

Pardelup Lagoon



Low water levels at Pardelup Lagoon 26th March 2008



Temporary Marker location at Pardelup Lagoon

Conclusion

Pardelup Lagoon receives surface runoff and sub surface flow and it is not connected to the groundwater table. Salinity was usually marginal to brackish but occasionally saline. Total nitrogen in the lagoon was high, including the forms available for uptake by plants however phosphorus levels were low. Water is abstracted from the wetland and the groundwater table in the area is thought to be rising which may have future impacts 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.

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.

- ◆ The Pardelup Farm authorities for their support of the project and allowing access to the lake on their property.
- ◆ Ruhi Ferdowsian (Department of Agriculture and Food, Albany) for providing knowledge of the hydrogeology associated with Pardelup 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.



Doug Grant identifying macroinvertebrate 26th March 2008

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Pardelup Lagoon

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

Pardelup Lagoon is located approximately 41km north of Denmark in Western Australia within the Wilson Inlet catchment and sub-catchment of the Hay River. The wetland is at approximately 225m AHD (Australian Height Datum) and the area receives an annual average rainfall of 760mm.



Pardelup Lagoon is located in part on a Crown Reserve vested with the Minister of Prisons within a small catchment of approximately 26.6km². The lake lies within a partially fenced wetland vegetation buffer zone extending approximately 0-600m from the wetland edge.

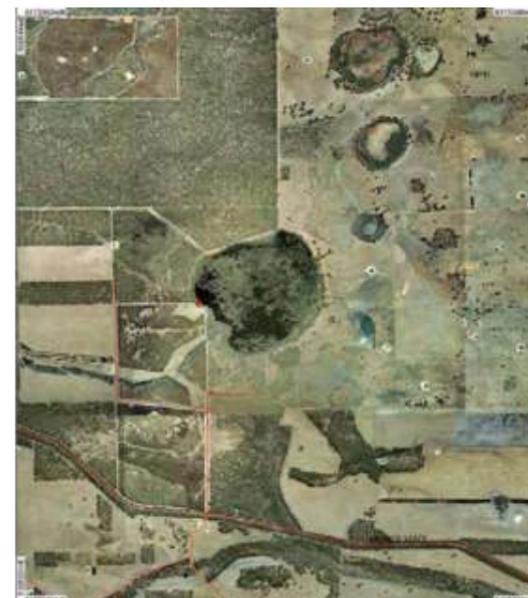
Vegetation predominantly consists of *Eucalyptus* species, *Melaleuca raphiophylla* (freshwater paperbark) and Blue Gums in the upper storey. There is very little understorey as a fire burnt the riparian vegetation during summer 2006-2007. Since the fire, burnt trees have re-sprouted and rushes are regenerating around the wetland.



Vegetation around Pardelup Lagoon



Pardelup Lagoon after fire



Pardelup Lagoon

Approximately 50% of the catchment has been cleared of native vegetation for livestock, cropping and now plantation forestry. Water is extracted from the wetland as a water supply for the Pardelup Prison Farm toilet facilities.

Water quality monitoring commenced in November 1999 which included physical, chemical and biological parameters as outlined in the appendices.

Wetland Suite	GPS Location Coordinates		
	Easting	Northing	MGA Zone
Unicup Suite	533899	6170881	50

Pardelup Lagoon

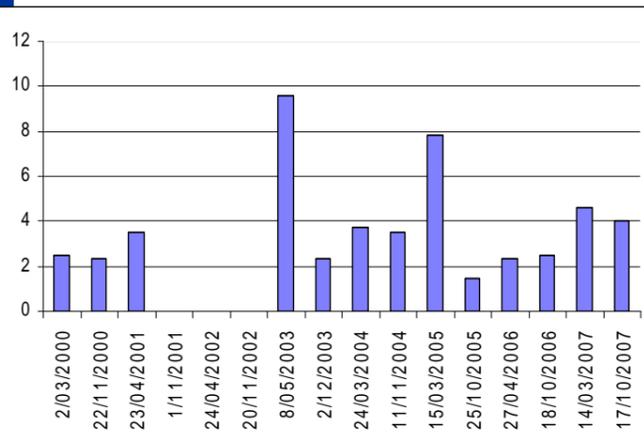
Wetland Classification

Wetland type	Water Salinity	Consistency of Salinity	Size (Metres)	Shape
Lake	Fresh—Subhaline Hyposaline	Poikilohaline	Mesoscale 1105 x 880	Irregular

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

Salinity

Salinity over the sample period was usually marginal to brackish (1.48 – 4.58 mS/cm) and saline (7.84 - 9.6 mS/cm) on two occasions. Fluctuations in salinities relate to seasonal fluctuations in rainfall, evaporation and hence water level variation.



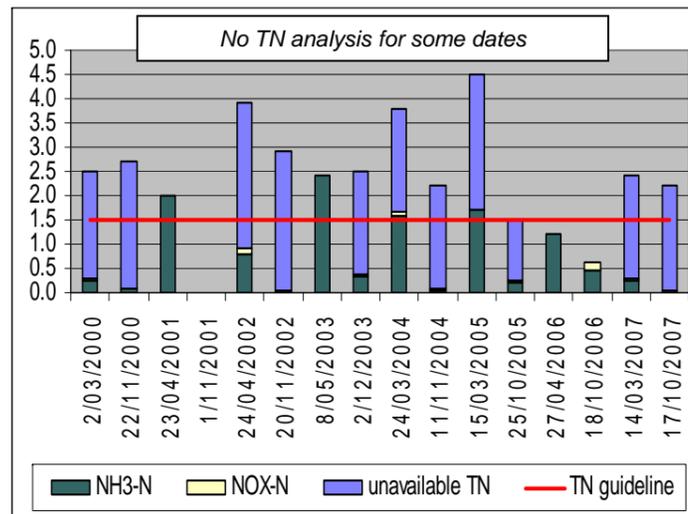
Salinity (mS/cm) over sample period

Pardelup Lagoon receives surface and sub surface flow from surrounding lands. Although the wetland-groundwater relationship needs further investigation, salinity in bores within a couple of kilometres at approximately the same elevation is saline. The comparatively fresher lake salinities infer there is no immediate groundwater connection however groundwater is rising in the area. The occasional saline wetland conditions may relate to evaporation and salt concentration.

Nutrients

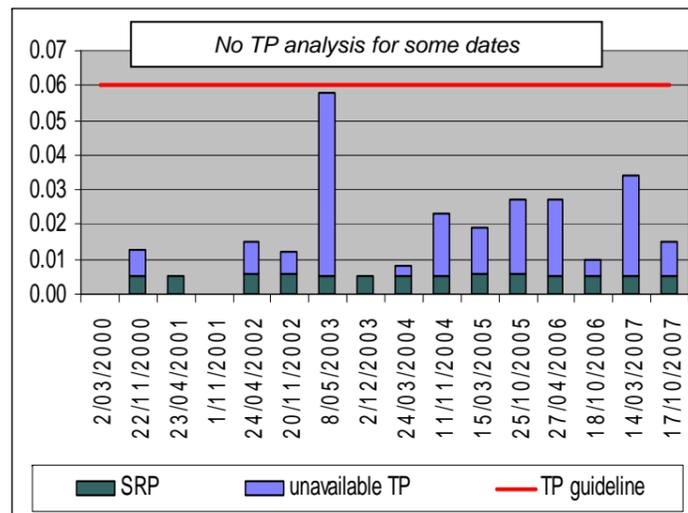
Total Nitrogen (TN) concentrations ranged between 1.4-4.5mg/L which exceeded the guidelines developed for ecosystem protection for southwest Australian wetlands for slightly disturbed systems of 1.5mg/L on most sample occasions.

Dissolved inorganic nitrogen fractions of ammonia (NH₃-N) ranged between 0.013-2.4mg/L which exceeded the recommended guideline value of 0.04mg/L on most occasions. Total oxidised nitrogen (NOx-N) ranged between 0.01-0.17mg/L which exceeded the recommended guideline value of 0.1mg/L on two sample occasions.



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

Total Phosphorus (TP) concentration ranged between 0.005-0.058mg/L which did not exceed the water quality guidelines of 0.06mg/L on any sample occasion.



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

Pardelup Lagoon

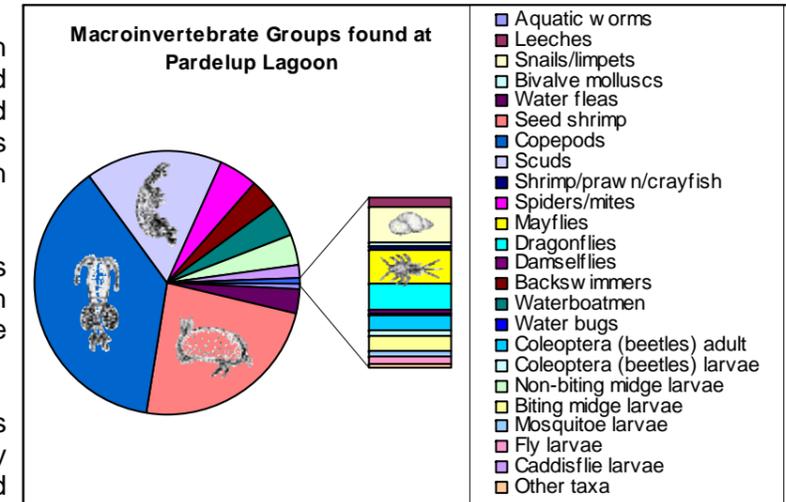
Soluble Reactive Phosphorus (SRP) (available form of phosphorus for uptake by plants) ranged between 0.005-0.006mg/L which did not exceed the recommended water quality guideline value of 0.03mg/L on any sample occasion.

The diversity of macroinvertebrates found over the sample period ranged between eight to twenty six groups with a median of sixteen which rates high based on the Ribbons of Blue Wetland Habitat Score.

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 catchment sediments may enter Pardelup Lagoon through surface and sub surface flow from the surrounding land.

Low proportions of available phosphorus can indicate the majority is being readily taken up by plants and animals or bound to clay soils.



Pardelup Lagoon Substrate 17th October 2008

Macroinvertebrates

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

Other groups of less abundance were found including; Hirudinea (leeches), Gastropoda (snails/limpets), Bivalvia (bivalve molluscs), Decapoda (shrimp/prawn/crayfish), Ephemeroptera (mayflies), Epiproctophora (dragonflies), Zygoptera (damselflies), Hemiptera (water bugs), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Ceratopogonidae (biting midge larvae), Culicidae (mosquito larvae), Other Diptera (fly larvae), and Other taxa.

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 Pardelup Lagoon are displayed in the below graph.

