

1976/43. Representative basin study: Peak Rivulet, Southern Tasmania

C.J. Knights

Peak Rivulet and its tributaries form a drainage system which flows east to a confluence with the Esperance River, 5 km north-west of Strathblane. The Peak Rivulet system drains a horseshoe shaped, steep sided catchment basin covering an area of approximately 40 km² between Adamsons Peak (1226 m, DN857001) and Esperance Peak (1143 m, DN844054).

The area has a high average annual rainfall and much of the basin is covered by a thick rainforest vegetation. The river system is swift flowing throughout the year, with Peak Rivulet being up to 6 m wide and one metre deep in summer.

GEOLOGY

Access to much of the catchment is difficult because of the thick bush, and this, together with the faulting, made detailed stratigraphic mapping impracticable for this survey. However some stratigraphic thicknesses were obtained from the northern section of the area.

SUCCESSION

Thickness	Probable age	Formation	Description
1.5-2 m	Quaternary		Partly rounded dolerite boulders in clay and humic earth.
1.5-2 m	Quaternary		Sandy alluvium and dolerite boulders.
	Jurassic		Igneous intrusion of dolerite as dykes and sills.
>365 m	Triassic		Massive clean quartz sandstone, with current bedding and widely spaced joints. Weathers to white or yellow sand.
180 m	Permian	Cygnat	Coal shales and sandstone.
		Ferntree	Hard, rhythmically bedded mudstone. Few fossils, erratics present blue-grey colour.
		Risdon	Not observed.
300 m		Malbina	Dirty grey sandstone with quartz pebbles.
		Grange	Very fossiliferous mudstone and siltstone weathering rapidly to a white clay.
		Bundella	Hard grey fossiliferous mudstone over thin unfossiliferous mudstone.
		Tillite?	Coarse quartz sandstone with pebbles or quartz and lithics.

Both Adamsons and Esperance Peaks are capped by Jurassic Dolerite which has intruded Triassic sandstone as both dykes and sills. Both the Triassic sandstone and the Permian rocks have been severely faulted, with sandstone occurring on the plains to the east of the catchment, and on the high ridge to the west. Between the plains and the ridge, faulting has caused a total displacement of between 670 and 920 m.

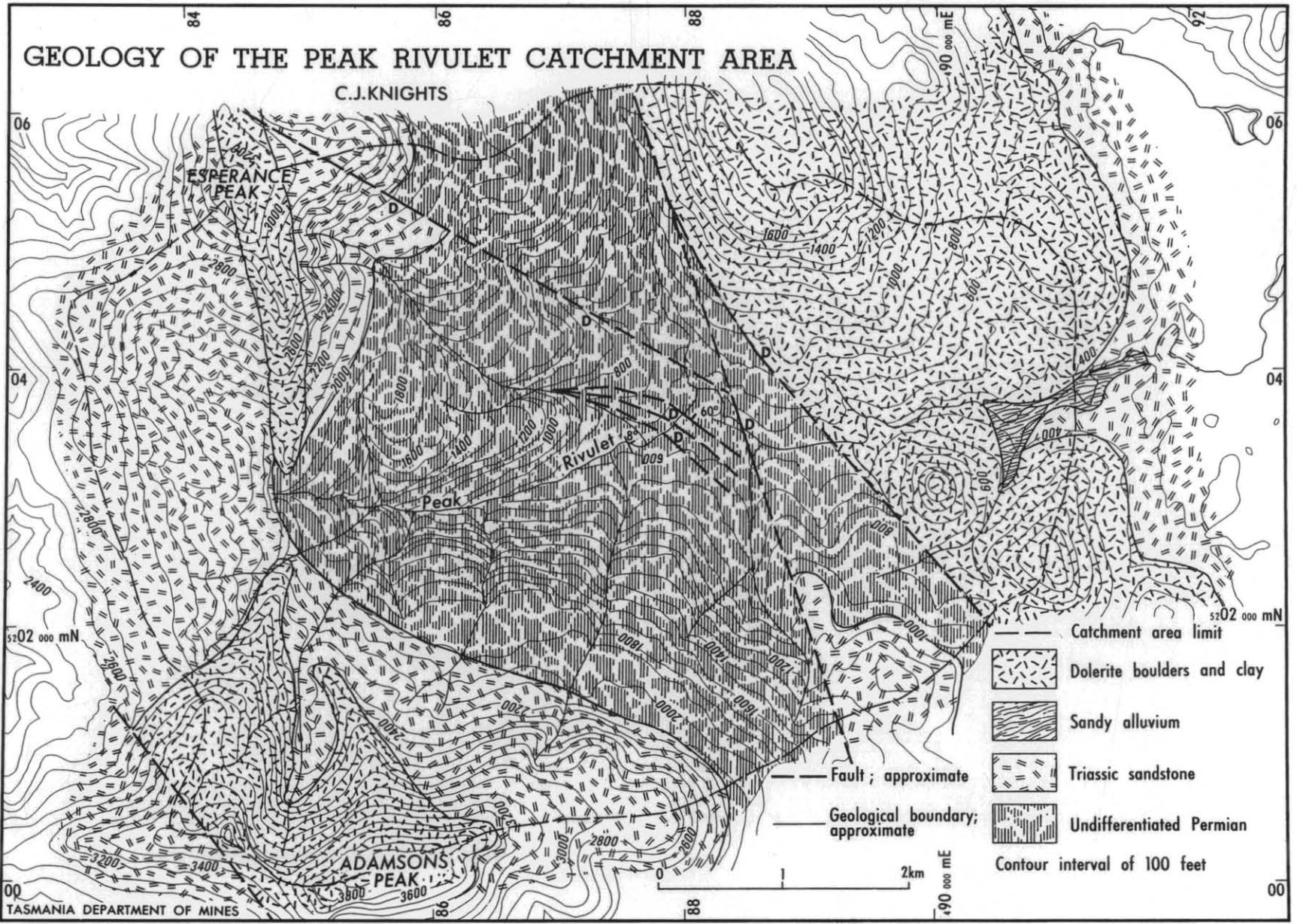


Figure 1.

5 cm

43-2

216

At the eastern end of the catchment the river cuts through a dolerite sill overlying Triassic sandstone. Here the valley floor is covered by a 1.5-2 m thick layer of dolerite boulders. The river cuts eastwards through the boulders and into an area of sandy alluvium of similar thickness.

FAULTING

Intra-Permian faulting can be observed in Peak Rivulet. Particularly evident are three close, parallel faults striking 120° and dipping 60° NE.

HYDROLOGICAL CHARACTERISTICS

Permian

The Permian rocks, especially the mudstone, are generally thin bedded and well jointed and are therefore more permeable than the other harder rocks. The harder mudstones do not appear to be very deeply weathered as they crop out in tributary streams. It is likely that there are many fairly open joints which will allow groundwater infiltration. Significant permeability in Permian rocks is normally only present in the top 30-60 m.

Two topographic benches occur on the Permian rocks below the Triassic and the Malbina sandstone. These benches intercept surface and sub-soil run-off to allow increased groundwater infiltration, and also retard storm run-off.

Triassic

The Triassic sandstones are massively bedded with widely spaced joints, so that groundwater infiltration will not be great. However jointing increases close to dolerite intrusions, and small springs were noted in the cliffs below the high plateau.

Dolerite

Generally this rock weathers rapidly and joints are sealed against groundwater access.

Quaternary

The dolerite boulders in the valley fill are set in clay and soil, but some water infiltration is evident.

The sandy alluvium is more permeable and it is probable that a percentage of the river actually flows through the alluvium, and is thus slowed down.

Faulting

Jointing is particularly evident close to faults and increases the rock permeability.

Soils

There is considerable interflow between the clay and humus horizons in rainforest areas with storm run-off consequently retarded.

Soils on the higher sandstone are thin, sandy, and freer draining.

[26 July 1976]

APPENDIX 1

Peak Rivulet: Vegetation and soils.

A limited study of vegetation and soils in the Peak Rivulet catchment area was undertaken with the assistance of H. Wessing.

VEGETATION

The dominant influence on vegetation associations is the easterly aspect of the basin and consequent shelter from the prevailing westerly weather patterns. The basin is on the lee side of a 1200 m high range and the well drained, fairly fertile soils combine with the aspect to control vegetation patterns.

With the exception of the steep exposed areas above 900 m, a dense and continuous rainforest ground cover and understory exists throughout the catchment area. This effectively increases the amount of infiltration and interflow occurring in the soil. It was also noted that the understory on the north facing slopes was considerably thicker than on the south facing slopes, and that there was a contrast in the species present.

SOILS

The profile morphologies of soils in the catchment area vary greatly in respect to the climate and parent material formative factors.

Skeletal soils

Shallow, undifferentiated soils occur at high altitudes on exposed slopes. These soils are coarse textured, with profiles generally less than 0.5 m in depth, and have formed on dolerite and Triassic sandstones and shales. Exposure of frost shattered parent material is common. The water table is shallow, generally lying about 15 cm below the surface.

Yellow podzols

These soils are formed on Triassic sandstones and are generally associated with rainforest vegetation. These soils have a typical podzol profile, with a leached A₂ horizon and an indurated hardpan horizon. The B horizon is generally a mottled sandy clay. The depth of the profile is variable with slope, but is generally less than 1.5 m.

Grey podzolics

These sandy clays may be separated according to vegetation and aspect, those on the south facing slopes being associated with a rainforest regime, and being considerably more moist than their counterparts on the north facing slopes. The latter show little variation from the yellow podzols, although they are more clay-rich.

Grey-brown and brown soils on dolerite

Grey-brown and brown soils occur on the lower slopes of the area associated with dolerite and dolerite scree. These soils have an organic rich A horizon over a medium clay acidic B horizon at shallow depth. These clays grade into decomposing dolerite at about one metre in depth, although dolerite fragments are generally distributed throughout the profile. The water table may be as low as 1.6-2 m below the surface.

43-5

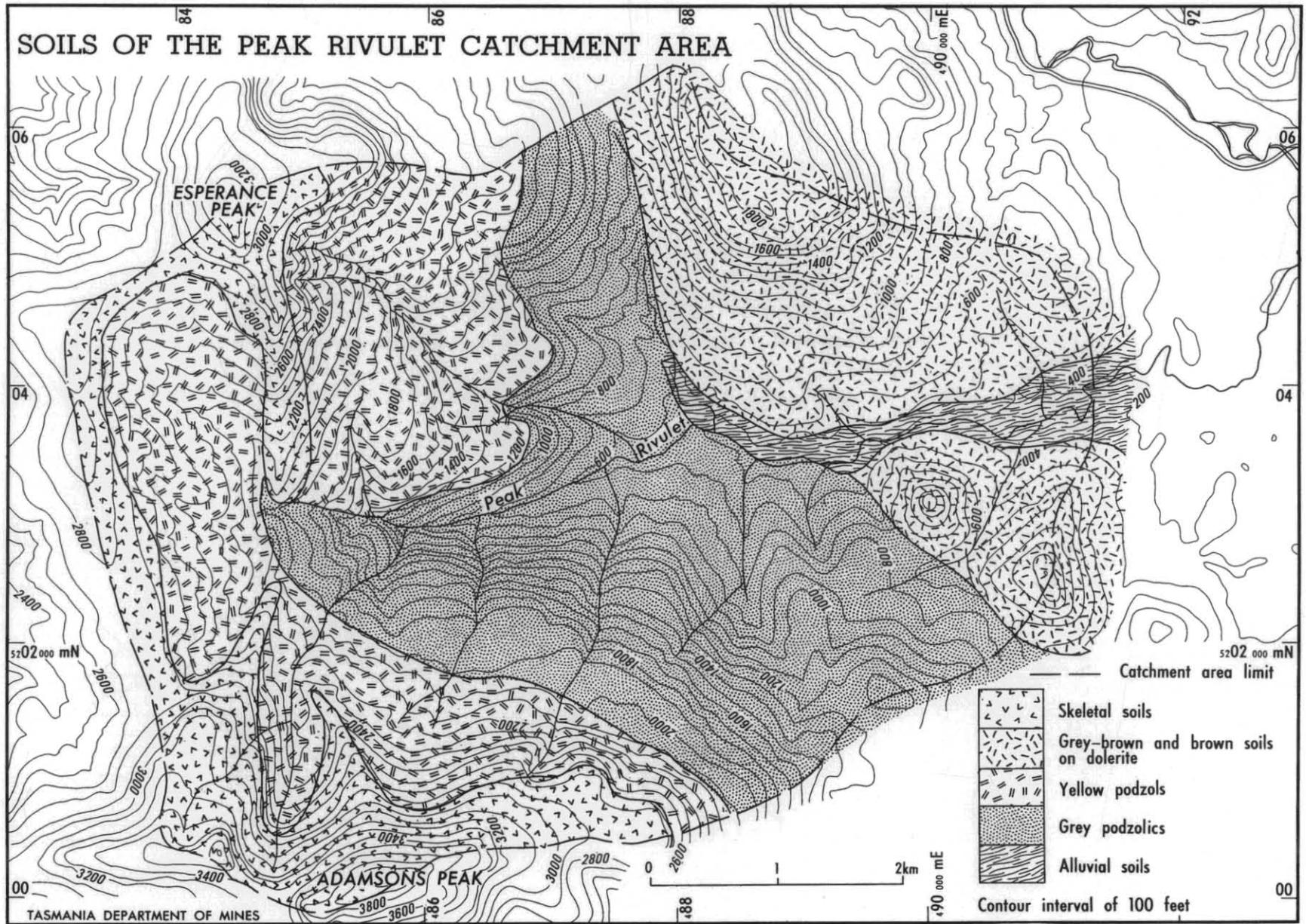


Figure 2.

5 cm

Soils on alluvium

These soils are found bordering Peak Rivulet and its flood plain and are formed upon a wide variety of parent material. An organic rich litter layer overlies a light sandy clay A₂ horizon between 30 and 80 cms deep. The B horizon has a similar thickness of gravel intermixed with a silty clay, grading down to a heavier sometimes mottled clay at depth. Organic material is common in the top of the profile and decreases with depth. The acidity decreases with depth with a pH of 3½ in the A₂ horizon and a pH of 4½ in the C horizon. The water table lies 2-3 m below the surface.