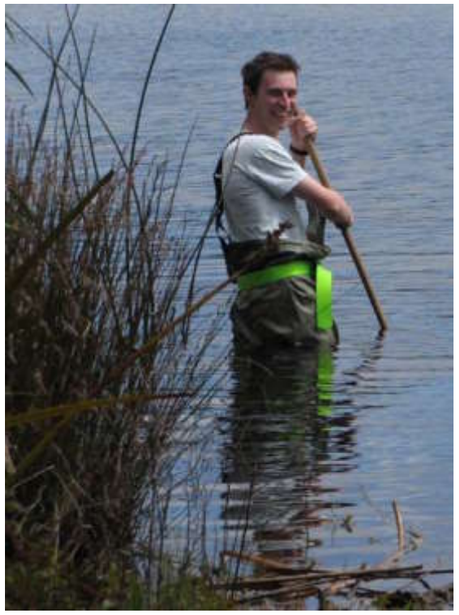
Gali Swamp

South Coast Wetland Monitoring Project **June 2008**



Sampler sweeping for macroinvertebrates.

Conclusion

Gali Swamp is a fresh surface water fed wetland with no connection to the groundwater table. Nutrient concentrations are high and the proportion of available nitrogen and phosphorus was usually high which may lead to high primary productivity.

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.

- Pamela and Mark Wood for their support of the project and allowing access to the wetland on their property.
- 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.

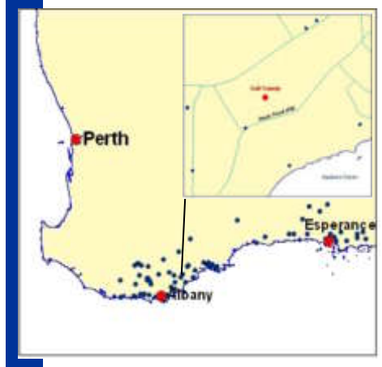
South Coast Wetland Monitoring Project **June 2008**

This report card summarises the Department of Water's current state of knowledge of the physical, chemical and biological characteristics of Gali 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 that 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 Gali Swamp



Gali Swamp is located approximately 73km east of Albany in Western Australia within the Willyun Creek catchment. The wetland is at approximately 145m AHD (Australian Height Datum) and the area receives an annual average rainfall of 575mm.

Wetland Suite	GPS Location Coordinates		
	Easting	Northing	MGA Zone
Manypeaks Suite	628777	6173125	50

Gali Swamp is located on privately owned land with a catchment of approximately 50km^2 and has a partially fenced wetland vegetation buffer zone extending approximately 10-70m from the wetland centre.

Gali Swamp

Vegetation throughout Gali Swamp including mature Eucalyptus occidentalis

Vegetation is scattered throughout the wetland with *Eucalyptus occidentalis* (Yates) in the upper storey, *Melaleuca cuticularis* (saltwater paperbark) in the mid storey and sparse *Juncus pallidus* in the understorey. There appears to have been some clearing within the wetland in the past however Yates and *J.pallidus* are regenerating through out the wetland.

Approximately 60% of the catchment has been cleared of native vegetation and used for cropping, livestock and plantation timber.

Department of Water
Government of Western Australia

SOUTHCOAST NATURAL RESOURCE MANAGEMENT
southcoastnrm.com.au
Australian Government

Gali Swamp

South Coast Wetland Monitoring Project **June 2008**

Water quality monitoring commenced in November 2005 including physical, chemical and biological parameters as outlined in the appendices.

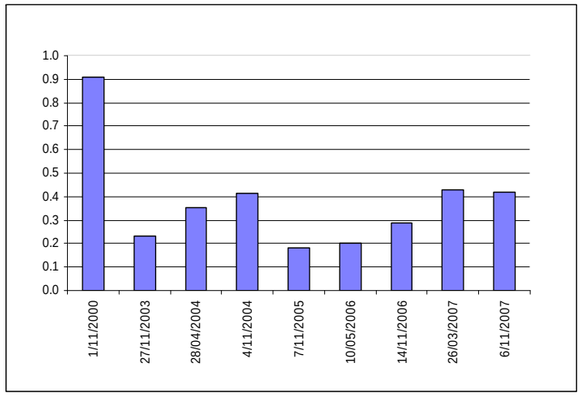
Wetland Classification

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

Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Lake	Fresh	Stasohaline	Mesoscale 780 x 535	Ovoid

Salinity

Salinity over the sample period was fresh ranging between 0.18-0.91mS/cm. Fluctuations in salinities relate to seasonal fluctuations in rainfall, evaporation and hence water level variation.



Salinity (mS/cm) over sample period

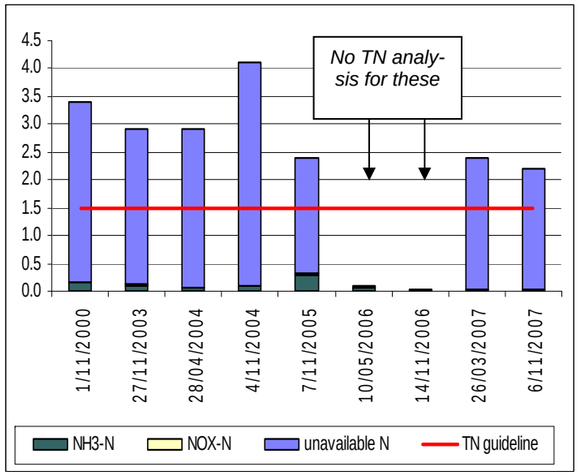
The presence of unstressed Yate trees and other vegetation throughout the wetland is indicative of a fresh water system with no connection with the groundwater. The groundwater table is thought to be 4m from the base of the wetland although investigations are required to determine the rate of rise and risk of future wetland-groundwater connectivity.

Nutrients

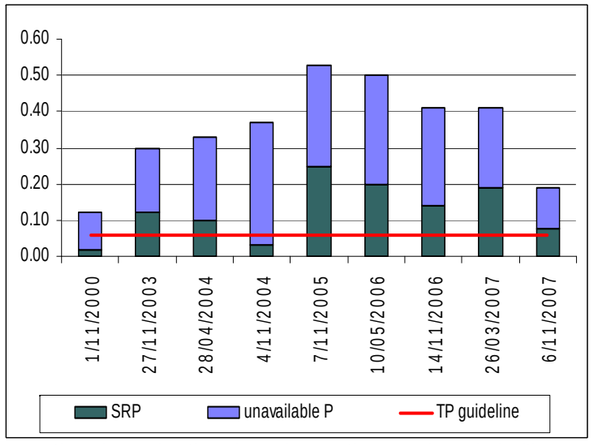
Total Nitrogen (TN) concentrations ranged between 2.2-4.1mg/L which exceeded the guidelines developed for ecosystem protection for southwest Australian wetlands for slightly disturbed systems of 1.5mg/L on all sample occasions.

Dissolved inorganic nitrogen fractions of ammonia (NH_3-N) ranged between 0.01-0.28mg/L which exceeded the recommended guideline value of 0.04mg/L on seven of the nine sample occasions. Total oxidised nitrogen (NOx-N) ranged between 0.01-0.028mg/L which did not exceed the recommended guideline value of 0.1mg/L.

Total Phosphorus (TP) concentration ranged between 0.012-0.53mg/L which exceeded the water quality guidelines of 0.06mg/L on all sample occasions.



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



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

Gali Swamp

South Coast Wetland Monitoring Project **June 2008**

Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged between 0.033-0.25mg/L which exceeded the recommended water quality guideline value of 0.03mg/L on seven of the nine sample occasions.

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

Substrate photo at Gali Swamp taken 6th November 2007

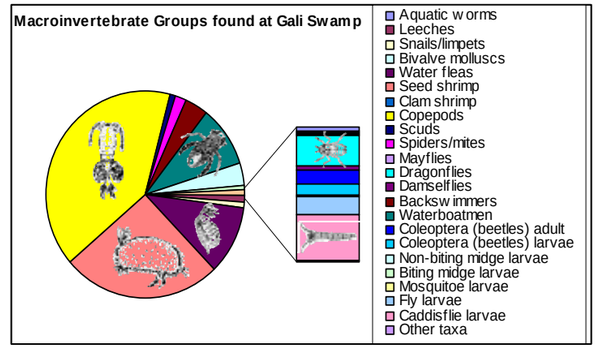
Catchment nutrients stores may enter Gali Swamp through surface and sub surface drainage flow from the surrounding land.

Macroinvertebrates

Twenty three groups of macroinvertebrates were found at Gali Swamp during the monitoring period of which the most abundant included; Copepoda (copepods), Ostracoda (seed shrimp), Cladocera (water fleas), Corixidae (waterboatmen), Notonectidae (backswimmers), Chironomidae (non-biting midge larvae), Ceratopogonidae (biting midge larvae), Acarina (spiders/mites), Gastropoda (snails/limpets), and Hirudinea (leeches).

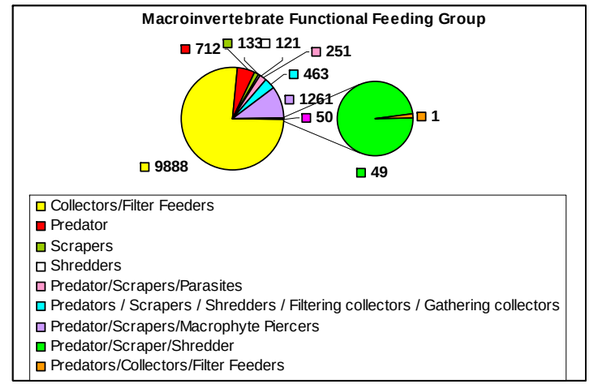
Other groups of less abundance were found including; Oligochaeta (aquatic worms), Bivalvia (bivalve molluscs), Conchostraca (clam shrimp), Ephemeroptera (mayflies), Epiproctophora (dragonflies), Zygoptera (damselflies), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Culicidae (mosquitoe larvae), Other Diptera (fly larvae), Trichoptera (caddisflie larvae), and Other taxa.

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



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 Gali Swamp are displayed in the below graph.



Sieving macroinvertebrates for identification