

# Mosquito monitoring at constructed wetland sites in Adelaide



Constructed wetlands throughout metropolitan Adelaide provide a range of services from habitat for birds to social amenities for people.

These wetlands are large, semi-permanent bodies of water that can also provide habitat for mosquito populations.

A Mosquito Monitoring Program was set up to monitor sites before wetlands were constructed, and after the wetlands were in place.

The program wanted to determine whether creating wetlands in urban areas increases the presence of mosquitos.

**Investigations found that constructed wetlands are generally large, semi-permanent water bodies of high quality unlikely to cause mosquito problems.**

Most wetlands of this nature will have a natural mosquito presence. However, with healthy populations of predatory aquatic invertebrates (e.g. dragon flies, beetles) and vertebrates (fish), mosquito populations are likely to be low.

After eight years of research, results suggests that with appropriate wetland design and monitoring, mosquito numbers in wetlands do *not* rise.

Annual fluctuation in mosquito numbers do occur yet the numbers are about the same as before a wetland was constructed.

# Mosquitoes are a natural part of the landscape



## Mosquitoes and wetlands

Mosquitoes are a natural part of the landscape and some mosquitoes do very well in urban environments.

Constructed wetlands function as stormwater recycling stations. They capture and filter stormwater making it suitable for irrigation.

Successfully constructed wetlands also function as a source of water for enjoyment by people, and as a habitat for wildlife such as native birds, fish and insects. Parrots, ducks, cockatoos and wader birds, including spoonbills, ibis and gulls, as well as dragonflies and frogs can be found in a well-functioning, established wetland.

Constructing wetlands is one permanent and sustainable solution to combat Australia's water shortage crises.

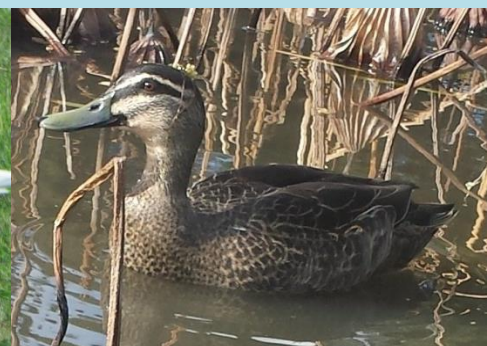
## Constructed wetlands within the Adelaide metropolitan area

Within the Adelaide metropolitan area there are a number of constructed wetlands, at varying stages of development.

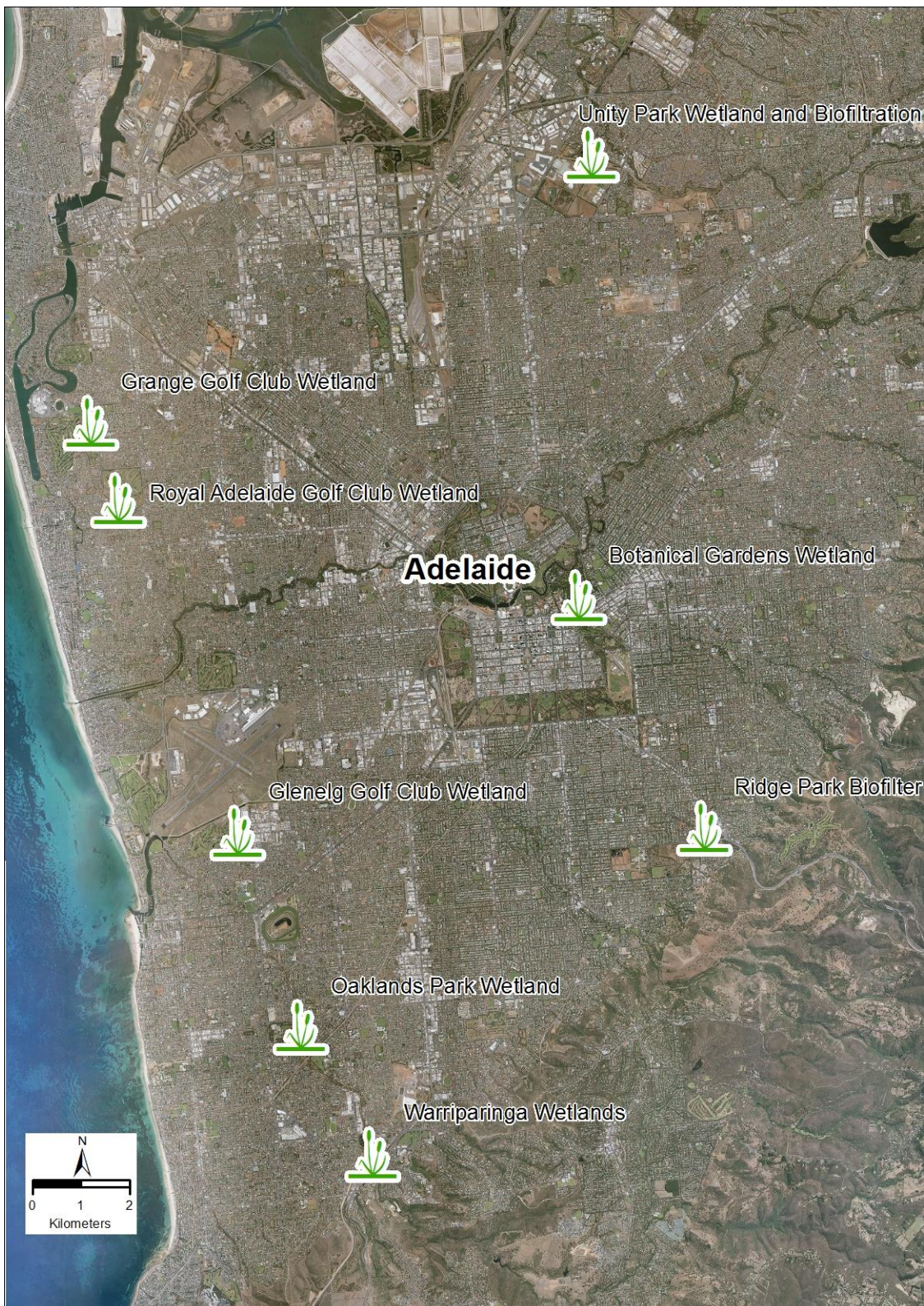
Eight of these have been studied for mosquitoes (Figure 1).

These are:

- *Warriparinga wetlands* - A rehabilitation project with the long-term plan to improve water quality in the wetlands.
- *Oaklands Park* - A newly established wetland site.
- *Glenelg Golf Club* - An established wetland site.
- *Royal Adelaide Golf Club* - An established wetland site.
- *Grange Golf Club* - An established wetland site.
- *Unity Park Wetland* - At the final stages of construction.
- *Adelaide Botanical Gardens* - A newly established wetland site.
- *Ridge Park* - An established wetland site.







**Figure 1 :** The location of eight wetland sites located throughout the Adelaide metropolitan area that have been examined for mosquitoes.





### Mosquito monitoring program

The best way to ensure mosquito populations remain low is through well-functioning and healthy wetlands. Through monitoring programs the abundance of mosquitoes in an area can be observed and potential increases prevented.

The Mosquitoes and Public Health Research Group at the University of South Australia, on behalf of the Adelaide and Mount Lofty Ranges Natural Resources Management Board, conducts pre- and post-wetland construction mosquito surveillance programs for eight wetlands within the Adelaide metropolitan area.

The aim of the program is to assess the different wetland sites for:

- Mosquito populations during the wetland construction phase (where relevant).
- Assess wetland performance in relation to management of nuisance mosquito populations.
- Address resident concerns in relation to the potential for artificial wetlands to increase biting mosquito populations on their property.
- Monitor mosquitoes as an indicator for ecosystem health.

### Collecting data

The monitoring season begins in spring when the mosquito season starts, and ends in autumn when mosquito numbers are low due to cooler temperatures. Monitoring data is collected by a team of experts.

Monthly trapping for *adult mosquitoes* is conducted at each site. Trapping involves overnight use of carbon dioxide-baited, miniature light traps (Figure 2). Traps are set amongst the wetlands and near residential properties.

Water collecting containers, water hazards, sumps and irrigation valve pits are also sampled for *mosquito larvae*.

Monitoring also includes detecting for diseases via genetic material collected from mosquito saliva for the presence of viruses that may be carried and transmitted by adult mosquitoes.

This novel virus detection is a new development of the monitoring group.

The technology is suitable to be used internationally and has the potential to save lives in countries with severe problems from mosquito-borne viruses.



**Figure 2 :** A carbon dioxide baited miniature light trap hung from a tree at Glenelg Golf Club.

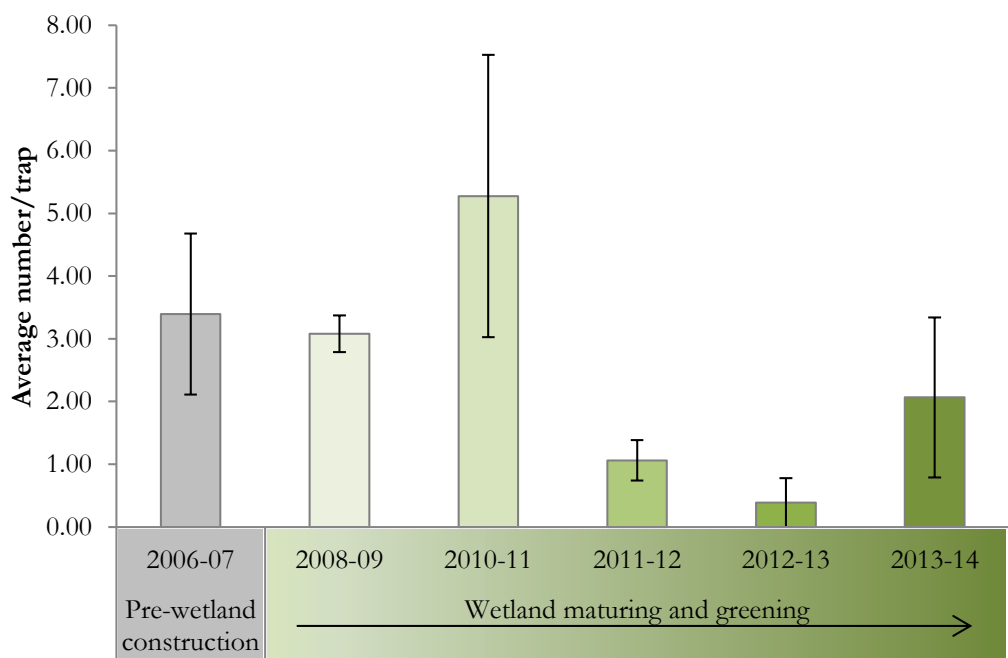


Program Summary

Monitoring data has been collected for up to eight years at some of the older, more established wetlands.

In the process we have learnt a lot about mosquitoes in the metropolitan area.

- Mosquito numbers decrease as wetlands mature, and established plants and mosquito predators become more abundant (Figures 3, 4 and 5).
- Seasonal variables in mosquito abundance occurs in response to environmental variables such as rainfall and temperature (Figure 5).
- Monitoring has shown which mosquito species are becoming more or less common in the constructed wetlands.
- Other mosquito research programs at the University of South Australia also use these data.
- New technology developed from this program may save lives internationally.
- The program has led to improved mosquito control and can function as an indicator of the health of the ecosystem.

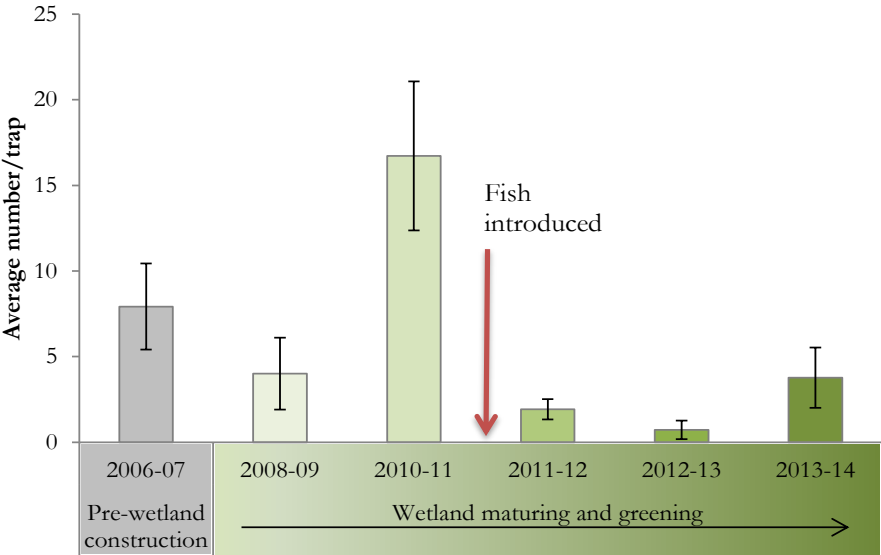


**Figure 3.** The abundance of mosquitoes at Grange Golf Club over six seasons. The number of mosquitoes decreases as the wetland matures and plants and mosquito predators become more abundant.





The number of mosquitoes decreases as the wetland matures and plants and mosquito predators become more abundant

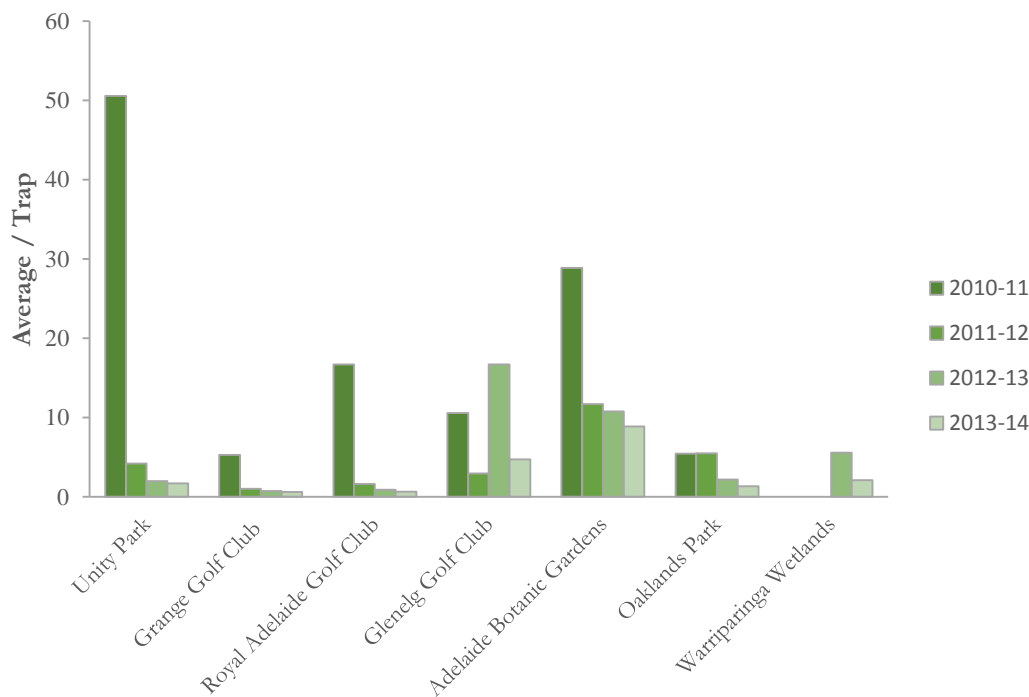


**Figure 4.** The abundance of mosquitoes at Royal Adelaide Golf Club over six seasons.



# Annual fluctuation in mosquito numbers is natural

The abundance of mosquitoes between years fluctuates with environmental variables such as rainfall and temperature



**Figure 5.** The abundance of mosquitoes at seven different wetland sites.





### Acknowledgments

The University of South Australia and the Adelaide and Mount Lofty Ranges Natural Resources Management Board would like to thank the following organisations for their involvement in the Mosquito Monitoring Program: City of Unley, Grange Golf Club Inc, Glenelg Golf Club Inc., Royal Adelaide Golf Club Inc., City of Salisbury, City of Marion, Botanic Gardens of South Australia.

### Photography

Sulphur-crested cockatoo,  
mosquito trap and wetland  
picture on p. 6  
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Duck  
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Family at Oaklands Park  
Wetland  
*City of Marion*

### Further information

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