Swan Lagoon

South Coast Wetland Monitoring Project **June 2008**

Swan Lagoon May 2008

There appears to be a high number of collectors / filter feeders which could relate to high amount of suspended decomposing fine particulate organic matter in the wetland. The high number of Macrophyte Piercers may be due to the large amount of organic matter on the floor of the wetland from the *Eucalyptus occidentalis* (Yates).

Conclusion

Swan Lagoon is fresh and fed by surface runoff and sub surface flow from the surrounding catchment during rainfall events. Fresh water in the swamp is maintained due to the low retention time which inhibits salt accumulation through evaporation. Depth to groundwater at two monitoring bores swamp indicated the swamp is perched greater than 10m above the groundwater. Total nitrogen and phosphorus concentrations are high however the available forms of these nutrients are low.

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.

- John Simons (Department of Agriculture and Food, Esperance) for providing knowledge of the hydrogeology associated with Swan Lagoon and editing assistance.
- 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.

Ania Lorenz monitoring Swan Lagoon 2006

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

Swan Lagoon

South Coast Wetland Monitoring Project **June 2008**

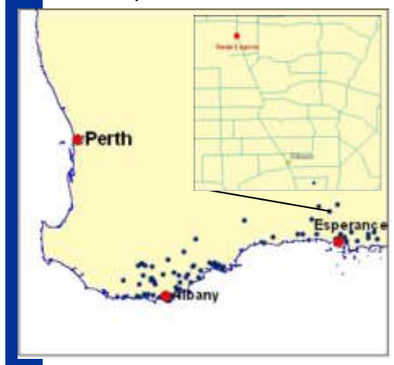
This report card summarises the current state of knowledge of physical, chemical and biological characteristics of Swan Lagoon based on the knowledge gained from investigation and monitoring conducted by the Department of Water through the South Coast Wetland Monitoring Program.

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 South Coast Natural Resource Management Inc. - supported by the Australian Government and the Government of Western Australia.

About Swan Lagoon

Swan Lagoon is located approximately 70km north of Esperance Western Australia, within the Lake Gore catchment and the smaller sub-catchment of the West Dalyup River. The wetland lies at approximately 190m AHD (Australian Height Datum). The area receives an annual average rainfall of 380mm.



	GPS Location Coordinates		
Wetland Suite	**Easting**	**Northing**	**MGA Zone**
Swan Lagoon Suite	373718	6318000	51

Swan Lagoon is located on Crown Reserve within a small catchment of approximately 155.4km^2. The wetland lies within an unfenced wetland vegetation buffer zone (reserve boundaries) that ranges between approximately 100-1380m from the wetland edge.

Vegetation predominantly consists of *Eucalyptus occidentalis* (Yates) throughout the wetland, with regenerating Yate trees in the midstorey and *Juncus pallidus* in the understorey. There is a large amount of woody debris in the wetland including a few collapsed trees.

Eucalyptus occidentalis (Yates) and regenerating trees in Swan Lagoon (note the high water line on the trunks)

Approximately 95% of the catchment area has been cleared for farming practices surrounding the wetland and Crown Reserve.

Water quality monitoring commenced in November 2005 however the lagoon was dry until the beginning of 2007. Monitoring included physical, chemical and biological parameters as outlined in the appendices.

Department of Water
Government of Western Australia

SOUTHCOAST NATURAL RESOURCE MANAGEMENT

- southcoastnrm.com.au -

Australian Government

Swan Lagoon

South Coast Wetland Monitoring Project **June 2008**

Wetland Classification

Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Playa	Fresh	Stasohaline	Microscale 360 x 360	Irregular - Oval

Classification of Swan Lagoon has been evaluated on the basis of guidelines developed by V & C Semeniuk Research Group. Extended dry periods of the wetland correspond with the hydro period classification Playa meaning intermittently flooded basin. During 2007, the lagoon flooded in response to heavy rainfall experienced in February that year. For further explanation please refer to the appendices.

Salinity

Salinity over the sample period was fresh ranging between 0.21-0.3mS/cm. Fluctuations in salinities also relate to fluctuations in rainfall, evaporation rates and hence water level variations. The lagoon receives inflows of fresh surface runoff, sub surface flow and via the creek that flows from the north east.

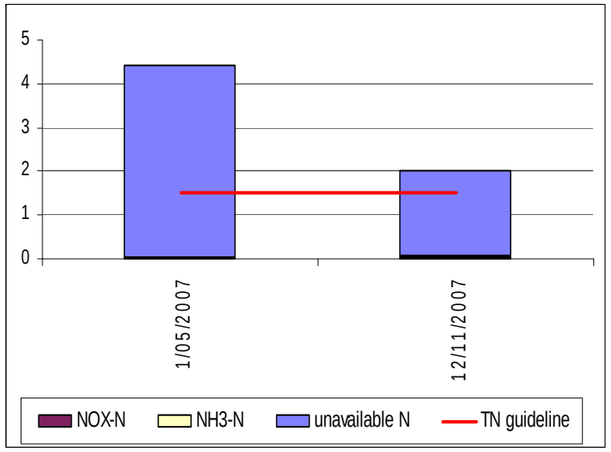
Salinities (mS/cm) over the sample period

Depth to groundwater recorded at two groundwater monitoring bores (GP5 and GP6) within close proximity to the wetland indicates there is no groundwater connectivity with the lagoon. Groundwater level measured in these bores in November 2003 indicate the watertable was at approximately 180m AHD which is 10m lower than the wetland situated at 192m AHD.

Nutrients

Total Nitrogen (TN) concentrations were high ranging from 2-4.4mg/L. TN concentrations on all sampling occasions 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 (NH_3-N) ranged from 0.02-0.028mg/L and total oxidised nitrogen (NOx-N) ranged between 0.01-0.04mg/L. NH_3-N and NO_X-N fractions did not exceed the recommended guideline values of 0.04mg/L and 0.1mg/L respectively, on any sample occasion.



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

Low proportions of available nitrogen can indicate the majority is being readily taken up by plants and animals while the remainder may be bound up in organic matter, or as dirt or dead cells.

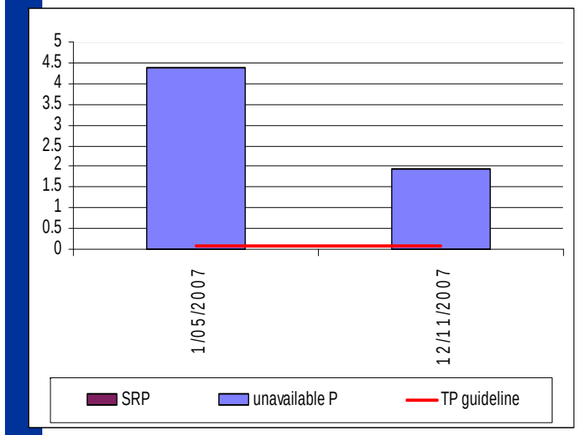
Large amounts of organic material in Swan Lagoon

Total Phosphorus (TP) concentrations ranged from 0.13-0.38mg/L and exceeded water quality guidelines of 0.06mg/L on all sample occasions.

Swan Lagoon

South Coast Wetland Monitoring Project June 2008

Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged from 0.005-0.01mg/L. In relation to water quality guidelines SRP exceeded the recommended value of 0.03mg/L on all sample occasions. Of the total phosphorus there was a very high percentage (44-89%) of available phosphorus (SRP) on all sampling occasions.



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

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.

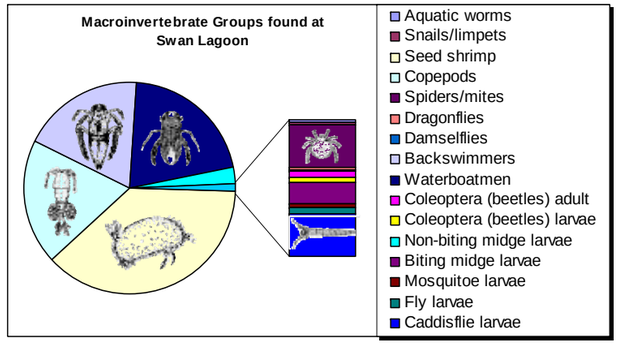
Nutrients stores in catchment sediments may enter Swan Lagoon through surface and sub surface flow from the surrounding land and through the creek line. High amounts of phosphorus may be delivered from catchment runoff suspended in sediments.

Macroinvertebrates

Sixteen groups of macroinvertebrates were found at Swan Lagoon during the monitoring period of which the most abundant included Ostracoda (seed shrimp), Corixidae (waterboatmen), Notonectidae (backswimmers), Copepoda (copepods), and Chironomidae (non-biting midge larvae).

Other groups of less abundance were found including; Trichoptera (caddisflie larvae), Other Diptera (fly larvae), Ceratopogonidae (biting midge larvae), Coleoptera (beetles) adult, Culicidae (mosquitoe larvae), Coleoptera (beetles) larvae, Zygoptera (damselflies), Epiproctophora (dragonflies), Acarina (spiders/mites), Gastropoda (snails/ limpets), and Oligochaeta (aquatic worms).

The diversity of macroinvertebrates found over the sample period ranged between eleven to eighteen groups with a median of sixteen which rates 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 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 Swan Lagoon are displayed in the below graph.