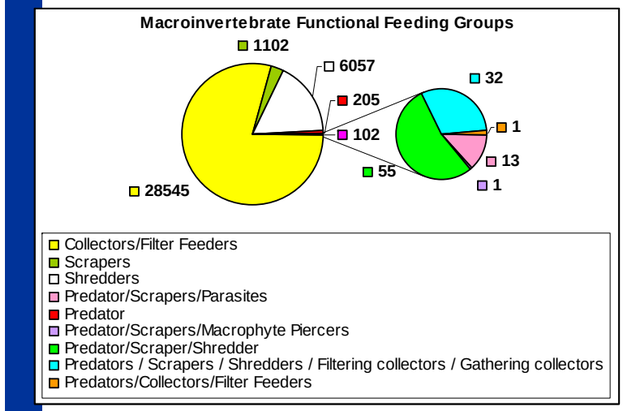
Poorarecup Lagoon

South Coast Wetland Monitoring Project **June 2008**

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 Poorarecup Lagoon are displayed in the below graph.



Conclusion

Poorarecup Lagoon was previously a fresh, seasonally inundated wetland perched above the water table. Since watertables have risen as a result of clearing for agriculture the wetland receives saline surfacewater and is now connected to saline groundwater which results in highly saline conditions. Total nitrogen levels were high on most occasions however phosphorus was low. Due to the high social and environmental values of Poorarecup Lagoon the main issues to consider 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.

Melaleuca cuticularis in flooded margins of Poorarecup Lagoon

Acknowledgements

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- Ruhi Ferdowsian (Department of Agriculture and Food, Albany) for providing knowledge of the hydrogeology associated with Poorarecup Lagoon.
- 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.

Poorarecup Lagoon is popular for picnicing

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 Poorarecup Lagoon based on the knowledge gained from investigation and monitoring conducted by the Department of Water through the South Coast Wetland Monitoring Program.

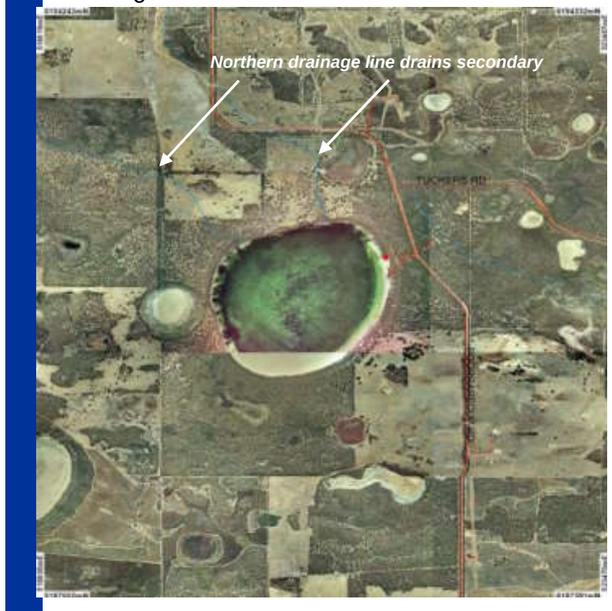
Accompanying this document are appendices that provide more detailed information about the wetland monitoring program, terminology of wetland classification, parameters monitored, methodology and the ANZECC&ARMCANZ guidelines used in this report.

Funding for this program has been provided through the South Coast Natural Resource Management Inc. - supported by the Australian Government and the Government of Western Australia.

About Poorarecup Lagoon

	GPS Location Coordinates		
Wetland Suite	*Easting*	*Northing*	*MGA Zone*
Unicup Suite	521589	6191434	50

Poorarecup Lagoon is located approximately 46.5km north west of Mount Barker, Western Australia, within the Irwin Inlet Catchment and the sub-catchment of the Kent Rivers. The wetland is at approximately 225m AHD (Australian Height Datum) and the area receives an annual average rainfall of 555mm.



Poorarecup Lagoon

Poorarecup Lagoon is located on Crown Reserve within a catchment of approximately 94km^2 which is under the jurisdiction of the Shire of Cranbrook. The Swamp lies within an unfenced wetland vegetation buffer zone that ranges between 38-350m from the wetland edge (including the reserve area).

Riparian vegetation at Poorarecup Lagoon with seagrass wrack deposited on shore

Vegetation includes *Eucalyptus occidentalis* (Swamp Yate) and *Melaleuca cuticularis* (saltwater paperbark) in the upper and mid storey sparse rushes in the understorey. There are a number of dead trees on the northern edge of the lake and little regeneration

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observed. *Ruppia megacarpa* (seagrass) exists within the lake and seagrass wrack deposits on the shoreline.

Approximately 50% of the catchment has been cleared of native vegetation for stock, cropping and now plantation forestry. The lake is popular for water skiing and an area has been cleared for picnicking.

Comprehensive water quality monitoring commenced in November 1999 which includes physical, chemical and biological parameters as outlined in the appendices.

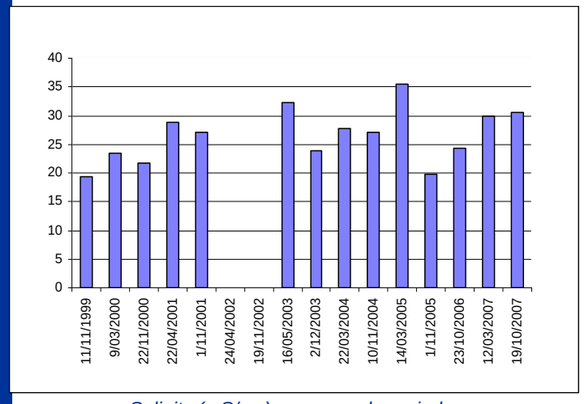
Wetland Classification

Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Lake	Fresh - Hyposaline	Stasohaline	Macroscale 1850 x 1485	Ovoid

Classification of Poorarecup Lagoon 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 highly saline and ranged between 19-35.4 mS/cm. Fluctuations in salinities relate to seasonal fluctuations in rainfall, surface runoff, groundwater recharge, discharge to and from the lake and evaporation.



Salinity (mS/cm) over sample period

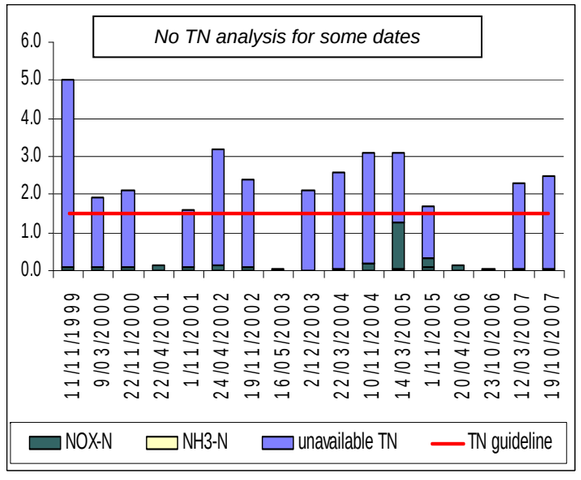
The two watercourses entering the lake drains surface salts especially during the onset of winter when stored salt are initially flushed into the lake. Once flows increase during winter the concentration of salts may decrease. In the past, during high water levels overflow from the lake was to the south toward the Kent River however it is considered there may not have been any overflow for the past 30 years.

Poorarecup Lagoon lies within the geological formation of the Plantagenet group which is made up of marine derived Pallinup Siltstone overlaying the deeper Werillup formation made up of lignite, clays and coarse sand. The lakes in the area are situated in the tertiary sediments that occur mainly on ancient drainage channels. Historically Poorarecup Lagoon was a freshwater system perched above the groundwater table and was only seasonally inundated. Since land clearing and groundwater rise, it is highly likely that there is groundwater and wetland connectivity.

The regional groundwater in this area has risen up to 6m since catchment land clearing and is rising at a rate of 20cm per year. Salinities measured from 2000-2008 at a nearby monitoring bore (60410012) ranged between 17.3-22.3mS/cm which correlates with highly saline conditions of the lagoon water. Higher salinities in the lagoon would correspond with high evaporation rates and concentration of salts.

Nutrients

Total Nitrogen (TN) concentrations ranged between 1.6-5mg/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.



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

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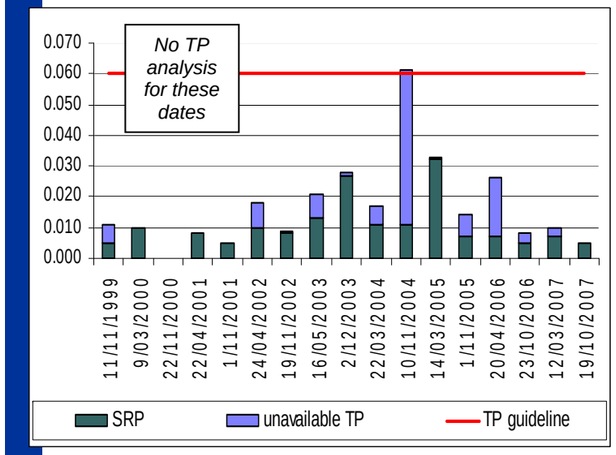
Dissolved inorganic nitrogen fractions of ammonia (NH_3-N) ranged between 0.01-1.2mg/L which exceeded the recommended guideline value of 0.04mg/L on twelve of the seventeen sample occasions. Total oxidised nitrogen (NOx-N) ranged between 0.01-0.082mg/L which did not exceed the recommended guideline value of 0.1mg/L on any sample occasion.

Total Phosphorus (TP) concentration ranged between 0.005-0.06mg/L which did not exceed the water quality guidelines of 0.06mg/L on any sample occasion.

Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged between 0.008-0.03mg/L which did not exceed the recommended water quality guideline value of 0.03mg/L.

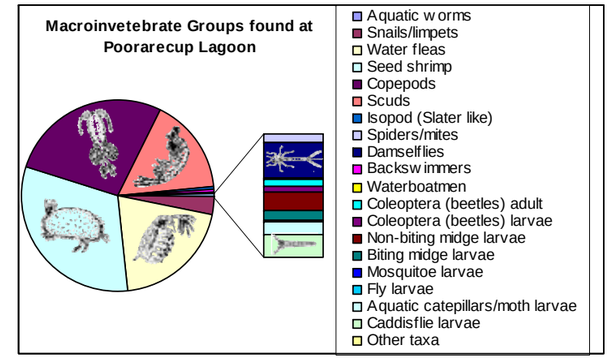


Phosphorus fractions in mg/L over the sample period with TP guideline illustrated

Nutrients may enter Poorarecup Lagoon through inflow from the watercourses to the north and runoff from surrounding agricultural lands that have accumulated nutrient stores over time as well as via groundwater. Low amounts of phosphorus and available phosphorus may indicate nutrients are readily taken up by plants or due to the high phosphorus absorption potential of the clays beneath the agricultural land.

Macroinvertebrates

Twenty groups of macroinvertebrates were found at Poorarecup Lagoon during the monitoring period of which the most abundant included; Gastropoda (snails/limpets), Cladocera (water fleas), Ostracoda (seed shrimp), Copepoda (copepods), Amphipoda (scuds), Notonectidae (backswimmers), Isopoda (slater like), and Other taxa



Other groups of less abundance were found including; Oligochaeta (aquatic worms), Acarina (spiders/mites), Zygoptera (damselflies), Corixidae (waterboatmen), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Chironomidae (non-biting midge larvae), Ceratopogonidae (biting midge larvae), Culicidae (mosquitoe larvae), Other Diptera (fly larvae), Lepidoptera (aquatic catepillars/moth larvae), and Trichoptera (caddisflie larvae).

The diversity of macroinvertebrates found over the sample period ranged between four to thirteen 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.

Macroinvertebrate identification