



# CITY OF COCKBURN

Prepared by City of Cockburn Environmental Services.

## INTEGRATED MIDGE CONTROL STRATEGY

### INTRODUCTION

For some years now, the City has been involved in the control of nuisance midge which emanate from wetlands around the municipality which have high levels of nutrients. To date the problem has largely centred around North Lake, Bibra Lake and Yangbeup Lake, although many of the City's other wetlands also have the potential for nuisance midge. Midge swarms from wetlands generally occur during the spring and summer months and may result in considerable nuisance to residents living up to a kilometre away.

The midge problem is a symptom of a much larger problem - that is, the eutrophication (nutrient enrichment) and degradation of urban wetlands. Bibra, North and Yangebup Lakes are all highly eutrophic, providing ideal conditions for midge to out breed predators which occur naturally within the wetland. Once this occurs natural predation of midge by other insects is limited and midge dominate the wetland with their numbers boosted by regular algal blooms upon which they feed. Chemical control therefore must only be viewed as a short term control measure. The long-term answer is to return eutrophic and degraded wetlands to a condition whereby natural ecosystem balance is restored.

Past approaches to midge control have relied largely on the periodic application of the larvicide Abate. In late 1994, a more rigorous monitoring program was implemented. It was also recognised that a long term strategy was required in order to provide long term solutions to the midge problem. Hence the Integrated Midge Control Strategy was developed. Monitoring was also expanded to incorporate the wetlands which were identified as being at risk of becoming eutrophic due to surrounding development and stormwater drainage design.

The key to providing long term effective control of midge within the City's wetlands is in the development of a range of measures which aim to restore water quality and natural ecosystem balance and prevent further degradation. The purpose of this strategy therefore is to provide a framework to achieve this long-term goal whilst reducing the level of nuisance to residents in the short term. A range of specific strategies have been developed to deal with the issue in an integrated manner. Issues which are considered important and are being addressed are wetland water quality, water levels, chemical treatment, research and monitoring, use of light traps, buffers, revegetation and community education.

## **CURRENT CONTROL STRATEGIES AND ISSUES**

The City currently spends in the order of \$80,000 per annum on its midge control and monitoring program and is focused mainly on the monitoring and larvicidal treatment of problem wetlands, however, a number of other strategies and actions have been developed to address the problem of nuisance midge.

### **Monitoring**

Intensive monitoring of a number of wetlands is carried out from October through to April. This monitoring is carried out to determine midge larvae numbers within the wetland which may help to predict when we may have a midge outbreak. This then gives an indication of whether council may need to undertake a larvicide treatment of a particular wetland. Monitoring after the event also helps to determine if the treatment was successful.

A number of other physical parameters are measured when monitoring. These are used to give an indication of the water quality within a wetland. This includes assessing parameters such as the water level, temperature, pH, conductivity, Chlorophyll a, Phaeophytin, visibility and nutrient content including Total Nitrogen, Total Phosphorous, and available Nitrogen and Phosphorous. These measurements help to provide a clearer picture in terms of the water quality and functioning of these wetlands and are used to gain a greater understanding of midge ecology and changes in water quality within Cockburn's wetlands.

In addition to larval monitoring and water quality assessment, limited adult trapping is also undertaken in order to provide information on adult emergence and distances travelled. This will hopefully provide improved information in terms of necessary buffer distances, adult midge behaviour and the timing and effectiveness of larvicide treatments.

### **Chemical Treatment/ Development of Alternative Larvicides**

When warranted, aerial larvicide treatment of North, Bibra and Yangebup Lakes may be undertaken. No other lakes have been treated to date. In recent years Yangebup Lake has been the only lake treated. North and Bibra Lakes have been drying out annually due to reduced rainfall and it is thought that this has had reduced the numbers of midge in these lakes.

The City has been using Abate, a granular larvicide, to treat the wetlands for many years. However there are some concerns in relation to the use of Abate. There has been some conjecture that that midge may build up a resistance to Abate which limits its

effectiveness. Abate is non-target specific and impacts on other insect species including midge predators. Abate is an organophosphate and thus adds nutrients to an already nutrient rich system. Abate may also bind to algae further reducing its effectiveness. With these concerns in mind the City lodged an application to use S-Methoprene as an alternative to Abate. Approval was granted by Australian Pesticides and Veterinary Medicines Authority in 2011. Although more expensive, S-Methoprene is a growth inhibitor and specific to mosquito and midge larvae and therefore less harmful to other aquatic invertebrates. It is not an organophosphate and thus does not add nutrients to the wetland. S-Methoprene has been used recently to treat Yangebup Lake and has proven to be very effective at reducing adult midge numbers. The minor use permit for S-Methoprene is valid until 2020.

### **Buffers**

The City currently has a policy of not supporting the subdivision of land for residential development within 500m of the edge of any lake that is subject to potential midge infestation. The Policy also requires development between 500 metres and 800 metres of the lake to have restrictive covenants placed on the title of each new residential lot warning prospective purchasers that the land may be affected by midge infestation. The policy places the onus on developers to show how they will mitigate the impacts of nuisance midge if development is to occur within 500metres of a wetland.

This policy has been useful in minimising the impact of nuisance midge surrounding new residential areas close to wetlands. It must be noted however that development within 500metres of a wetland still occurs and these subdivisions are still supported by the West Australian Planning Commission.

Commercial development is not subject to the policy and high profile lighting and advertising signs attract high numbers of midge leading to complaints from some companies and businesses.

Many residential areas were developed in close proximity to problem wetlands prior to midge becoming a problem and the policy being developed. Thus many older residential areas are still affected by nuisance midge.

### **Revegetation**

Since 1995 the City has and continues to undertake an extensive revegetation program around problem wetlands. Increasing vegetation around wetlands helps to screen lighting, which midge are attracted to. It also acts as an effective barrier to midge. Fringing vegetation also utilises nutrients which helps to remove them from the system and thus reduce the likelihood of algal blooms. Many of the lakes, however are so nutrient enriched that revegetation has a minimal effect.

### **Light Traps**

Previous investigations and trials of light traps at wetlands have shown them to have some benefit in attracting midge. The City has installed a number of light traps in some wetlands. Bibra Lake has three lights installed while Yangebup Lake has six. However the sheer number of adults that emerge from some of the wetlands mean that the lights have minimal effect on overall numbers.

The lights at these two wetlands are turned on in September and turned off in April. The lights are only lit between dusk and dawn.

### **Community Education**

Many calls are received by the City's Environmental Services section in relation to midge particularly during the spring and summer months. This is used as an opportunity to inform residents about the complexity of the problem and provide advice on what practical measures they can take to reduce the impact on their homes.

A brochure has been developed which is made available to residents within the areas affected by midge. The brochure details the life cycle of midge, the impacts they have and the steps that residents can take to minimise the problem. The aim is to foster a greater understanding of the problem within the community. This is available for download on the City's webpage under Environment ([www.cockburn.wa.gov.au/environment](http://www.cockburn.wa.gov.au/environment)).

### **Research**

The City was instrumental in establishing the Midge Research Group which comprises representatives from a number of Local Authorities and State Government Agencies as well as Murdoch University and the Wetlands Conservation Society. The aim of the group is to take a co-operative approach to midge management and to foster research and the development of control strategies.

In recent years the Midge Research Group has not been as active as in the past as the midge problem experience in some areas has declined, likely due to reduced rainfall and drying wetlands.

The City still collects data and promotes ongoing research. Recently all of the data collected in relation to midge and water quality monitoring was analysed by Edith Cowan University to try to determine if there was a pattern that could be noted that would help predict midge outbreaks. Unfortunately no pattern could be found but a report was produced which contains a number of recommendations including changes to the current monitoring program so that it might be streamlined and provide additional information which may help to minimise midge concerns. A new streamlined monitoring program was implemented in September 2013.

## **TARGETED APPROACH**

The development of an overall Integrated Management Strategy for midge within the City requires the development of a number of individual strategies in relation to the restoration of water quality, management of water levels, chemical treatment, buffers, revegetation, light traps, community education and research and monitoring. Objectives and strategies for each of these areas have been developed and are detailed below. It is considered that the implementation of these strategies and actions which follow will provide long term solutions to the midge problem within the City.

***The overall aim of these strategies is to reduce the impact of nuisance midge on residents within the City via the development of long-term environmentally sensitive integrated control strategies.***

Individually, these strategies are as follows:-

### **WATER QUALITY**

#### **Objective**

To restore water quality within eutrophic wetlands such that algal blooms are reduced and conditions favourable for the proliferation of midge are prevented.

#### **Strategies**

- Determine the sources of nutrient input to wetlands and develop strategies to reduce these inputs and deal with in lake nutrient levels.
- Pursue implementation of nutrient reduction strategies which are developed with assistance from State Government Departments as necessary.
- Protect water quality within other wetlands which have the potential to suffer from nuisance midge through careful catchment management and water quality control.

### **WATER LEVELS**

#### **Objective**

Restore natural water level regime in problem wetlands so as to reduce potential midge breeding areas and allow occasional drying of lake sediments.

#### **Strategies**

- Lobby the Water Corporation and State Government in relation to the pumping of problem wetlands in order to reduce elevated water levels and allow occasional summer drying.

- Ensure that water level regimes in other wetlands which have the potential to create midge problems are not artificially altered in a manner which will encourage the proliferation of midge species.

## **CHEMICAL TREATMENT**

### **Objective**

Continue to utilise chemical control such as Abate and S-Methoprene as a primary control measure to reduce the short term effects of midge on local residents.

### **Strategies**

- Continue to use Abate as an interim measure. Aim to phase out Abate as a chemical control method and instead utilise S-Methoprene where suitable. Continue to trial the effectiveness of S-Methoprene based products and pursue permanent registration should trials prove effective.
- Investigate other possible non-invasive larvicides which are more affordable than S-Methoprene.
- Investigate the possibility and impacts of carrying out adult fogging as a control measure.

## **BUFFERS**

### **Objective**

Minimise the impact of midges on residential areas and other sensitive land uses via the application of suitable buffers to new development adjacent to problem wetlands.

### **Strategies**

- Maintain current buffer policy and review as necessary.
- Improve monitoring of wetlands located within future residential areas to ensure that potential midge problems are identified well ahead of proposed development.
- Investigate the feasibility of applying midge buffer to commercial development located within close proximity to problem wetlands.
- Review midge buffer policy as long term measures take effect.
- Gain support to prevent the development within 500 metres of wetlands by seeking the support of the West Australian Planning Commission

## REVEGETATION

### Objective

Re-establish fringing and upland vegetation around degraded wetlands to help screen wetlands from residential areas and remove excessive nutrients.

### Strategies

- Continue to restore fringing vegetation to improve buffering around problem wetlands.
- Ensure that existing fringing vegetation around wetlands is maintained and enhanced.

## LIGHT TRAPS

### Objective

Continue to use of light traps as a means of reducing midge numbers around wetlands.

### Strategies

- Install and maintain 1 light traps around wetlands that experience high midge numbers which impact on local residents.

## COMMUNITY EDUCATION

### Objective

Raise the level of community awareness in relation to the complexity of the problem, the measures that are being taken to control midge and what to advise residents about what they can do to reduce to reduce the problem.

### Strategies

- Distribute regular information to affected residents and place information on the City's website in relation to the complexity of the problem, what measures the city is taking to reduce the problem and advising residents what they can do to help minimise the problem.  
[http://www.cockburn.wa.gov.au/Council\\_Services/Environment/Midge\\_Control/default.asp](http://www.cockburn.wa.gov.au/Council_Services/Environment/Midge_Control/default.asp)

## RESEARCH AND MONITORING

### Objective

Continue and expand current monitoring and research efforts to better understand midge ecology, improve control measures and assess the impacts of control strategies.

### Strategies

- Regularly review collected midge data to determine if it is valuable in predicting midge outbreaks.
- Review current monitoring activities with the aim of obtaining relevant information that can predict midge outbreaks and minimise the impact on residents.
- Continue to assess the impacts of treatment on non-target species.
- Participate and support ongoing research on midge control measures and wetland ecology.
- Participate in ongoing research to reduce nutrient input to wetlands and thus reduce algal blooms.

The above objectives and strategies provide a framework for decision making and the development of specific actions in relation to addressing the midge problem in an integrated manner with the aim of providing long term solutions to the problem.

A holistic approach to midge control is required to reduce the reliance on chemical treatment which will ultimately result in further degradation of our wetlands.

The development of the above strategies and formulation of actions needs to be viewed in a long term timeframe and it is envisaged that this would take in the order of 10 to 15 years.