

Lake Eyrie

The diversity of macroinvertebrates found over the sample period ranged between three to twenty groups with a median of ten, which rates 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 Lake Eyrie are displayed in the below graph.

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.



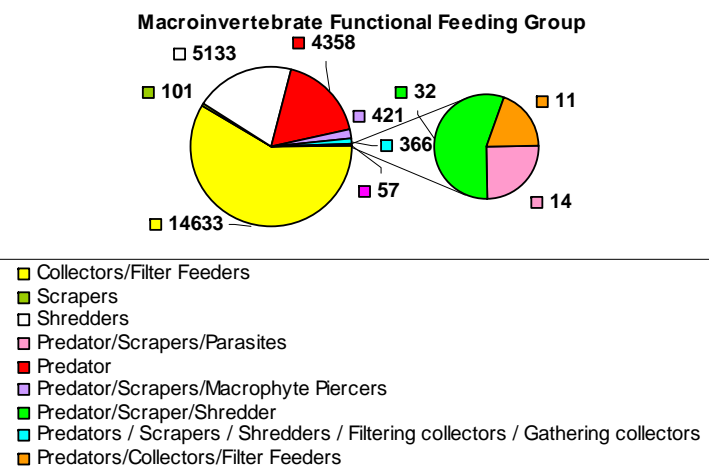
Degraded area on the shore of Lake Eyrie

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.

- ◆ Great Southern Land Holdings for their support of the project and allowing access to the lake through their property.
- ◆ Ruhi Ferdowsian (Department of Agriculture and Food, Albany) for providing knowledge of the hydrogeology associated with Lake Eyrie.
- ◆ 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.



Conclusion

Lake Eyrie receives water from surface and groundwater sources and ranges in salinity between marginal and highly saline. Both nitrogen and phosphorus components were consistently high causing high chlorophyll a concentrations and reportedly regular algae bloom events. The wetland has high ecological values with a number of rare flora species however it is impacted by surrounding land uses and poor water quality.

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

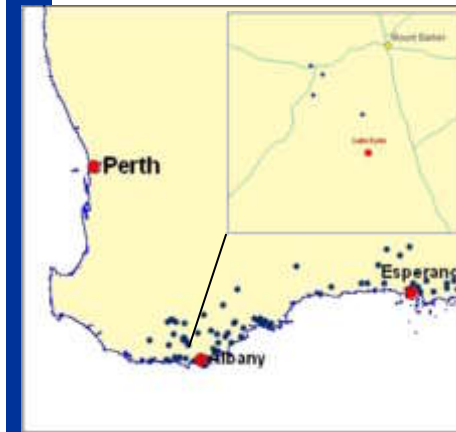
Lake Eyrie

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



Lake Eyrie 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 125m AHD (Australian Height Datum) and the area receives an annual average rainfall of 720mm.

| Wetland Suite | GPS Location Coordinates | | |
|---------------|--------------------------|----------|----------|
| | Easting | Northing | MGA Zone |
| Lake Barnes | 558176 | 6151678 | 50 |

Lake Eyrie is located within a small catchment of approximately 20km² partly within a Nature Reserve vested under the Department of Environment and Conservation and several other adjoining privately owned properties. The lake lies within a sparse wetland vegetation buffer zone extending approximately 0-150m from the wetland edge which was fenced on the western side in late 2007 to keep livestock out.



Taxandria juniperina and rushes on the western shore of Lake Eyrie

Vegetation predominantly consists of a few *Taxandria juniperina*, Blue gum plantations to the north, south and west of lake in the upper storey with *Melaleuca cuticularis* (saltwater paperbark) and *Astartea juniperina* in the mid storey and a few

Lake Eyrie

Juncus pallidus in the understory. There are some weeds in the riparian zone with degraded areas due to stock access.

Approximately 90% of the catchment has been cleared of native vegetation for agriculture including, livestock, aquaculture, chicken carcass composting and now plantation forestry. The lake has been reported to support migratory birds listed on the Japan/China Australia Migratory Bird Agreement as well as containing two priority flora species.

Water quality monitoring commenced in November 1999 including physical, chemical and biological parameters as outlined in the appendices.

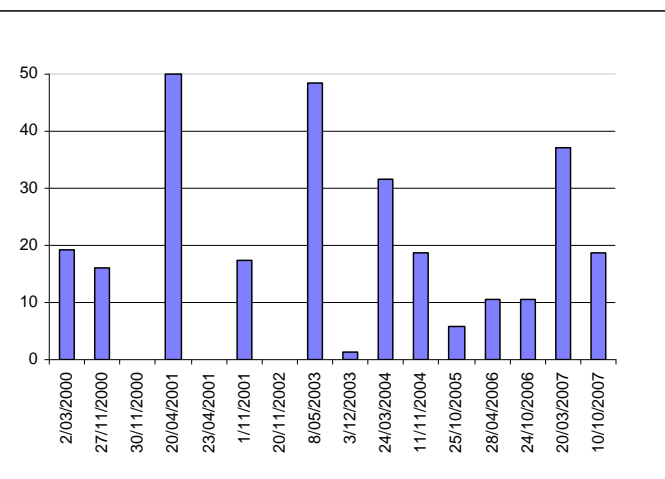
Wetland Classification

| Wetland type | Water Salinity | Consistency of Salinity | Size (Metres) | Shape |
|--------------|---------------------------------|-------------------------|------------------------|-------|
| Lake | Fresh - Hyposaline - Mesosaline | Poikilohaline | Mesoscale 650 x 530 | Round |

Classification of Lake Eyrie 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 marginal (1.3mS/cm) and highly saline (48.5mS/cm). Fluctuations in salinities relate to seasonal fluctuations in rainfall, evaporation and hence water levels variation.



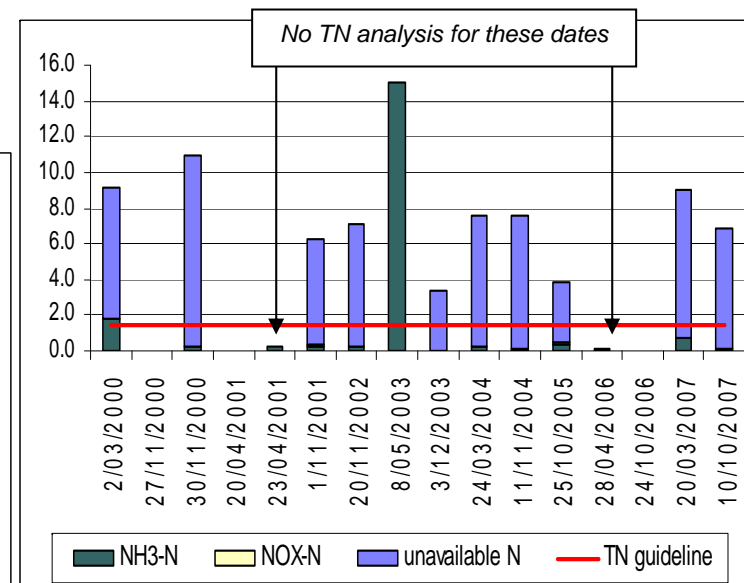
Salinity (mS/cm) over sample period

Lake Eyrie lies within tertiary sediments in a paleochannel (ancient drainage line). The lake is a window to the groundwater which discharges into the lake. Groundwater salinities vary in the area around the lake and range from fresh (0.2mS/cm) to marginal (1.3mS/cm) where variability depends on recharge rates. Wetland salinities correlate with groundwater salinities however higher salinities relate to evaporation and concentration of salts in the wetland. Bluegum plantations around the lake may assist in lowering groundwater levels in the area.

Lake Eyrie also receives fresh surface runoff and sub surface flow from surrounding land particularly from the steeper sloping hill to the north.

Nutrients

Total Nitrogen (TN) concentrations ranged between 3.4-11mg/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 (NH₃-N) ranged between 0.029-15mg/L which exceeded the recommended guideline value of

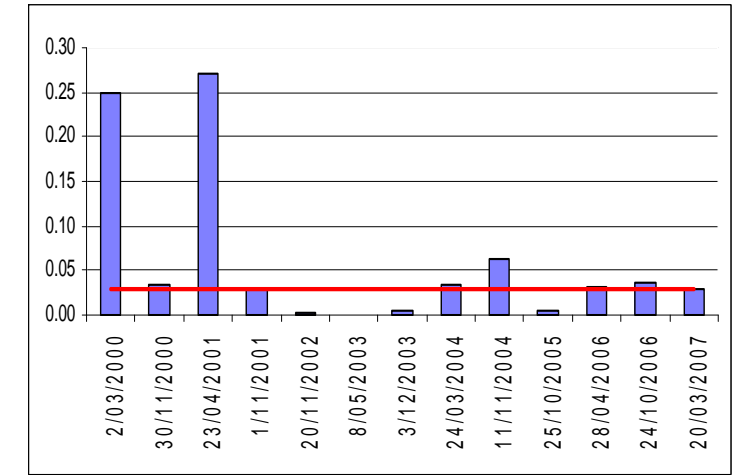
Lake Eyrie

0.04mg/L on all sample occasions. Total oxidised nitrogen (NO_x-N) ranged between 0.01-0.17mg/L which exceeded the recommended guideline value of 0.1mg/L on one of the fourteen sample occasions.

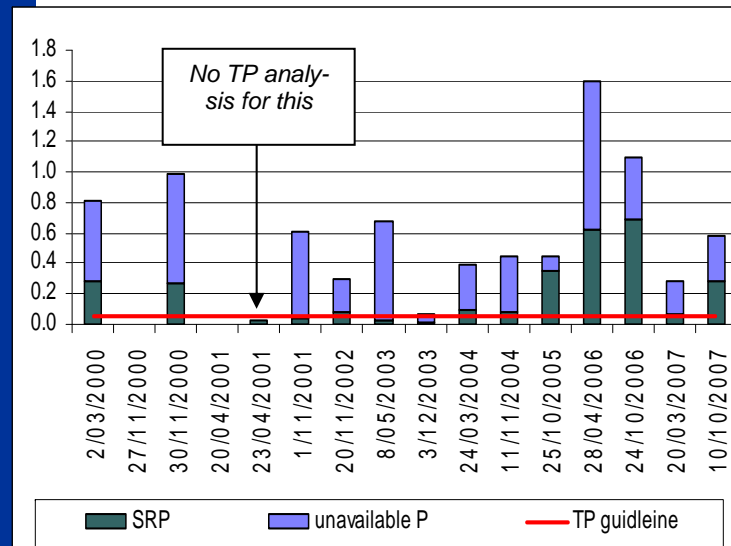
Total Phosphorus (TP) concentration ranged between 0.29-1.6mg/L which exceeded the water quality guidelines of 0.06mg/L on all sample occasions.

Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged between 0.011-0.69mg/L which exceeded the recommended water quality guideline value of 0.03mg/L on ten of the fourteen sample occasions.

high nutrient content providing adequate food source for algal growth in Lake Eyrie.



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



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 Lake Eyrie through surface and sub surface flow and via a number of drains that have been diverted into the wetland from the adjacent plantation.

Chlorophyll a

Chlorophyll a concentrations over the sample period ranged from 0.001-0.27mg/L and exceeded the water quality guideline of 0.03mg/L on most sampling occasions. A high concentration of chlorophyll a is indicative of

Macroinvertebrates

Twenty one groups of macroinvertebrates were found at Lake Eyrie during the monitoring period of which the most abundant included; Ostracoda (seed shrimp), Copepoda (copepods), Amphipoda (scuds), Cladocera (water fleas), Notonectidae (backswimmers), Chironomidae (non-biting midge larvae), Gastropoda (snails/limpets), and Corixidae (waterboatmen).

Other groups of less abundance were found including; Oligochaeta (aquatic worms), Isopoda (slater like), Acarina (spiders/mites), Ephemeroptera (dragonflies), Zygoptera (damselflies), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Ceratopogonidae (biting midge larvae), Culicidae (mosquitoe larvae), Other Diptera (fly larvae), Lepidoptera (aquatic caterpillars/moth larvae), Trichoptera (caddisfly larvae) and Other taxa.

