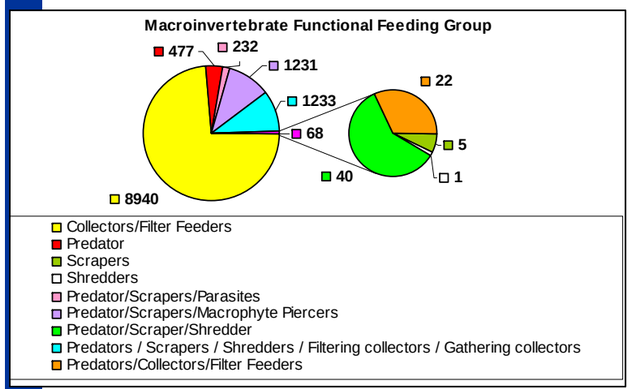
Adam's Swamp

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 Adams Swamp are displayed in the below graph.



Conclusion

Adam's Swamp is fed by surface runoff and sub surface flow and has no connection with the groundwater table which is 4m below the wetland. Salinity levels range between fresh and marginal. Nutrient concentrations were high including the forms of nitrogen and phosphorus available for plant growth which is indicated in the high chlorophyll *a* levels.

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.

- Mark and Heather Adams 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 Adam's 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.

Sampler sorting macroinvertebrates

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

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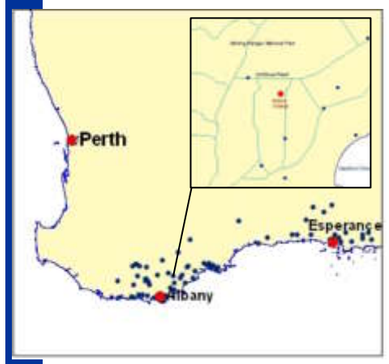
This report card summarises the Department of Water's current state of knowledge of the physical, chemical and biological characteristics of Adam's Swamp based on the knowledge gained from investigation and monitoring conducted by the Department of Water through the South Coast Wetland Monitoring Program.

Accompanying this document are appendices 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 Adam's Swamp



Adam's Swamp is located near the coast approximately 56km northeast of Albany in Western Australia within Willyun Creek sub-catchment. The wetland is at approximately 145-150m AHD (Australian Height Datum) and the area receives an annual average rainfall of 550mm.

	GPS Location Coordinates		
Wetland Suite	Easting	Northing	MGA Zone
Manypeaks	609526	6170889	50

Adam's Swamp is located on privately owned property within a catchment of approximately 33.5km^2. The wetland lies within a partially fenced wetland vegetation buffer zone extending approximately 90m from the wetland centre.

Vegetation consists predominantly of *Eucalyptus occidentalis* (Yates) in the upper storey throughout the swamp with *Melaleuca rhaphiophylla* (freshwater paperbark) in the mid storey and regenerating Yates in the understorey.

Adam's Swamp

Wetland vegetation at Adam's Swamp

Approximately 80% of the catchment has been cleared of native vegetation for cropping and livestock.

Water quality monitoring commenced in November 1999 however the swamp was dry at the end of most summers and in 2007. Monitoring included physical, chemical and biological parameters as

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outlined in the appendices.

Wetland Classification

Classification of Adam's Swamp has been evaluated on the basis of guidelines developed by V & C Semeniuk Research Group. Extended dry periods of the lake correspond with the hydro period classification Playa meaning it would fill intermittently following rains. For further explanation please refer to the appendices.

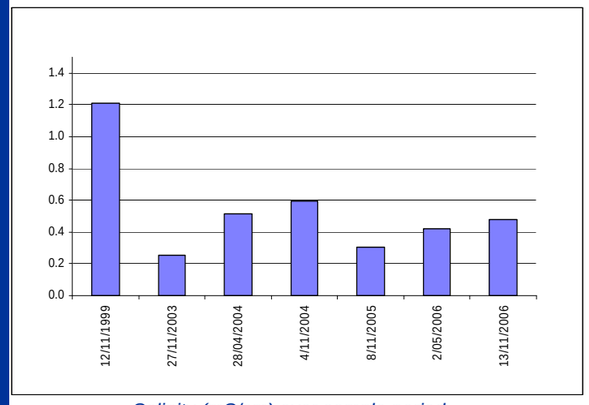
Adam's swamp receives fresh surface and sub surface flow from the surrounding catchment. Although further investigations are required to establish current rate of groundwater rise and salinities, depth to groundwater in a bore on adjacent land in 2007 indicated there is no groundwater connectivity as the swamp is perched approximately 4m above the groundwater table.

Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Playa	Fresh	Stasohaline	Mesoscale	Irregular

Regenerating Yates in the understorey

Salinity

Salinity over the sample period ranged between fresh (0.25mS/cm) and marginal (1.21mS/cm). Fluctuations in salinities relate to seasonal fluctuations in rainfall, evaporation and hence water level variation.

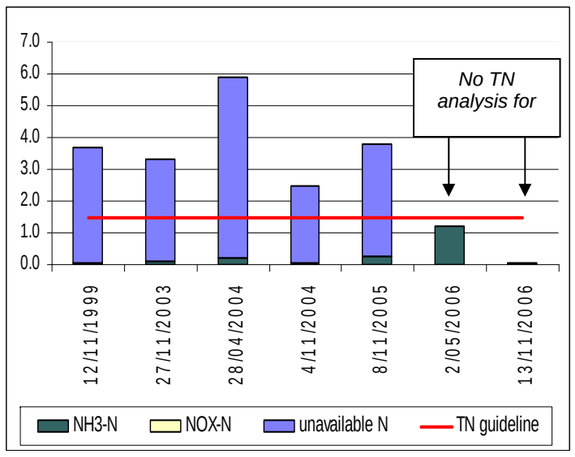


Salinity (mS/cm) over sample period

Nutrients

Total Nitrogen (TN) concentrations ranged between 2.5-5.9mg/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 0.023-1.2mg/L which exceeded the recommended guideline value of 0.04mg/L on five of the seven sample occasions. Total oxidised nitrogen (NOx-N) was consistent at 0.01mg/L which did not exceed the recommended guideline value of 0.1mg/L on any sample occasion.



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

Total Phosphorus (TP) concentration ranged between 0.12-0.85mg/L which exceeded the water quality guidelines of 0.06mg/L on all sample occasions.

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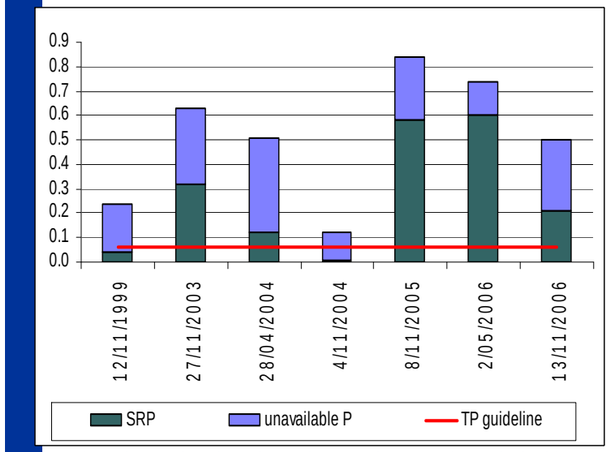
Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged between 0.008-0.6mg/L which exceeded the recommended water quality guideline value of 0.03mg/L on five of the seven sample occasions.



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

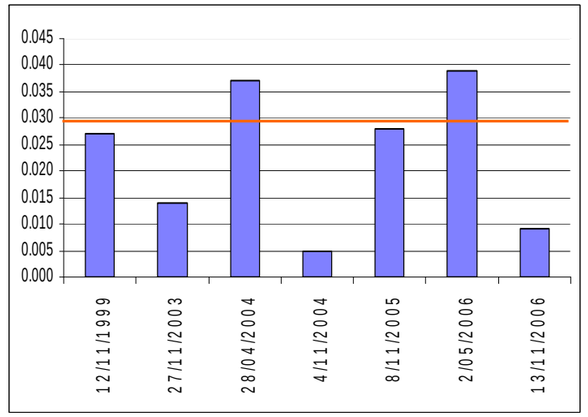
Nutrients are recycled naturally through the swamp due to uptake and assimilation of nutrients by plants and animals and through release of nutrients for example through microbial breakdown of organic material. During algae bloom events nitrogen maybe high as it is stored in phytoplankton.

Nutrients stores in the catchment sediments may enter Adam's Swamp through surface and sub surface flow from the surrounding land.

Left: Lisa Braun filtering Nutrients

Chlorophyll *a*

Chlorophyll *a* concentrations over the sample period ranged from 0.005 to 0.039 mg/L. Chlorophyll *a* exceeded the water quality guideline of 0.03mg/L on two of the seven sampling occasions. A high concentration of chlorophyll *a* is indicative of high nutrient content providing adequate food source for algal growth in Adam's Swamp.



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

Macroinvertebrates

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

Other groups of less abundance were found including; Gastropoda (snails/limpets), Amphipoda (scuds), Epiproctophora (dragonflies), Zygoptera (damselflies), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Culicidae (mosquitoe larvae), Other Diptera (fly larvae), and Trichoptera (caddisflie larvae).

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