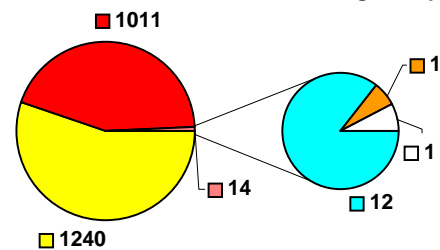


Boyatup Swamp

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 Boyatup Swamp are displayed in the below graph.

Macroinvertebrate Functional Feeding Groups



- Collectors/Filter Feeders
- Predator
- Predators / Scrapers / Shredders / Filtering collectors / Gathering collectors
- Predators / Collectors / Filter Feeders
- Predator / Scrapers / Parasites

There appears to be a high number of collectors / filter feeders which could relate to the high amount of suspended decomposing fine particulate organic matter in the wetland.

Conclusion

Boyatup Swamp is a fresh water swamp that is intermittently flooded during high rainfall events. The main issues to consider are high nutrient levels in the swamp as well as the potential for groundwater rise and interaction of saline groundwater with the swamp and the associated ecological changes.

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.



Identifying Macroinvertebrates

Acknowledgements

The Department of Water would like to sincerely thank and acknowledge the following people for their assistance and contribution toward Department of Water's South Coast Wetland Monitoring Program and production of this report.

- Justin and Mandy Warren for their support of the project and allowing access the swamp situated on their property
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- 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.

Boyatup Swamp

This report card summarises the Department of Water's current state of knowledge of the physical, chemical and biological characteristics of Boyatup 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 is an appendices that provides 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 Boyatup Swamp



Boyatup Swamp is located approximately 65km east of Esperance, Western Australia, within the Coastal Catchment and the smaller sub-catchment of Cape Le Grand National Park. The wetland is at approximately 76m AHD (Australian Height Datum) and

the area receives an annual average rainfall of 620mm.



Boyatup Swamp

Wetland Suite	GPS Location Coordinates		
	Easting	Northing	MGA Zone
Boyatup Suite	435559	6258521	51

Boyatup Swamp is located on private property within an internally drained catchment of approximately 683km² in the Esperance Shire. The Swamp lies within an unfenced wetland vegetation buffer zone that ranges between 160-500m from the wetland centre.



Yate trees are good indicators of the presence of fresh water

Vegetation exists throughout the wetland which is dominated by *Eucalyptus occidentalis* (Yates) with an understorey of *Juncus pallidus*, *Eleocharis acuta* and grass. There are a number of dead Yate trees scattered throughout the wetland.

Approximately 95% of the catchment has been cleared of native vegetation for cattle, cropping and tree farming. The catchment features localised sand dunes with little evidence of secondary salinised land. With relatively flat topography there is little evidence of drainage or creek lines associated with the wetland.

The swamp is not fed by the entire catchment area that it is situated in and only receives run-off from the surrounding agricultural land during significant rainfall events.

Boyatup Swamp

Water quality monitoring commenced in November 2005 however the wetland was dry until a summer storm in February 2007. Monitoring included physical, chemical and biological parameters as outlined in the appendices.

Wetland Classification

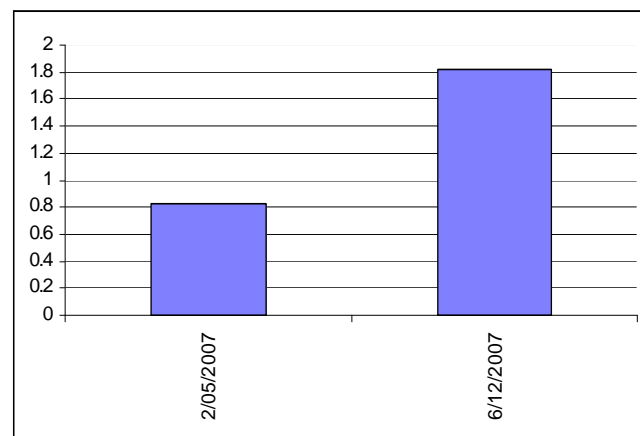
Wetland type	Water Salinity	Consistency of Salinity	Size (Metres)	Shape
Playa	Fresh	Stasohaline	Mesoscale 1020 x 520	Irregular - Enlongate

Classification of Boyatup Swamp has been evaluated on the basis of guidelines developed by V & C Semeniuk Research Group (1997). Long dry wetland periods correspond with the hydro period classification Playa which indicates the wetland may only fill in high rainfall events. For further explanation please refer to the attached appendices.

Salinity

Salinity on the two samples collected in 2007 was fresh at 0.825mS/cm and marginal at 1.82mS/cm. Fluctuations in salinities relate to seasonal fluctuations in rainfall which in turn determines the amount of surface runoff and sub surface flow from surrounding land. The freshness of the water in Boyatup Swamp indicates there is no connection with the groundwater.

This was evident in January 1995 as groundwater salinities measured from a nearby groundwater monitoring bore (EWD2.95) with moderately saline water (5.76mS/cm) at 10m depth and saline water (9.18mS/cm) at 30m depth (Baddock 1995) did not correlate with the wetland salinity. Increasing salinities at depth could be due to groundwater recharge while increasing salinities in the swamp relate to the swamp evaporating and drying.



Salinity (mS/cm) over the sample period

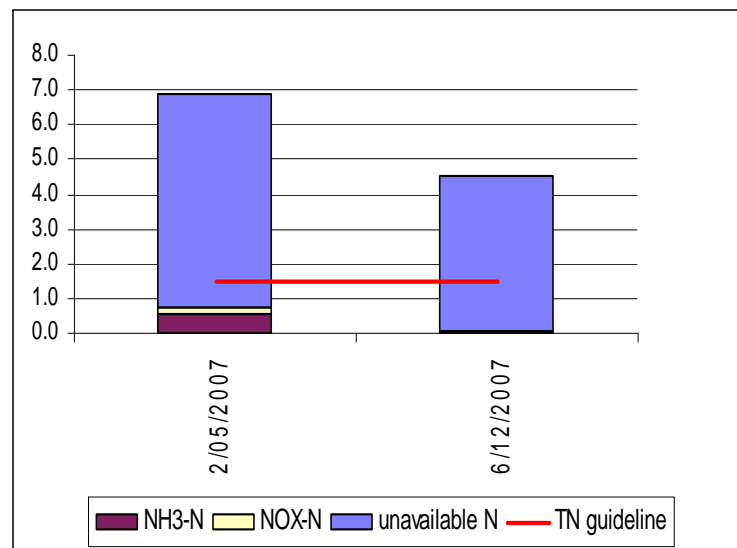
The height of the water table recorded at the bore on the 10/08/2007 was 76.25m AHD which indicates the groundwater is approximately 25cm from the bottom of the Swamp. Groundwater level trends over the past years shows groundwater rise is less than 3cm per year which means groundwater is currently relatively static.

At this rate of rise, however, there could be groundwater interaction with the wetland within a decade or potentially sooner if the rate of groundwater rise increases.

Nutrients

Total Nitrogen (TN) concentrations taken on two sample occasions following the February floods in 2007 ranged between 4.5-6.9mg/L which 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 (NH₃-N) ranged between 0.04-0.56mg/L which also exceeded the recommended guideline value of 0.04mg/L on one of the two sample occasions and total oxidised nitrogen (NOx-N) ranged between 0.05-0.17mg/L which also exceeded the recommended guideline value of 0.1mg/L on one of the two sample occasions.



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

Boyatup Swamp



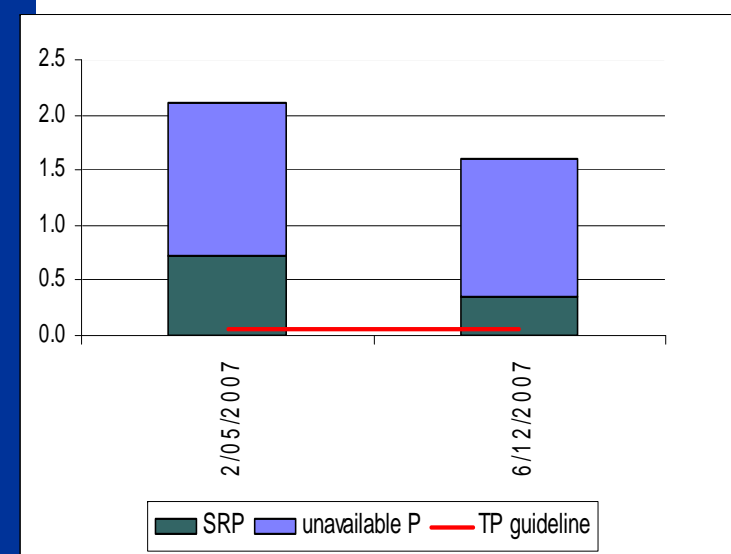
Photo of Boyatup Swamp Substrate taken May 2007

Total Phosphorus (TP) ranged between 1.6-2.1mg/L which exceeded the water quality guidelines of 0.06mg/L on both occasions.

Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged between 0.05-0.17mg/L which also exceeded the recommended value of 0.03mg/L on both sample 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.

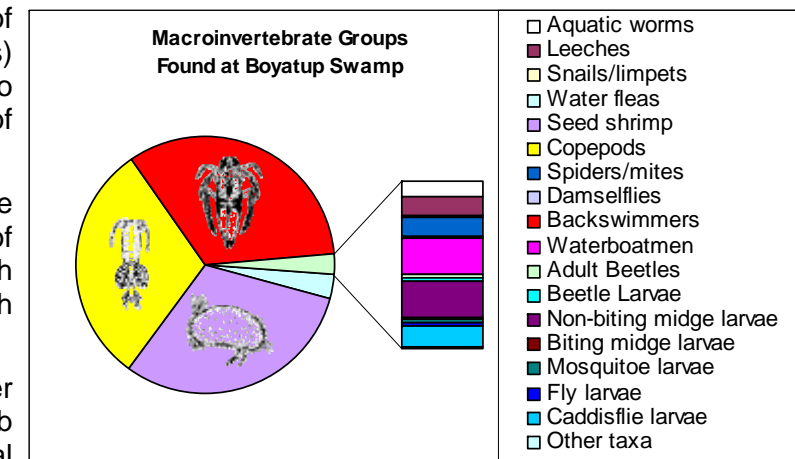
Catchment stores of nutrients may also enter Boyatup Swamp through surface and sub surface flow from the surrounding agricultural land.



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

Macroinvertebrates

Eighteen groups of macroinvertebrates were found at Boyatup Swamp during the monitoring period of which the most abundant included Ostracoda (seed shrimp), Copepoda (copepods), Notonectidae (backswimmers), and Cladocera (water fleas). Other groups of less abundance were found including; Oligochaeta (aquatic worms), Hirudinea (leeches), Gastropoda (snails/limpets), Acarina (spiders/mites), Zygoptera (damselflies), Corixidae (waterboatmen), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Chironomidae (non-biting midge larvae), Ceratopogonidae (biting midge larvae), Culicidae (mosquito larvae), Other Diptera (fly larvae), Trichoptera (caddisfly larvae), and Other taxa.



The diversity of macroinvertebrates found over the sample period ranged between thirteen to twenty eight groups which rates from average to high 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