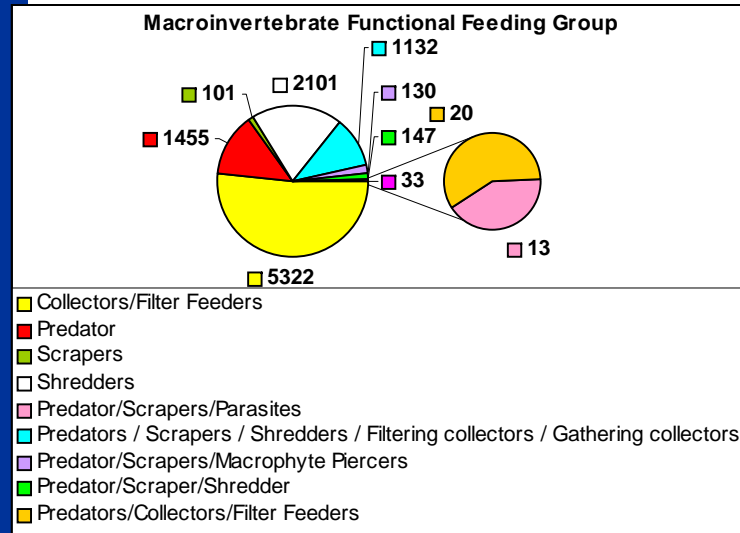


# Hazeldene Swamp



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 Hazeldene Wetland are displayed in the below graph.

## Conclusion

Hazeldene Swamp is a surface water fed wetland situated within a small, reasonably well vegetated catchment. Water quality is good with salinity ranging from marginal to brackish and nutrient levels are usually low although nitrogen and phosphorus concentrations have been high occasionally. Hazeldene Swamp has high cultural values and it is important to protect and maintain the ecological integrity of the system.

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.

- Bibulmun Tribal Group Aboriginal Corporation for their support of the project and allowing access to the wetland on their property.
- 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.



Hazeldene Swamp when dry March 2007

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

# Hazeldene Swamp

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

Hazeldene Swamp is located approximately 36km north west of Albany in Western Australia within the Wilson Inlet catchment and sub-catchment of the Hay River. The wetland is at approximately 200 m AHD (Australian Height Datum) and the area receives an annual average rainfall of 670mm.



Wetland Suite	GPS Location Coordinates		
	Easting	Northing	MGA Zone
Forest Hill	549505	6164792	50



Hazeldene Swamp

Hazeldene Swamp is located in part on Crown Reserve that is vested with the Bibulmun Tribal Group Aboriginal Corporation within a small catchment of approximately 3.7km<sup>2</sup>. The lake lies within an unfenced wetland vegetation buffer zone extending approximately 20-55m from the wetland edge.

Vegetation predominantly consists of *Eucalyptus marginata*, (Jarrah) *Corymbia calophylla* in the upper storey with *Melaleuca preissiana*, *Banksia grandis*, *Banksia littoralis* (Swamp Banksia) in the mid storey and a *Baumea articulata* in the understorey. There are approximately 40 dead trees along with regenerating vegetation in the wetland.



Vegetation surrounding and within Hazeldene swamp

Although there is a reasonable sized area of remnant native vegetation surrounding the wetland, approximately 40% of the catchment has been cleared of native vegetation for cropping and now plantation forestry. A deep sump has been excavated in the middle of the swamp and an overflow drain is situated to the south.

# Hazeldene Swamp

South Coast Wetland Monitoring Project

June 2008

## Wetland Classification

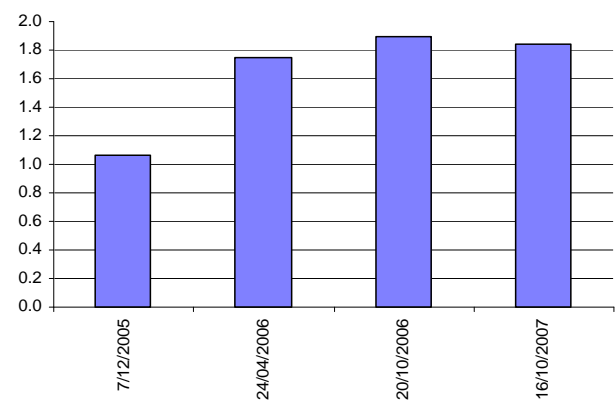
Wetland type	Water Salinity	Consistency of Salinity	Size (Metres)	Shape
Basin	Fresh—Subhaline	Poikilohaline	Microscale 300 x 270	Round

Classification of Hazeldene Swamp has been evaluated on the basis of guidelines developed by V & C Semeniuk Research Group. Dry wetland periods correspond with the hydro period Playa which indicates the wetland may only fill in high rainfall events. For further explanation please refer to the appendices.

Water quality monitoring commenced in November 2005 which included physical, chemical and biological parameters as outlined in the appendices.

## Salinity

Salinity over the sample period ranged between marginal (1.0mS/cm) and brackish (1.8mS/cm). Fluctuations in salinities relate to seasonal fluctuations in rainfall, evaporation and hence water level variation.



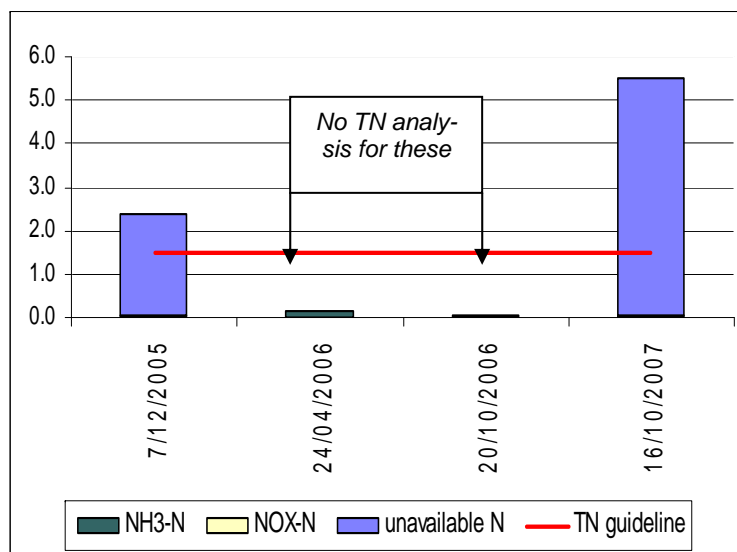
Salinity (mS/cm) over sample period

Hazeldene Swamp receives reasonably fresh to marginal surface and sub surface flow from surrounding lands during high rainfall events and becomes intermittently flooded. Although it requires further investigation, there appears to be no wetland connection with the groundwater as groundwater salinities in the area are moderately saline to saline (5-12 ms/cm) which does not correlate with the fresher waters of the swamp.

## Nutrients

Total Nitrogen (TN) concentrations ranged between 2.4-5.5mg/L which exceeded the guidelines developed for ecosystem protection for southwest Australian wetlands for slightly disturbed systems of 1.5mg/L on both sample occasions.

Dissolved inorganic nitrogen fractions of ammonia (NH<sub>3</sub>-N) ranged between 0.036-0.16mg/L which exceeded the recommended guideline value of 0.04mg/L on two of the four sample occasions. Total oxidised nitrogen (NO<sub>x</sub>-N) ranged between 0.01-0.026mg/L which did not exceed the recommended guideline value of 0.1mg/L on any sample occasion.



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

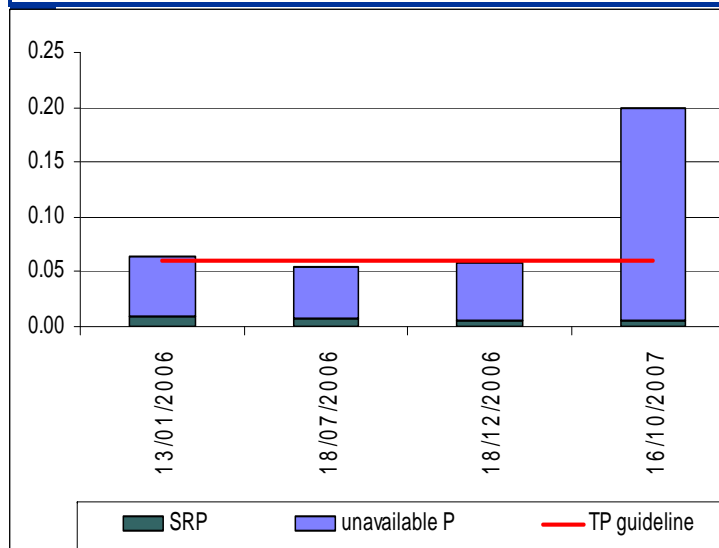
Total Phosphorus (TP) concentration ranged between 0.039-0.19mg/L which exceeded the water quality guidelines of 0.06mg/L on one of the four sample occasions.

Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged between 0.005-0.008mg/L which did not exceed the recommended water quality guideline value of 0.03mg/L on any sample occasion.

# Hazeldene Swamp

South Coast Wetland Monitoring Project

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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 nutrients stores may enter Hazeldene Swamp through surface and sub surface flow from the surrounding land.

Low proportions of available nutrients on some occasions can indicate the majority is being readily taken up by plants and animals while the remainder may be bound up in organic matter, as dirt or dead cells or bound to clay soils in the case of phosphorus.

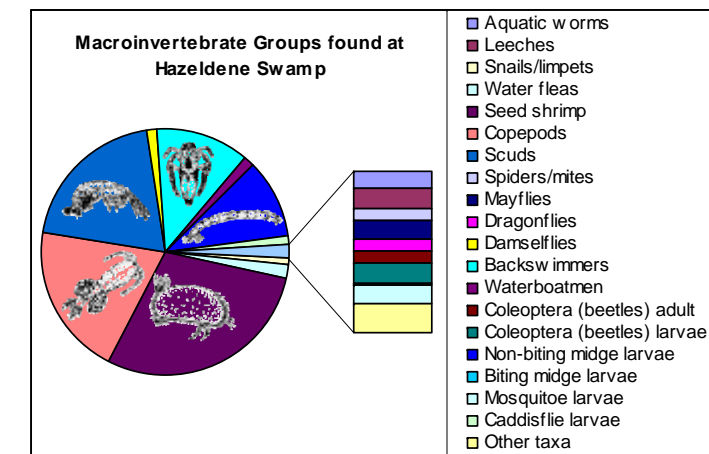


Hazeldene Swamp Substrate taken 16th October 2007

## Macroinvertebrates

Twenty groups of macroinvertebrates were found at Hazeldene Swamp during the monitoring period of which the most abundant included; Ostracoda (seed shrimp), Copepoda (copepods), Amphipoda (scuds),

Notonectidae (backswimmers), Chironomidae (non-biting midge larvae), Trichoptera (caddisfly larvae), Corixidae (waterboatmen), Gastropoda (snails/limpets), Cladocera (water fleas) and Zygoptera (damselflies).



Other groups of less abundance were found including; Oligochaeta (aquatic worms), Hirudinea (leeches), Acarina (spiders/mites), Ephemeroptera (mayflies), Ephemeroptera (dragonflies), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Ceratopogonidae (biting midge larvae), Culicidae (mosquito larvae) and Other taxa.

The diversity of macroinvertebrates found over the sample period ranged between eighteen to twenty groups with a mean of twenty groups, which rates as high based on the Ribbons of Blue Wetland Habitat Score.

High diversity of macroinvertebrate groups may be related to the wetland being intermittently wet. When the wetland is dry, plants are able to regenerate throughout the wetland providing a great range of habitat types and food sources when the wetland is inundated. Also the wetland is relatively fresh which allows for a greater variety of species.

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.