2 Groundwater Flow Systems

The Groundwater Flow Systems (GFS) have been developed in the National Land and Water Audit (Audit) as a framework for dryland salinity management in Australia (NLWRA, 2001). They *"…characterise similar landscapes in which similar groundwater processes contribute to similar salinity issues, and where similar salinity management options apply"* (Coram, *et al.*, 2001). In Australia, twelve GFS have been identified on the basis of nationally distinctive geological and geomorphological character.

In the Audit, GFS are characterised by their hydrological responses and flow paths into local (short flow path, quick response time), intermediate and regional (long flow path, slow response time) systems. This terminology should not be confused with that used in classic groundwater textbooks (eg. Freeze & Cherry, 1979; Fetter, 2001) for the nested flow systems that develop in groundwater basins, depending on the basin length to depth ratio and the topographic undulation. The terminology used by the Audit, describes local, intermediate and regional GFS by their flow path length and corresponding ability to respond to hydrological change caused by alteration to the natural environment. The underlying assumption is that salinity is caused by increased recharge leading to rising groundwater tables, which have resulted from changes in land management over the past 200 years.

The Audit provides definitions of flow systems as tabulated below (Table 1).

Attribute	Rating	Meaning/Value
Scale	Local	Groundwater flows over distances <5km
	Intermediate	Groundwater flows over distances 5 – 30km
	Regional	Groundwater flows over distances > 50km
Aquifer transmissivity	Low	Less than 2 m^2/day
	Moderate	2 m^2/day to 100 m^2/day
	High	Greater than 100 m^2/day
Groundwater salinity	Low	Less than 2000 mg/L
	Moderate	2000 mg/L to 10000 mg/L
	High	Greater than 10000 mg/L
Catchment size	Small	Less than 10 km^2
	Moderate	10 km^2 to 500 km^2
	Large	Greater than 500 km^2
Annual rainfall	Low	Less than 400 mm
	Moderate	400 mm to 800 mm
	High	Greater than 800 mm
Salinity rating	S1	Loss of production
	S2	Saline land covered with salt-tolerant volunteer species
	S3	Barren saline soils, typically eroded with exposed sub-soils
Responsiveness to land management	Low	Salinity benefits accrue over timeframes > 50 years
	Moderate	Salinity benefits accrue over timeframes from 30 to 50 years
	High	Salinity benefits accrue over timeframes < 30 years

Table 1. GFS definitions in the Audit (NLWRA, 2001).

2.1 PPWP CMA GFS

The 18 GFS recognised in the PPWPCMA region are based on the outcomes of the October 2003 workshop and subsequent discussions with regional experts. It should be noted that the delineation of the groundwater flow systems for salinity management is not an attempt at a hydrogeological mapping, but rather the development of a tool for assessing the responsiveness of a catchment to salinity management options.

The spatial distribution of the PPWPCMA GFS is shown overpage.

Port Phillip and Westernport

CATCHMENT MANAGEMENT AUTHORITY

Groundwater Flow Systems

Local systems

- GFS 1 - Quaternary sediments
- GFS 2 - Gravel and sand sediments
- GFS 3 - Nepean barrier dunes
- GFS 4 - Greenstone ranges

Local and intermediate systems

- GFS 5 - Swamps and backdune wetlands
- GFS 6 - Weathered Older Volcanics
- GFS 7 - Older Volcanic fractured basalt
- GFS 8 - Acid volcanics
- GFS 9 - Granitic rocks
- GFS 10 - Brighton Group sediments
- GFS 11 - Werribee Delta
- GFS 12 - Rowsley Valley complex
- GFS 13 - Mornington fractured bedrock
- GFS 14 - Strzelecki Group rocks
- GFS 15 - Fractured Palaeozoic rocks

Intermediate and local systems

- GFS 16 - Weathered Palaeozoic rocks

Intermediate and regional systems

- GFS 17 - Westernport plain

Regional and intermediate systems

- GFS 18 - Volcanic plains

Kyneton
Kilmore
Jamieson
Daylesford
Healesville
Melton
Warburton
Melbourne
Werribee
Dandenong
Frankston
Geelong
Warragul
Korumburra
Leongatha
Cowes
Wonthaggi

0 20 40
kilometres

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