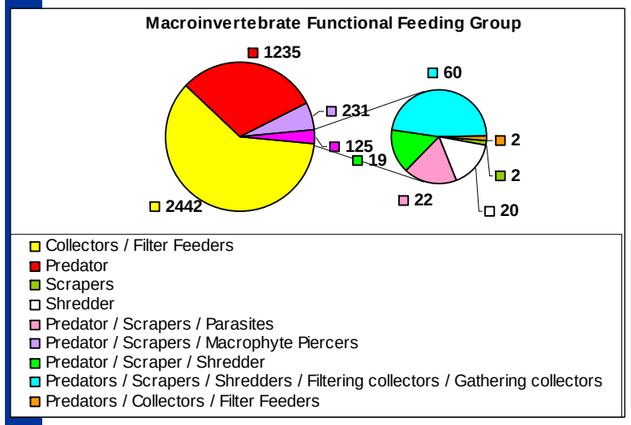
Robert's Swamp

South Coast Wetland Monitoring Project **June 2008**



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. There also appears to be a high number of predators which may mean there is a great availability of animals, living or dead, to consume.

Conclusion

Roberts Swamp is fresh and fed by surface runoff and sub surface flow from the surrounding catchment. Fresh water in the swamp is maintained due to the low retention time of the water which inhibits salt accumulation through evaporation. The groundwater table is greater than 10m below the wetland. Nutrient concentrations are high although the available forms of nitrogen and phosphorus are low.

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.

Sampler geared up for monitoring

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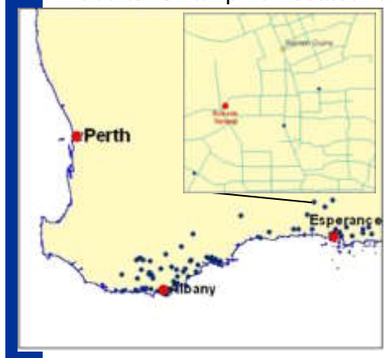
This report card summarises the current state of knowledge of physical, chemical and biological characteristics of Roberts Swamp based on the knowledge gained from investigation and monitoring conducted by the Department of Water through the South Coast Wetland Monitoring Program.

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 Roberts Swamp

	GPS Location Coordinates		
Wetland Suite	Easting	Northing	MGA Zone
No Suite listed	349659	6326374	51



Roberts Swamp is located approximately 90km north west of Esperance, Western Australia, within the Stokes Inlet catchment and the smaller sub-catchment of Lort River. The wetland lies at 200m AHD (Australian Height Datum). The area receives an annual average rainfall of 380mm.

Roberts Swamp is located on Crown Reserve which is under the jurisdiction of the Shire of Esperance, within a catchment of approximately 310km^2. The Lake lies in an uncleared vegetated area that extends between 365-2000m from the wetland edge.

Vegetation predominantly consists of Mallee woodland, emergent *Eucalyptus occidentalis* (Yate), and *Melaleuca acuminate* fringing the wetland area.

Eucalyptus occidentalis (Yate)

Approximately 70% of the catchment area has been cleared for farming practices including cropping and cattle.

Water quality monitoring commenced on the 17/12/2003 however no autumn samples were taken as the swamp was dry after summer months until the storm event that occurred in February 2007. Monitoring included physical, chemical and biological parameters as outlined in the appendices.

Roberts Swamp

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Wetland Classification

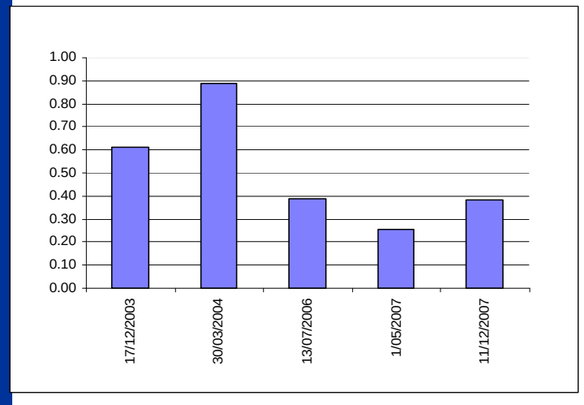
Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Playa	Fresh	Stasohaline	Macroscale 1540 x 1255	Irregular - Round

Classification of Roberts 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 little and was fresh ranging between (0.25-0.8mS/cm) which corresponds with the consistency of salinity classification based on Semeniuk 1997 as outlined in the table.

Fresh water enters Robert Swamp through surface flow over gently undulating land and through creek lines to the north. Recent drilling by the Department of Agriculture and Food confirmed that the wetland is not connected to groundwater as no groundwater was intercepted within 25 m from the surface at the eastern end of the reserve, indicating groundwater could be greater than 10 m below the wetland base. Consistently low salinities in Roberts Swamp relates to the low retention time of water where salts are removed into underlying soil profiles rather than accumulating in the wetland though evaporation.

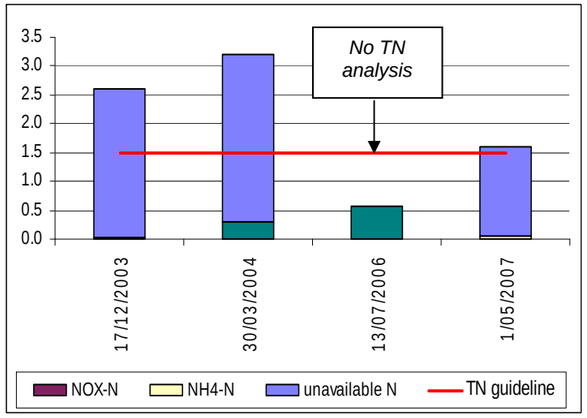


Salinities (mS/cm) over the sample period

Nutrients

Total Nitrogen (TN) concentrations were high ranging from 1.6-3.2mg/L. TN concentrations on all 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_3-N) ranged from 0.02-0.57mg/L and total oxidised nitrogen (NOx-N) was consistent at 0.01mg/L. NH_3-N fractions exceeded the recommended guideline value of 0.04mg/L on two of the four sample occasions. The NO_X-N fraction did not exceed the recommended value of 0.1mg/L on any sample occasion.



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

Overall, there was a low percentage (3.5-23%) of available nitrogen (NH_4-N and NO_x-N) making up the total nitrogen (TN) on all sampling occasions.

Total Phosphorus (TP) concentrations ranged from 0.1-0.6mg/L. TP concentrations 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 0.005-0.03mg/L. In relation to water quality guidelines SRP did not exceed the recommended value of 0.03mg/L on any sampling occasion. Of the total phosphorus (TP) there was low percentage (1.8-15%) of available phosphorus (SRP) on all sampling occasions.

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

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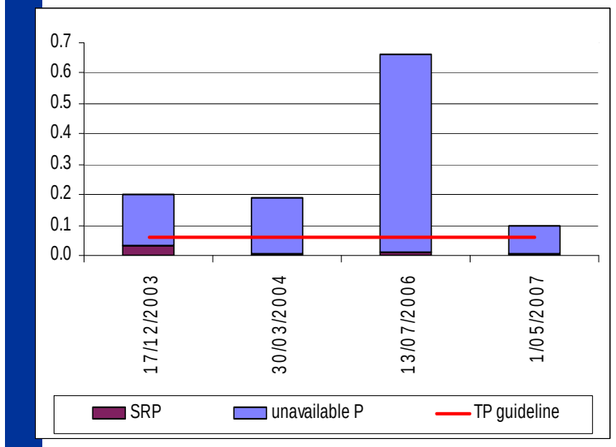


Phosphorus fractions in mg/L over the sample period with TP guideline illustrated

Catchment nutrients may also enter Roberts Swamp through surface and sub surface flow from the surrounding land and via the creek lines. Catchment runoff through the creek has been reported to be high in suspended clay type sediments which can deliver nutrients (particularly phosphorus) to the swamp.

Low proportions of available nutrients can indicate the majority is being readily taken up by plants and animals while the remainder may be bound up in organic matter, as dirt or dead cells that contain nitrogen or bound to clay soils in the case of phosphorus.

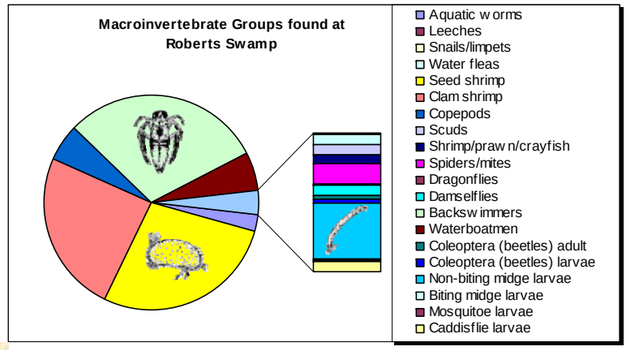
Large amount of organic material in Roberts Swamp

Macroinvertebrates

Twenty groups of macroinvertebrates were found at Roberts Swamp during the monitoring period of which the most abundant included Ostracoda (seed shrimp), Notonectidae (backswimmers), Conchostraca (clam shrimp), and Copepoda (copepods).

Other groups of less abundance were found including; Corixidae (waterboatmen), Copepoda (copepods), Chironomidae (non-biting midge larvae), Oligochaeta (aquatic worms), Cladocera (water fleas), Amphipoda (scuds), Decopoda (shrimp/ prawn/crayfish), Acarina (spiders/mites), Zygoptera (damselflies), Trichoptera (caddisflie larvae), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Gastropoda (snails/limpets), Culicidae (mosquitoe larvae), Hirudinea (leeches), Epiproctophora (dragonflies), and Ceratopogonidae (biting midge larvae).

The diversity of macroinvertebrates found over the sample period ranged between six to fourteen groups with a median of eleven which rates as 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 Roberts Swamp are displayed in the below graph.