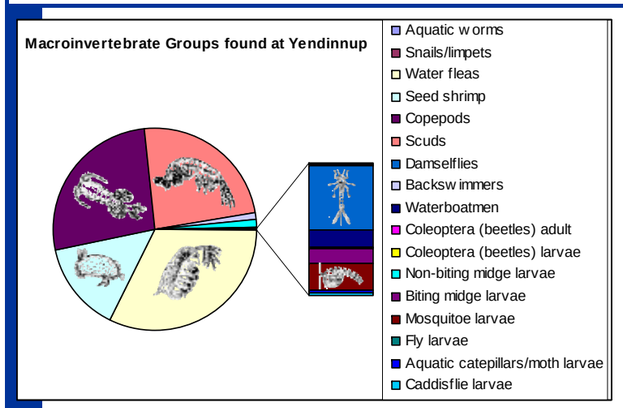
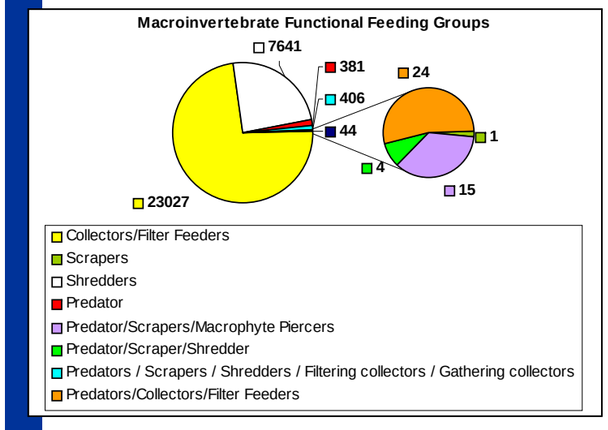
Yendinnup Swamp

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 Yendinnup Swamp displayed in the below graph.



Conclusion

Yendinnup Swamp is a perched wetland which was previously fresh but now ranges between saline and brine. The swamp receives water through surface runoff, sub surface flow and via the creek line draining a catchment which is largely affected by secondary salinisation. Groundwater is 10m below the surface and rising at 10-15cm/year which indicates the wetland will remain perched for many years. Nitrogen levels were always high and phosphorus levels were usually high. The available form of phosphorus was usually low however the available form of nitrogen was often high and the high chlorophyll *a* levels recorded on occasions indicate the wetland has high productivity and algal blooms have been observed.

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.

- David and Adrienne Campbell for their support of the project and allowing access to the wetland on their property.
- Ruhi Ferdowsian (Department of Agriculture and Food, Albany) for providing knowledge of the hydrogeology associated with Campbell 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.

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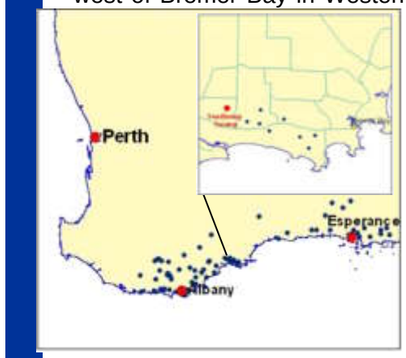
This report card summarises the Department of Water's current state of knowledge of the physical, chemical and biological characteristics of Yendinnup Swamp based on the knowledge gained from investigation and monitoring conducted by the Department of Water through the South Coast Wetland Monitoring 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 the South Coast Natural Resource Management Inc. - supported by the Australian Government and the Government of Western Australia.

About Yendinnup Swamp

Yendinnup Swamp is located approximately 44km west of Bremer Bay in Western Australia within the Beaufort Inlet catchment and smaller sub-catchment of Pallinup River. The wetland is at approximately 100m AHD (Australian Height Datum) and the area receives an annual average rainfall of 530mm.



GPS Location Coordinates			
Wetland Suite	*Easting*	*Northing*	*MGA Zone*
Pabelup Suite	674993	6198589	50

Yendinnup Swamp

Yendinnup Swamp is located on privately owned land within a large catchment of approximately 140 km^2. The wetland lies within a within a fenced wetland vegetation buffer zone that extends approximately 0-30m from the wetland edge *photo looks like no buffer*.

Vegetation in the upper storey consists of *Eucalyptus occidentalis* (Yates) along with *Melaleuca cuticularis* (saltwater paperbark) and *Melaleuca preissiana* (Mondong) in the mid storey and salt bush, samphire and rushes in the understorey. There are a large number of dead trees across and around the rim of wetland as well as regeneration of Melaleuca and Yates.

Dead trees in Yendinnup Swamp

Rushes and Melaleuca cuticularis on the shore of Yendinnup Swamp

Approximately 90% of the catchment has been cleared of native vegetation for cropping, livestock and now plantation.

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

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Yendinnup Swamp

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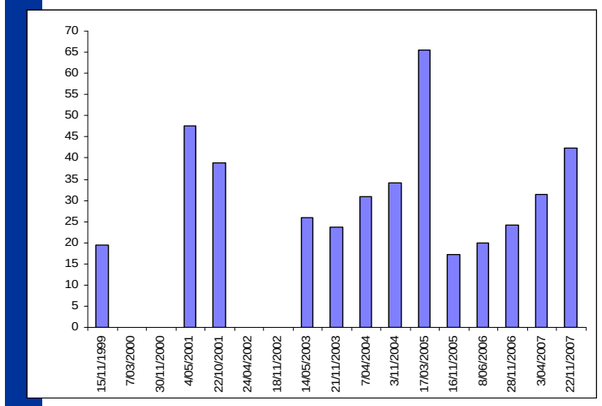
Wetland Classification

Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Lake	Hyposaline - Mesosaline	Poikilohaline	Macroscale 1590 x 1290	Round

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

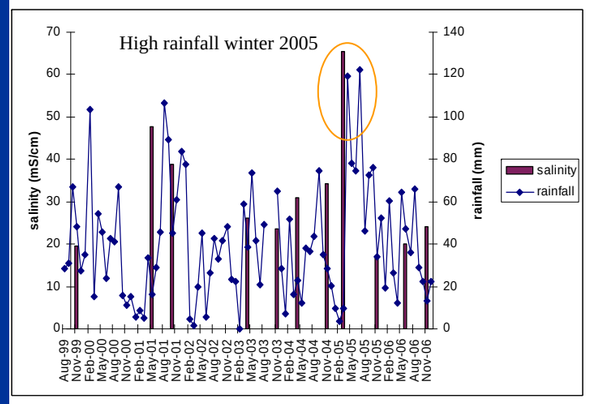
Salinity

Salinity over the sample period ranged from saline (17.3mS/cm) to brine (65.5mS/cm). Fluctuations in salinities relate to seasonal fluctuations in rainfall, evaporation and water levels.



Salinity (mS/cm) over sample period

Water enters Yendinnup Swamp through surface and sub surface flow and during high rainfall events when the wetland is full Yendinnup Swamp may flow over-land toward Yellilup Swamp.



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

Fluctuations in salinities relate to seasonal fluctuations in rainfall which in turn determines the amount of runoff through the creek lines to the north which drains surface salts from secondary salinised land. During low rainfall events surface salts enter Yendinnup Swamp increasing salinity while during high rainfall events the higher flows may dilute incoming water and reduce salinities.

Originally the wetland would have been fresh but since clearing for agriculture and then secondary salinity processes occurred, the wetland now receives higher salinity water from the catchment which is then further concentrated by evaporation.

Investigation of the Department of Agriculture and Food monitoring bore, SR1D94, indicates the water table is 10m below the ground surface which confirms Yendinnup Swamp is perched and is likely to be recharging the groundwater. The rate of groundwater rise in the area is 10-15cm/year which indicates there would be no wetland-groundwater connection in the near future unless the rate increases.

Nutrients

Total Nitrogen (TN) concentrations ranged between 2.0-6.1mg/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 0.01-0.39mg/L which exceeded the recommended guideline value of 0.04mg/L on thirteen of the seventeen sample occasions. Total oxidised nitrogen (NOx-N) ranged between 0.01-0.13mg/L which exceeded the recommended guideline value of 0.1mg/L on one sample occasion.

Total Phosphorus (TP) concentration ranged between 0.058-1.5mg/L which exceeded the water quality guidelines of 0.06mg/L on thirteen of the sixteen sample occasions.

Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged between 0.005-0.03mg/L which did not exceed the recommended water quality guideline value of 0.03mg/L.

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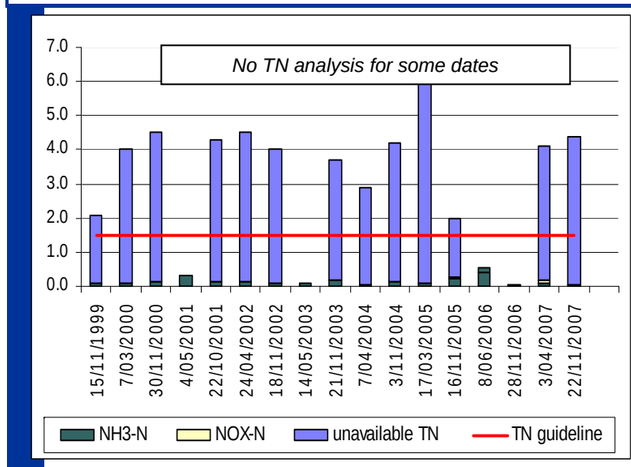
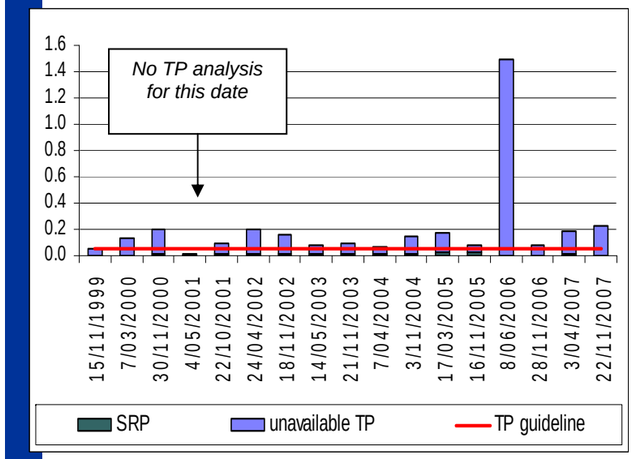


Nitrogen fractions in mg/L over the sample period with TN guideline illustrated

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.

Being very large and exposed to wind action turbulence may resuspend sediments and release nutrients. Nutrients stores in the catchment may enter Yendinnup Swamp through drainage flow from the northern drainage line, through surface runoff and sub surface flow.

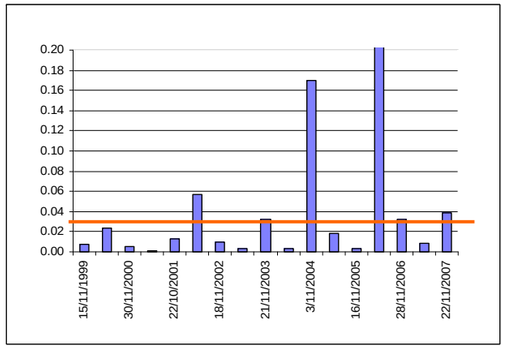


Phosphorus fractions in mg/L over the sample period with TP guideline illustrated

Chlorophyll *a*

Chlorophyll *a* concentrations over the sample period ranged from 0.001 to 0.2 mg/L. Chlorophyll *a* exceeded the water quality guideline of 0.03mg/L on six of the seventeen sampling occasions. A higher concentration of chlorophyll *a* is indicative of high nutrient content providing adequate food source for algal growth in Yendinnup Swamp.

Green tinge to water as a result of an algae bloom



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

Macroinvertebrates

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

Other groups of less abundance were found including; Oligochaeta (aquatic worms), Gastropoda (snails/limpets), Zygoptera (damselflies), Corixidae (waterboatmen), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Ceratopogonidae (biting midge larvae), Culicidae (mosquitoe larvae), Lepidoptera (aquatic catepillars/moth larvae), and Trichoptera (caddisflie larvae).

The diversity of macroinvertebrates found over the sample period ranged between two to thirteen groups with a median of seven which rates low based on the Ribbons of Blue Wetland Habitat Score.