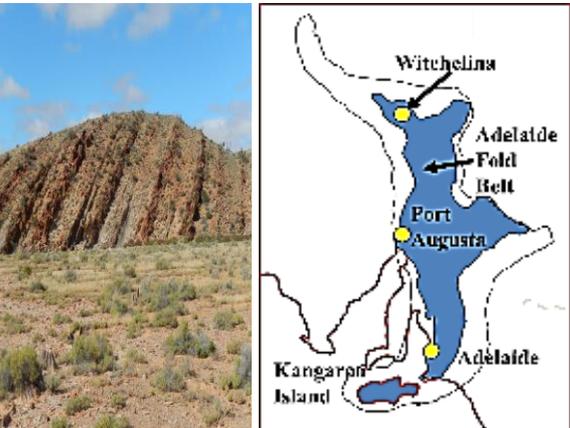


5 - Fold and Fault Deformation Structures at Witchelina

Now buried by this mountain-building process, the fine sedimentary layers were tilted and crumpled into fantastic folds and cut by the geological faults which are also revealed throughout the Flinders Ranges (eg Wilpena Pound), and in spectacular satellite images of Witchelina



Twenty Km deep section of the earth's crust across Witchelina after Wallace MacKay, Univ.Tas. in 2011



* Front photo shows the Dolomite Alps of northern Italy, named after the French naturalist and geologist Deodat de Dolomieu (1750-1801), who first described this magnesium rich limestone. Many of the rocks around Witchelina are dolomites and were deformed in the Delamerian Mountains.

Witchelina Nature Reserve Nature Drives

Total distances: Approx. 80-100 km round trips
Difficulty: Easy to moderate with some difficult sections

The Nature Foundation welcomes you to Witchelina. This is one of our flagship Reserves, and we're proud of the conservation and scientific work that we and our partners do here.

Basic signs

As you drive, you'll see a few basic signs:

-  shows the direction to follow for the Nature Drives.
-  indicates a geological feature you may like to stop and inspect. *Please note: fossicking on Witchelina is prohibited.*
-  indicates another feature you may like to stop and inspect.

Introducing Nature Foundation SA

Nature Foundation SA is a not-for-profit nature charity which works to Save, Protect and Restore South Australia's Natural Biodiversity & Geodiversity.

Before you set off

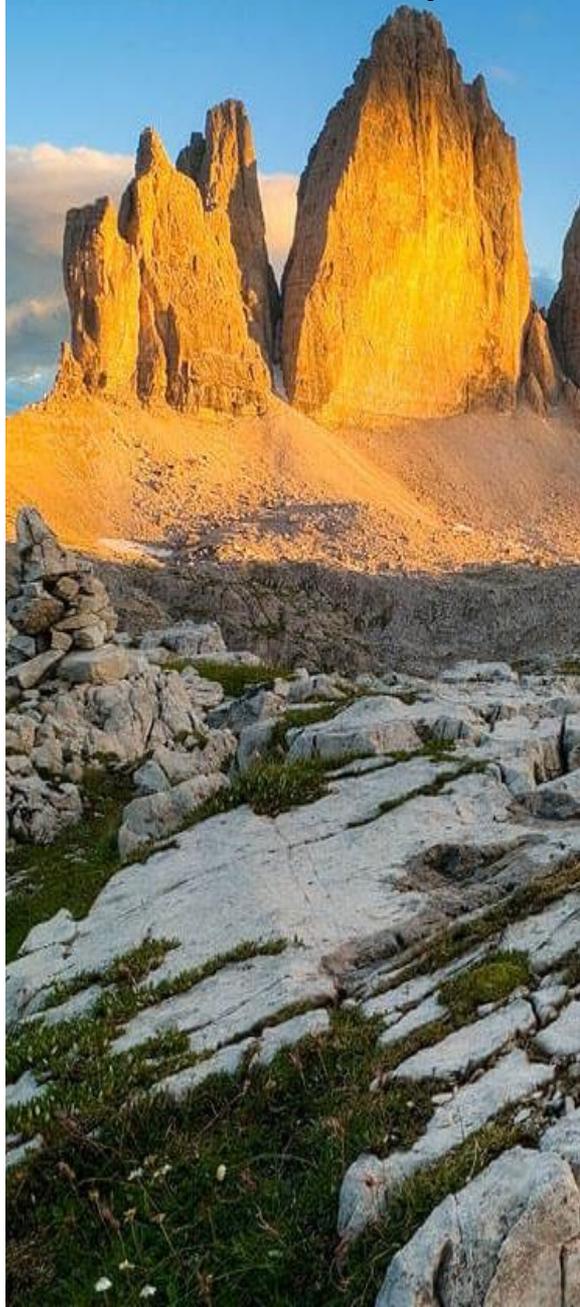
Please ensure you've signed an indemnity form, paid your entry fee, have enough fuel, food and plenty of water.

Your safety is our concern but your responsibility ..

The Nature Drives are only suitable for 4WD vehicles. Due to uneven terrain, roaming animals, and other factors, the drive is safe to travel only during daylight hours. Please begin your drive on the track before 10.00am. Signs clearly show your route, please do not leave the marked track.



Welcome to Witchelina Rocks & Landscapes



1 – Introducing Witchelina Geology

Witchelina is a 421,000ha nature reserve in the Willouran Ranges, which was acquired by Nature Foundation SA in 2010. It was decommissioned as a pastoral property and destocked, and is gradually returning to its natural state.

Witchelina lies in the far northwest corner of the 'Adelaide Sedimentary Basin'. The Basin is famous for its ancient landscapes and rock formations dating from the Ediacaran period of Geologic time. They formed more than 550 million years ago, just prior to the emergence of bountiful life on planet earth.

Geotrails including nature drives and walks on Witchelina give you a chance to see a spectacular arid landscape of desert plains and ranges, with insights into its unique geological history.

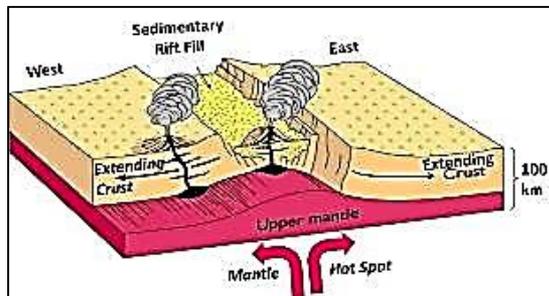


2 - The Adelaide Sedimentary Basin

The Adelaidean Sedimentary Basin is one of Australia's largest and deepest regions of sedimentary strata. The Basin evolved over a period of more than 350 million years, from 850 to 500 million years ago.

The Basin was formed through the breaking up of the ancient supercontinent of Rodinia, originally made up of land that became the western half of Australia as well as parts of Antarctica, China and North America.

Continental break up occurs by the rifting apart along major geological faults of massive sections of the earth's crust known as 'tectonic plates'; just like that which is occurring in central Africa along the great East African Rift valleys today. A geological fault is a crack in the rocks that make up the earth's crust, along which rocks on either side have moved past each other. There are three major faults on Witchelina, which can be seen on Google Earth images .



Sedimentary Basins form by infilling of Rifts formed by extension of crustal plates. Diagram modified from New Mexico Bureau of Geology website

The formation of deep rift basins and of the high plains and mountains that surround them is accompanied by linear chains of volcanic mountains breaking through the crust, and floods of basaltic lava. In the northern Flinders Ranges, the earliest examples of this volcanic activity are seen at Arkaroola in the east and Witchelina in the west. These volcanic remnants form isolated knobs and ridges of black basalt across the Witchelina area.

3 - Sediments become rocks

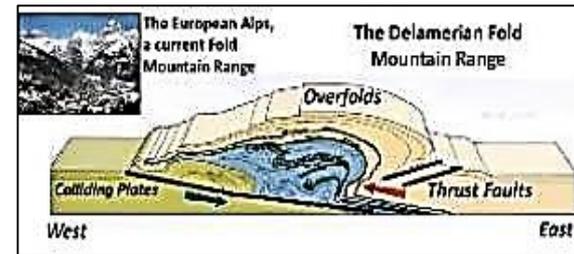
When rifting (breaking apart) occurs along large faults such as in the West Willouran Fault on Witchelina, the major elevation difference between the resulting trough valleys and their bordering mountains leads to high levels of river and slope erosion. The flooding rivers fill the valleys with pebbly and sandy sediments like today's Gulf St Vincent. These coarse sediments eventually turn into **sandstones**, like those seen across Witchelina. Large saline lakes occur and fill with salt rich sediments, **shales and muds**, like Lake Torrens today.

The Adelaidean Sedimentary Basin of 850 to 500 million years ago was nearly filled with sediments from flooding rivers and saline lakes. Inundation by the sea also produced chemical precipitation of carbonate-rich muds which eventually turned into **limestone**. So the three predominant rock types across the Witchelina Reserve are **sandstone, shale (or mudstone)** and dolomitic **limestone**. You will see one or more of these rock types during your nature drive.

4 - The Delamerian Mountain Chain

After almost 350 million years of rifting and sedimentation, the continent of Australia eventually broke away from the other fragments of Rodinia. A wide ocean basin to the east formed as a precursor ocean to the Pacific.

But subsequent continental drift produced a vastly different geological outcome. Rifting of tectonic plates ceased and then reversed. The collision of a new continental fragment of Eastern Australian closed the Adelaide Sedimentary Basin to form a major mountain chain 1000km long, known as the Delamerian Mountains (named after the village of Delamere, on the southern Fleurieu Peninsula, south of Adelaide).



Colliding tectonic plates produce major faults and folds in the earth's crust, modified from Journal of the Virtual Explorer

This collision led to burial of the sedimentary basin, while the ranges were uplifted by enormous earthquake-generating faults as big as those currently observed in the San Andreas system in California USA, and in the Himalayas. These ranges have been eroded over several hundred million years to leave the familiar features of today - the Mount Lofty Ranges, and the Flinders Ranges.