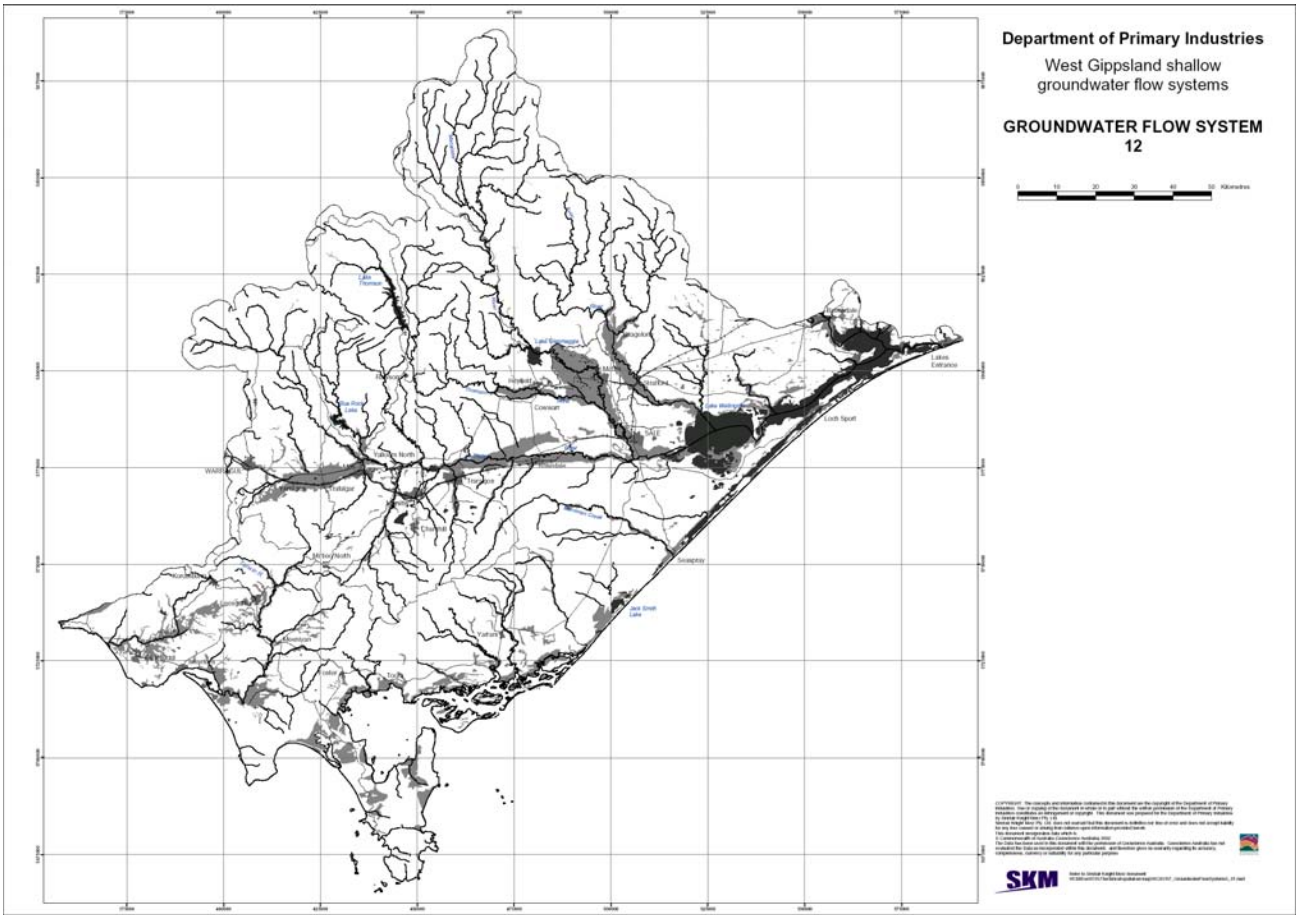
GFS 12: Recent alluvials

1. GFS definition



Geology constraint: Qrm and Qra

Slope constraint: None

Area constraint: None

Rationale for choice of GFS: Drilling around the Macalister Irrigation District has shown that the alluvials associated with the present day rivers do not have the well developed basal gravel aquifer as the adjacent older Quaternary alluvials (see GFS 6). These recent alluvial deposits are likely to have their own unique groundwater characteristics

GFS priority: High

GFS 12: Recent alluvials

2. The salinity problem

Salinity occurrence: Low lying land in the MID, low lying coastal areas (Source: DNRE (2000) and WGCMA (2005))

Assets being affected: Agricultural land, urban area in Rosedale, Seaspray, Port Albert, Dowd Morass, Sale Common, Lake Coleman, Heart Morass, interaction with deeper aquifers, impact on surface water assets, native vegetation (Source: MID: eg. SKM (2003) Urban areas: SKM (2005 in prep.))

Area of mapped land salinity: 3314ha Class 1, 2776ha Class 2, 2221ha Class 3, 3564ha undifferentiated (Source: West Gippsland Land Salinity GIS layer, DNRE (2000) and WGCMA (2005))

Area of primary and secondary land salinity: 1081ha primary salinity, 9692ha secondary salinity, 1101ha unknown (Source: West Gippsland Land Salinity GIS layer, DNRE (2000) and WGCMA (2005))

Area of wetland salinity: Key wetlands affected by salinity: Sale Common, Dowd Morass, Heart Morass, Lake Coleman and Jack Smith Lake (primary salinity)

Surface water salinity: Monitoring stations with less than 100% attainment of 90^{th} percentile SEPP: Avon River at Stratford (94%)

Salinity process: In the MID, GFS tends to be a low lying discharge area for recharge which occurs in the up-gradient irrigated areas (esp GFS 9). Reduction in aquifer transmissivity between GFS9 and GFS 12 can cause significant discharge to land prior to discharging to rivers.

(Source: MID: SKM (1998) and WGCMA (2005))

Current area of less than 2m depth to water table: 33,548ha <2m, 6384ha coastal plain (<2m AHD – this includes floodplains) = total 39,932ha (Source: West Gippsland DTWT GIS layer and WGCMA (2005))

Groundwater salinity: Highly variable (<1000µS/cm to >10,000µS/cm). (Source: SKM average bore salinity map for the MID (based on data from the GMS))

Land salinity trend: In the MID, decreasing due to dry years and groundwater pumping

(Source: SKM (2004b))

Groundwater level trend: Falling due to dry years, likely to rise when average rainfall returns. (Source: Observation bores data from the GMS)

3. Landscape attributes

Area: Swamps and floodplains

Geology: Recent alluvials and swamp deposits

Topography: Floodplains and low lying relatively flat land

Soil permeability: Mostly moderate permeability with even covering of very high, high, low, very low and very very low permeability. (Source: West Gippsland Soil Permeability GIS layer)

Annual Rainfall: <600-700mm MID, 900-1100mm Moe area, 900-1000mm coastal South Gippsland areas. (Source: West Gippsland Annual Rainfall GIS layer)

Annual Evaporation: Varies between <900 and 1000mm.

(Source: West Gippsland Annual Evaporation GIS layer)

Landuse: Predominantly farming with large areas of native vegetation.

(Source: West Gippsland Landuse GIS layer)

GFS 12: Recent alluvials

4. Hydrogeology

Geology: Sands, gravels, clays

Aquifer type: Unconsolidated sediments

Hydraulic conductivity: Low to moderate

Aquifer transmissivity: Low to moderate (gravel aquifer between 10 and 20m deep seen in GFS 9 is either absent or not as well developed in GFS12) (Source: MID: SKM (2000) and SKM (1998))

Aquifer storage coefficient: 0.005 to 0.02 (Source: MID: SKM (2000) and SKM (1998))

Hydraulic gradient: Low

Yield: Low (typically less than 0.5ML/d)

Temporal recharge distribution: Episodic recharge from flood events plus rainfall recharge thoughout the year

Spatial recharge distribution: Recharge likely to vary spatially according to rainfall and irrigation

Recharge estimate: MID modelling suggests approx 25mm/yr recharge on dryland and 40mm/yr flood irrigation (Source: SKM (2004c)

Aquifer uses: Irrigation, stock and domestic – irrigation use is not as prolific as for GFS 9

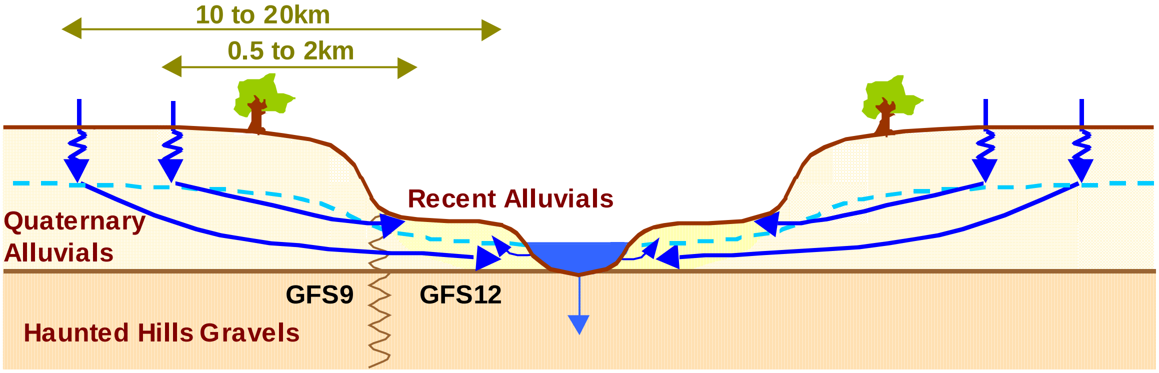
Scale of groundwater flow path: Local

Responsiveness to land management: Highly responsive to groundwater pumping, land management change likely to take significantly longer

National GFS type most like (ref Coram et al., 1998): Local 1, 4 and 5 (Source: GFS workshop)

Groundwater flow between GFSs: GFS 12 generally occurs at the discharge end of a groundwater flow cell and receives groundwater from GFSs 4, 9 and 10

5. Conceptual model of recharge discharge relationship



GFS 12: Recent alluvials

6. *Salinity Management Options*

Current salinity management: Groundwater pumping in MID, some perennial pastures, groundwater level monitoring (Source: DNRE (2000) and WGCMA (2005))

Recharge control options: Key to mitigating salinity in this area is to reduce the recharge in abutting GFSs through more efficient irrigation and groundwater pumping (especially GFS9). Steep slopes on GFSs abutting GFS9 – almost unproductive because they are so steep – good for revegetation. River areas – plantings with many multi-benefits though not compelling from a salinity perspective. (Source: GFS workshop)

Pasture or crop potential	*Trees for biodiversity potential*	*Trees for forestry potential*	*Surface drainage potential*	*Irrigation management potential*
Weak	Strong	Strong	Weak	Strong

Groundwater discharge enhancement options: Groundwater pumping where viable yields exist though need to be wary of river interaction. Groundwater pumping may be viable in areas where shoestring sands are present. Potential for break of slope tree planting to intercept shallow groundwater prior to discharging down-gradient (Source: GFS workshop)

Public groundwater control pumping	*Private groundwater pumping potential*	*Tile and mole drain potential*	*Break of slope tree planting*
Moderate	Strong	Weak	Strong

Living with salt options: Salt tolerant grasses and crops. (Source: DNRE (2000), WGCMA (2005) and GFS workshop)

Conflicts with other NRM programs: Pumping can have conflicts with resource sustainability, Potential conflict with weed and wetland program if salt tolerant crops and pastures infest areas outside intended saline areas (eg wetland reserves). Irrigation efficient developments may conflict with trees.

(Source: GFS workshop)

Synergies with other NRM programs: Synergies with the Biodiversity, Water Quality and River Health programs. (Source: GFS workshop)