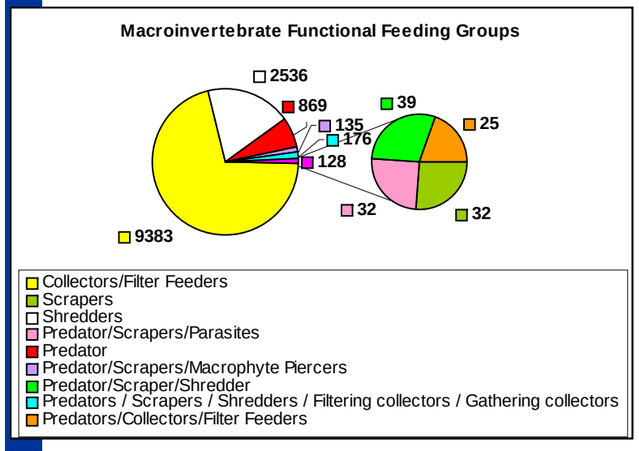
Milne Swamp

(mosquitoe larvae), Other Diptera (fly larvae), Trichoptera (caddisflie larvae) and Other taxa.

The diversity of macroinvertebrates found over the sample period ranged between eight to twenty six groups with a median of fourteen which rates 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.

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 Milne Swamp are displayed in the below graph.



Conclusion

Milne Swamp receives fresh water inputs from surface runoff and sub surface flow and was usually fresh but moderately saline on one occasion. Although current groundwater salinities and rate of rise needs confirming it appears the wetland is perched above the groundwater however high salinities in a dam excavated in the swamp indicate the groundwater table may be close to the wetland floor.

Total and available nitrogen concentrations were high on most occasions in contrast to phosphorus which was low on the majority of occasions. It is important to determine wetland-groundwater interactions by investigating groundwater salinity, watertable level and the rate of rise as well as the ecological effects of any salinity changes in 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.

- Mary and Graham Gordon for his 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 Milne Swamp.
- 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.

Milne Swamp

South Coast Wetland Monitoring Project June 2008

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

Milne Swamp is located approximately 7km north east of Borden, north of the Stirling Range in Western Australia, within the Beaufort Inlet catchment and sub-catchment of the Pallinup River. The wetland is at approximately 240m AHD (Australian Height Datum) and the area receives an annual average rainfall of 385mm.

	GPS Location Coordinates		
Wetland Suite	Easting	Northing	MGA Zone
No Suite Listed	620140	6222139	50

Milne Swamp

Milne Swamp is located on privately owned land within a catchment of approximately 11.6km^2. The wetland lies within an unfenced wetland vegetation buffer zone which extends approximately 10-40m from the wetland edge.

Vegetation grows throughout the wetland consisting of *Eucalyptus occidentalis* (Yate) in the upper storey *Melaleuca cuticularis* (Saltwater paperbark) in the mid storey and *Typha orientalis, Juncus pallidus* and *Isolepis nodosa* in the understorey. There are a number of dead trees within the swamp and some encroaching weeds.

Vegetation grows throughout Milne Swamp

Approximately 80% of the catchment has been cleared of native vegetation for cropping and livestock.

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

Department of Water
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Milne Swamp

South Coast Wetland Monitoring Project **June 2008**

Wetland Classification

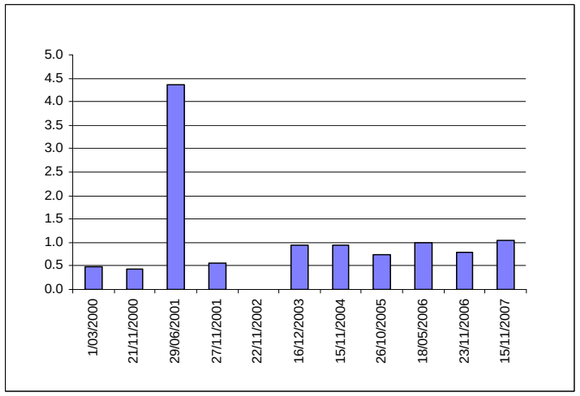
Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Sumpland	Fresh—Subhaline	Stasohaline	Microscale 320 x 380	Irregular - Round

Classification of Milne Swamp 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 usually fresh (0.44 – 1.04 mS/cm) and moderately saline (4.37mS/cm) on one occasion. Fluctuations in salinities relate to seasonal fluctuations in rainfall, evaporation and hence in water level variation. Milne swamp is fed by surface runoff and sub surface flow from surrounding lands.

A dam and a sump have been constructed within the swamp where water may be extracted when required for drought relief which may influence variable salinities. The wetland appears to be perched above the groundwater which was inferred by the fresh water, the vegetation type and distribution throughout the swamp and through comparison of the dam and soak salinities in April 2008. There was a marked difference between the shallow soak and the deeper dam salinities which were 0.841ms/cm and 24.73mS/cm respectively. These salinity differences indicate the dam may correspond with the saline groundwater in that area and that the groundwater table may be close to the swamp floor. The high salinity observed in June 2001 may relate to interaction with groundwater.



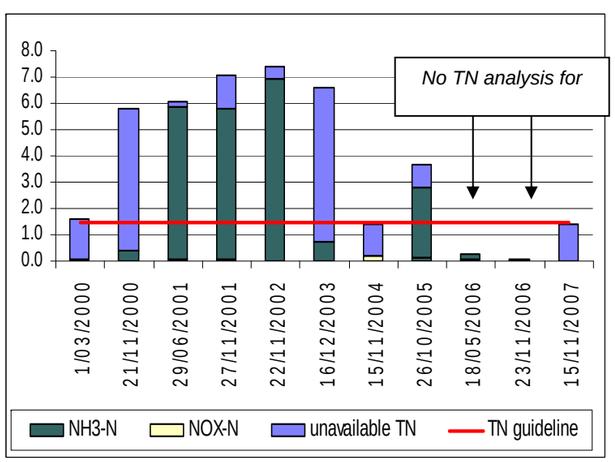
Salinity (mS/cm) over sample period

Nutrients

Total Nitrogen (TN) concentrations ranged between 1.4-7.4mg/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 0.017-0.73mg/L which exceeded the recommended guideline value of 0.04mg/L on six of the eleven sample occasions. Total oxidised nitrogen (NOx-N) ranged between 0.01-6.9mg/L which exceeded the recommended guideline value of 0.1mg/L on five of the eleven sample occasions.

Situation of the dam and soak within the swamp salinities mS/cm)



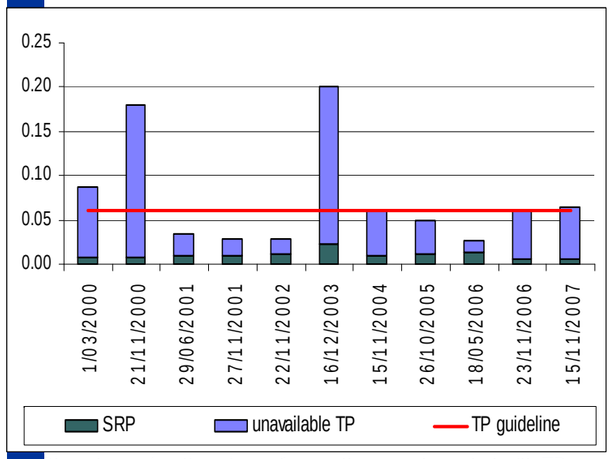
Nitrogen fractions in mg/L over the sample period with TN guideline illustrated

Milne Swamp

South Coast Wetland Monitoring Project **June 2008**

Total Phosphorus (TP) concentration ranged between 0.028-0.2mg/L which exceeded the water quality guidelines of 0.06mg/L on three of the eleven sample occasions.

Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged between 0.005-0.02mg/L which did not exceed the recommended water quality guideline value of 0.03mg/L on any sample occasion.



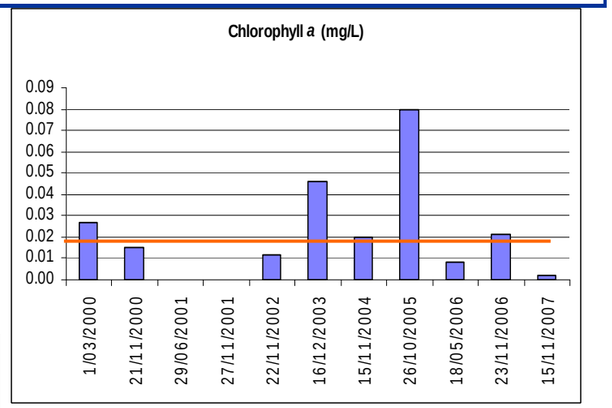
Phosphorus fractions in mg/L over the sample period with TP guideline illustrated

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.

Catchment nutrient stores may enter Milne Swamp through surface runoff and sub surface flow from surrounding agricultural lands.

Chlorophyll *a*

Chlorophyll *a* concentrations over the sample period ranged from 0.002-0.08 mg/L. Chlorophyll *a* exceeded the water quality guideline of 0.03mg/L on two of the nine sampling occasions. A higher concentration of chlorophyll *a* is indicative of high nutrient content providing adequate food source for algal growth. Alternatively low incidences of algal blooms may relate to nutrients being readily taken up by the vegetation which occupies the whole wetland basin or due to the coloured waters that limit light for algae growth.



Chlorophyll a (mg/L) over sample period in comparison to recommended guideline value of 0.03mg/L.

Vegetation growing throughout the swamp in coloured waters

Macroinvertebrates

Twenty groups of macroinvertebrates were found at Milne Swamp during the monitoring period of which the most abundant included; Cladocera (water fleas), Ostracoda (seed shrimp), Copepoda (copepods), Amphipoda (scuds), Zygoptera (damselflies), Notonectidae (backswimmers), Corixidae (waterboatmen), and Chironomidae (non-biting midge larvae).

Other groups of less abundance were found including; Oligochaeta (aquatic worms), Gastropoda (snails/limpets), Decopoda (shrimp/ prawn/crayfish), Acarina (spiders/mites), Epiproctophora (dragonflies), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Ceratopogonidae (biting midge larvae), Culicidae