Bailey Swamp

South Coast Wetland Monitoring Project **June 2008**

Bailey Swamp when dry March 2007

Conclusion

Bailey Swamp salinities ranged between moderately saline and highly saline. The wetland was previously fresh and perched above the groundwater table however due to groundwater rise it is now both surface water and groundwater fed with the highly saline groundwater influencing the wetland salinities.

Nutrient concentrations were high, including on some occasions, the forms of nitrogen and phosphorus available for plant growth. Further groundwater rise may have an increased impact on the ecology of the wetland.

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.

Bailey Swamp Samphire sp. regenerating

Bailey Swamp when dry April 2008

Acknowledgements

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- 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.

South Coast Wetland Monitoring Project **June 2008**

This report card summarises the Department of Water's current state of knowledge of the physical, chemical and biological characteristics of Bailey 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 Bailey Swamp

Bailey Swamp is located approximately 86km north east of Albany, in Western Australia, within the Beaufort Inlet catchment smaller sub-catchment of Pallinup River. The wetland is at approximately 124m AHD (Australian Height Datum) and the area receives an annual average rainfall of 495mm.

Bailey Swamp is located on privately owned land, within a catchment of approximately 44.5km^2. The wetland lies within a fenced (electric) wetland vegetation buffer zone which is ranges from approximately 60-110m from the wetland edge. Periodically there is stock access. Drains have been excavated to collect surface flow from the surrounding paddocks to a dam at the edge of the wetland.

Vegetation in the upper storey consists of *Eucalyptus occidentalis* (Yate) *Melaleuca preissiana* (Modong) in the mid storey and *Samphire* in the understorey. There are a number of dead trees in the wetland and some regeneration of Melaleuca trees and Samphire along with encroaching pasture grasses on the wetland edge. The remains of an old fence also runs through the wetland.

	GPS Location Coordinates		
Wetland Suite	**Easting**	**Northing**	**MGA Zone**
Manypeaks	638947	6190175	50

Bailey Swamp

Wetland vegetation around Bailey Swamp

Approximately 90% of the catchment has been cleared of native vegetation for cropping and livestock farming. Water quality monitoring commenced in November 1999 however the wetland has been dry frequently during summer months. Monitoring included physical, chemical and biological parameters as outlined in the appendices.

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Bailey Swamp

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Wetland Classification

Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Playa	Hyposaline - Hypersaline	Poikilohaline	Microscale 375 x 180	Ovoid

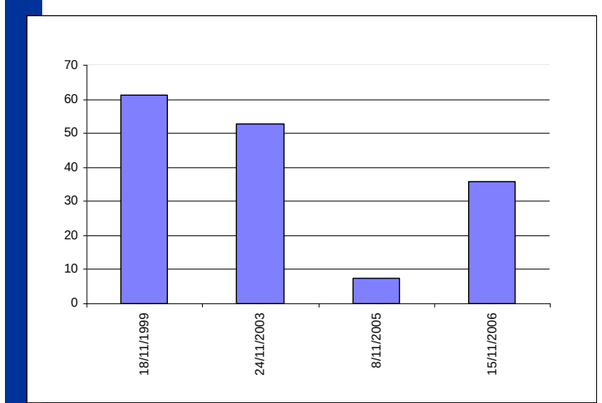
Classification of Bailey Swamp has been evaluated on the basis of guidelines developed by V & C Semeniuk Research Group. Long dry wetland periods correspond with the hydro period classification Playa which indicates the wetland fills as a result of higher surface runoff and groundwater rise during winter. For further explanation please refer to the appendices.

Salinity

Salinity over the sample period ranged between moderately saline to highly saline 7.37-61mS/cm. Fluctuations in salinities relate to seasonal fluctuations in rainfall, evaporation and hence water levels variation, and groundwater interaction.

The wetland lies within a deep depression in the tertiary sediments that overlay the Werillup formation. The wetland was previously fresh and perched above the groundwater however with increasing groundwater levels the wetland is now a window to the groundwater.

The highly saline to brine groundwater discharging into the swamp has increased the salinity. Dilution of salinities is dependant on rainfall and surface runoff from surrounding land.

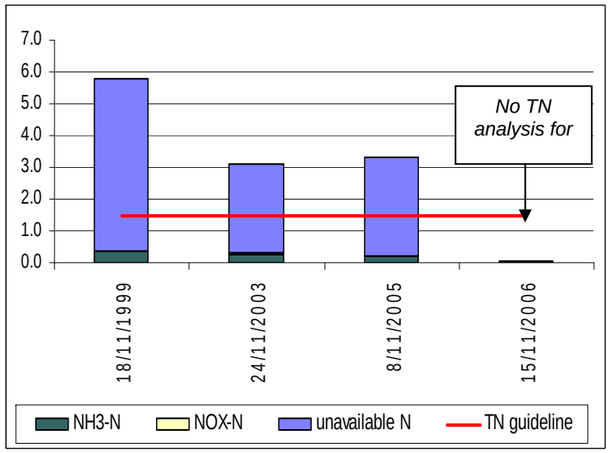


Salinity (mS/cm) over sample period

Nutrients

Total Nitrogen (TN) concentrations ranged between 3.1-5.8mg/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 0.02-0.38mg/L which exceeded the recommended guideline value of 0.04mg/L on all sample occasions. Total oxidised nitrogen (NOx-N) ranged between 0.01-0.014mg/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

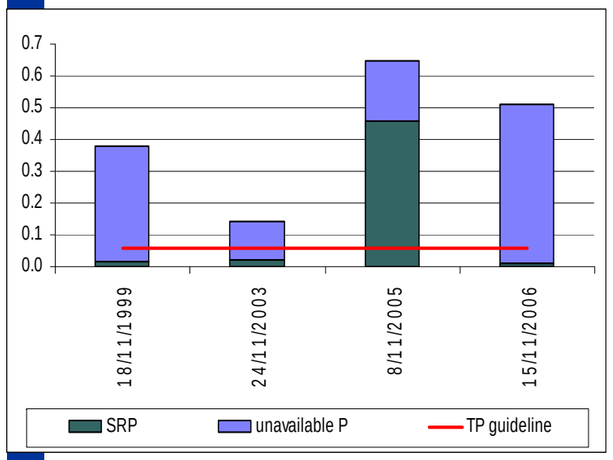
Total Phosphorus (TP) concentration ranged between 0.14-0.65mg/L which exceeded the water quality guidelines of 0.06mg/L on all of the sample occasions.

Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged between 0.01-0.46mg/L which exceeded the recommended water quality guideline value of 0.03mg/L on one occasion.

Bailey Swamp

South Coast Wetland Monitoring Project June 2008

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.



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

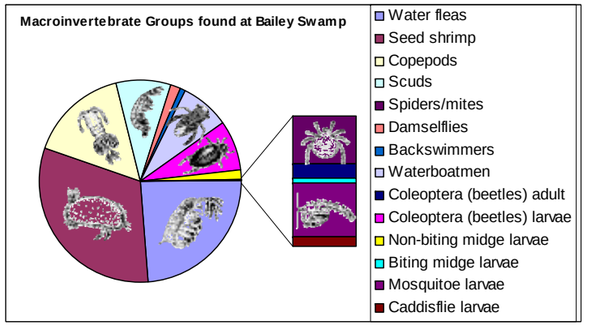
Nutrients stores in the catchment may enter Bailey Swamp through surface and sub surface flow from the surrounding land and through groundwater discharge.

Macroinvertebrates

Fourteen groups of macroinvertebrates were found at Bailey Swamp during the monitoring period of which the most abundant included; Cladocera (water fleas), Ostracoda (seed shrimp), Copepoda (copepods), Amphipoda (scuds), Corixidae (waterboatmen), Coleoptera (beetles) larvae, Chironomidae (non-biting midge larvae), Zygoptera (damselflies), and Notonectidae (backswimmers).

Other groups of less abundance were found including; Culicidae (mosquitoe larvae), Acarina (spiders/mites), Coleoptera (beetles) adult, Ceratopogonidae (biting midge larvae), and Trichoptera (caddisflie larvae).

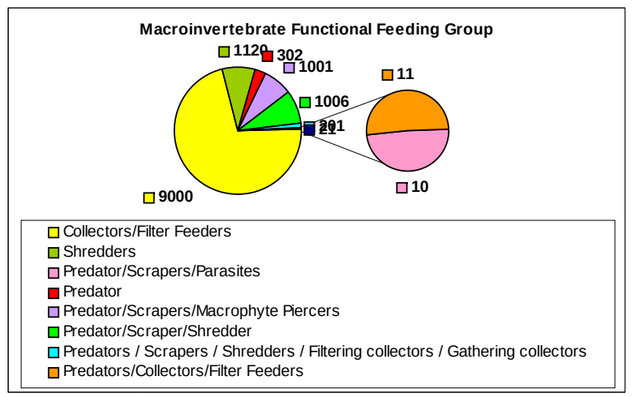
The diversity of macroinvertebrates found over the sample period ranged between four to fourteen groups with a median of ten, which rates as average based on the Ribbons of Blue Wetland Habitat Score.



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 Bailey Swamp are displayed in the below graph.



Temporary Marker Location at Baileys Swamp