
Introduction to Tasmanian karst groundwater systems
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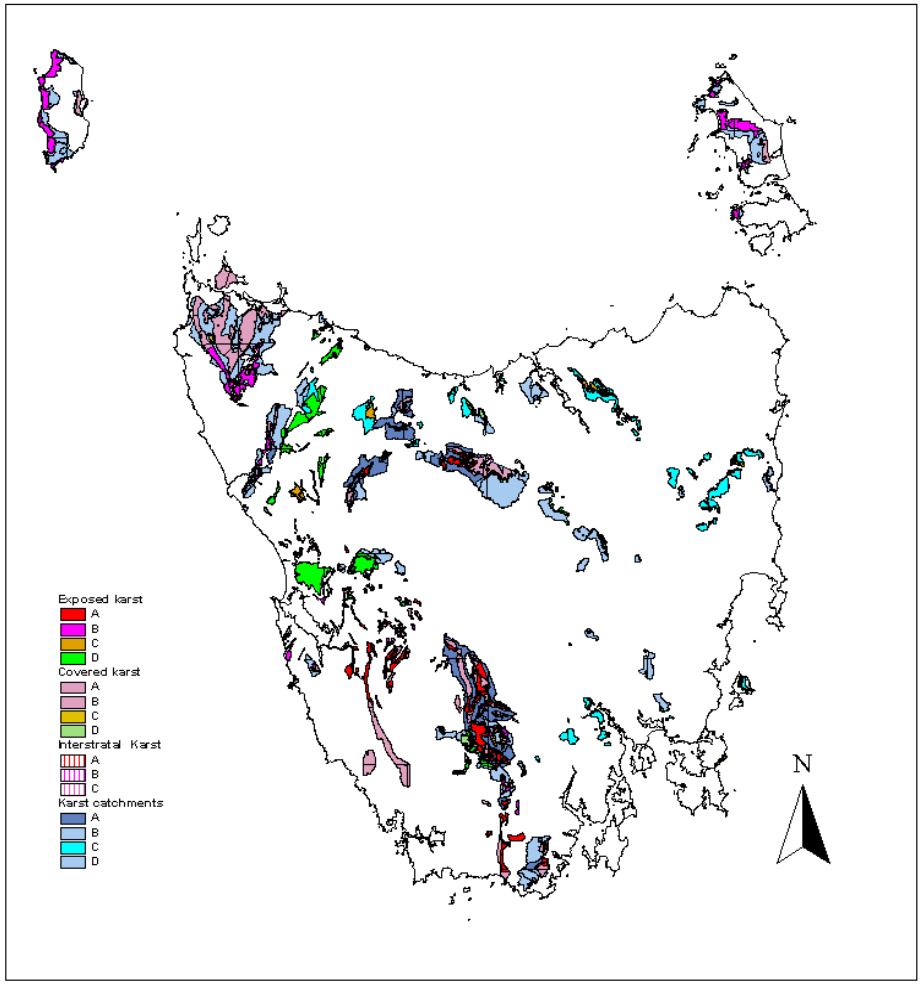
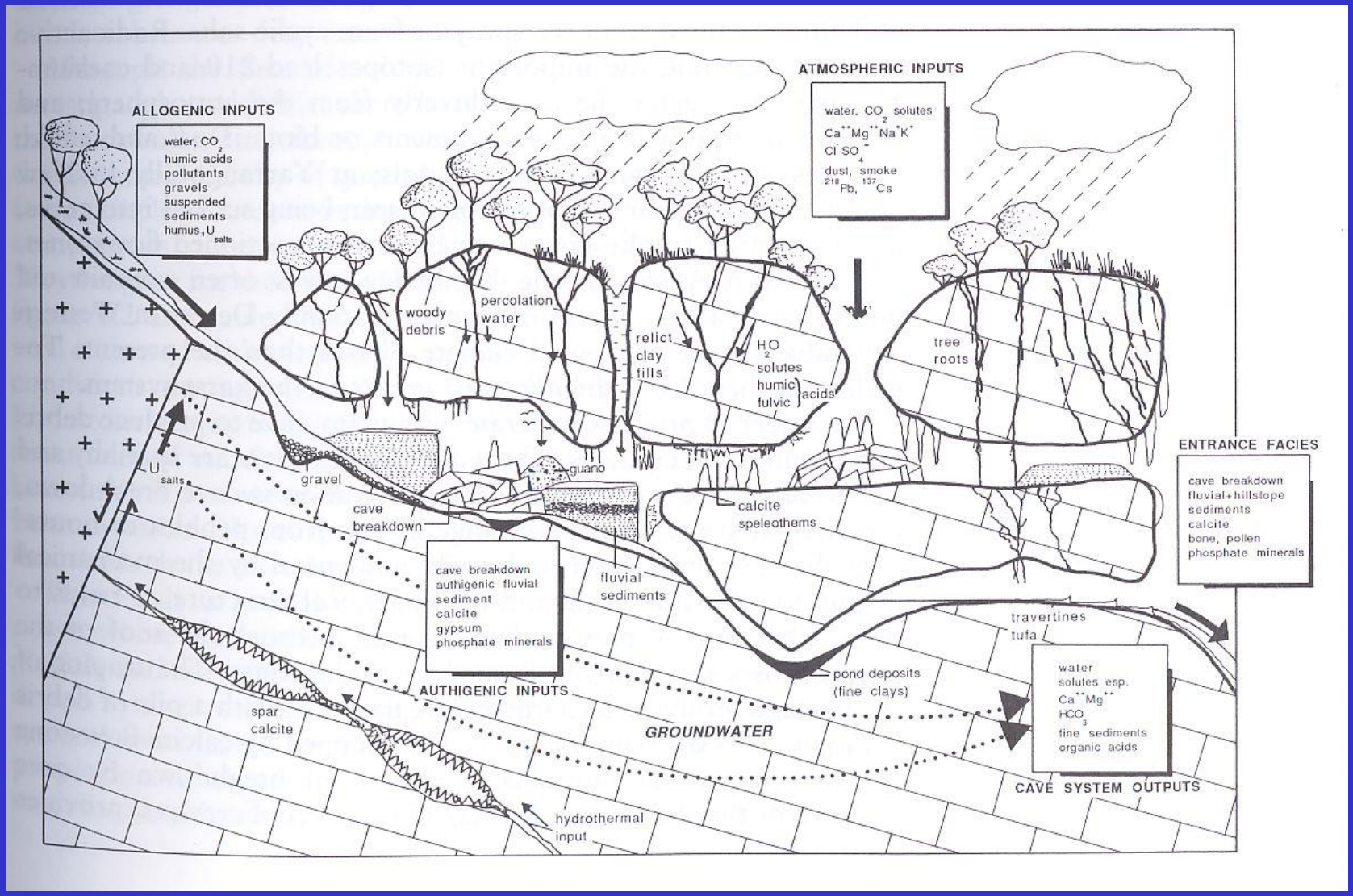
Earth Science Section DPIWE

Tasmanian karst areas



0 40 80 120 160 200 Kilometers

The karst groundwater system



The four state karst groundwater model

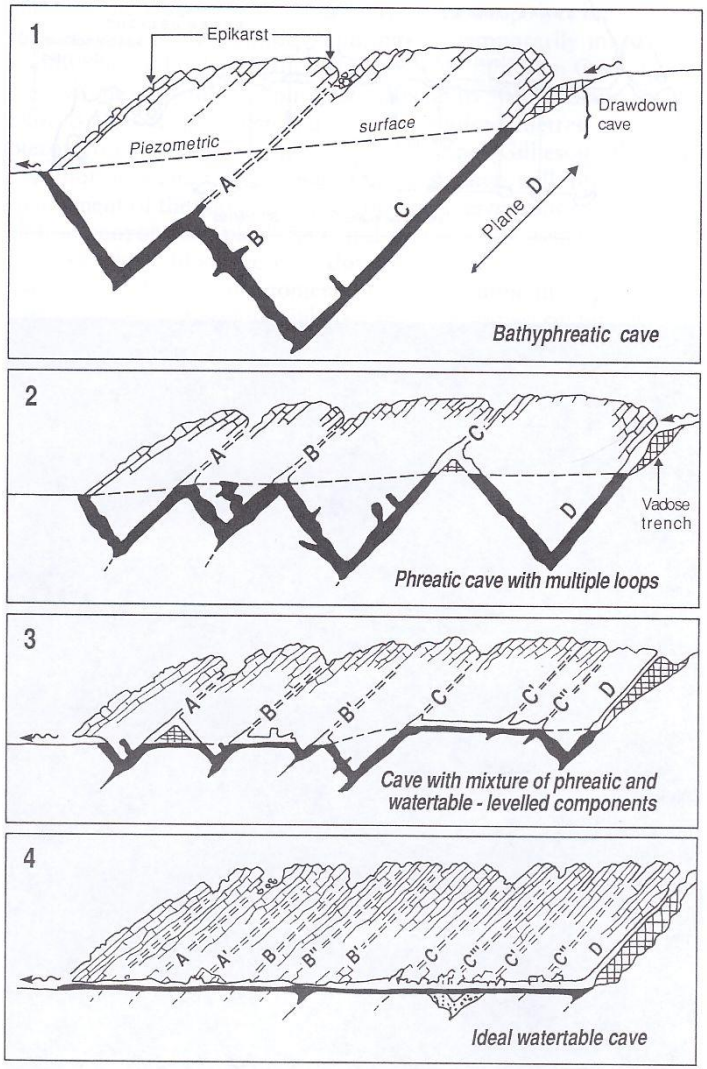


Figure 3.16
The four-state model differentiating the basic types of phreatic and water table caves. From Ford and Williams (1989).

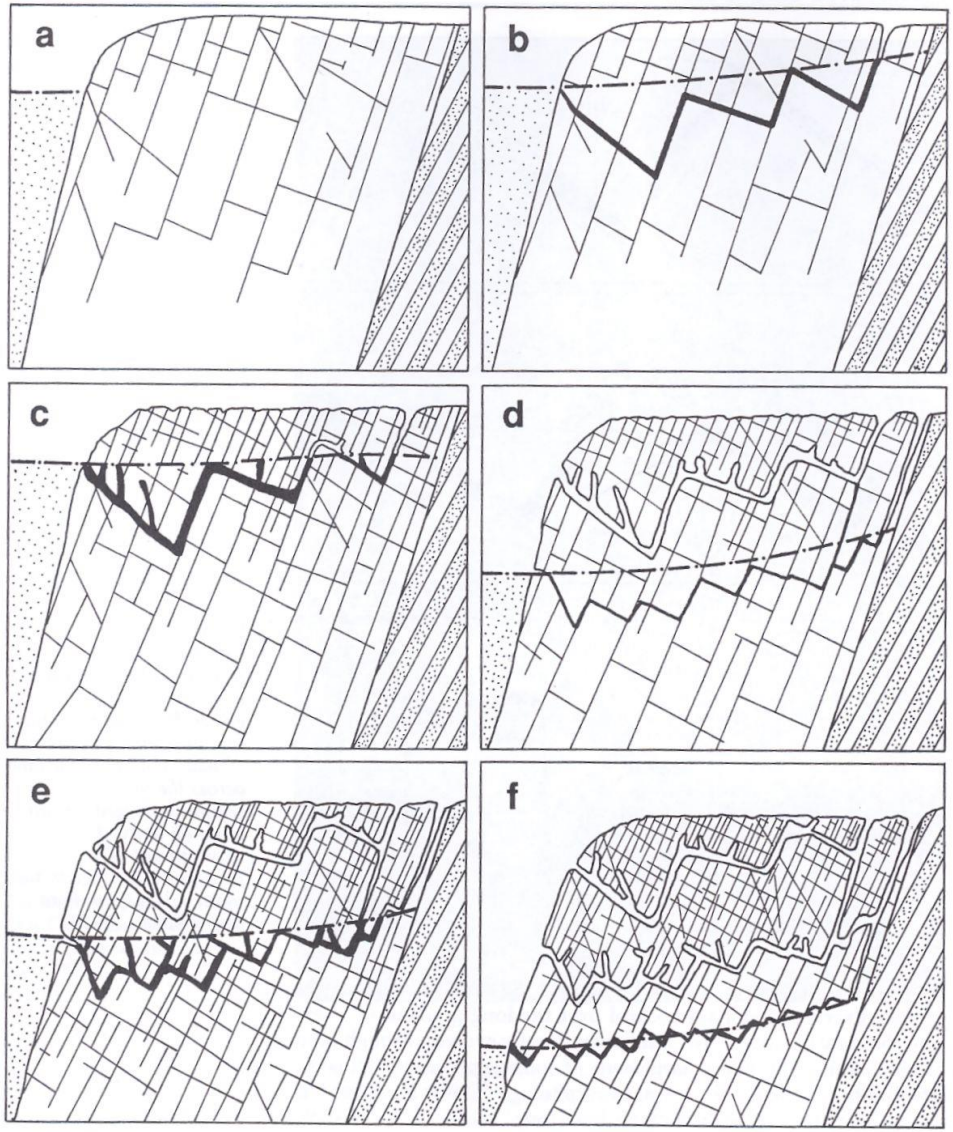


Figure 3.19
The geometry of successive caves in a multiphase system is affected by the increase in fissure frequency over time. First-generation caves are of the state 2, bathyphreatic type, while later caves tend to state 3 (mixed phreatic and water table) and 4 (water table-levelled) types. From Ford and Williams (1989).

The four state model over time

Model of karst aquifer types

Table 2.1 Porosity types and karst aquifer properties

	Primary porosity	*Secondary porosity*	*Conduit porosity*
Components	Intergranular pores Vughs Mineral veins	Linked joints and fractures Bedding plane partings Connected mineral veins	Open channels and pipes of variable size and shape
Homogeneity	Usually isotropic	Usually anisotropic due to fracture origins, often oriented	Highly anisotropic forming networks
Flow regime	Laminar	Laminar to just turbulent	Turbulent
Governing hydraulic law	Darcy	Hagen–Poseuille	Darcy–Weisbach
Water table	Well defined	Irregular surface	Often perched and at varying levels
Flow response to input water	Slow	Moderate	Rapid

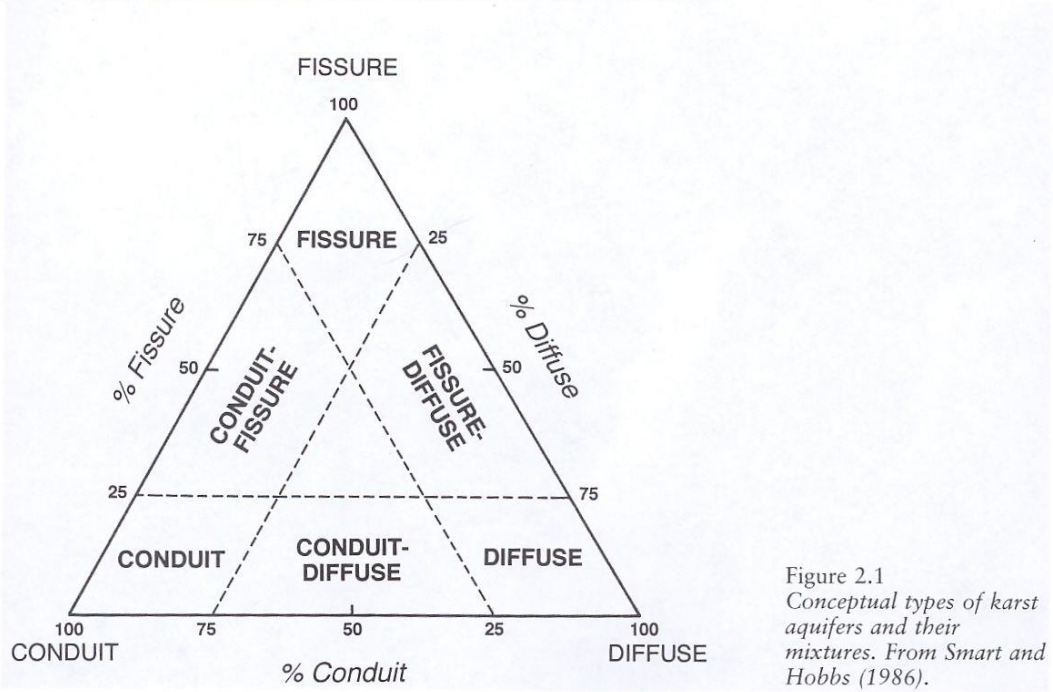


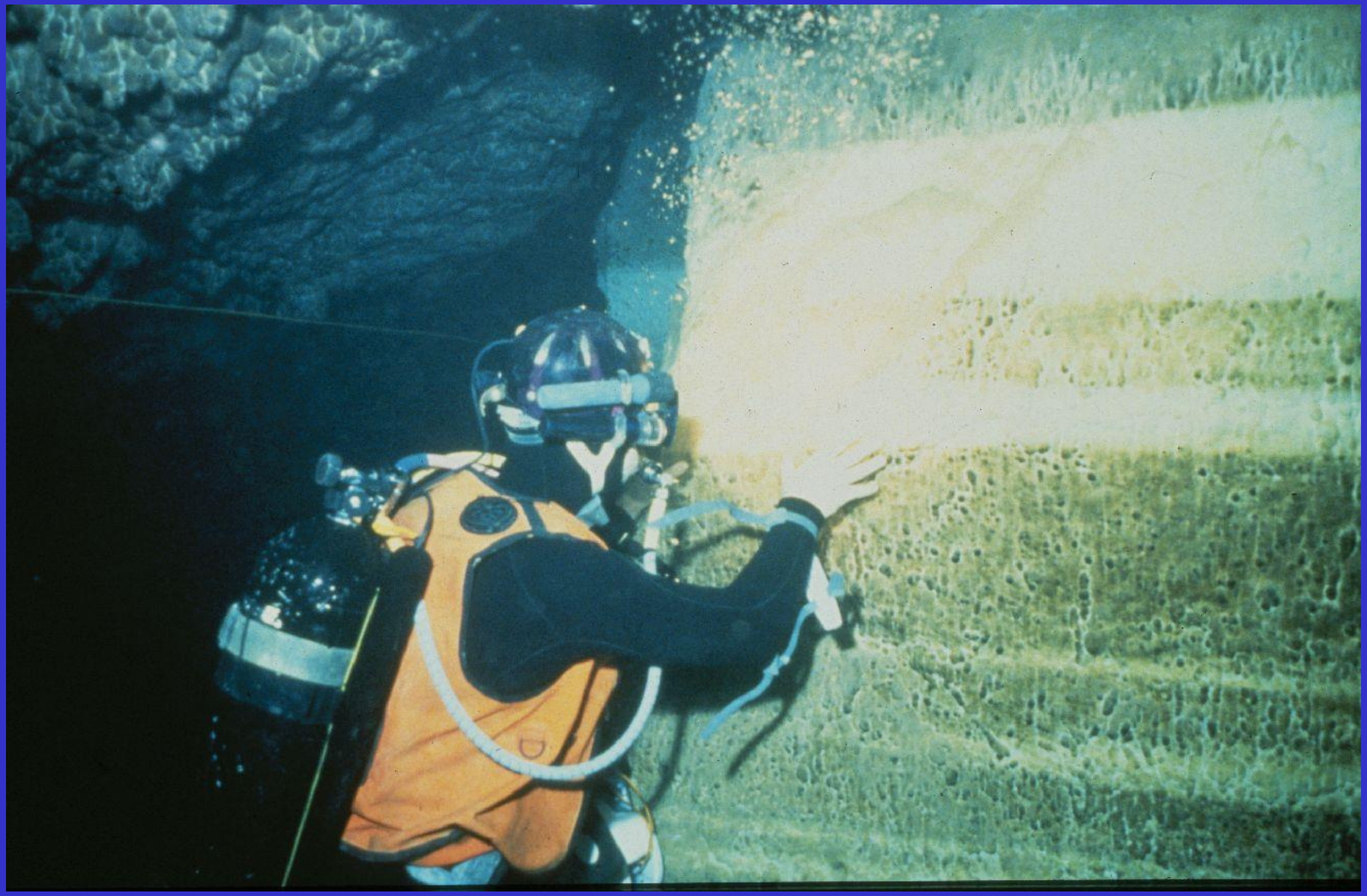
Figure 2.1
Conceptual types of karst aquifers and their mixtures. From Smart and Hobbs (1986).

Inflows

High energy vadose flows

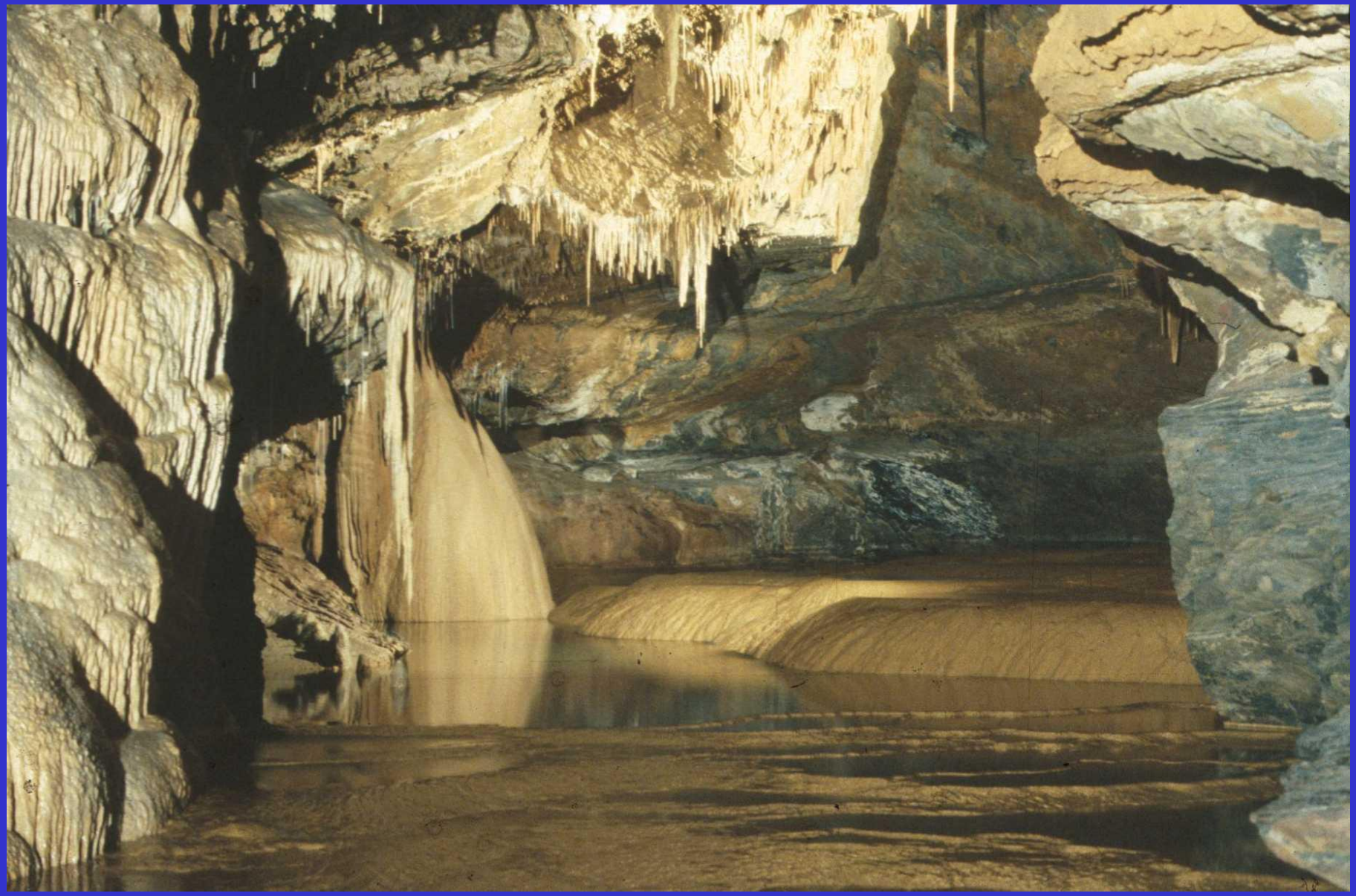
Low energy vadose - epiphreatic flows

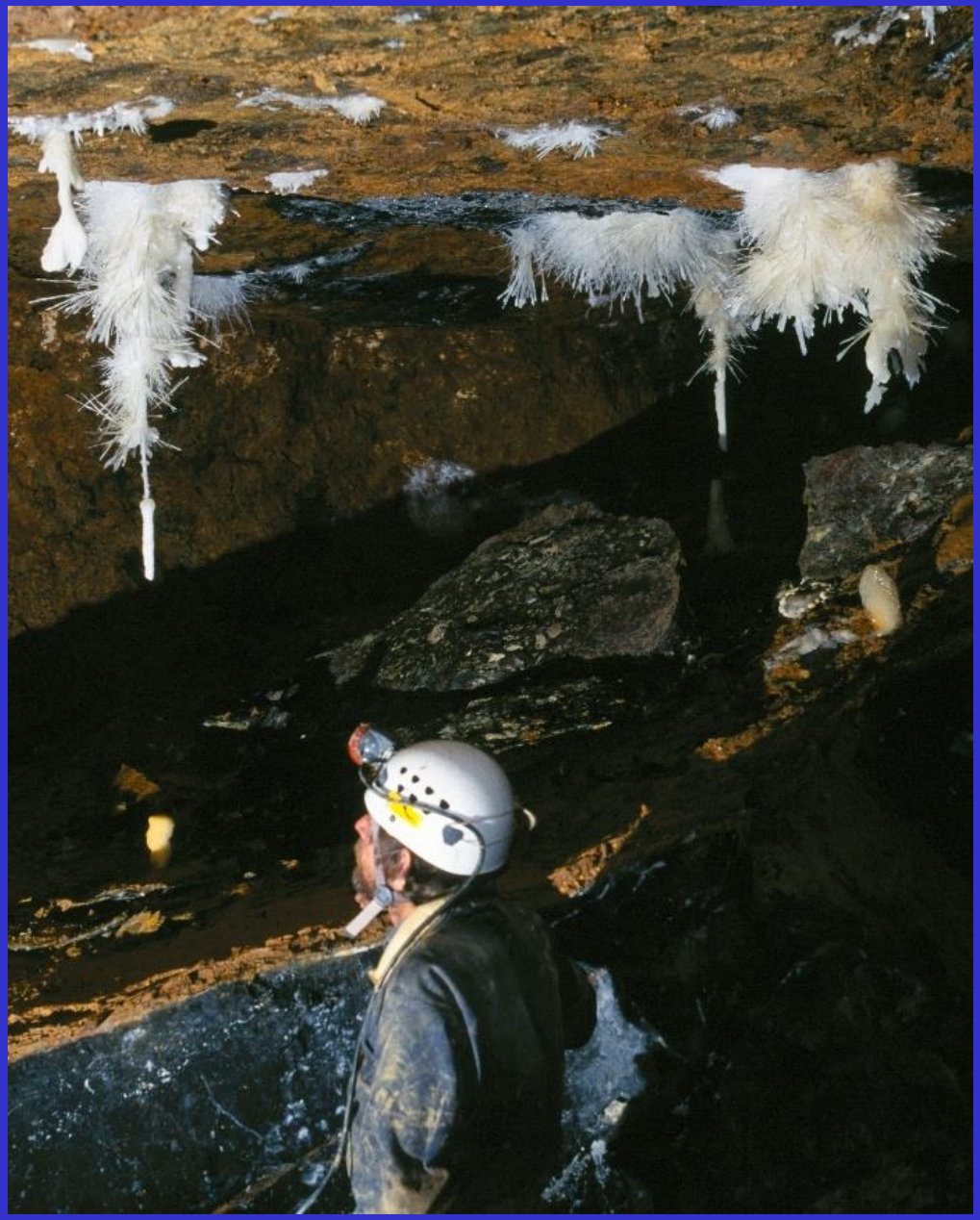
Phreatic flows



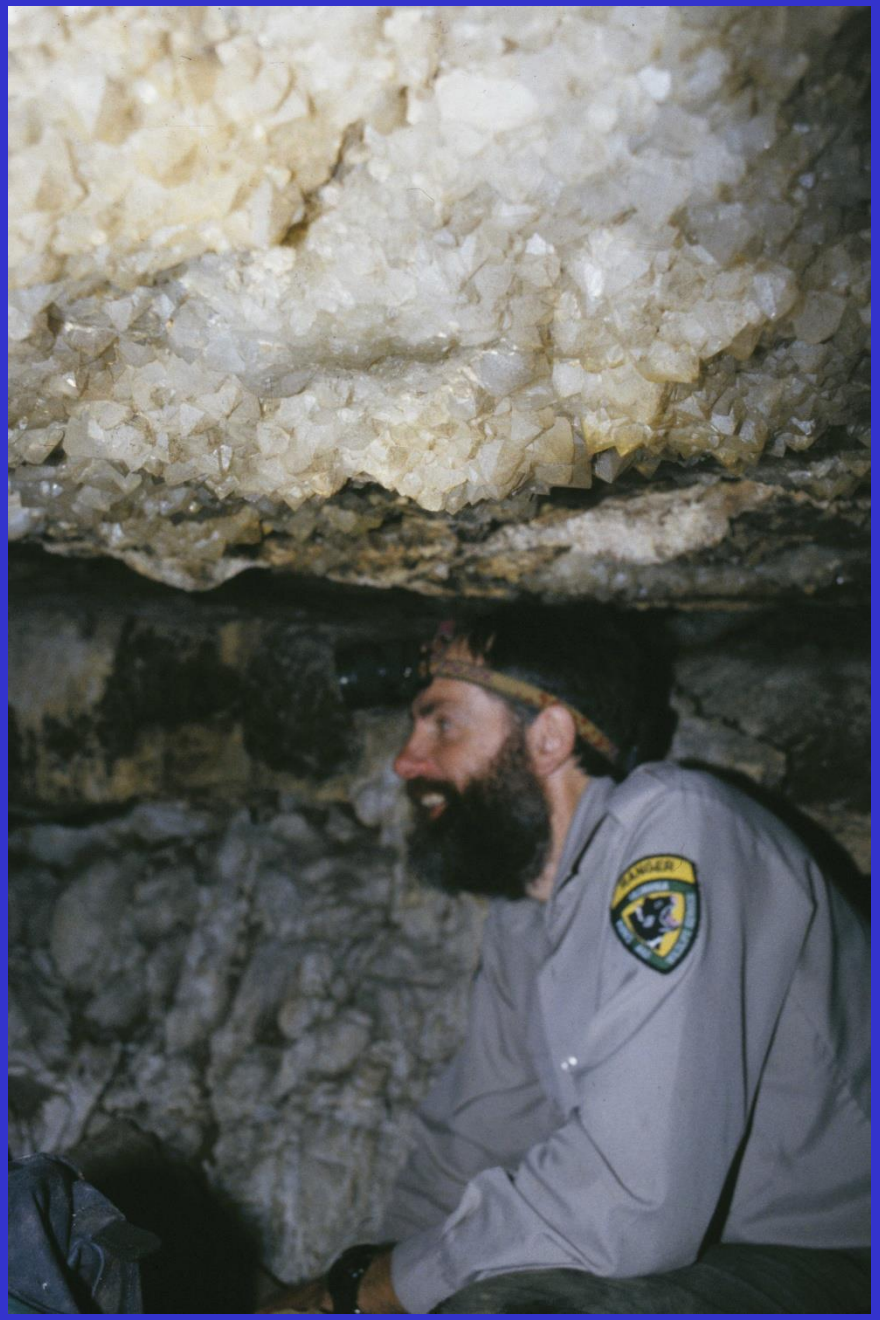
Anastomosing tubes

Percolation flows





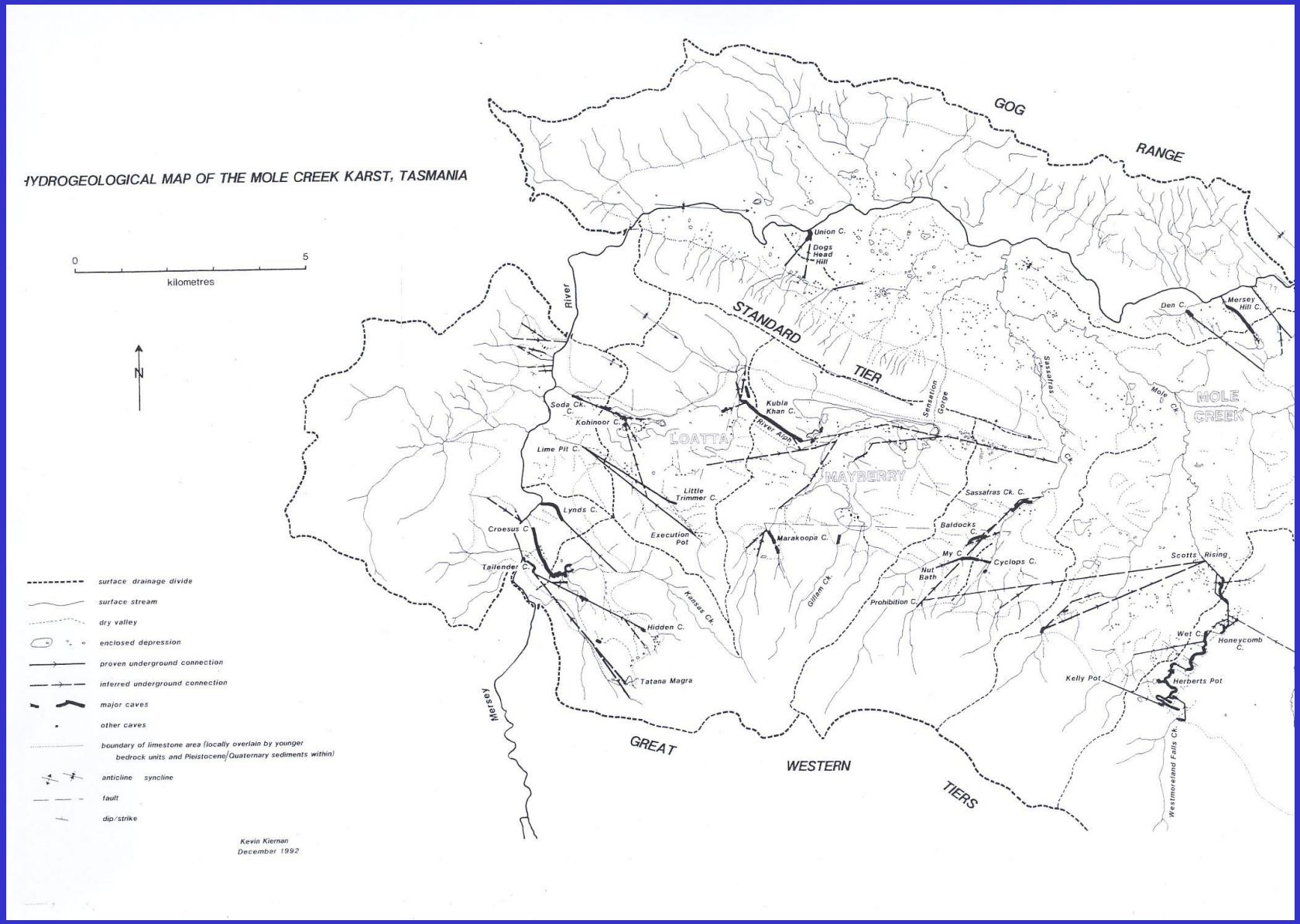
Fissure flows



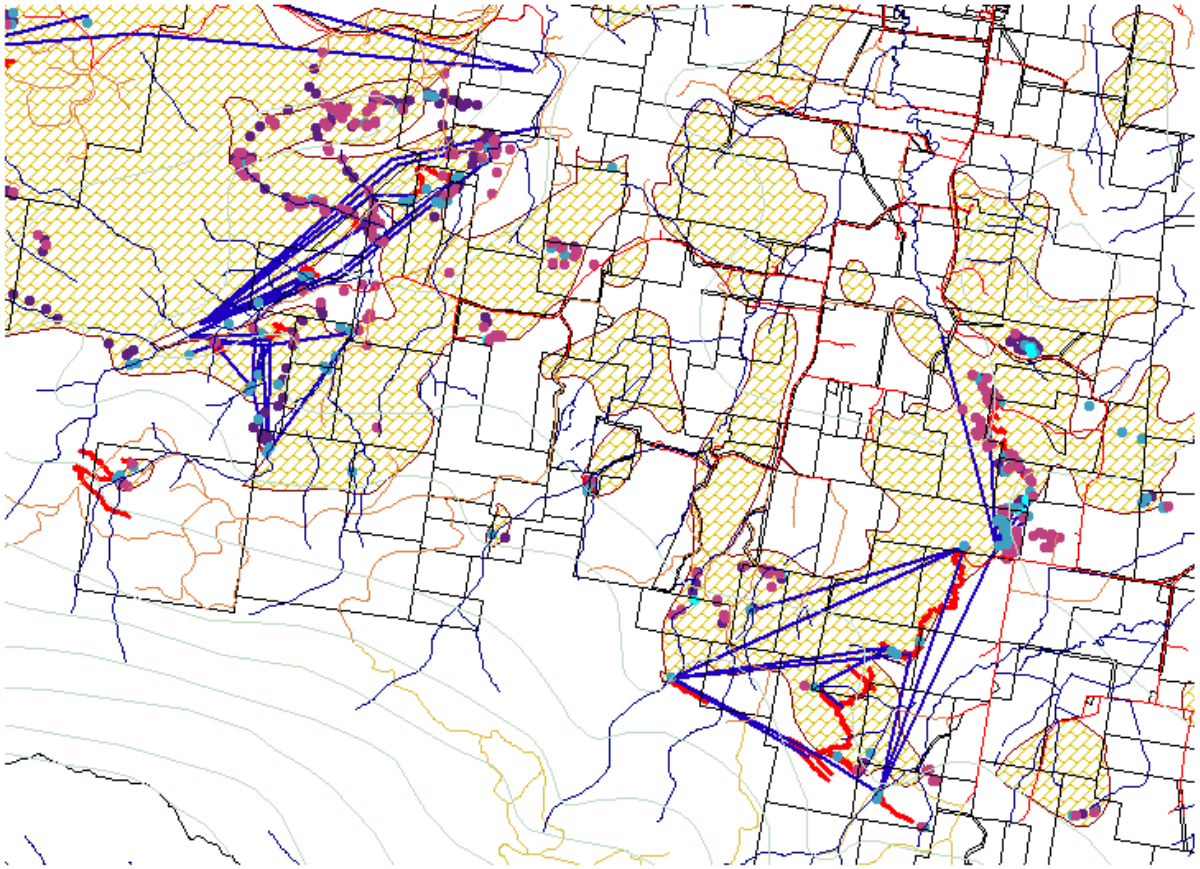
Hydrothermal flows

Outflows

Mole Creek karst hydrology



Mole Creek karst atlas March 2003



Sinkholes
tufa feb 2003
cavents feb 2003
karren feb 2003

Water traces
Cave 9mar2003

Exposed karst
A

N

1 0 1 2 3 4 5 Kilometers

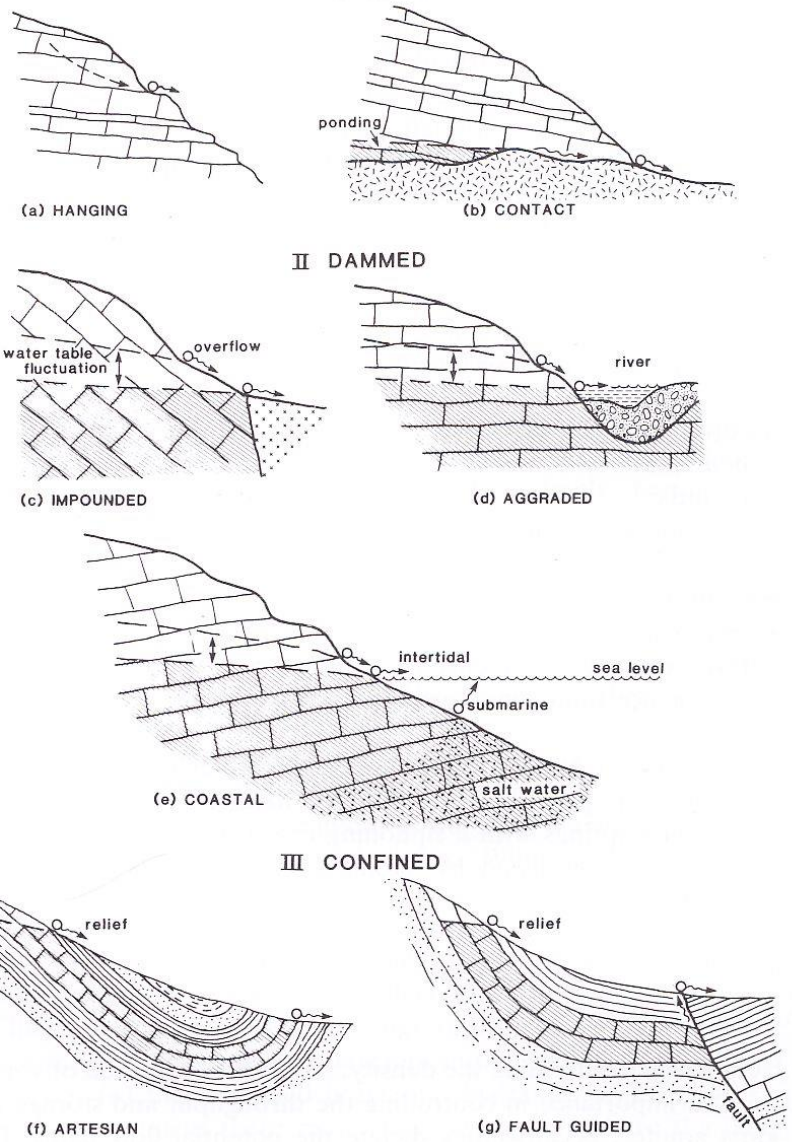


Figure 5.18 Types of springs encountered in karst.

Karst spring types

Karst spring chemographs

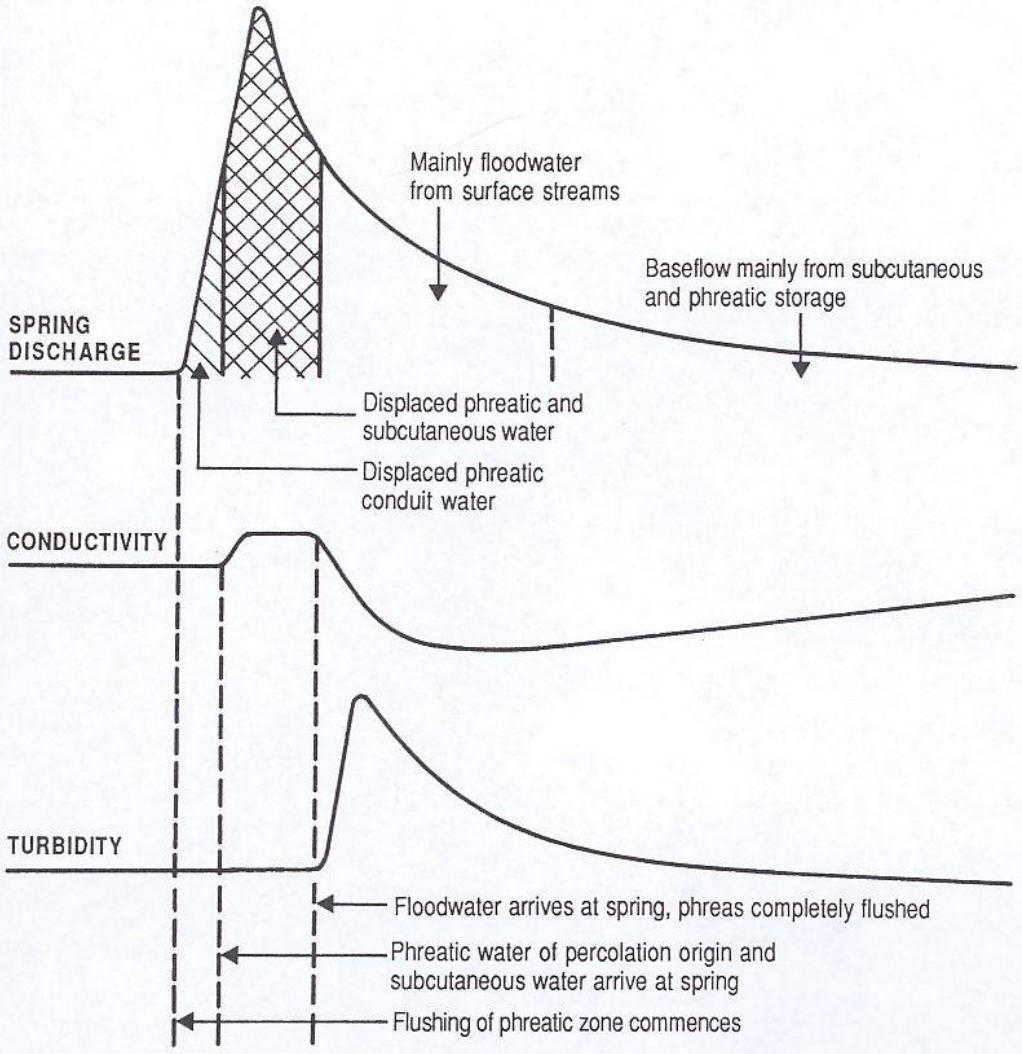
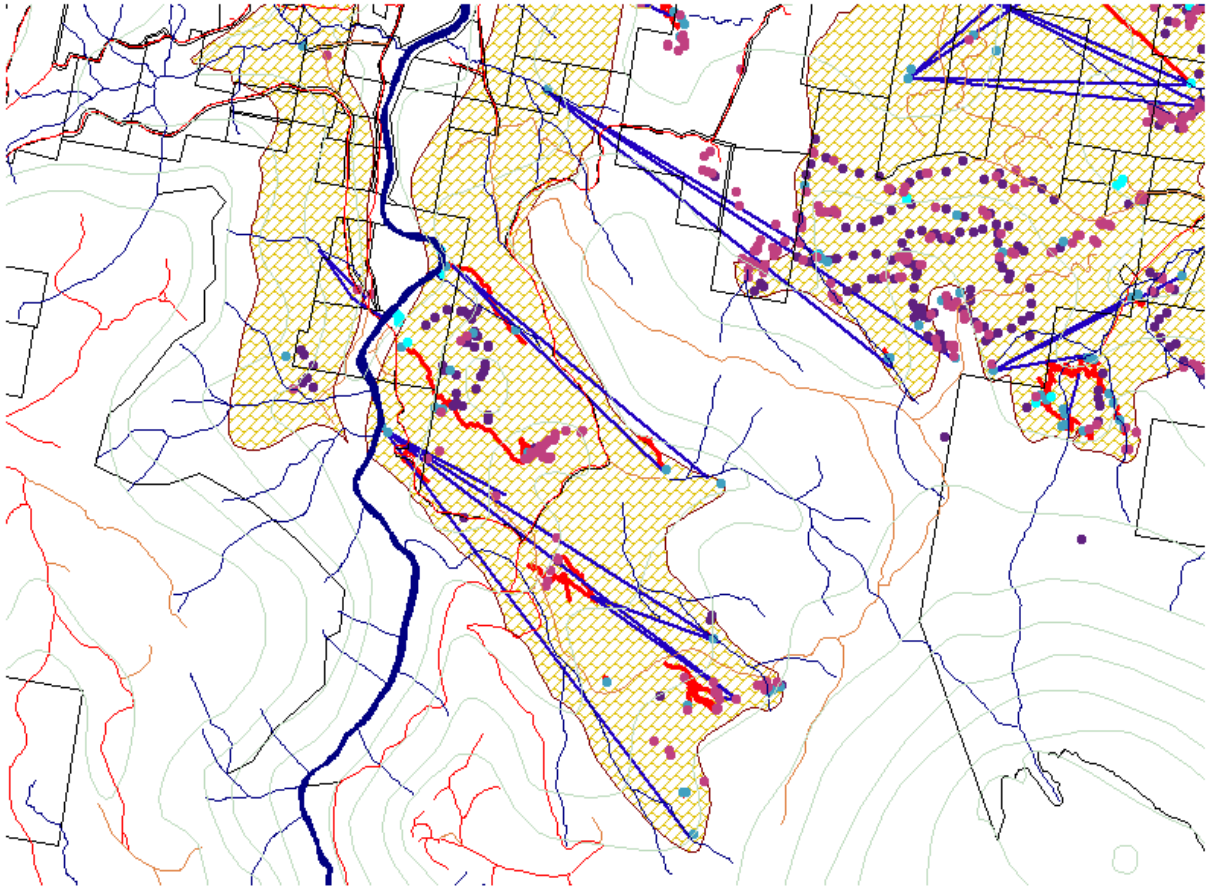
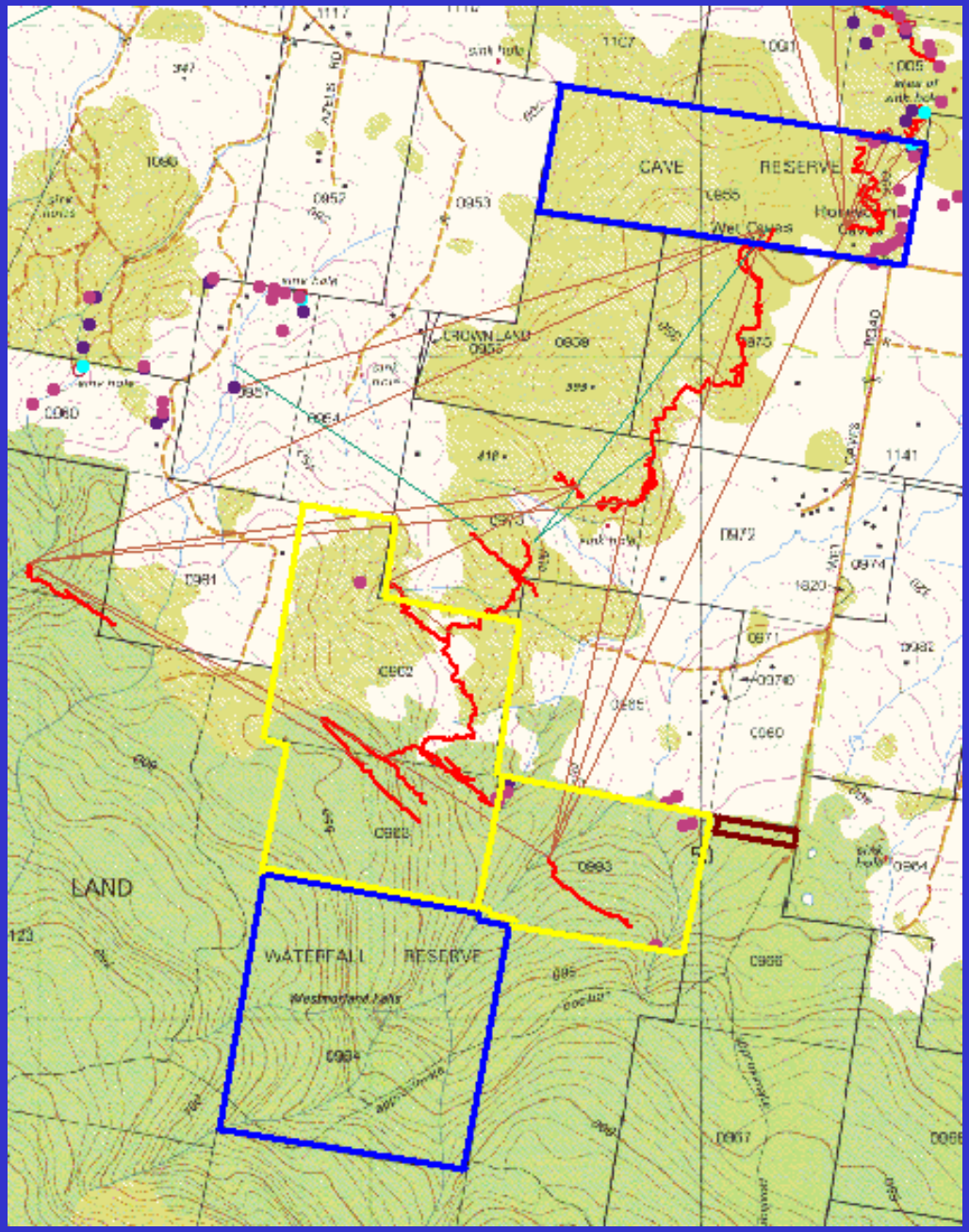


Figure 2.10
Interpretation of an idealized spring hydrograph and chemograph. From Williams (1983).

Water tracing - Hastings

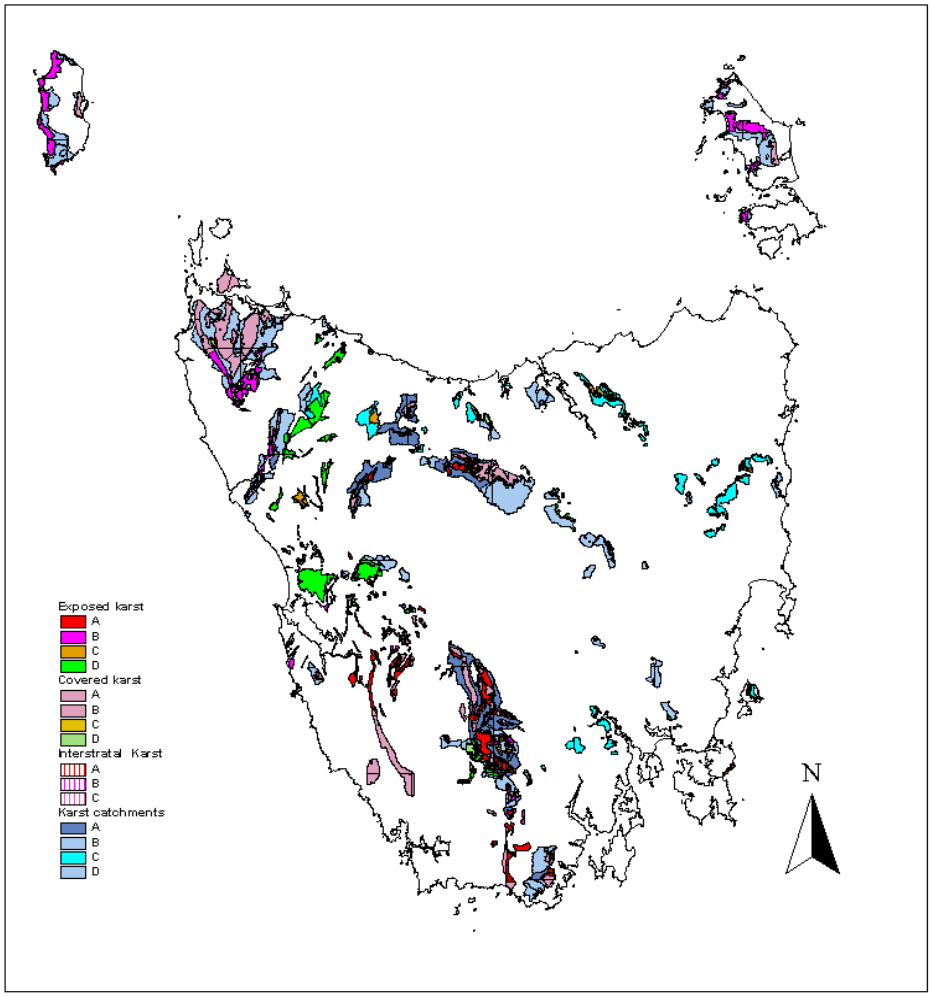
Karst Atlas - Mill-Kansas area





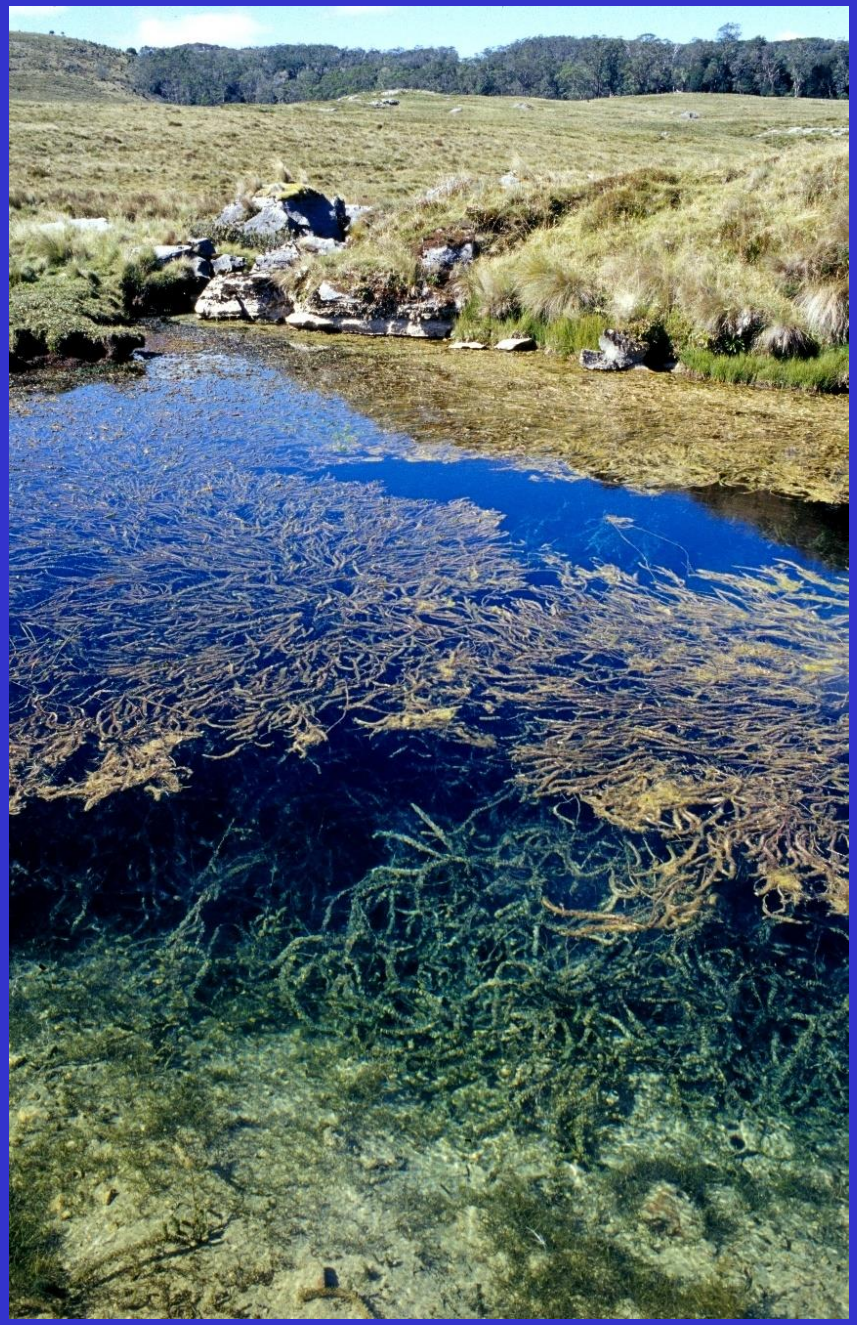
Water tracing and landuse planning

Tasmanian karst areas



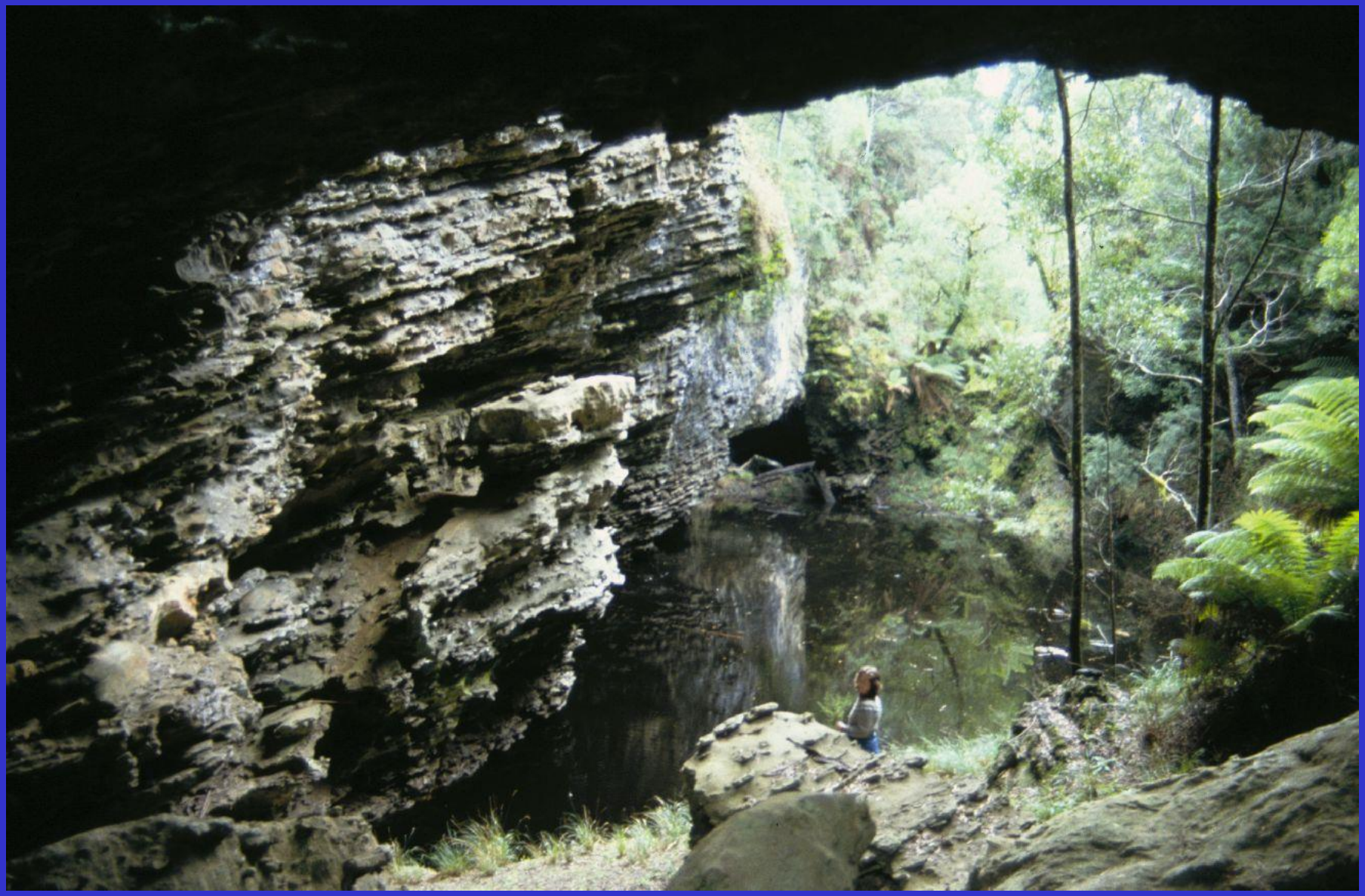
0 40 80 120 160 200 Kilometers

Mt Bobs streamsinks - subalpine karst



Vale of Belvoir - subalpine spring

Trowutta Arch - drowned doline



Boggy Creek tufa terraces - King Island

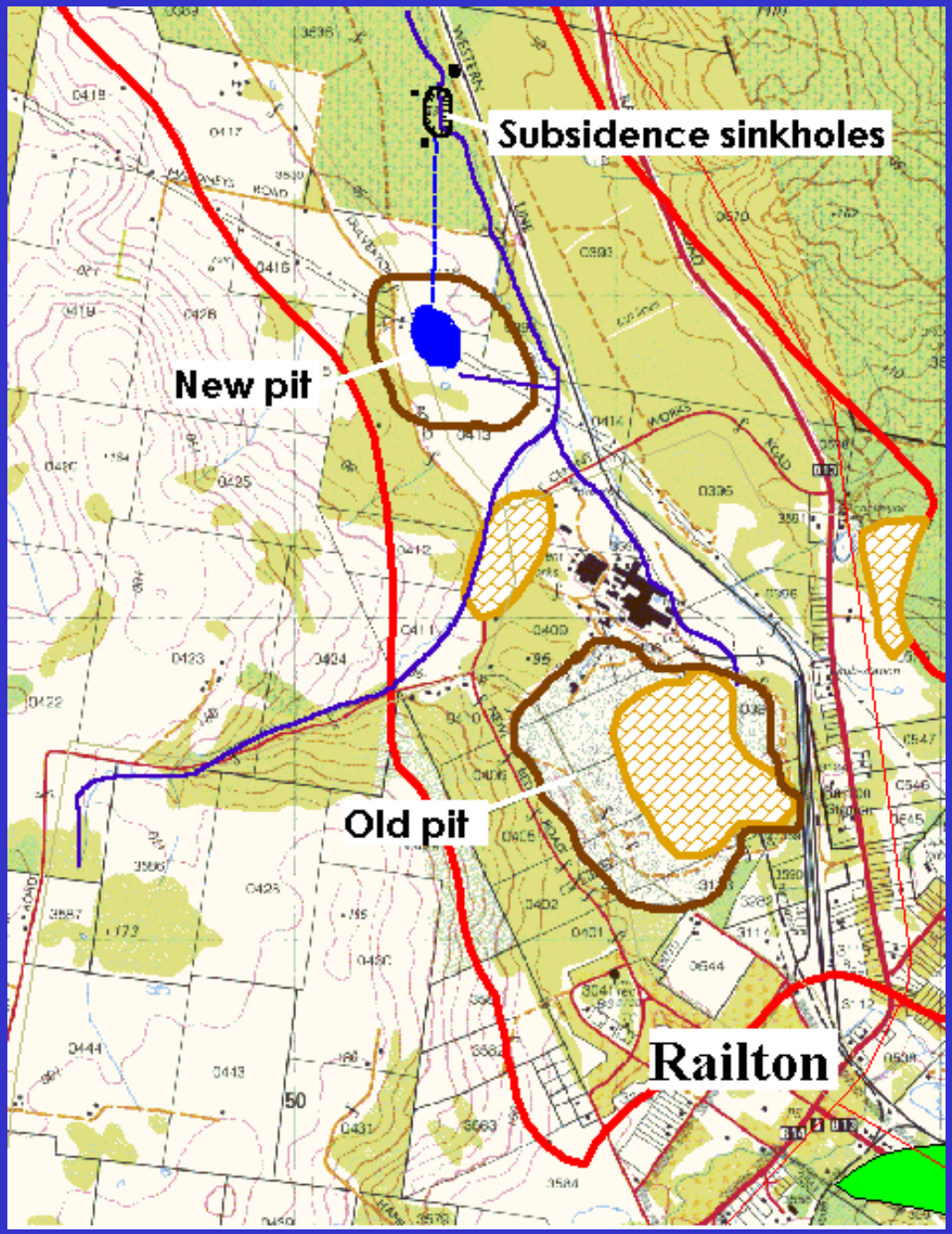
Montagu River drain

Doline full - Dismal Swamp polje

Doline empty- Dismal Swamp polje

Montagu Cave - full

Montagu Cave - empty



Sinkhole subsidence - Railton limeworks

New Pit - Railton

Karst water inflow - Railton mine

Sinkhole collapse - Railton

Potential effects on karst groundwater dependent systems - Montagu