Russell Swamp

the graph Macroinvertebrate Functional Feeding Group. 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

Russell Swamp is fresh and fed by surface runoff sub surface flow from surrounding land and via the creek line that flows from the north west. It is unlikely the wetland is directly connected to the saline groundwater aquifer which was 22m below the surface in 1995. Groundwater may however be rising in the area which needs further investigation. Nutrient levels are high including the available forms of nitrogen and phosphorus. The main consideration for Qualinup Swamp is to maintain the integrity and protection of this 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

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- Ruhi Ferdowsian (Department of Agriculture and Food, Albany) for providing knowledge of the hydrogeology associated with Russell 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.

Sampler filtering water for available nutrients

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 Russell 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 South Coast Natural Resource Management Inc. - supported by the Australian Government and the Government of Western Australia.

About Russell Swamp

	GPS Location Coordinates		
Wetland Suite	Easting	Northing	MGA Zone
Bremer Bay	694643	6194500	50

Russell Swamp is located approximately 25km west of Bremer Bay in Western Australia within the sub-catchment of Bitter Water Creek. The wetland is at approximately 55m AHD (Australian Height Datum) and the area receives an annual average rainfall of 590mm.

Russell Swamp is located on privately owned land, within a small catchment of approximately 25km^2. The Lake lies within a within an unfenced wetland vegetation buffer zone that extends approximately 50-900m from the wetland edge.

Russell Swamp

Vegetation at Russell Swamp

Vegetation predominantly consists of Eucalyptus occidentalis (Yates) and *Melaleuca cuticularis* (saltwater paperbark) in the upper storey and *Baumea articulata* in the understorey. There are a number of dead trees scattered in the wetland. The duckweed, *Lemna spp.* was observed growing on the swamp in 2005.

Approximately 80% of the catchment has been cleared of native vegetation for cropping and livestock.

Russell Swamp

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

Wetland Classification

Russell Swamp receives fresh water through surface runoff, sub surface flow and via the creek line that flows from the north west.

Russell Swamp was formed due to land subsiding and wind driven lunette (crater like) formation. It is unlikely that there is connection between the wetland and groundwater as depth to the saline groundwater in bores drilled in 1995 was 22m. Although wetland salinity has been increasing it is expected the swamp recharges the groundwater with no immediate threat of impact from the saline groundwater. Higher salinities relate to evaporation, low water levels and concentration of salts as measured in the low rainfall year of 2007.

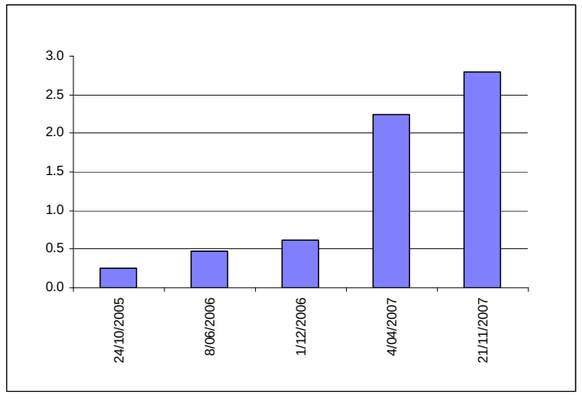
Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Lake	Hypersaline - Brine	Poikilohaline	Macroscale 1540 x 1255	Irregular - Round

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

Lemna spp. growing on the swamp in 2005.

Salinity

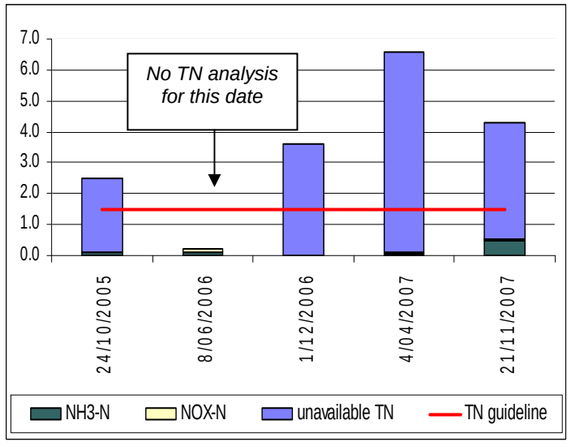
Salinity over the sample period ranged between fresh (0.2mS/cm) and brackish (2.8mS/cm). Fluctuations in salinities relate to seasonal fluctuations in rainfall, evaporation and water levels.



Salinity (mS/cm) over sample period

Nutrients

Total Nitrogen (TN) concentrations ranged between 2.5-6.6mg/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.



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

Dissolved inorganic nitrogen fractions of ammonia (NH_3-N) ranged between 0.06-0.5mg/L which exceeded the recommended guideline value of 0.04mg/L on all sample occasions. Total oxidised nitrogen (NOx-N) ranged between 0.01-0.05mg/L which did not exceed the recommended guideline value of 0.1mg/L on any sample occasion.

Russell Swamp

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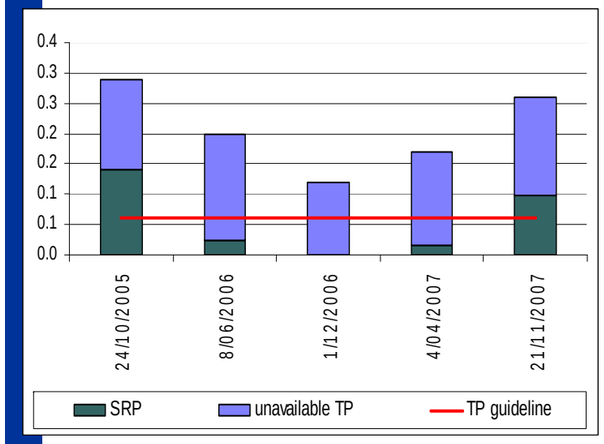
Total Phosphorus (TP) concentration ranged between 0.12-0.29mg/L which exceeded the water quality guidelines of 0.06mg/L) on all of the sample occasions.

Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged between 0.015-0.14mg/L which exceeded the recommended water quality guideline value of 0.03mg/L on two of the four sample occasions.



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

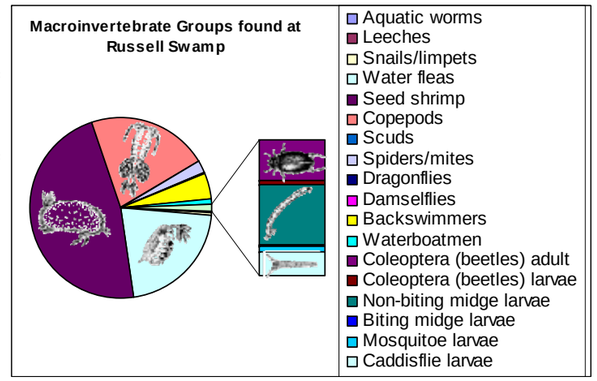
Nutrients are recycled naturally through the swamp due to uptake and assimilation of nutrients by plants and animals and through release of nutrients for example through microbial breakdown of organic material.

Nutrient stores in the catchment due to long term farming practices may also enter Russell Swamp through surface runoff and sub surface flow.

Macroinvertebrates

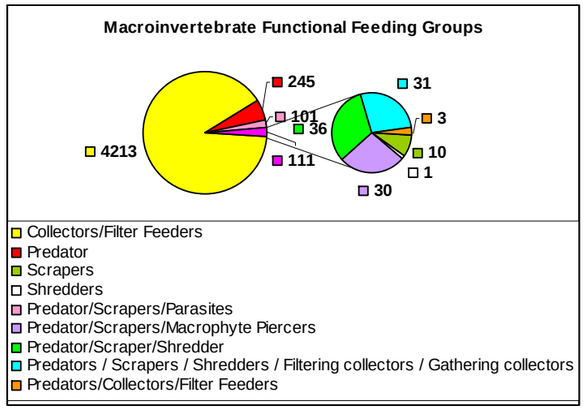
Eighteen groups of macroinvertebrates were found at Russell Swamp during the monitoring period of which the most abundant included; Cladocera (water fleas), Ostracoda (seed shrimp), Copepoda (copepods), Acarina (spiders/mites), and Notonectidae (backswimmers).

Other groups of less abundance were found including; Oligochaeta (aquatic worms), Hirudinea (leeches), Gastropoda (snails/limpets), Acarina (spiders/mites), Zygoptera (damselflies), Corixidae (waterboatmen), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Chironomidae (non-biting midge 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 nine to twelve groups with a median of eleven 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.



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 Russell Swamp are displayed in