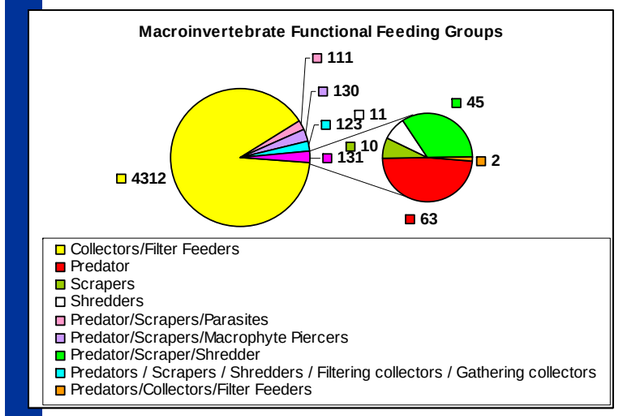
# Subasio Swamp

**South Coast Wetland Monitoring Project** **June 2008**

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 Subasio 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 in the wetland.

## Conclusion

Subasio Swamp was fresh receiving fresh water from surface runoff and sub surface flow from surrounding land. There is no connection with the groundwater as groundwater is well below the swamp floor and with the current rate of groundwater rise there is no short term threat of groundwater interaction. Total nitrogen levels are high however the available forms are generally low. Both total and available forms of phosphorus are high and chlorophyll *a* levels have been high on occasions. The dark water of the wetland may limit algal growth by reducing light penetration. The main consideration for Subasio Swamp is to maintain and protect the integrity of the wetland and address the high nutrient levels.

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.

- Rex and Jenny Measday and Stuart and Sam Stone for their support of the project and allowing access to the wetland on their property.
- Ruhi Ferdowsian (Department of Agriculture and Food, Albany) for providing knowledge of the hydrogeology associated with Subasio 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 Department of Water's current state of knowledge of the physical, chemical and biological characteristics of Subasio 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 which 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 Subasio Swamp


Subasio Swamp is located approximately 90km north east of Albany in Western Australia within the Beaufort Inlet catchment and the sub-catchment of the Pallinup River. The wetland is at approximately 130m AHD (Australian Height Datum) and the area receives an annual average rainfall of 490mm.

| | GPS Location Coordinates | | |
|---|---|---|---|
| Wetland Suite | Easting | Northing | MGA Zone |
| Manypeaks Suite | 641602 | 6192126 | 50 |

Subasio Swamp is located on privately owned land, within a catchment of approximately 30km$^2$. The wetland lies within a fenced wetland vegetation buffer zone extending approximately 5-290m from the wetland edge.

*Subasio Swamp*

*Vegetation surrounding Subasia Swamp (note: the dark coloured water)*

Vegetation in the upper storey consists of *Eucalyptus occidentalis* (Yate) throughout the swamp, *Melaleuca sp.* in the mid storey and *Juncus pallidus* in the understorey. There are a few dead trees in the swamp with some regenerating trees and rushes. A sump has been excavated in the middle of the swamp which may be used for water abstraction during drought relief.

Department of Water
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Approximately 95% of the catchment has been cleared of native vegetation for cropping and livestock.

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

### Wetland Classification

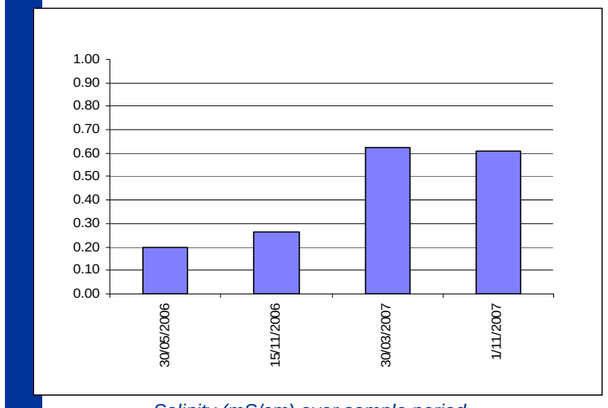
| *Wetland type* | *Water Salinity* | *Consistency of Salinity* | *Size (Metres)* | *Shape* |
|---|---|---|---|---|
| Lake | Fresh | Stasohaline | Mesoscale 935 x 300 | Irregular |

Classification of Subasio 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 fresh ranging between 0.2-0.62mS/cm. Fluctuations in salinities relate to seasonal fluctuations in rainfall, evaporation and water levels. Water abstraction from the central sump could also contribute to salinity variations.

The wetland is perched above the groundwater in a shallow depression and is not connected to groundwater. The wetland receives fresh water from surface runoff and sub surface flow and contributes to groundwater recharge. Depth to groundwater is about 17 metres and groundwater is rising at 16-17cm/year which indicates there will be no connection with the swamp for some time.

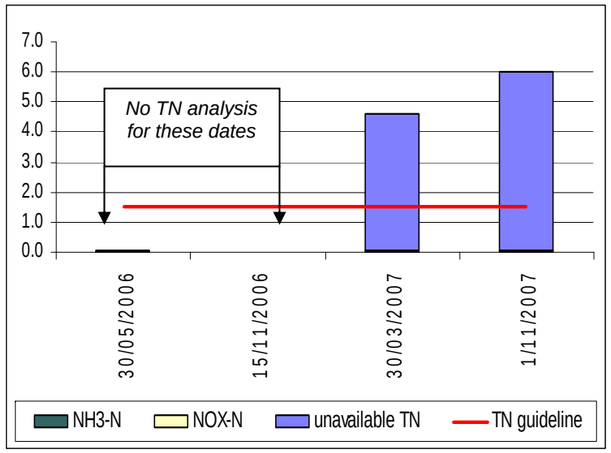



*Salinity (mS/cm) over sample period*

## Nutrients

Total Nitrogen (TN) concentrations ranged between 4.6-6.0mg/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 0.019-0.054mg/L which exceeded the recommended guideline value of 0.04mg/L on one sample occasion. Total oxidised nitrogen (NOx-N) ranged between 0.019-0.054mg/L which did not exceed the recommended guideline value of 0.1mg/L on any sample occasions.




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

Total Phosphorus (TP) concentration ranged between 0.48-1.1mg/L which exceeded the water quality guidelines of 0.06mg/L on all of the sample occasions.

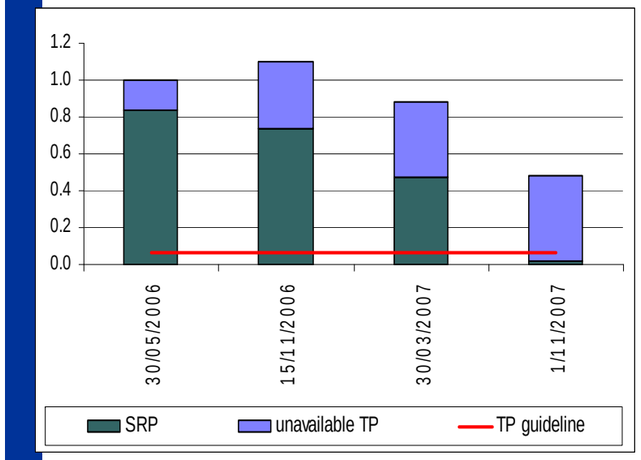
Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged between 0.022-0.86mg/L and exceeded the recommended water quality guideline value of 0.03mg/L on three sample occasions.

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.



Subasio Swamp

South Coast Wetland Monitoring Project June 2008



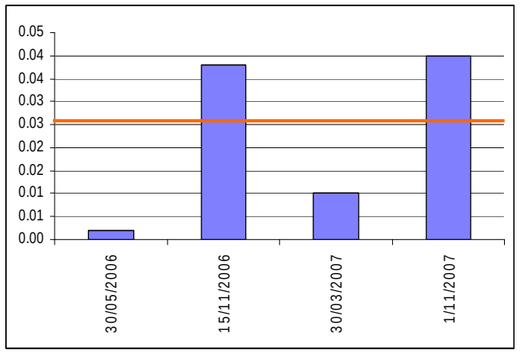

*Phosphorus fractions in mg/L over the sample period with TP guideline illustrated*

There may be large amounts of nutrients stored in the agricultural soils due to long term farming practices. Nutrients may enter Subasio Swamp through surface runoff from surrounding agricultural lands and sub-surface flow.

Low amounts of available nitrogen may indicate most of the nitrogen is locked up in organic material within the wetland. In contrast there were high percentages (53-84%) of phosphorus available for uptake by plants and algal growth on three occasions. Nutrients may concentrate during periods of low water levels.

## Chlorophyll a

Chlorophyll *a* concentrations over the sample period ranged from 0.002 to 0.04 mg/L. Chlorophyll *a* only exceeded the water quality guideline of 0.03mg/L twice over the four sample occasions. Low algal growth may relate to the stained to highly coloured nature of the waters within the wetland reducing light penetration for photosynthesis.




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

*Highly stained water with organic material in Subasio Swamp*

## Macroinvertebrates

Twenty groups of macroinvertebrates were found at Lake Vancouver during the monitoring period of which the most abundant included; Ostracoda (seed shrimp), Copepoda (copepods), Corixidae (waterboatmen), Chironomidae (non-biting midge larvae), Acarina (spiders/mites), and Cladocera (water fleas).

Other groups of less abundance were found including; Oligochaeta (aquatic worms), Hirudinea (leeches), Gastropoda (snails/limpets), Bivalvia (bivalve molluscs), Amphipoda (scuds), Notonectidae (backswimmers), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Ceratopogonidae (biting midge larvae), Culicidae (mosquitoe larvae), Other Diptera (fly larvae), and Trichoptera (caddisflie larvae).

The diversity of macroinvertebrates found over the sample period ranged between eleven to fourteen groups with a median of eleven which rates as average based on the Ribbons of Blue Wetland Habitat Score.