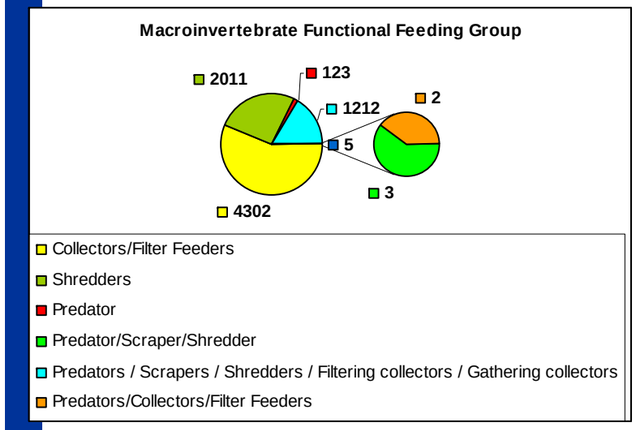
Lake Chillinup

South Coast Wetland Monitoring Project **June 2008**

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 Lake Chillinup are displayed in the below graph.



Conclusion

Lake Chillinup was previously perched above the groundwater table but due to groundwater rise and secondary salinisation in the catchment it now receives highly saline groundwater discharge and saline surface water discharge resulting in highly saline to brine conditions. Due to increasing lake salinity and water level a program has been established to reduce maximum water levels and excess flooding by siphoning water out of the wetland. Nutrient levels are reasonably high including the available forms of nitrogen and phosphorus on some occasions. The siphoning scheme is not expected to change waer quality significantly however the changing water level regimes should have an impact on the wetland ecology.

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

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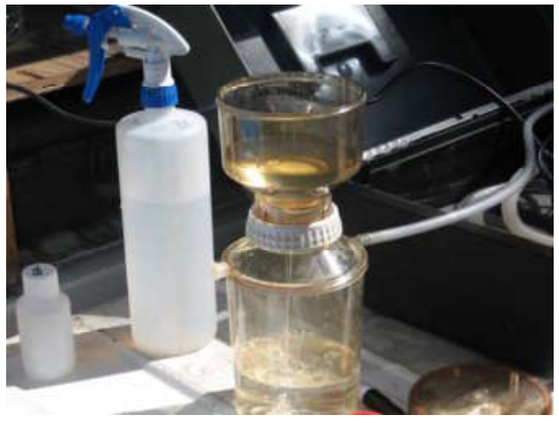
- Ruhi Ferdowsian (Department of Agriculture and Food, Albany) for providing knowledge of the hydrogeology associated with Lake Chillinup.
- Ania Lorenz, Sherrie Randall, Kevin Hopkinson, and Albany Department of Water team who conducted the monitoring.
- Kevin Hopkinson, Naomi Arrowsmith, Andrew Maughan and others for their support and editing assistance.
- Sherrie Randall and Tracy Calvert for data analysis and report compilation.



Filtering water for available nutrient analysis

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

Lake Chillinup

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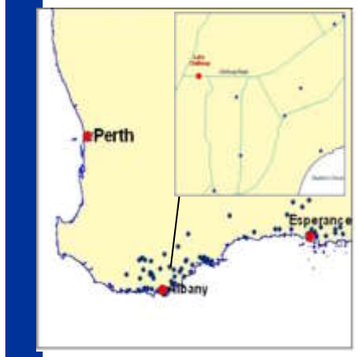
This report card summarises the Department of Water's current state of knowledge of the physical, chemical and biological characteristics of Lake Chillinup based on the knowledge gained from investigation and monitoring conducted by the Department of Water through the South Coast Wetland Monitoring Program.

Accompanying this document are appendices providing 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 the South Coast Natural Resource Management Inc. - supported by the Australian Government and the Government of Western Australia.

About Lake Chillinup



Lake Chillinup is located approximately 57.2km north east of Albany in Western Australia within the Oyster Harbour catchment and the sub-catchment of the Kalgan River. The wetland is at approximately 165m AHD (Australian Height Datum) and the area receives an annual average rainfall of 500mm.

	GPS Location Coordinates		
Wetland Suite	*Easting*	*Northing*	*MGA Zone*
Manypeaks Suite	598358	6176481	50

Lake Chillinup is located in a flora conservation protection area vested in the Western Australia Wildlife Authority and managed by the Department of Environment and Conservation. The wetland lies within an unfenced wetland vegetation buffer zone that extends approximately 40-250m from the wetland edge and has a catchment of approximately 61km^2.

Lake Chillinup

Trees flooded in the margins of the lake

Vegetation is predominantly *Eucalyptus occidentalis* (Yates) in the upper storey with *Melaleuca cuticularis* (saltwater paperbark) in the mid storey and Samphires, *Gahnia trifida* in the understorey. There are a number of flooded and dead trees in the wetland margins with some regenerating Yates on the edges.

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Lake Chillinup

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Approximately 90% of the catchment has been cleared of native vegetation for cropping and Blue Gum Plantations.

Water quality monitoring commenced in November 2005 including physical, chemical and biological parameters as outlined in the appendices.

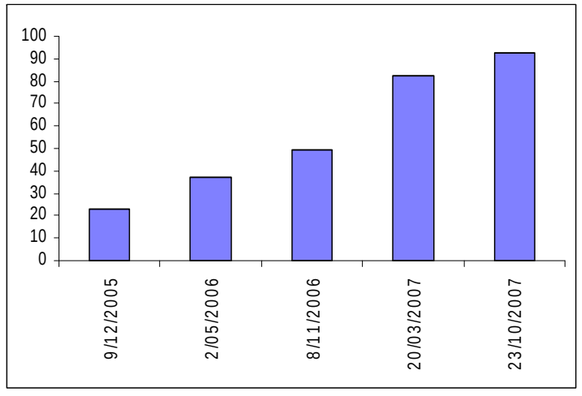
Wetland Classification

Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Lake	Hypersaline - Brine	Poikilohaline	Macroscale 1540 x 1255	Irregular - Round

Classification of Lake Chillinup 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 ranged between highly saline (23.1mS/cm) and brine (92.7mS/cm). Fluctuations in salinities relate to seasonal fluctuations in rainfall, evaporation and hence water level variation.



Salinity (mS/cm) over sample period

Fluctuations in salinities relate to surface and sub surface flow and through the creek line draining surface salts from secondary salinised land to the northwest which flows into the swamp. During rainfall events surface salts may wash into Lake Chillinup increasing salinity while high rainfall events and flows may dilute incoming water and reduce salinities.

Chillinup Lake is situated on the valley floor where wind driven sand has created a lunette system on the eastern side of the lake. The lake was previously perched above the groundwater table however is now groundwater connected where highly saline groundwater (30.5mS/cm) discharges at the wetland margins.

Due to concerns of increasing salinity and water levels, a siphon was installed at the southern end of the lake to drain excess water into a small wetland to the south which then drains to the Kalgan River. Continued monitoring will assess the success of the drainage however salinities are likely to maintain at the current level.

Flooded dead trees within Chillinup Lake

Nutrients

Total Nitrogen (TN) concentrations ranged between 1.5-6.1mg/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 0.01-0.41mg/L which exceeded the recommended guideline value of 0.04mg/L on two of the five sample occasions. Total oxidised nitrogen (NOx-N) ranged between 0.01-0.06mg/L which did not exceed the recommended guideline value of 0.1mg/L on any sample occasion.

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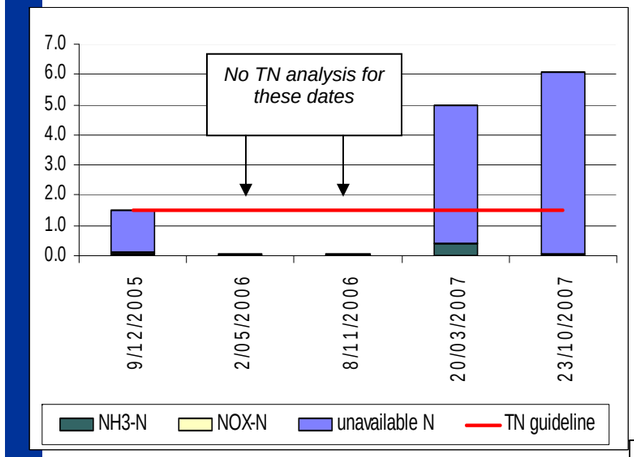
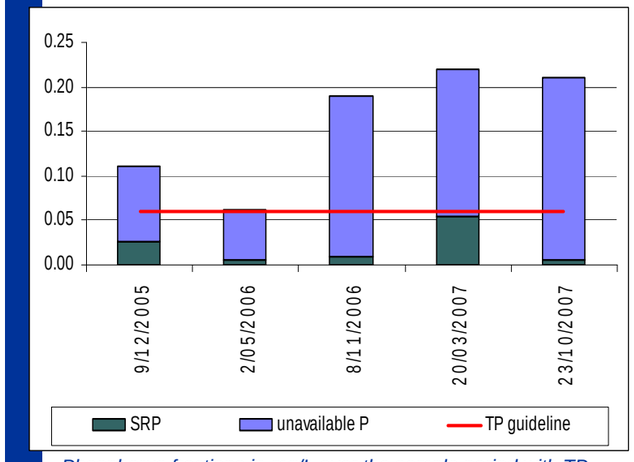


Nitrogen fractions in mg/L over the sample period with TN guideline illustrated

Total Phosphorus (TP) concentration ranged between 0.062-0.22mg/L which exceeded the water quality guidelines of 0.06mg/L on three of the five sample occasions.

Soluble Reactive Phosphorus (SRP) (available form of phosphorus for uptake by plants) ranged between 0.01-0.055mg/L which exceeded the recommended water quality guideline value of 0.03mg/L on one of the five sample occasions.



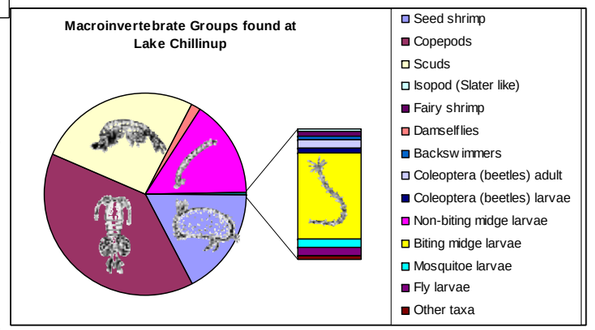
Phosphorus fractions in mg/L over the sample period with TP guideline illustrated

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.

Nutrients stores in the catchment sediments may enter Lake Chillinup through surface and sub surface flow from the surrounding land via the creek line to the northwest and groundwater discharge.

Macroinvertebrates

Fourteen groups of macroinvertebrates were found at Lake Chillinup during the monitoring period of which the most abundant included; Copepoda (copepods), Amphipoda (scuds), Ostracoda (seed shrimp), Chironomidae (non-biting midge larvae), and Zygoptera (damselflies)



Other groups of less abundance were found including; Isopoda (slater like), Anostraca (fairy shrimp), Notonectidae (backswimmers), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Ceratopogonidae (biting midge larvae), Culicidae (mosquitoe larvae), Other Diptera (fly larvae), and Other taxa.

The diversity of macroinvertebrates found over the sample period ranged between five to nine groups with a median of eight, which rates average based on the Ribbons of Blue Wetland Habitat Score. It appears that the macroinvertebrate groups have changed to more salt tolerant species in response to the increasing salinity in the wetland.

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