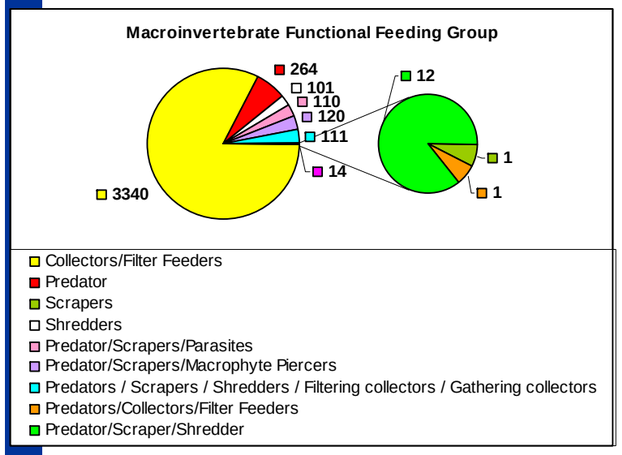
Boggy Spring

South Coast Wetland Monitoring Project **June 2008**

Boggy Springs when dry 20th November 2007



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 Boggy Spring are displayed in the below graph.

Conclusion

Boggy Spring is fresh and fed by surface runoff and sub surface flow during winter months and during high rainfall events. The wetland has no connection with the groundwater as the spring recharges the groundwater which discharges to the ocean via a steep gradient. Although there is limited data nutrient concentrations are high although the available forms of nitrogen and phosphorus are generally low. The main consideration for Boggy Spring is to maintain the integrity and protection of this system.

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.

- Wesley & Barbara Thomas for their support of the project and allowing access to the wetland via their property.
- Ruhi Ferdowsian (Department of Agriculture and Food, Albany) for providing knowledge of the hydrogeology associated with Boggy Spring.
- 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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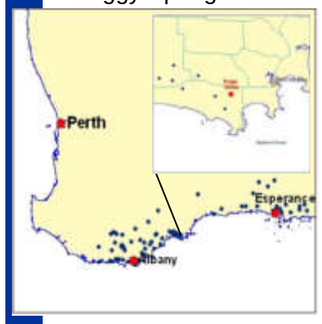
This report card summarises the Department of Water's current state of knowledge of the physical, chemical and biological characteristics of Boggy Spring based on the knowledge gained from investigation and monitoring conducted by the Department of Water through the South Coast Wetland Monitoring Program.

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 Boggy Spring

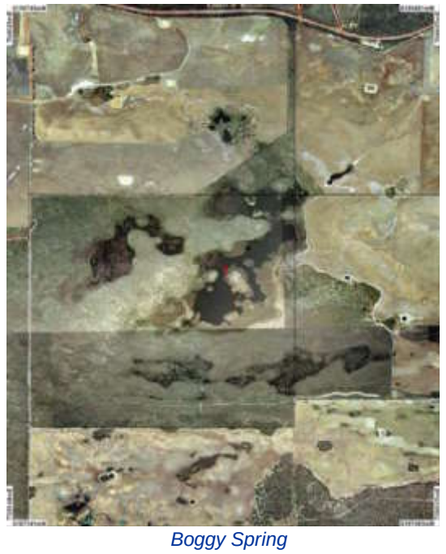
Boggy Spring is located on the coast approximately 14.5km west of Bremer Bay, in Western Australia, within the Dillon catchment smaller sub-catchment of Bitter Water Creek.



The wetland is at approximately 35m AHD (Australian Height Datum) and the area receives an annual average rainfall of 645mm.

Boggy Spring is located on Unallocated Crown Land, within a catchment of approximately 32km^2. The Lake lies within a coastal native vegetation area which is fenced off at the neighbouring property. Access to the spring is via this property owned by Wesley Thomas.

Vegetation in the upper storey consists of *Eucalyptus occidentalis* (Yate) that extends into the crown land and *Melaleuca cuticularis* (saltwater paperbark) and *Juncus pallidus* and *Baumea articulata* in the understorey. *Lemna sp* (Duckweed) was observed growing on the water body after summer in 2006. There are a few dead trees in the spring with a large number of regenerating Melaleuca trees.



Boggy Spring

Wetland Vegetation surrounding Boggy Spring with regenerating Melaleuca cuticularis in the background

Lemna sp (Duckweed) growing on the wetland surface after summer 2006.

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

Water quality monitoring commenced in November 2005 however the spring was dry during 2007. Monitoring included physical, chemical and biological parameters as outlined in the appendices.

	GPS Location Coordinates		
Wetland Suite	***Easting***	***Northing***	***MGA Zone***
Boggy Spring Suite	705322	6188887	50

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Boggy Spring

Wetland Classification

Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Flat	Fresh	Stasohaline	Macroscale	Irregular

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

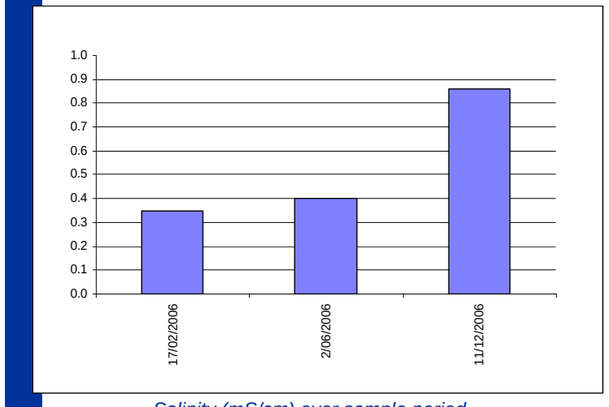
Salinity

Salinity over the sample period was fresh ranging between 0.3-0.8mS/cm. Fluctuations in salinities relate to seasonal fluctuations in rainfall, variation in lake water levels and evaporation.

The wetland is located on a flat ancient seabed overlain by the Werillup formation (river derived material and infill of old river systems) and was formed due to land subsidence and migration of clay. The swamp receives fresh water from surface and subsurface runoff from the surrounding flat land.

A fresh to brackish groundwater aquifer lies below the wetland however it is highly unlikely there is connection with groundwater as the spring recharges the aquifer which then discharges to the ocean.

With a reasonably steep gradient of the Werillup Formation at the coast it is not expected that groundwater will rise and wetland connectivity will occur in this area.

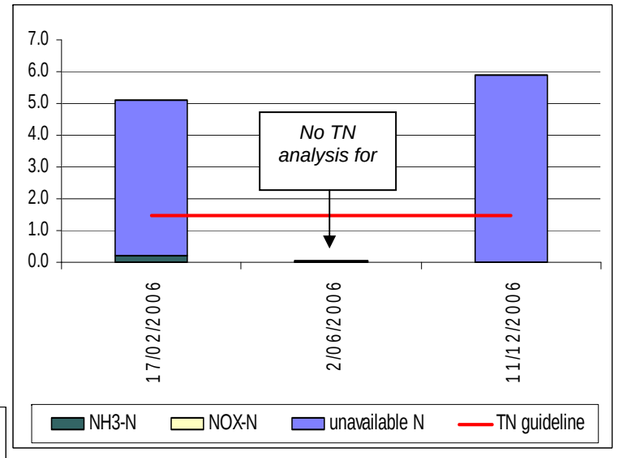


Salinity (mS/cm) over sample period

Nutrients

Total Nitrogen (TN) concentrations ranged between 5.1-5.9mg/L which exceeded the guidelines developed for ecosystem protection for southwest Australian wetlands for slightly disturbed systems of 1.5mg/L on both sample occasions. Note: No TN data was collected on the 2/06/2006.

Dissolved inorganic nitrogen fractions of ammonia (NH_3-N) ranged between 0.02-0.2mg/L which exceeded the recommended guideline value of 0.04mg/L on one of the three 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 occasions.



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

Total Phosphorus (TP) concentration ranged between 0.19-0.26mg/L which exceeded the water quality guidelines of 0.06mg/L on all of the 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 on any sample occasion.

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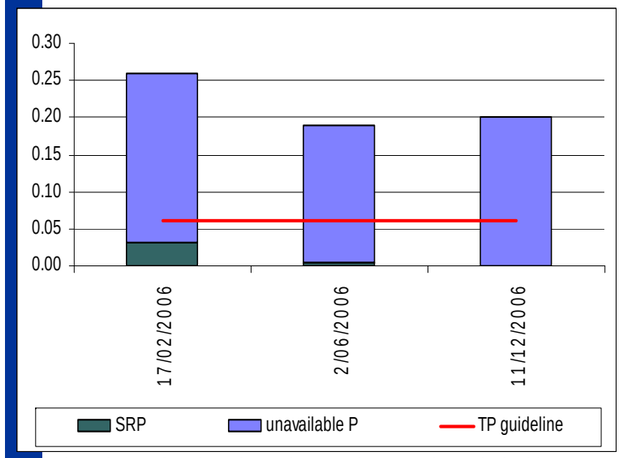


Phosphorus fractions in mg/L over the sample period with TP guideline illustrated

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. The duckweed for example would take up available nutrients during the growth phase and nutrients would be released when it dies and decays.

Some nutrients may also enter Boggy Swamp through surface and sub surface flow from surrounding land.

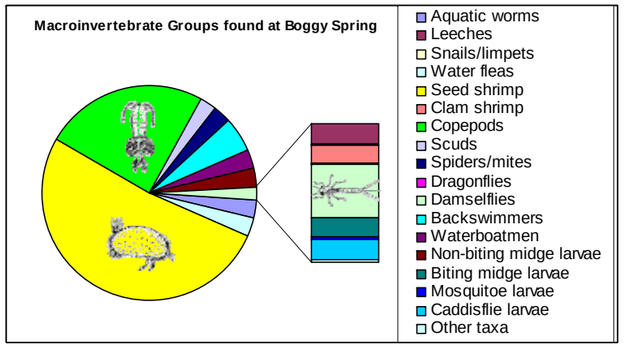
Boggy Springs wetland substrate taken December 2006

Macroinvertebrates

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

Other groups of less abundance were found including; Hirudinea (leeches), Zygoptera (damselflies), Trichoptera (caddisflie larvae), Ceratopogonidae (biting midge larvae), Culicidae (mosquitoe larvae), Gastropoda (snails/limpets), Conchostraca (clam shrimp), Epiproctophora (dragonflies) and Other taxa.

The diversity of macroinvertebrates found over the sample period ranged between twelve to fourteen groups with a median of twelve groups, 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.