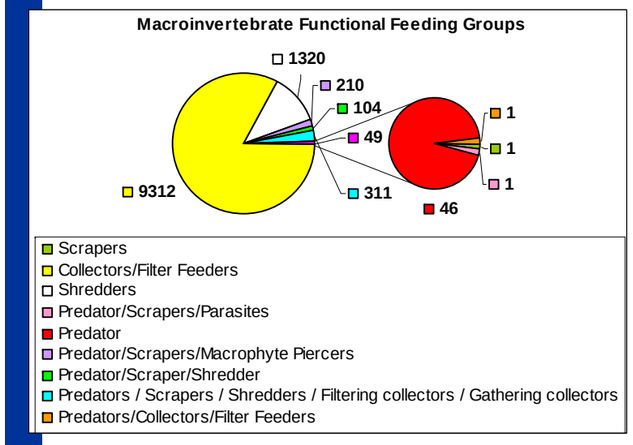
Yellilup Swamp

South Coast Wetland Monitoring Project **June 2008**

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 Yellilup 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 in the wetland.



Conclusion

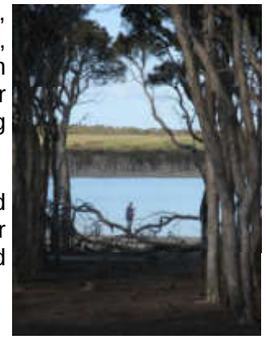
Yellilup Swamp is perched well above the moderately saline groundwater table yet the wetland salinity ranges from moderately saline to brine. The wetland receives water through surface runoff, sub surface flow and via the creek lines draining a large catchment that is affected by secondary salinisation. Nutrient levels are often reasonably high and the available forms of nitrogen and phosphorus are occasionally high. The main issues for the wetland are considering catchment processes and hydrological changes that may affect the ecology of the wetland, particularly the riparian vegetation.

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.

- Wayne and Johanna Tomlinson for their support of the project and allowing access to the lake on their property.
- Ruhi Ferdowsian (Department of Agriculture and Food, Albany) for providing knowledge of the hydrogeology associated with Yellilup Swamp.
- 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.

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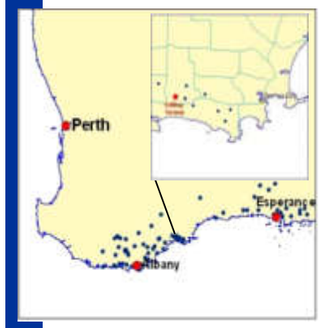
This report card summarises the Department of Water's current state of knowledge of the physical, chemical and biological characteristics of Yellilup Swamp based on the knowledge gained from investigation and monitoring conducted by the Department of Water through the South Coast Wetland Monitoring Program.

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 Yellilup Swamp



Yellilup Swamp is located approximately 37km west of Bremer Bay in Western Australia within the Beaufort Inlet catchment and sub-catchment of Pallinup River. The wetland is at approximately 60m AHD (Australian Height Datum) and the area receives an annual average rainfall of 560mm.

	GPS Location Coordinates		
Wetland Suite	*Easting*	*Northing*	*MGA Zone*
Pabelup Suite	682041	6193634	50

Yellilup Swamp is located on privately owned land, within a large catchment of approximately 107km^2. The wetland lies within a within a fenced wetland vegetation buffer zone that extends approximately up to 740m from the wetland edge.

Yellilup Swamp

Riparian vegetation surrounding Yellilup Swamp (note the ring of dead trees around the margins)

Vegetation in the upper storey consists of *Melaleuca cuticularis* (saltwater paperbark), *Acacia sp* in the mid storey and salt bush, *Gahnia trifidia*, and samphire in the understorey. *Ruppia megacarpa* (seagrass) was observed in the water. There are number of dead trees around the margins of the wetland which may relate to increased inundation and salinities due to rising water tables since catchment clearing.

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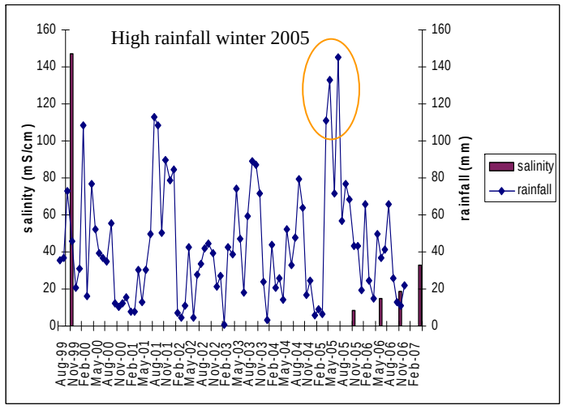
Approximately 95% of the catchment has been cleared of native vegetation for cropping, livestock and now tree plantations.

Water quality monitoring commenced in November 1999 which included physical, chemical and biological parameters as outlined in the appendices.

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

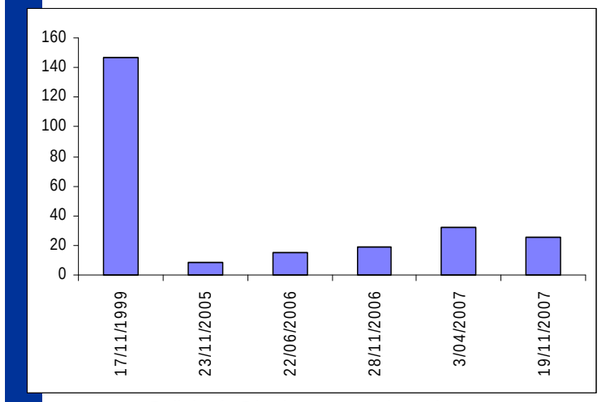


Wetland Classification

Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Lake	Hyposaline - Hypersaline	Poikilohaline	Macroscale 1675 x 1215	Ovoid - Irregular

Salinity

Salinity over the sample period ranged between moderately saline (8.6mS/cm) to brine (147mS/cm). Fluctuations in salinities relate to seasonal fluctuations in rainfall, evaporation and water level.



Salinity (mS/cm) over sample period

Water enters Yellilup Swamp through surface and sub surface flow and during high rainfall events overflow from Yendinnup Swamp.

Fluctuations in salinities relate to seasonal fluctuations in rainfall which in turn determines the amount of runoff through the creek lines to the north and west which drains surface salts from secondary salinised land. The presence of salt tolerant plant species infers the swamp has been saline for some time. During low rainfall events surface salts may wash into Yellilup Swamp increasing salinity while during high rainfall events the higher flows may dilute incoming water and reduce salinities.

Lowest salinities recorded when swamp flooded in 2005 due to high rainfall

The swamp was formed due to land subsiding and wind driven lunette (crater like) formation. Water in the nearby Department of Agriculture and Food monitoring bore (SR6094) is moderately saline at 3.9mS/cm however the water table is 10m below the ground surface which confirms Yellilup Swamp is perched and is likely to be recharging the groundwater. The rate of groundwater rise is 10-15cm/year which indicates connectivity will not occur in the near future unless rates significantly increase. Extreme wetland salinities relate to evaporation in dry years leading to concentration of salts.

Nutrients

Total Nitrogen (TN) concentrations ranged between 2.4-10mg/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.

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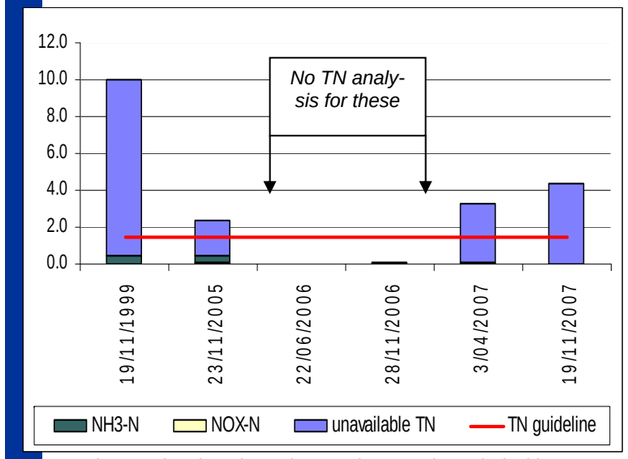
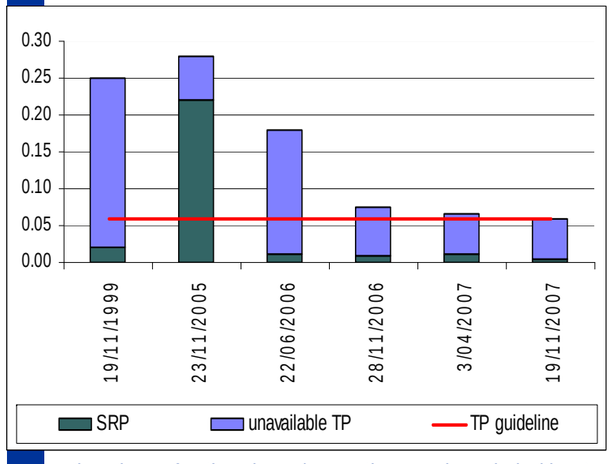
Dissolved inorganic nitrogen fractions of ammonia (NH_3-N) ranged between 0.018-0.43mg/L which exceeded the recommended guideline value of 0.04mg/L on two of the six sample occasions. Total oxidised nitrogen (NOx-N) ranged between 0.01-0.31mg/L which exceeded the recommended guideline value of 0.1mg/L on one sample occasion.



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

Total Phosphorus (TP) concentration ranged between 0.059-0.22mg/L which exceeded the water quality guidelines of 0.06mg/L on five of the six sample occasions.

Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged between 0.005-0.22mg/L which exceeded the recommended water quality guideline value of 0.03mg/L on one of the six sample occasions.



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

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.

As the surface area of the swamp is large, wind driven turbulence may also resuspend sediments and release nutrients.

Catchment nutrients stores may enter Yellilup Swamp through drainage flow from the north and west drainage lines, through surface runoff and sub surface flow.

Macroinvertebrates

Eighteen groups of macroinvertebrates were found at Yellilup Swamp during the monitoring period of which the most abundant included; Cladocera (water fleas), Ostracoda (seed shrimp), Copepoda (copepods), Amphipoda (scuds), Corixidae (waterboatmen), Chironomidae (non-biting midge larvae), Other Diptera (fly larvae), and Trichoptera (caddisflie larvae).

Other groups of less abundance were found including; Gastropoda (snails/limpets), Conchostraca (clam shrimp), Acarina (spiders/mites), Epiproctophora (dragonflies), Zygoptera (damselflies), Notonectidae (backswimmers), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Ceratopogonidae (biting midge larvae), and Culicidae (mosquitoe larvae).

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