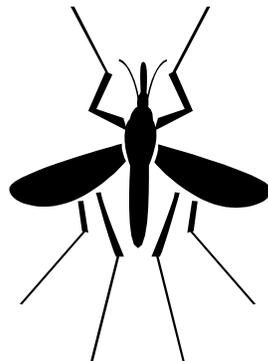




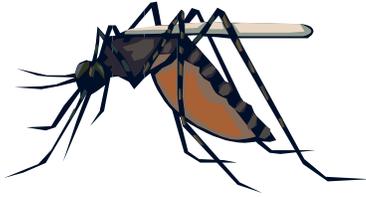
**MOSQUITO MANAGEMENT  
STRATEGY**



## OBJECTIVES

The objectives of the strategy are:

- Undertake appropriate monitoring to both determine the risk of outbreaks of mosquito-borne diseases and to further define the mosquito breeding areas within the Shire; then to undertake a program of management of mosquitoes using the most environmentally safe and cost effective methods available to reduce residents and visitors exposure to disease carrying mosquitoes;
- Investigate the feasibility of a regional management strategy in relation to mosquito management methods and resource sharing and build on the joint public awareness campaign already operating with other local governments in the southwest to educate the community about mosquitoes and mosquito borne diseases ;
- Enlist the support of those landowners with mosquito breeding habitats on their properties in the mosquito management efforts and implement a strategy whereby landowners receive timely warnings of larvicide treatments.
- Identification of mosquito breeding habitats to ensure that developers, and Council, are aware of the implications for land development close to such areas. That both parties accept the implications of having to allocate resources to ensure that effective mosquito management is achievable and environmentally acceptable in the long term. As part of those resource implications Council investigates contribution requirements from developers for the implementation of mosquito management strategies.



## **INTRODUCTION**

The high incidence of Ross River Virus and Barmah Forrester Virus presents a potential serious risk to Public Health. The following strategy is designed to reduce the risk of an outbreak of the disease to residents and visitors.

Mosquitoes are a fact of life in the region; the first settlers noted that there were plagues of both flies and mosquitoes as early as the 1850's. With the spread of urban development there has been a dispersal of rural mosquito species into urban environments as development moves closer to the main mosquito breeding habitats. Urban development brings more breeding habitats for different species of mosquito, such as backyard breeding in water tanks, effluent disposal systems, stormwater drains and engineered wetlands etc.

It is simply not possible or environmentally desirable to eradicate mosquitoes as they are an important part of the ecosystem. However, it is possible to achieve a reduction in mosquito populations and the incidence of mosquito borne diseases such as RRV with an effective Mosquito Management Strategy.

An effective Mosquito Management Strategy for the Shire of Capel requires a clear definition of the mosquito problem, determination of practical objectives, the selection of appropriate control measures, procedures for measuring the effectiveness of mosquito control operations and the establishment of a process for evaluating the management strategy.

This Mosquito Management Strategy has been developed to provide a responsible balance that is acceptable to the community without being detrimental to the environment and strives to improve Public Health and sustain a quality of life. This is an evolving document and will be refined as the strategy progresses.

## **BACKGROUND**

The Western Australian Department of Health (DoH) has a statewide charter to ensure the protection of Public Health. This power is laid out in the Health Act 1911 and is devolved to local governments in Section 26 of the Act, where local government is authorized and directed to carry out the provisions of the Act. Part IX of the Act, Infectious Diseases, gives local government the power to check infectious disease; this includes the threat to public health from mosquito-borne disease.

A group known as the "Mosquito Control Advisory Committee" (MCAC) currently oversees the provision of DoH funding to Local Government Authorities with recognised mosquito-borne disease problems. The MCAC includes representatives from DoH, the Department of Conservation and Land Management, the Ministry for Planning and Infrastructure, the

Department of Environmental Protection, the Peel Development Commission and the Western Australian Local Government Association.

State Government funding for the management of mosquitoes requires as a pre-requisite the formation of a Contiguous Local Authority Group (CLAG). In April 2004 (Minute OC0158/2004) Council approved Shire officers holding discussions with the Shire of Busselton staff regarding the formation of a CLAG.

In 2001/02 after consultation with the Department of Health, Council employed a consultant, Mr Bob Rankine, to assist staff identify mosquito breeding habitats and develop an effective monitoring system. The identification of the mosquito breeding habitat has involved extensive background research and monitoring. This has involved the setting up of 17 mosquito monitoring trap sites throughout the Shire and utilizing the services of the Department of Health and staff from the University of Western Australia's Arbovirus Research Laboratory.

This background work has determined the mosquito species responsible for the high nuisance levels and spread of RRV and identified approximately six hundred hectares of mosquito breeding habitat, three hundred south of the Capel River and three hundred north of the Capel River. The waters from the mosquito breeding habitats south of the Capel River drain into Vasse-Wonnerup estuary, a Ramsar listed wetland, (Ramsar wetlands have international significance for their unique habitat and for migratory birds) As result the Shire of Capel is required to make an application to the Federal Department of Environment and Heritage to operate a mosquito management strategy in this area under the provisions of the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. The application was approved on 14 March 2006.

## **MOSQUITO MANAGEMENT**

The overall aim of mosquito management operations is to reduce the numbers of pest or disease vector species to a level where the impact on the adjacent human populations is kept to an acceptable level. The long-term goal should be to maintain the mosquito populations below this threshold.

The most effective mosquito control strategies integrate well-established and proven mosquito management techniques, which incorporate physical, chemical and biological control methods. Integrated control aims at giving the best combination of methods to give maximum long-term control at the most efficient overall cost.

To complement the control operations, it is important to implement an effective public education campaign to increase awareness of the mosquito problem and identify some simple measures that can be carried out by the individual householder to eliminate backyard breeding sites and to reduce the incidence of them being bitten by mosquitoes. Members of the community should give consideration to where they choose to live as areas close to mosquito breeding habitats, wetlands and large areas of natural vegetation, could impact on their quality of life due to a large build up of mosquitoes in the environment. They need to assess how they can adapt their lives around the environment.

A further aspect of the management program is to ensure that when urban development takes place this does not result in the creation of new or the exacerbation of existing significant mosquito breeding habitats. Where this has the potential to occur developers should be required to prepare an effective mosquito management strategy approved by the Shire of Capel.

The most environmentally sound and effective mosquito control method identified for the Capel mosquito breeding habitats is to control mosquitoes in the larval stage whilst in a localised area, before the mosquitoes emerge as adults. Any larval treatment will be undertaken using mosquito specific control products such as S-methoprene in a form approved by relevant Federal and State Government agencies. Council will not support any mosquito control products or application methods that may detrimentally impact on invertebrates in designated wetland areas.

The ongoing survey has identified priority treatment zones (private property north and south of Capel River) for a mosquito larviciding control program, and it is believed that a significant level of mosquito control for the community can be achieved by focusing on these areas.

### **Pre-treatment survey**

CO<sup>2</sup> light traps will be used at designated trap sites throughout the Shire. These sites have been used for 5 years in the preliminary survey of the Shire. They are good indicator sites for monitoring the increase in populations. The mosquitoes caught in the traps have to be counted and identified, a task carried out in Perth by Mr Rankine. At the peak of the mosquito breeding season there are over ten thousand (10,000) mosquitoes to count and identify in each trapping session. The traps are set fortnightly during the main breeding season, August to February and monthly at all other times.

Mosquito breeding habitats will be regularly surveyed to determine the level of mosquito activity. The survey involves taking a water sample with a larval dipper to gather information on both the number of larvae per m<sup>2</sup> and also what stage the larvae have reached in their life cycle. Water depth and temperature also have a bearing on the frequency of the surveys. Both of these factors influence the numbers of mosquitoes and how quickly they breed. The findings of these surveys will determine if there is a need for the application of larvicide to minimise mosquito numbers.

### **Areas to be treated.**

All of the identified breeding habitats are on private property. Council met with the majority of the landowners on February 14 2006 to discuss the development of a mosquito management strategy. As the mosquito breeding habitats are used for agriculture pursuits, predominantly beef, (although there are several horse trainers and a dairy in the area), Council has undertaken to notify the ninety (90) landowners before any treatment starts so that stock can be moved if necessary. Once the treatment has been carried out Council staff will follow up by sending a completed generic quality assurance sheet to all of the affected landowners. The information sheets can then be inserted into the individual quality assurance manuals.

The peak mosquito breeding times are from August through to November. If larviciding needs to be carried out it would occur up to four (4) times a year when late rainfall followed by warmer weather is experienced in the region. The most likely months for treatment are September, October, November and December. However, some seasonal conditions may require more frequent applications. It is essential to apply larvicide during this period to reduce mosquito numbers and therefore the possibility of Ross River virus being transmitted to residents and visitors to the Shire of Capel.

### **Aerial Larvicide Application**

Where larval breeding sites are extensive, or inaccessible by normal means, the larvicide will be administered via helicopter. The aim of applying the larvicide to the mosquito breeding habitats via helicopter is to minimise the numbers of mosquito larvae that will hatch into biting adults.

A Bell 260 Jetranger helicopter will be used to apply the larvicide (Prosand<sup>R</sup>) to mosquito breeding habitats when the larvae are in the 2<sup>nd</sup>, 3<sup>rd</sup> and/or 4<sup>th</sup> instar stages. These stages will be determined at the time of the pre-treatment survey. It is expected that around 28 to 35 hectares per hour will be treated. To improve the accuracy of the larvicide application GPS will be used.

At the time of applying the larvicide the helicopter will fly at heights of between 10 to 15 metres above the wetlands. The hoppers on the helicopter are wired so that they can be operated together producing a swathe width of 20 metres or they can operate in isolation producing a swathe width of 10 metres.

At the time of the pre-treatment survey, wind speed and direction are determined. It is important for the helicopter to operate under optimal conditions of wind speed and direction so that there is minimal drift of larvicide. Maximum wind speed for helicopter safety is 20 knots (38km/h); however, for the accuracy of application of the larvicide, the helicopter will not operate if the wind is higher than 15 knots (28km/h.) The helicopters will work into the wind so any birds will fly away from the helicopter. Experience of this kind of treatment in the City of Mandurah and the local governments of the Leschenault CLAG (City of Bunbury, Shires of Dardanup & Harvey) suggests that the birds return quickly once the helicopter has passed.

The application rate for Prosand<sup>R</sup> is 3 kg/ha. Approximately two (2) tonnes of larvicide will be applied at each treatment of the six hundred (600) hectares involved.

### **Hand application of larvicide**

Where breeding sites are relatively small, the Shire of Capel will endeavour to apply the larvicide by hand where applicable.

### **Post treatment survey**

After an aerial application intensive monitoring will be conducted to ascertain the effectiveness of the treatment. The monitoring will take two forms:

- Larvae survey. The sites will be monitored to ascertain what effect the treatment has had on the mosquito larvae. This will entail checking all the treatment sites for larvae. In addition trapping of adults will be carried out.
- Adult trapping. Adult mosquito traps are used to monitor the numbers and types (species) of adult mosquitoes found in certain areas. The purpose of this operation is to be able to determine the need for the control of known vector species that may transmit Ross River virus if left uncontrolled.

Experience in the Peel and Leschenault CLAGs has shown that for every one (1) hour the helicopter spends in the air at least four (4) hours need to be spent on the ground monitoring the situation. Given the major differences in the Shire of Capel, rain controlled mosquito

breeding habitats instead of tidal and private property instead of public land, it's estimated that the ground work for Capel will be eight (8) hours field work for every helicopter hour.

### **Physical methods of control**

Physical methods of control usually mean cutting runnels into the mosquito breeding habitat to allow the surface water to drain away faster than it would under normal conditions. It has not been possible for Council to explore physical methods of mosquito control in the area as the land form is basically flat with little fall and does not drain to a defined outfall. Another limiting factor is that all of the breeding sites are on private property.

## **ENVIRONMENTAL**

The implementation of a mosquito management strategy will be contentious as some people will not want it to proceed on environmental grounds, damage to the environment or the effects on the farming practises in the area, withholding periods associated with the application of larvicides. Others will want the program to go ahead for both health and lifestyle issues.

Given the range of environmental concerns expressed by various sections of the community Council may want to look at expanding the monitoring work carried out as part of the strategy. This should be done in conjunction with the Shire of Busselton who has an environmental consultant on board, Dr Mike Bamford, who's main interest is in birds. The extra monitoring would concentrate on the area of most vulnerability, the macro invertebrates and birds. This extra monitoring could be done in part by landowners, members of the LCDC, schools and tertiary institutions. There are National Heritage Trust grants available for the monitoring of water quality, species habitats, or other natural resources where this will have a clear local benefit for biodiversity conservation or sustainable natural resource management and will contribute to national, state or regional data sets.

### **Approvals**

Council has received approval from the Federal Department of Environment & Heritage to carry out a larvicide program in the area south of the Capel River. The water from this area eventually flows into the Vasse/Wonnerup estuary. The estuary is a Ramsar listed wetland and is covered by international treaties governing protected wetland ecosystems. None of the protected wetland is in the Shire of Capel but as the larvicide treatment involves the use of chemicals which may enter the system Council has to make a formal application.

The larvicide, Prosand<sup>R</sup>, is a registered larvicide with the Australian Pesticides & Veterinary Medicines Authority.

## FINANCIAL

### Application and treatment costs

Under the current Mosquito Control Advisory Council (MCAC) guidelines the Department of Health would fund up to 100% of helicopter application costs (currently \$1040/hour) and 50% of the cost of larvicide (current cost \$10,000/tonne) This funding is only available if the Shire has received permission from the MCAC to form a CLAG. Staff have made an application to the MCAC to form a CLAG. The costs of all pre and post treatment monitoring and ground based applications of larvicide would need to be met by the Shires.

It is difficult to set a firm figure for treatment costs at this stage as the total area to be treated is not fully known and the amount of larvicide used will vary substantially from year-to-year depending on seasonal conditions and the extent of Ross River virus activity. However, it is estimated that in a “normal” year up to four (4) applications of larvicide will be required. This will equate to approximately eighty (80) hours of helicopter flight and use eight (8) tonnes of larvicide for a total cost of \$163,000 of which the Department of Health will meet \$123,000. One point to be borne in mind is that Council would have to purchase the larvicide before it can claim the fifty percent rebate.

	<u>One application</u>	<u>Four applications</u>
Helicopter time	20 hours @ \$1040/hr = \$20800	\$ 83200
Larvicide	2 Tonnes @\$10000/tonne = <u>\$20000</u>	<u>\$ 80000</u>
	<u>\$40800</u>	<u>\$163200</u>
DoH contribution	<u>\$30800</u>	<u>\$123200</u>
Shire contribution	<u>\$10000</u>	<u>\$ 40000</u>

To this must be added the cost of carrying out the management program, eight (8) hours for every hour of helicopter use, 160 hours for one (1) application. 640 hours for four applications. Although staff/contractor costs are not known at this stage they are expected to at least equate to the costs of four treatments, \$40000. Mr Rankine has given an estimated figure of between \$39,000 & \$43,000 for the management program, this equates to approximately \$65 an hour.

Council staff will be required to continue with the regular mosquito trapping, at least in the first year. In the peak period this happens once a fortnight and takes a day to set and collect the traps. The counting and identification of the mosquitoes can take a lot longer, especially at the height of the season when there might be 10,000 mosquitoes to count and identify. Staff will not be carrying out this function; this will be left to a consultant. Staff costs would be met from the existing annual allocation to mosquito management, \$15,000.

The logistics of notifying approximately 90 landowners and following up with quality assurance forms will also take some considerable time and effort.

## **Staffing**

The scope of the Mosquito Management Strategy is beyond the capacity of the current environmental health staff. The intensive nature of monitoring and control activities associated with mosquito management will require the employment of an additional person (staff or contract) over the peak risk period from July to February each year. The work is specialised and attention to detail is important. It is therefore essential that there is continuity of personnel each season to enable them to build up a detailed knowledge of the district and all aspects of the program. There are three possible options for Council to consider:

### 1. Technical officer

The person chosen for the position would obviously need to be trained but would also need a high level of flexibility and commitment. This flexibility and commitment would also be required from Council management. The operation of the mosquito management program must at all times take precedence over any other duties that the officer is responsible for. The program may on occasions only require the officer to be involved one or two days per week, while at other times during the main breeding season. July to February, it will be a full time position.

The cost of an officer, level 6/7, would range between \$44,000 to \$54,000, and overheads.

To carry out the function effectively a four wheel drive vehicle crew cab utility or similar, trailer & four wheel motorbike will need to be supplied.

### 2. Employ a contractor/consultant

The advantage of this option is that Council would be employing a trained operator from the outset. It is obviously important that the operator has extensive experience and is qualified in mosquito management. The contract would have to be for a reasonable time frame, five (5) to seven (7) years, to both allow the remainder of the investigation work to be done and allow the operator to become familiar with the region. The operator would be responsible for supplying their own equipment, vehicle and protective clothing whilst Council would supply the larvicide.

### 3. Employment of an officer/consultant by the CLAG

It is expected that both Shires will operate a joint program, at least as far as the mosquito breeding habitats in the Vasse-Wonnerup estuary. The Shire of Busselton has over one hundred (100) hectares of breeding area in the Vase-Wonnerup estuary immediately south of the Capel border which will need to be treated at the same time as the Capel area. Busselton does have areas where tidal breeding takes place; this is usually at a different time frame from the freshwater mosquito breeding habitat.

Given the large area of mosquito breeding habitat in the two Shires the officer/contractor would need to be employed full time. The officer/contractor would be managed by the CLAG which is run by the officers of the two local governments.

## **Contiguous Local Government Group.**

The group is set up under the provisions of the Health Act 1911 and is administered by the Mosquito Control Advisory Committee. CLAG's will be obliged to set up trust funds into which ten (10) percent of their annual budget for mosquito control will be deposited and carried over. Funds accumulated in this manner will then be used during RRV epidemics when greatly increased levels of control activity will be required. The CLAG's are required to submit annual financial returns to the Department of Health.

### **FUNDING**

The full costs of implementing the strategy are not clear at this stage, although it is expected the direct cost, excluding administration costs, will be between \$80,000 and \$90,000 if Capel goes ahead without working with the Shire of Busselton. When the Shires form a joint CLAG the labour costs should drop.

Any funds not required in the first year and possibly subsequent years, should be transferred to a reserve fund on the basis that these funds could be utilised in future years to meet additional applications required, possibly allowing for a reduction in the annual budget allocation when an acceptable level in the reserve funds is reached.

The most equitable method of raising the finance required for the Mosquito Management Strategy is to fund the costs directly from rate revenue, this would equate to a three (3) percent raise in the general rates.

## **LEGISLATIVE REQUIREMENTS**

There is an obligation under the provisions of Part IX of the Health Act 1911 for local governments to control the spread of infectious diseases within its boundaries. There is also a provision for Councils to form Contiguous Local Government Groups to access funding to carry out that function, providing it is from a public health perspective not as a lifestyle issue.

If a local government chooses not to implement a mosquito management strategy, Section 35 of the Health Act 1911 allows the Executive Director, Public Health, to require the local government to enforce the provisions of the Act. If, for whatever reasons, the local government does not enforce the provisions of the Act the Executive Director, Public Health may appoint some person to perform such duty, and shall order that the cost of performing that duty shall be met by the local government.

## **COMMENT**

The mosquito management strategy is expected to take a considerable amount of staff time and resources to get off the ground and operational. As already mentioned, staff will continue, at least in the first year, to continue with the adult mosquito trapping. At the height of the mosquito breeding season this takes up one day a fortnight. This will allow the consultant to finalise the mapping of the mosquito breeding habitat and to carry out the regular monitoring that will be required. Each monitoring survey is expected to take between fourteen (14) to sixteen (16) hours to complete.

The complexity of the strategy means that the operational costs cannot be fully quantified as there are too many variables; we are after all dealing with nature.

The management strategy can only operate effectively if there is an achievable outcome which can be measured effectively. This requires a monitoring program which demonstrates that there is a reduction in mosquito numbers without any detrimental environmental effect.

Environmentally the most fragile portion of the treatment program is its effect on the non target macro invertebrate species in the wetlands. Very little work has been done to determine the extent of the macro invertebrates in the wetland systems in the Vasse-Wonnerup and Capel wetlands. Part of the monitoring program outlined in the strategy should include the identification of such species and what effects the larvicide may, or may not, have on them. This information would be included in the annual evaluation of the strategy.

The preferred option to operate a mosquito management strategy at this stage is either option 2 or 3. Further discussions will be held with officers from the Shire of Busselton regarding progress on this matter.

## **RECOMMENDATION**

**That Council commence the implementation of a Mosquito Management Strategy as outlined in the above document in the in the 2006/07 financial year;**

**April 2006**