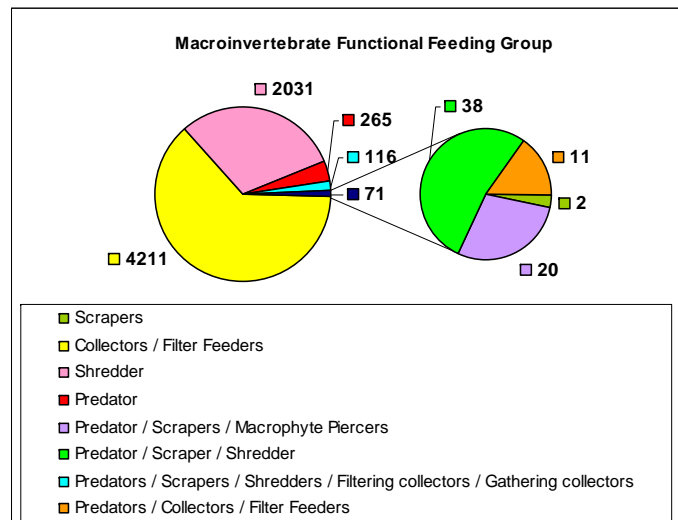


# Dunn's Swamp

Each group of Macroinvertebrate play a different role in the food chain, some feed on organic material (Shredders), others feed on fine organic particles (Collectors/filter feeders), others graze on algae (Scrapers), some feed on each other (Predators), others are parasitic (Parasites) and some are Macrophyte piercers that feed off living plants and algae fluids. These groups are called Functional Feeding Groups (FFG). Some Macroinvertebrates fit into more than one of these groups, for example the Water Boatman is a Predator, a Scraper and a Macrophyte piercer.

A healthy wetland should have a representative of each functional feeding group. A loss or dominance in a particular group may indicate a change in ecology of the wetland. The composition of these groups at Dunns Swamp are displayed in the below graph. There appears to be a high number of collectors / filter feeders which could relate to high amount of suspended decomposing fine particulate organic matter, and the high numbers of shredders may be due to the availability of living plant material in the wetland



## Conclusion

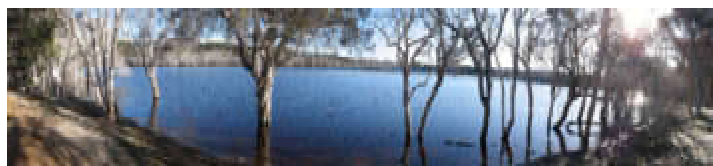
Dunn's Swamp is a saline to brine wetland which is connected to the groundwater. The death of the fringing vegetation infers riparian vegetation may be stressed from inundation and potentially altered salinities. Nutrient levels are high and the available forms of nitrogen and phosphorus exceed guideline levels on some occasions. The main issues to consider for Dunn's Swamp are the potential impacts of urban development, the wetland-groundwater connectivity, rate of groundwater rise and the impacts of the changed water regimes and water quality on the ecology of the wetland.

Some knowledge gaps were identified during the investigation, monitoring and data analysis for this wetland which should be addressed to improve understanding of the water quality and biodiversity and to detect changes over time. The monitoring period was relatively short and some effects of previous and current land use change and management may not yet be evident. Macroinvertebrates would need to be identified to family or species level to allow more detailed analysis of ecological condition and relationship to other wetland characteristics. The hydrology of the wetland and its catchment is not fully understood or monitored, particularly the interaction between groundwater and surface water. A future monitoring program should be developed to address these issues.

## Acknowledgements

The Department of Water would like to sincerely thank and acknowledge the following people for their assistance and contribution toward the South Coast Wetland Monitoring Program and production of this report.

- John Simons (Department of Agriculture and Food, Esperance) for providing knowledge of the hydrogeology associated with Dunn's Swamp.
- Tim Frodsham (Greenskills, Denmark), for providing knowledge of Dunns Swamp vegetation.
- Ania Lorenz, Sherrie Randall, Kevin Hopkinson, and Albany Department of Water team who conducted the monitoring.
- Kevin Hopkinson, Naomi Arrowsmith, Andrew Maughan and others for their support and editing assistance.
- Sherrie Randall and Tracy Calvert for data analysis and report compilation.



For further information please contact Tracy Calvert at the Department of Water Albany (08) 9842 5760.

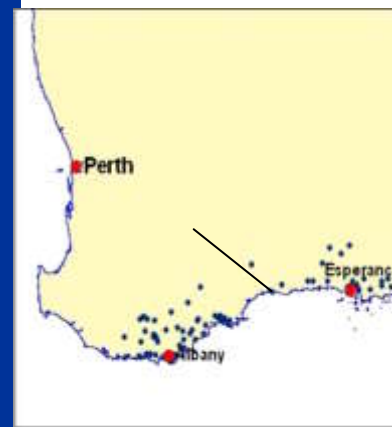
# Dunn's Swamp

This report card summarises the current state of knowledge of physical, chemical and biological characteristics of Dunn's Swamp based on the knowledge gained from investigation and monitoring conducted by the Department of Water through the South Coast Wetland Monitoring Program.

Accompanying this document are appendices which provide more detailed information about the wetland monitoring program, terminology of wetland classification, parameters monitored, methodology and the ANZECC&ARMCANZ guidelines used in this report.

Funding for this program has been provided through South Coast Natural Resource Management Inc. - supported by the Australian Government and the Government of Western Australia.

## About Dunn's Swamp



Dunn's Swamp is located approximately 3.5km northeast of Hopetoun Western Australia within the Jerdacuttup River catchment. The wetland is situated approximately 1.8km from the south coast and lies at 8-9m AHD (Australian Height Datum). The area receives an average rainfall of 500mm. Dunn's Swamp is located on Crown Reserve which is

Wetland Suite	GPS Location Coordinates		
	Easting	Northing	MGA Zone
Dunn's Swamp Suite	236908	6242613	51

under the jurisdiction of the Shire of Ravensthorpe within a catchment of approximately 263km<sup>2</sup>. The wetland lies in a relatively uncleared coastal area however there are increasing pressures on the swamp due to housing development in Hopetoun.



Riparian vegetation at Dunn's Swamp with a number of dead trees around the margin

Vegetation predominantly consists of *Eucalyptus occidentalis* *Melaleuca cuticularis* and understory consisting mainly of *Isolepis nodosa*, *Gastrolobium bilobum* and *Acacia Cyclops*. Tim Frodsham (Greenskills Inc.) also observed *Labichea lanceolate*, *Spyridium globulosum*, *Rhagodia preissei* within the understory.

There are a number of dead *Melaleuca cuticularis* on the fringes of the lake which is in part due to previous harvesting of wood for fence posts and also may relate to periods of increased inundation.



Dunn's Swamp



# Dunn's Swamp

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## Wetland Classification

Wetland type	Water Salinity	Consistency of Salinity	Size (Metres)	Shape
Lake	Hyposaline - Mesosaline	Poikilohaline	Microscale 180 x 460	Irregular

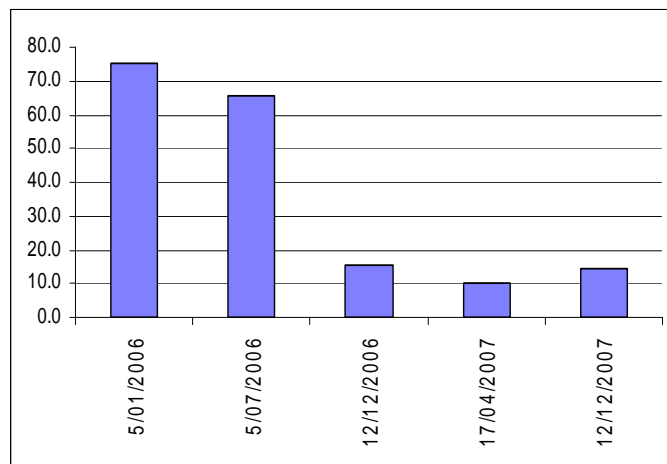
Approximately 45% of the catchment area has been cleared for cropping practices. The remainder is coastal scrubland heath and low Banksia/Eucalyptus woodland.

Water quality monitoring commenced on the 05/01/2006 and included physical, chemical and biological parameters as outlined in the appendices.

Classification of Dunn's Swamp has been evaluated on the basis of guidelines developed by V & C Semeniuk Research Group. For further explanation please refer to the appendices.

## Salinity

Salinity over the sample period varied between saline (10.12mS/cm) and brine (75.2mS/cm). Fluctuations in salinities relate to fluctuations in rainfall, evaporation and water level.



Salinities (mS/cm) over the sample period

Surface runoff and sub surface flow from salinised land to the north may also contribute to salinity in Dunn's Swamp. Some water from the roadside catchment has been diverted toward Companion Swamp through a constructed stormwater drain.

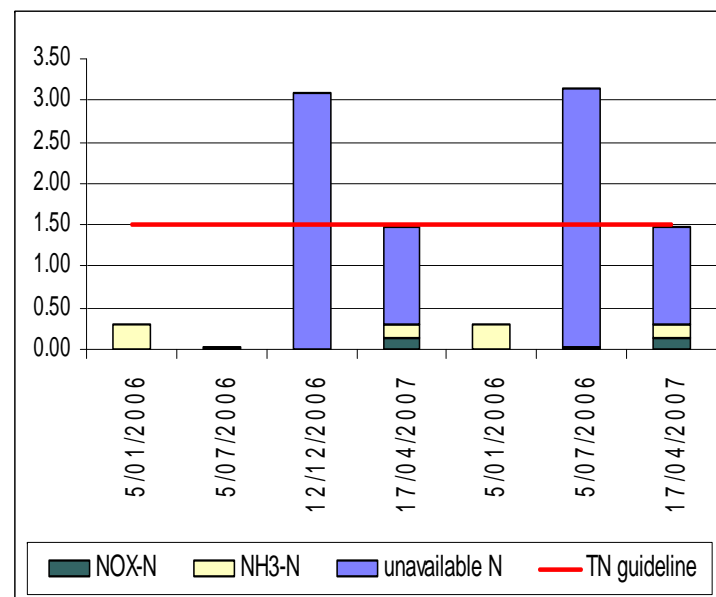
Recent (2008) drilling by the Department of Agriculture and Food indicates the wetland is groundwater connected. Bores were drilled on the east and west side of the wetland at approximately 10-11m AHD and groundwater was 3.12-3.53m below ground surface at approximately 7-8m AHD which is within 1m of the floor of the wetland.

Groundwater salinities ranged from 28mS/cm to 34mS/cm at the top of the aquifer with increasing salinities with depth. Further groundwater monitoring would confirm wetland-groundwater relationships and rate of rise.

## Nutrients

Total Nitrogen (TN) concentrations were high ranging from 1.2-3.1mg/L. TN concentrations on half of the sampling occasions exceeded the guidelines developed for ecosystem protection for southwest Australian wetlands for slightly disturbed systems of 1.5mg/L.

Dissolved inorganic nitrogen fractions of ammonia (NH<sub>3</sub>-N) ranged from 0.01-0.15mg/L and total oxidised nitrogen (NO<sub>x</sub>-N) ranged between at 0.023-0.29mg/L. NH<sub>3</sub>-N fractions exceeded the recommended guideline value of 0.04mg/L on four of the six sample occasions and the NO<sub>x</sub>-N fraction exceeded the recommended value of 0.1mg/L two of the six sample occasions.



Nitrogen fractions in mg/L over the sample period with TN guideline illustrated

Total Phosphorus (TP) concentrations ranged from 0.17-0.32mg/L and exceeded water quality guidelines of 0.06mg/L on all sample occasions.

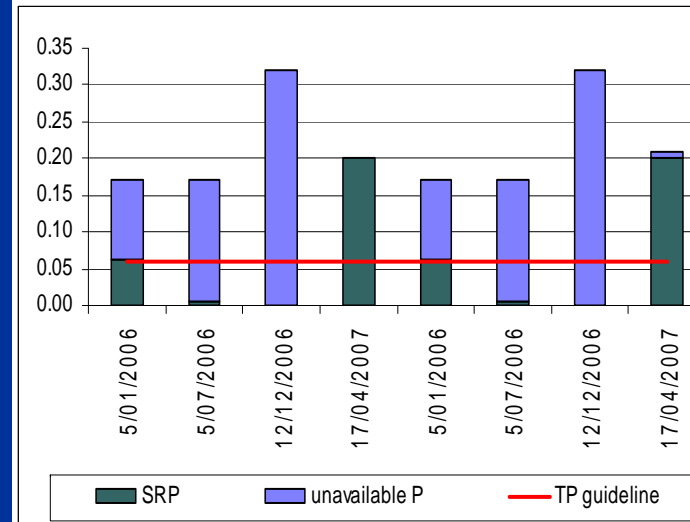
Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged from 0.006-0.2mg/L which exceeded the

# Dunn's Swamp

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recommended value of 0.03mg/L four of the six sampling occasions.



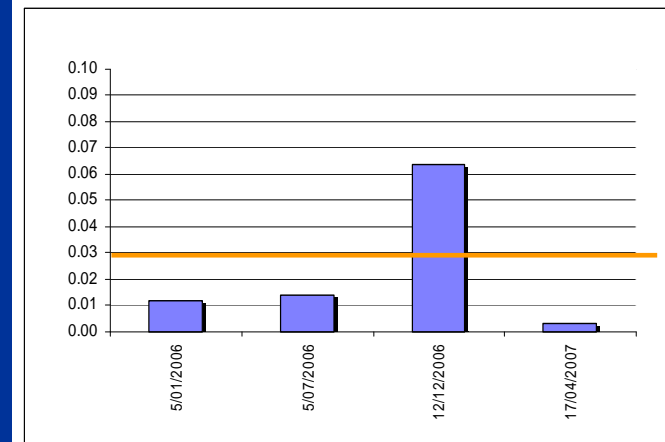
Phosphorus fractions in mg/L over the sample period with TP guideline illustrated

Nutrients are recycled naturally through the wetland due to uptake and assimilation by plants and animals and through release of nutrients for example through microbial breakdown of organic material.

Catchment nutrient stores may also enter Dunn's Swamp through surface runoff and sub surface flow from the surrounding land and through groundwater. High phosphorus may relate to leaching of phosphorus through the sandy coastal soils.

## Chlorophyll a

Chlorophyll a concentrations over the sample period was low and ranged from 0.003-0.064mg/L. Chlorophyll a exceeded the water quality guideline of 0.03mg/L on one sample occasion on 12/12/2006 which corresponded with high nutrient concentrations.



Chlorophyll a (mg/L) over sample period in comparison to recommended guideline value of 0.03mg/L

Low occurrence of algae blooms may relate to the stained to highly coloured nature of the waters within the swamp which limits light penetration.



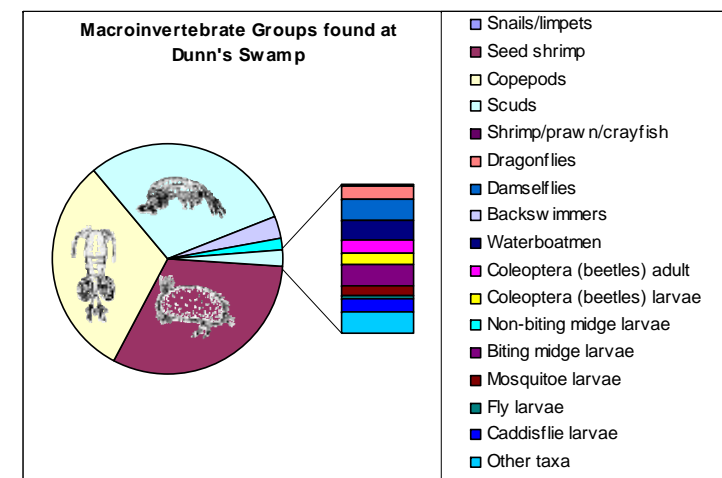
Coloured waters in Dunn's Swamp

## Macroinvertebrates

Seventeen groups of macroinvertebrates were found at Dunn's Swamp during the monitoring period of which the most abundant included Copepoda (copepods), Ostracoda (seed shrimp), Amphipoda (scuds), Notonectidae (backswimmers), Chironomidae (non-biting midge larvae).

Other groups of less abundance included Ceratopogonidae (biting midge larvae), Zygoptera (damselflies), Corixidae (waterboatmen), Trichoptera (caddisfly larvae), Culicidae (mosquitoe larvae),

Other Diptera (fly larvae), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Ephemeroptera (dragonflies), Decapoda (shrimp/prawn/crayfish), Gastropoda (snails/limpets) and other taxa were found and are listed in the below graph.



The diversity of macroinvertebrates found over the sample period ranged between six to thirteen groups, with a median of ten which rates as average based on the Ribbons of Blue Wetland Habitat Score.