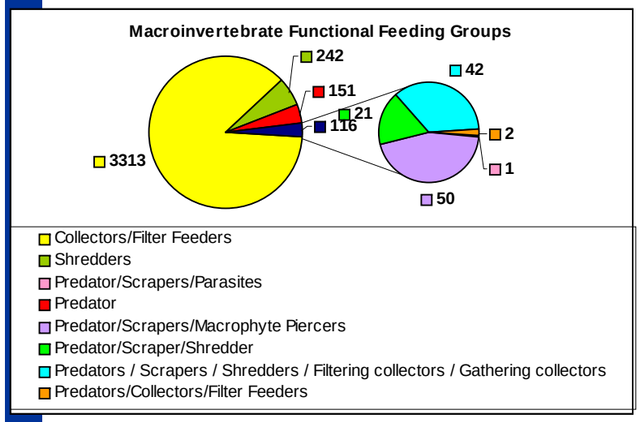
Peaceful Bay Wetland

South Coast Wetland Monitoring Project **June 2008**

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 Peaceful Bay Wetland 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

Peaceful Bay Wetland ranged between fresh and marginal with freshwater inputs from surface runoff and sub surface flow from the surrounding catchment. Nutrient concentrations were high however the dark coloured waters may reduce algal growth by limiting the light penetration required for photosynthesis. The wetland has an extensive buffer on the southern and eastern sides but has only a narrow vegetation buffer to the north and west.

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.

- Mrs Penelope Opitz for her support of the project and allowing access to the lake on her 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.

Naomi Arrowsmith surveying at Peaceful Bay Wetland May 2006

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

South Coast Wetland Monitoring Project **June 2008**

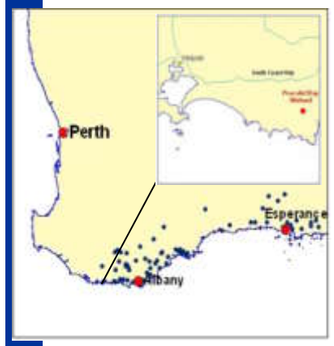
This report card summarises the Department of Water's current state of knowledge of the physical, chemical and biological characteristics of Peaceful Bay Wetland based on the knowledge gained from investigation and monitoring conducted by the Department of Water through the South Coast Wetland Monitoring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

Accompanying this document are appendices providing 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 Peaceful Bay Wetland

Peaceful Bay Wetland is located near the coast approximately 44km west of Denmark in Western Australia within an ill-defined coastal catchment. The wetland is at approximately 20m AHD (Australian Height Datum) and the area receives an annual average rainfall of 1155mm.



Peaceful Bay Wetland is located on privately owned land within a catchment of approximately 8.2km^2. The lake lies within an unfenced wetland vegetation buffer zone extending approximately 10-165m from the wetland edge.

Vegetation predominantly consists of *Taxandria juniperina* in the upper storey, *Callistachys lanceolata*, young *Taxandria juniperina* in the mid storey and *Meeboldina sp., Juncus pallidus* and bracken fern in the understorey.

	GPS Location Coordinates		
Wetland Suite	**Easting**	**Northing**	**MGA Zone**
Balgamup Suite	491644	6123806	50

Peaceful Bay Wetland

Taxandria juniperina in the upper and mid storey

Approximately 35% of the catchment has been cleared of native vegetation for cropping, livestock and now tree plantations.

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

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South Coast Wetland Monitoring Project **June 2008**

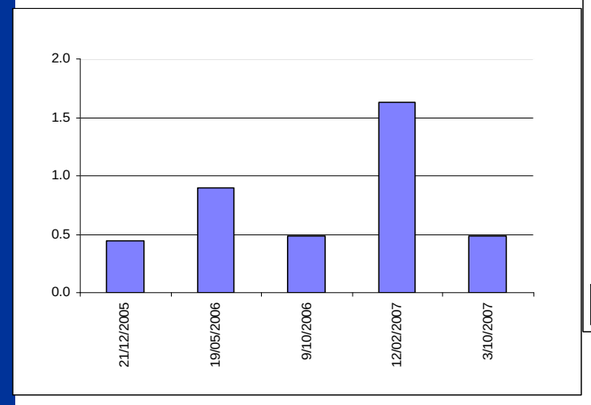
Wetland Classification

Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Lake	Fresh	Stasohale	Microscale 166 x 145	Ovoid

Classification of Peaceful Bay Wetland 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 ranged between fresh (0.9mS/cm) and marginal (1.6mS/cm). Fluctuations in salinities relate to seasonal fluctuations in rainfall, evaporation and hence water level variation.



Salinity (mS/cm) on all sample occasions

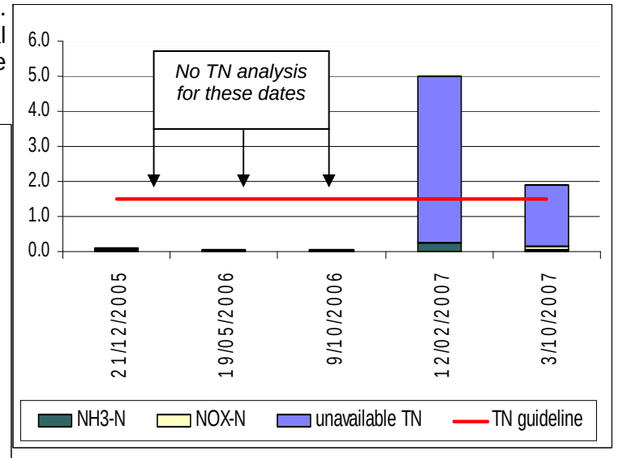
Peaceful Bay Wetland lies within a small depression and receives fresh surface runoff and sub surface flow from relatively flat surrounding land.

While the wetland-groundwater relationship requires investigation including current groundwater levels, salinities and rate of rise, groundwater in a nearby bore drilled in 1974 was 6.5m below ground and salinities were fresh.

Nutrients

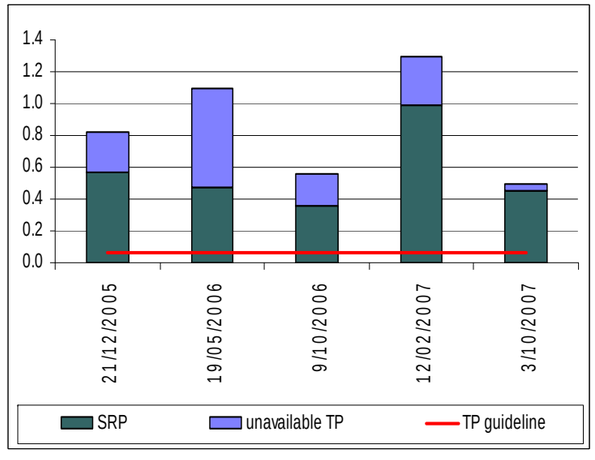
Total Nitrogen (TN) concentrations ranged between 1.9-5.0mg/L which exceeded the guidelines developed for ecosystem protection for southwest Australian wetlands for slightly disturbed systems of 1.5mg/L on both sample occasions.

Dissolved inorganic nitrogen fractions of ammonia (NH_3-N) ranged between 0.03-0.07mg/L which exceeded the recommended guideline value of 0.04mg/L on two of the five sample occasions. Total oxidised nitrogen (NOx-N) ranged between 0.01-0.06mg/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 guideline illustrated

Total Phosphorus (TP) concentration ranged between 0.49-1.3mg/L which exceeded the water quality guidelines of 0.06mg/L on all sample



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

Peaceful Bay Wetland

South Coast Wetland Monitoring Project June 2008

occasions.

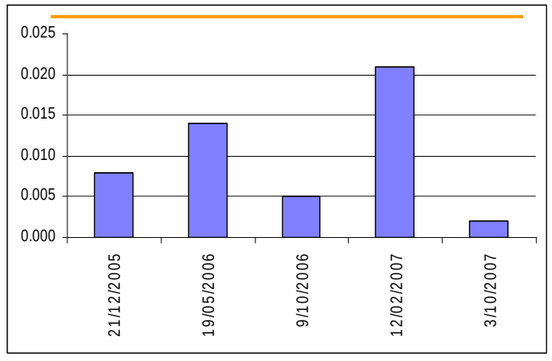
Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged between 0.36-0.99mg/L which exceeded the recommended water quality guideline value of 0.03mg/L on all sample occasions. Of the total phosphorus (TP) there was a very high percentage (42.7-91.8%) of available phosphorus (SRP) on all sampling 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.

Nutrients stores in the catchment may also enter Peaceful Bay Wetland through surface runoff and sub surface flow from the surrounding land.

Chlorophyll a

Despite high amounts of available nutrients, Chlorophyll *a* on all sample occasions was low (0.002-0.02mS/cm) and did not exceed the recommended water quality guideline of 0.03mg/L. Low concentrations of chlorophyll *a* relate to the highly coloured nature of the wetland which reduces light penetration through the water column and the ability for algae to photosynthesis and grow.



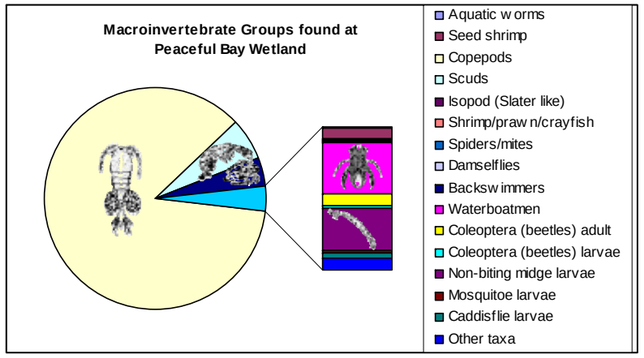
Chlorophyll a concentrations (mg/L) over the period of sampling With guideline of 0.03mg/L illustrated.

Highly coloured water at Peaceful Bay Wetland

Macroinvertebrates

Sixteen groups of macroinvertebrates were found at Peaceful Bay Wetland during the monitoring period of which the most abundant included; Copepoda (copepods)Amphipoda (scuds)Notonectidae (backswimmers)

Other groups of less abundance were found including; Oligochaeta (aquatic worms), Ostracoda (seed shrimp), Isopoda (slater like), Decopoda (shrimp/prawn/crayfish), Acarina (spiders/mites), Zygoptera (damselflies), Corixidae (waterboatmen), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Chironomidae



(non-biting midge larvae), Culicidae (mosquitoe larvae), Trichoptera (caddisflie larvae) and Other taxa.

The diversity of macroinvertebrates found over the sample period ranged between eight to seventeen groups with a median of nine which rates as 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.