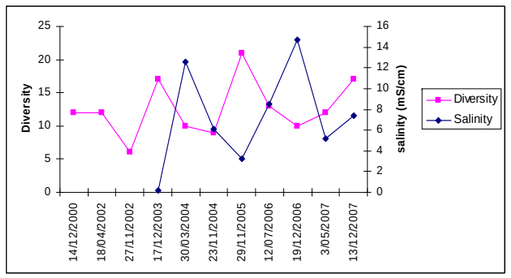
Melijinup Swamp

South Coast Wetland Monitoring Project **June 2008**

Trichoptera (caddisflie larvae), and Other taxa.

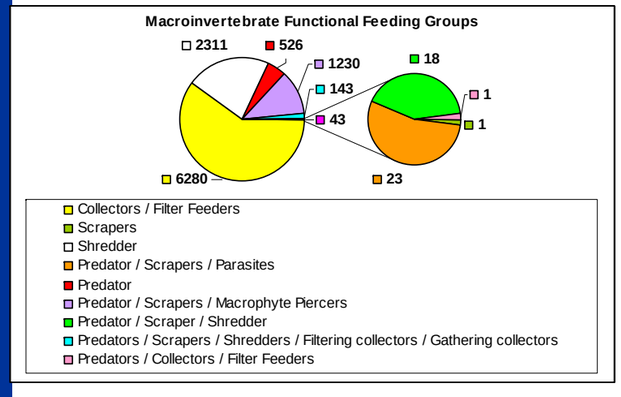
The diversity of macroinvertebrates found over the sample period ranged between six to twenty one groups, with a median of twelve which rates as average based on the Ribbons of Blue Wetland Habitat Score. Macroinvertebrate diversity was highest when salinities were lowest which coincides with the trend that higher diversities relate to low salinities as illustrated when salinity is graphed against macroinvertebrate diversity at Melijinup Swamp.



Macroinvertebrate diversity in comparison to salinity

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 Melinjinup are displayed in the below graph.



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.

Conclusion

Melinjinup Swamp ranged between fresh and saline and is influenced by both groundwater and surface water including the northern creek line from the upper catchment which is affected by secondary salinisation. Total nutrients and available nutrients in the swamp were consistently high leading to high productivity. The main issues to consider are catchment inputs of nutrients and salts.

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.

- Tilo Massenbauer Catchment Conservation Officer Department of Environment and Conservation (Esperance) for providing knowledge of the hydrogeology and catchment processes associated with Melinjinup 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.

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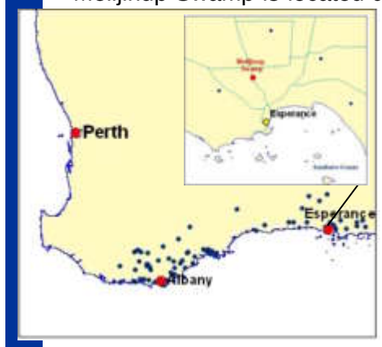
This report card summarises the current state of knowledge of physical, chemical and biological characteristics of Melijinup Swamp based on the knowledge gained from investigation and monitoring conducted by the Department of Water through the South Coast Wetland Monitoring Program.

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.

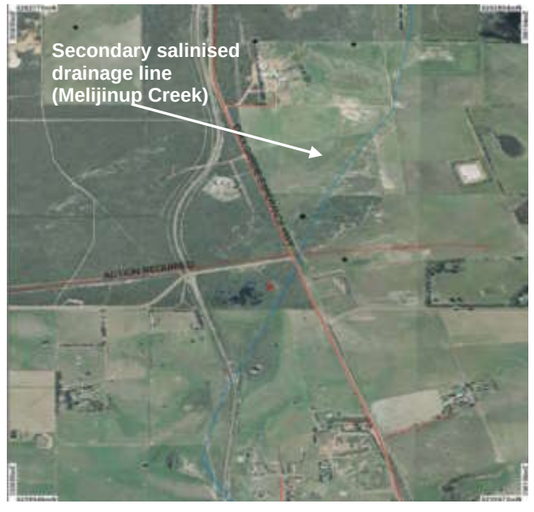
Funding for this program has been provided through South Coast Natural Resource Management Inc. - supported by the Australian Government and the Government of Western Australia.

About Melijinup Swamp

Melijinup Swamp is located approximately 10km north of Esperance, Western Australia, within the Bandy Creek Catchment and the smaller sub-catchment of Melijinup Creek. The wetland lies at approximately 40-60m AHD (Australian Height Datum) and receives an annual average rainfall of 580mm.



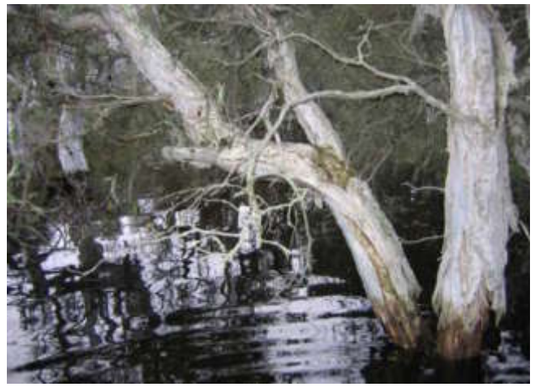
	GPS Location Coordinates		
Wetland Suite	*Easting*	*Northing*	*MGA Zone*
No Suite listed	395032	6261015	51



Melijinup Swamp

Department of Water
Government of Western Australia

Melijinup Swamp is located on unallocated land which is under the jurisdiction of the Esperance Shire within a small catchment of approximately 6.3ha The Swamp lies within an unfenced wetland vegetation buffer zone that ranges between 0-166m from the wetland edge. Vegetation predominantly consists of mature *Melaleuca cuticularis* (saltwater paperbark) and sedges and rushes. Samphire or saltmarsh plants are also present in the outer rim of the wetland area.



Melaleuca cuticularis in flooded margins of the lake

Approximately 90% of the catchment has been cleared of native vegetation mostly for farming practices. An Abattoir is located to the north of the swamp. Melijinup Creek runs partially through the swamp toward the south, draining secondary salinised land from the north.

Water quality monitoring commenced on the 19/12/2000 and included physical, chemical and biological parameters as outlined in the appendices.

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Melijinup Swamp

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Wetland Classification

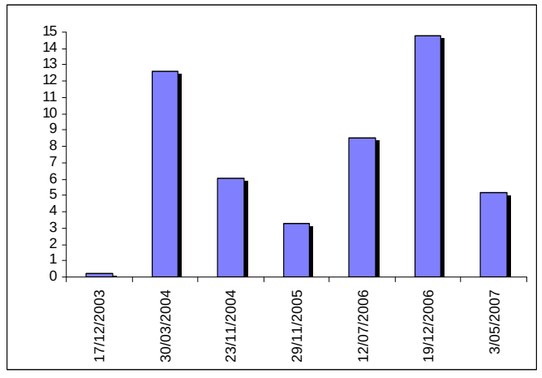
Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Lake	Fresh - Subhaline - Hyposaline	Poikilohaline	Microscale 335 x 295	Round

Classification of Melijinup Swamp has been evaluated on the basis of guidelines developed by V & C Semeniuk Research Group (1997). For further explanation please refer to the appendices.

Salinity

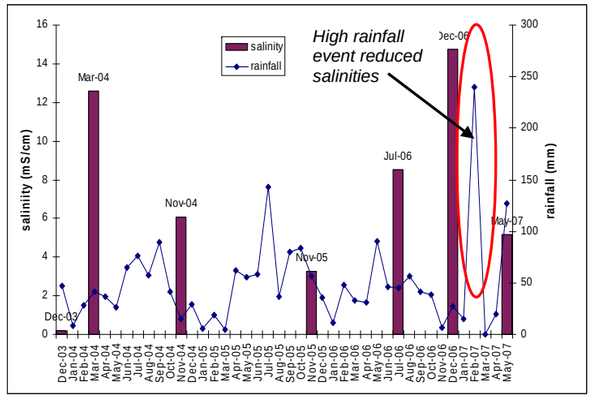
Salinity over the sample period fluctuated between fresh (0.22mS/cm) and saline (12.9mS/cm) which corresponds with the water salinity classification based on Semeniuk 1987. Fluctuations in salinities relate to seasonal fluctuations in rainfall which in turn determines the amount of surface runoff through Melijiniup Creek which drains salts from secondary salinised land to the north east. The creek flows partially through the swamp and south into Lake Warden. During low rainfall events surface salts may wash into Melijinup Swamp increasing salinity while during high rainfall events the higher flows may dilute incoming water and reduce salinities.

Higher salinities experienced on the 30/0/04 and the 19/12/2006 may correspond with the preceding low rainfall period. The storm event in February 2007 which brought approximately 240mm of rainfall resulted in the reduction of salinity recorded on the 3/05/07.



Salinities (mS/cm) over the sample period

Melijinup Swamp lies between two underlying Granite ridges that run northwest and southeast where two groundwater aquifers converge and flow onto Pink Lake to the south west. The swamp lies on Pallinup Siltstone formation overlying the Pallinup aquifer which is saline and may contribute saline water to Melijinup Swamp. Adjacent to the swamp fresh water springs are located at the interface of the Pallinup Siltstone and deep flat sand sheets which may create a fresh lens over the saline Pallinup aquifer and influence fluctuating salinities in Melijinup Swamp (Massenbauer 2008).



Low salinities in May 2007 relate to high rainfall event February 2007

Nutrients

Total Nitrogen (TN) concentrations were high ranging from 4.4 to 9.8mg/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) and total oxidised nitrogen (NOx-N), ranged from 0.063-0.61mg/L and 0.02-0.1mg/L respectively.

All NH_3-N fractions exceeded the recommended guideline value of 0.04mg/L except on the 12/07/2006. In comparison, the NO_X-N fraction did not exceed the recommended value of 0.1mg/L. Overall, there was a low percentage (1.6-8.4%) of available nitrogen (NH_4-N and NO_x-N) making up the total nitrogen (TN) on all sampling occasions. Low proportions of available nitrogen can indicate the majority of nitrogen 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 that contain nitrogen.

Melijinup Swamp

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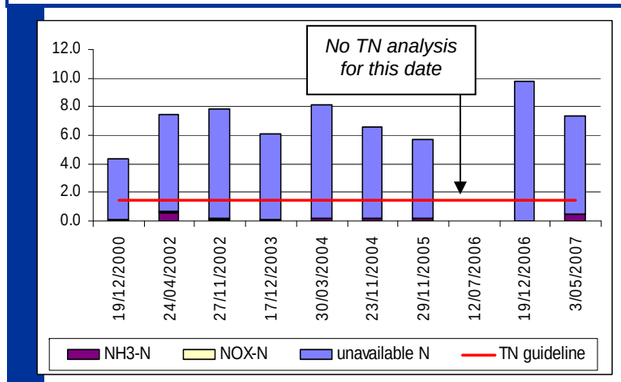
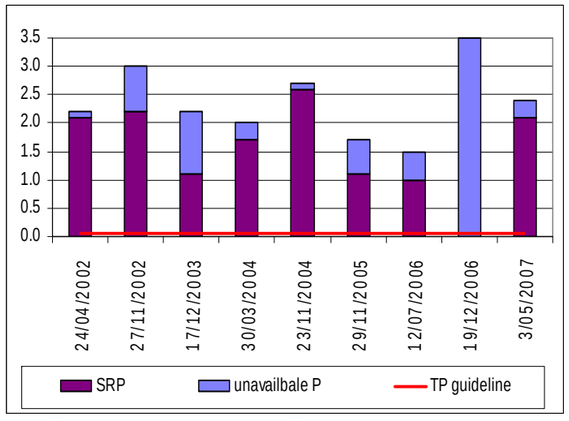


Nitrogen fractions in mg/L over the sample period with TN guideline illustrated

Total Phosphorus (TP) concentrations ranged from 1.5mg/L-3.5mg/L. TP concentrations on all sampling occasions exceeded water quality guidelines of 0.06mg/L.

Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged from 1.0-2.6mg/L. In relation to water quality guidelines SRP exceeded the recommended value of 0.03mg/L on all sampling occasions. Of the total phosphorus (TP) there was a very high percentage (50-96.3%) of available phosphorus (SRP) on all sampling occasions.



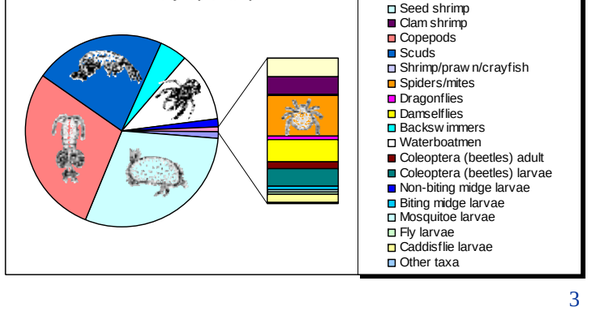
Phosphorus fractions in mg/L over the sample period with TP guideline illustrated

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.

Catchment nutrient stores may also enter Melijinup Swamp through surface and sub surface flow from the surrounding land, via the creek line and through groundwater. 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 that contain nitrogen.

Chlorophyll *a*

Chlorophyll *a* concentrations over the sample period ranged from 0.044 to 0.380 mg/L. Chlorophyll *a* exceeded the water quality guideline of 0.03mg/L on all sampling occasions. A high concentration of chlorophyll *a* is indicative of high nutrient content providing adequate food source for algal growth in Melijinup Swamp.



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

Macroinvertebrates

Twenty one groups of macroinvertebrates were found at Melijinup Swamp during the monitoring period of which the most abundant included Copepoda (copepods), Ostracoda (seed shrimp), Corixidae (waterboatmen), Notonectidae (backswimmers), Chironomidae (non-biting midge larvae), Oligochaeta (aquatic worms), and Amphipoda (scuds).

Other groups of less abundance were found Acarina (spiders/mites), Decopoda (shrimp/prawn/crayfish), Gastropoda (snails/limpets), Cladocera (water fleas), Conchostraca (clam shrimp), Epiproctophora (dragonflies), Zygoptera (damselflies), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Ceratopogonidae (biting midge larvae), Culicidae (mosquitoe larvae), Other Diptera (fly larvae),