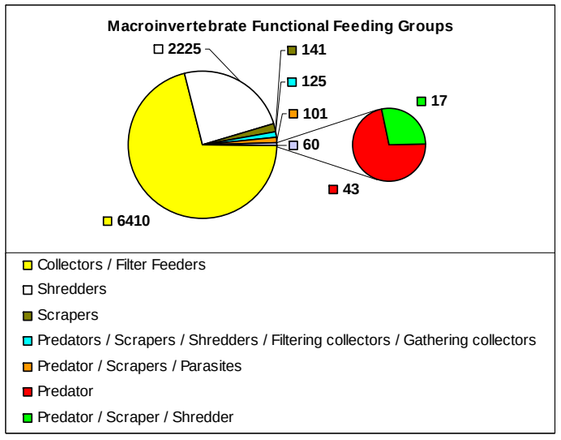
Condingup Swamp

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 Condinginup Swamp 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 and a high number of shredders may relate to the high amount of living or decomposing vascular plant tissue in the wetland.

Conclusion

Condingup Swamp is a surface water and most likely groundwater fed wetland with a groundwater level approximately 1m from the base of the wetland. Salinities range between brackish and moderately saline. Nitrogen concentrations are generally high however the forms of nitrogen available for plant growth were low and phosphorous concentrations were usually 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 Condingup Swamp 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.

Condingup Swamp February 2006

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

Condingup Swamp

This report card summarises the current state of knowledge of physical, chemical and biological characteristics of Condingup 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 is an appendices that provides 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 Condingup Swamp

	GPS Location Coordinates		
Wetland Suite	*Easting*	*Northing*	*MGA Zone*
Condingup Suite	459053	6265394	51

Condingup Swamp is located approximately 62km east of Esperance, Western Australia, within West Howick Catchment and the smaller sub-catchment of Mungliginup River. The wetland lies at approximately 82m Australian Height Datum (AHD) and receives an annual average rainfall of 580mm.

Condingup Swamp is located on unallocated crown land within a small catchment of approximately 85km^2 in the Esperance shire. The Swamp lies within an unfenced wetland vegetation buffer zone that ranges between 188-730m from the wetland edge. Vegetation predominantly consists of mature *Melaleuca cuticularis* (saltwater paperbark), *Banksia speciosa, Gahnia trifidia* and *Meeboldina sp.* There are a number of dead Melaleuca trees around the perimeter and flooded margins of the swamp along with some regenerating trees.

Wetland vegetation in flooded margins of Condingup

Approximately 95% of the catchment has been cleared of native vegetation for cropping, livestock and plantation forestry.

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Condingup Swamp

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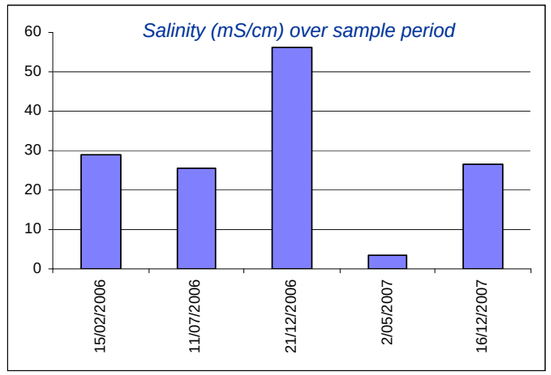
Water quality monitoring commenced on the 15/02/06 and included physical, chemical and biological parameters as outlined in the appendices.



Wetland Classification

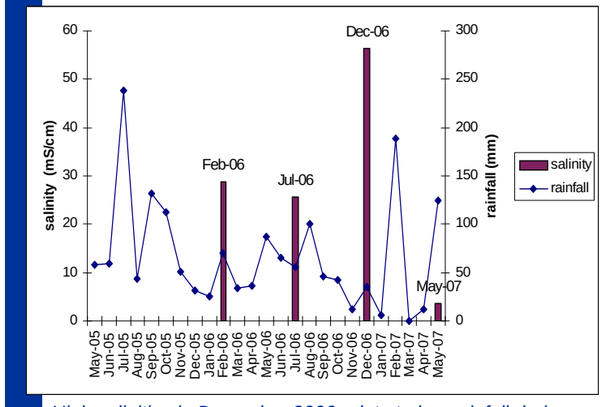
Classification of Condingup Swamp has been evaluated on the basis of guidelines developed by V & C Semeniuk Research Group (1997). For further explanation please refer to the attached appendices.

Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Lake	Subhaline - Hyposaline - Mesosaline	Poikilohaline	Microscale 425 x 310	Irregular

Salinity

Salinity over the sample period fluctuated between brackish (3.5mS/cm) and highly saline (56.3mS/cm) which corresponds with the water salinity classification based on Semeniuk 1997 as outlined in the table. Fluctuations in salinities relate to fluctuations in rainfall and evaporation rates and hence water level variation.

Higher salinities experienced on the 21/12/2006 corresponds with the low rainfall in preceding months. The storm event in February 2007 that brought approximately 240mm of rainfall resulted in the reduction of salinity recorded on the 2/05/07.



High salinities in December 2006 relate to low rainfall during preceding months

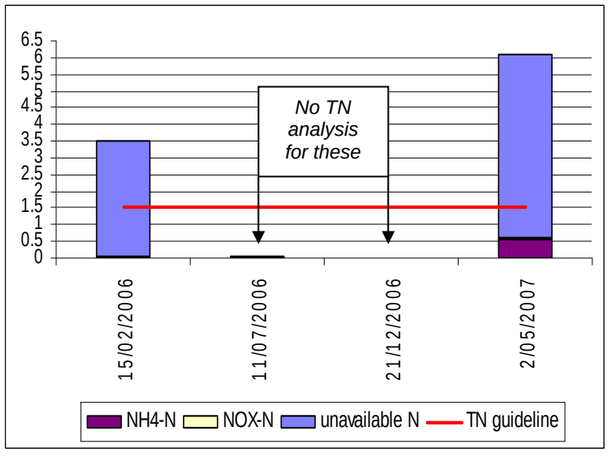
Condingup Swamp is connected to groundwater which also influences salinities. A nearby groundwater monitoring bore (EF48) to the east has groundwater at 81m AHD in August 2007 indicating the groundwater level could be less than 1m below the lake, and interacting with the Swamps' water body.

Groundwater salinity was 25mS/cm which is within the range measured in the swamp. Higher salinities in the swamp relate to evaporation and low water levels.

Nutrients

Total Nitrogen (TN) concentrations were high ranging from 3.5-7.1mg/L. TN concentrations on the three sampling occasions exceeded the guidelines developed for ecosystem protection for southwest Australian wetlands for slightly disturbed systems of 1.5mg/L. Note: There is no TN data for the 11/7/2006 or 21/12/2006.

Dissolved inorganic nitrogen fractions of ammonia (NH_3-N) and total oxidised nitrogen (NOx-N), ranged from 0.037-0.55mg/L and 0.01-0.036mg/L respectively. All NH_3-N fractions exceeded the recommended guideline value of 0.04mg/L except on the 11/07/2006.



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

Condingup Swamp

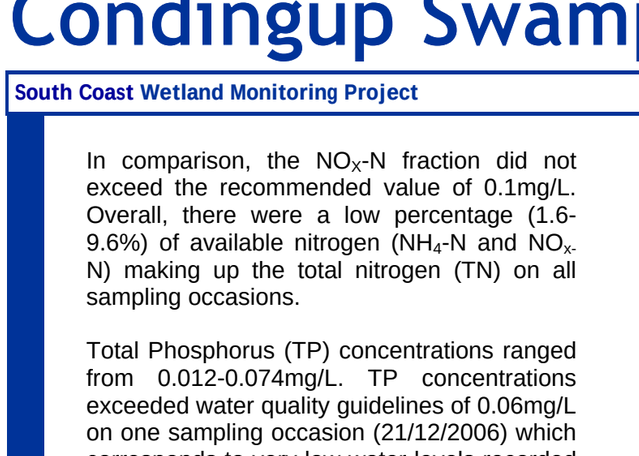
South Coast Wetland Monitoring Project June 2008

In comparison, the NO_X-N fraction did not exceed the recommended value of 0.1mg/L. Overall, there were a low percentage (1.6-9.6%) of available nitrogen (NH_4-N and NO_x-N) making up the total nitrogen (TN) on all sampling occasions.

Total Phosphorus (TP) concentrations ranged from 0.012-0.074mg/L. TP concentrations exceeded water quality guidelines of 0.06mg/L on one sampling occasion (21/12/2006) which corresponds to very low water levels recorded on this date.

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 did not exceed the recommended value of 0.03mg/L on any sampling occasion.

Of the total phosphorus (TP) there was low to moderate percentage (21-41%) 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 by plants and animals and through release of nutrients, for example, through microbial breakdown of organic material. Catchment stores of nutrients may also enter Condingup Swamp through surface runoff and sub surface flow from the surrounding agricultural land as well as through groundwater.

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. High total nitrogen may also relate to incidences of algae blooms as phytoplankton stores nitrogen.

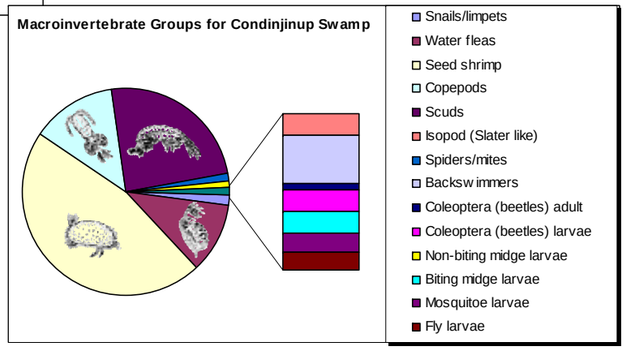
Low proportions of phosphorus may relate to the Swamp being groundwater fed and the high phosphorus absorption potential of the clays beneath the agricultural land absorbing phosphorus before the water recharges the aquifers.

Macroinvertebrates

Fourteen groups of macroinvertebrates were found at Condingup Swamp during the monitoring period of which the most abundant included Ostracoda (seed shrimp), Amphipoda (scuds), Copepoda (copepods), Cladocera (water fleas) and those that had less abundance included, Gastropoda (snails/ limpets), Chironomidae (non-biting midge larvae), Acarina (spiders/mites), Notonectidae (backswimmers), Isopoda (slater like), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Ceratopogonidae (biting midge larvae), Culicidae (mosquitoe larvae), Other Diptera (fly larvae).

The composition of the groups abundance at Condingup Swamp is displayed in the below graph. The diversity of macroinvertebrates found over the sample period ranged between eight to fifteen groups with a median of twelve groups.

The diversity value is 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