# Geological history of the Lake Bolac – Skipton area

*Ken Grimes, Hamilton Field Naturalists Club, September 2012*

The geological history of the area is summarised in the four maps. The main interest is in the volcanoes of the last 2 million years (Ma), but map 1 shows the older rocks, volcanos and sediments in the area.

Cambrian sediments and volcanic rocks were deposited about 500 million years ago, and were intruded by granite and strongly folded and cooked up during a violent upheaval about 420-450 million years ago. Blanketing these to the SW of Lake Bolac is an area of coastal sands formed about 5 million years ago. Linear chains of lakes and hollows here mark old coastal swales between higher dune ridges - analogous to what we see at present in the Coorong area of South Australia.

The volcanoes of the Western Plains began erupting about five million years ago. The oldest are badly eroded and weathered to form deep soils, so specific volcanoes are not easy to identify. A few recognisable ones are shown on map 1. These probably started to erupt shortly after the sea that formed the coastal sands withdrew to the south.

## Dating the volcanoes (see separate handout)

The ages of the volcanoes and lava flows are deduced in two ways: firstly, from their relative sequence, as shown where one set of lavas has flowed over and buried an older set; and secondly, by comparison of features that change progressively with time such as soil type and thickness, and the degree of erosion of lava landforms such as the stony rises. A more accurate method is to measure the amounts of radioactive isotopes which decay at known rates – giving a numeric age in years. Only a few isotope dates are available in the Lake Bolac area, so the map ages are based on correlation with dated volcanoes elsewhere in the region that have similar soils and degree of erosion. The descriptions and history given here are derived mainly from reports by MacInnes (1985), Rosengren (1994) and Gray & McDougall (2009).

## The main volcanoes of the area (listed from oldest to youngest)

**Mt. Wyvern:** This is a very low-angle lava cone with a crater filled with sediments. The soils are well-developed, 3m thick and red to dark-grey with gilgae (small boggy hollows). Isotopically dated at 1.9 Ma.

**Mt. Vite Vite** is a small, flat-topped, lava cone with lava ridges on the east side. There are some degraded stony rises and the soils are similar to Mt. Wyvern.

**The Mooralla Flow**, along the west side of Mt Emu creek, has no identifiable source volcano – possibly the vent was buried by the later lavas from the Mt. Hamilton Volcano. There are degraded stony rises with well-developed soils between the hummocks.

**Mt. Hamilton** is an excellent example of a broad, symmetrical lava cone with a large summit crater. It is surrounded by relatively smooth-surfaced lava flows with stony rises restricted to the edges. There is a group of lava caves; the largest has a complex branching form with about 1 km of passage length in all.

**Mt Elephant** is a large, steep, isolated scoria cone with an irregular rim and a shallow breached crater. This is an excellent example of a scoria cone with breached crater, but marred by the large quarry on the west side. However, the quarry does expose the strata. The surrounding lavas form degraded stony rises.

**Mt. Widderin** is a broad low lava dome with extensive stony rise lava flows to the south and west. There is a lava cave, with a pair of large chambers, which used to host a bat colony (now gone) and rare minerals (now trampled).

**Mt. Fyans** has a low scoria mound on a broad lava shield with numerous overlapping stony rise lava flows. The scoria mound has a thin lava capping. A large quarry pit in the scoria exposes a variety of volcanic structures including feeder dykes that intrude through the scoria. The eruption was in two stages: the older more extensive one now forms slightly degraded stony rises; whereas the younger one, which extends only a few kilometres from the summit, has fresh stony rises.

## Drainage modifications

With each eruption, the lava flows diverted or dammed up some of the pre-existing streams. This has converted what was probably a simple north to south drainage of parallel stream channels into a complex of offsets with numerous swamps and lakes. The progressive changes are illustrated on the four maps.

# Geological evolution of the Lake Bolac – Skipton area

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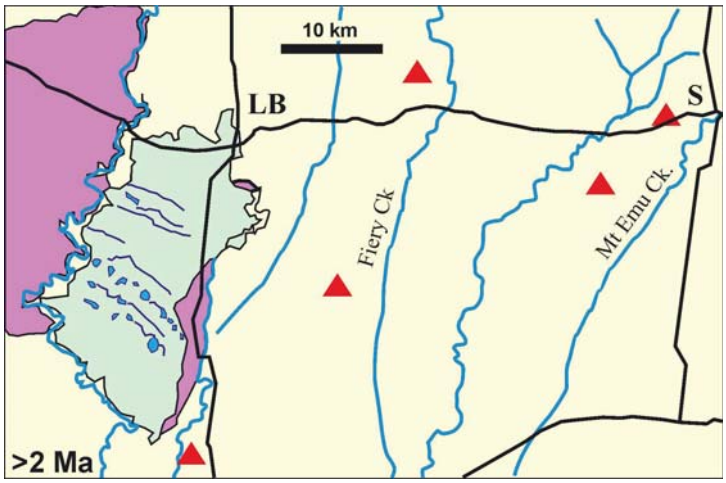


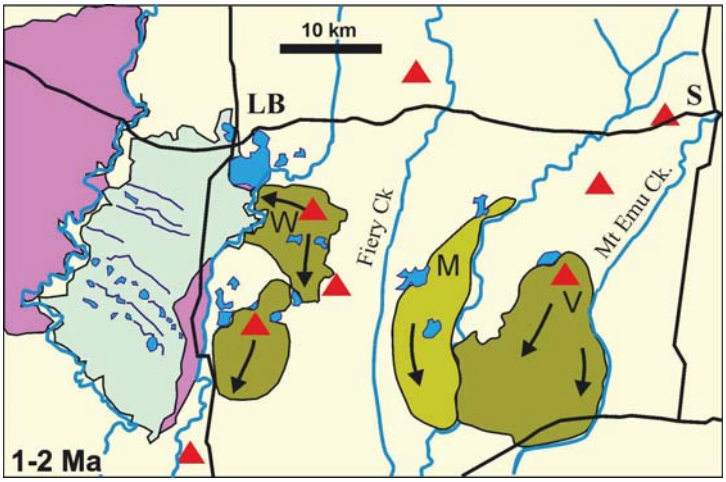

**1: Before 2 million years ago**.

Blue lines are a reconstruction of the drainage at this time.

Purple area is outcrop of ancient (Cambrian) strongly-folded rocks.

The light green is a belt of old coastal sand dunes and lagoons that formed about 5 million years ago.

The cream area is older lava flows (2-5 million years old) that now form deep clay soils with buckshot gravels. The red triangles are older volcanoes.



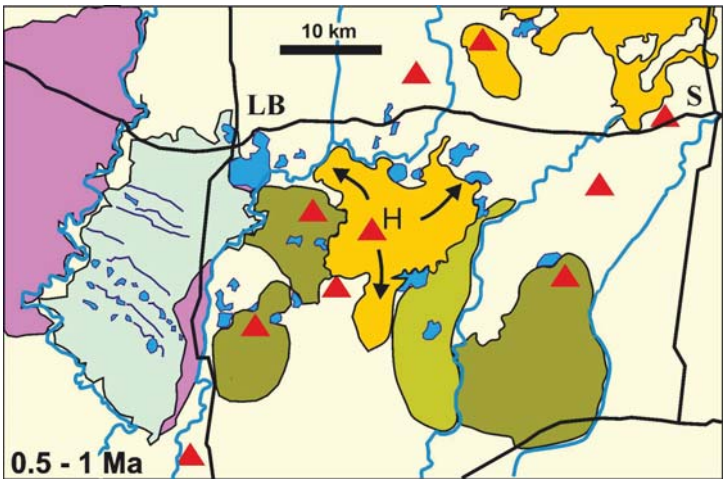

**2: 1 - 2 million years ago**.

In the west Mt. Wyvern (**W**) and another unnamed volcano blocked the streams to the north to form Lake Bolac.

Mt. Vite Vite eruption (**V**) in east may have diverted Mt Emu Creek to the east.

A slightly younger flow (**M**), from an unidentified source, ran down a valley to the west of the Vite Vite flow.

These flows all have well-developed soils.

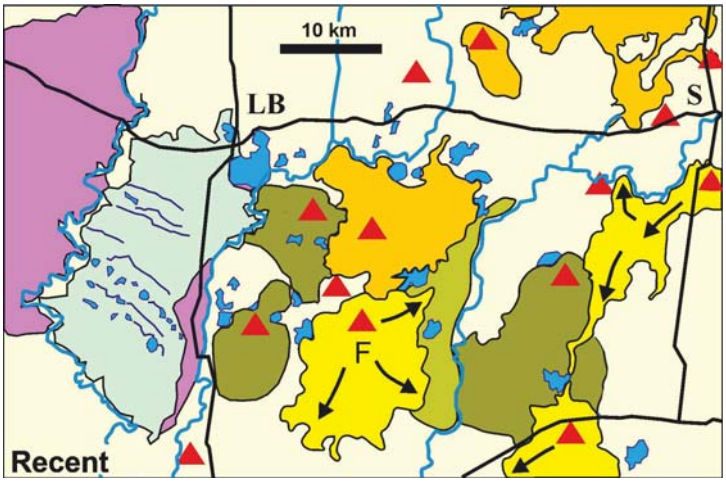



**3: 500,000 to 1 million years ago**.

The most drastic change to the drainage resulted from the eruption of Mt Hamilton (**H**), which diverted Fiery Creek west into Lake Bolac.

Lava flows from Stockyard Hill and other sources ran down valleys in the northeast about 1 million years ago.

These flows have smooth slopes or degraded stony rises with moderate red soil development.




**4: The last 500,000 years.**

Mt Fyans (**F**) erupted - possibly in two stages.
Lava flows from Mt Elephant (**E**) blocked the lower part of Mt Emu Creek.
A flow from Mt Widderin (**W**) followed the old valley of Emu Creek and diverted the creek west to its present position.

These flows all have only thin soils over well-preserved stony rises.