



# MOSQUITO MANAGEMENT IN THE PEEL REGION



## WHAT IS THE PROBLEM?

- The Peel-Harvey Estuary is a diverse ecosystem that is home to a range of organisms including mosquitoes. Two mosquito species use the saltmarshes that fringe the estuary and its tributaries as a habitat to complete part of their lifecycle, these are *Ochlerotatus camptorhynchus* and *Ochlerotatus vigilax* (the latter dominating in summer). The larvae of these mosquitoes use the stagnant water within the saltmarshes to develop until they are ready to emerge as adults.
- Although natural predators of larvae exist, the amount of breeding is so extreme that the predators cannot consume enough larvae to control mosquitoes to an acceptable level. It is not uncommon to find over 5000 larvae per square metre in some breeding sites.
- It has been estimated that there is approximately 600 Hectares (6 million square metres) of breeding grounds in the Peel Region. Because of the extent of the saltmarsh area and the extreme breeding, the majority of mosquito control activities in the Peel Region concentrate on this environment.
- Both saltmarsh mosquito species transmit Ross River virus, therefore control is required to reduce disease in the region and also minimise the nuisance activity of the mosquitoes.

## WHAT IS BEING DONE?

- Mosquito management in the Peel Region is undertaken in a collaborative manner by the municipalities of Mandurah, Murray, Rockingham, Waroona and the WA Department of Health (DOH). Many years ago these bodies formed a Contiguous Local Authority Group (CLAG), which is active between August and April every year.
- At the City of Mandurah a full time Mosquito Operations Officer implements Council's Mosquito Management Program which has five main components:

### 1. Larval Surveying

- All saltmarsh areas are surveyed approximately three times a week (dependant upon tidal activity) and the amount of breeding and lifecycle stages of the larvae is determined. With this information and also data on predicted tides and weather patterns, the CLAG members make a decision on the aerial application of a larvicide.



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## **2. Aerial Larviciding**

- Once the decision to treat has been made the appropriate chemical is selected. At this point in time S-Methoprene an insect growth regulator is the chemical of choice however Temephos may also be used depending upon environmental factors and the stage of larval development.
- A helicopter provided by DOH undertakes the aerial larviciding. A moderate to large treatment will use approximately 1000kg of S-Methoprene and will cover around 300 hectares over 1-2 days.
- Larviciding is the most effective method of mosquito control as the larvae are confined to the saltmarshes making them easier to treat rather than waiting until they are adults and have dispersed throughout the ENTIRE Peel Region. For this reason the majority of CLAG and Council resources are devoted to larviciding.

## **3. Post Treatment Surveying**

- After the treatment has been completed, a survey is undertaken to determine the effectiveness of the treatment. With S-Methoprene, this involves the collection of pupal samples and determining emergence rates to gauge control levels. In general control rates below 80% are unsuccessful and undesirable however with favourable tidal conditions, most treatments undertaken by the CLAG can achieve control rates around 90% - 95%.

## **4. Adulticiding**

- If larviciding has been unsuccessful, adulticiding (fogging) may be undertaken. A "Barrier Fog" is undertaken around the wetland areas where the adults are resting prior to flying.
- The method of application of adulticide is primarily through a vehicle mounted Ultra Low Volume (ULV) applicator, which produces a fine mist of the chemical.
- The chemical of choice is currently Bioresmethrin, which is a synthetic pyrethroid (similar to most domestic fly sprays). This chemical is widely used both in Australia and abroad as it is far more "environmentally friendly" and has much lower effects on "non-target organisms" than other chemicals that are available.
- Fogging is used as a last resort as it is a very reactive control method and its effectiveness is much lower than larviciding as the adult mosquitoes can travel large distances throughout their life span.
- The areas where fogging is undertaken is determined by the Mosquito Operations Officer and the Manager, Environmental Health Services and is based on the results of adult mosquito trapping carried out by the City and

DOH. The areas that maybe fogged are based on in field observations, weather conditions.

## **5. Adult Trapping**

- Adult mosquito activity in the Peel Region is monitored throughout the year. During CLAG operations, the DOH and City of Mandurah set traps on a fortnightly basis. The results from trapping are instrumental in determining adult activity on the saltmarshes and residential areas, which indicates the effectiveness of larviciding and whether fogging is required.
- Trapping also indicates which mosquito species are affecting certain areas. This is important to know, as there are many species which breed in other habitats such as freshwater swamps, roadside gullies, rainwater and septic tanks and pot plants. With this information, corrective action can be taken such as treating roadside gullies or educating the public to reduce mosquitoes breeding in domestic backyards.
- Mosquitoes collected by DOH are also processed for Ross River virus and Barmah Forest virus at the University of WA, which provides a valuable indicator of the amount of virus activity in the region.

## **WHY ARE SOME YEARS WORSE THAN OTHERS?**

- Mosquito activity in the saltmarshes is heavily influenced by tidal activity. If the tides are higher than predicted or increase unexpectedly, mosquito control becomes extremely difficult as the chemical larvicide used can be diluted, which reduces its effectiveness.
- A number of factors can influence tidal levels.
  - Local low-pressure systems and the effect of wind can result in higher than expected tides.
  - The progression of cyclones down the coast of Western Australia may also increase tides particularly if they travel as far south as Exmouth.
  - Climatic phenomena such as the La Niña cycle can result in higher than expected rainfall throughout Western Australia as well as higher tides. A La Niña cycle was present throughout the 1999/2000-mosquito season and resulted in tidal levels being approximately 300 mm higher than expected, according to Department of Transport data. This coupled with high water temperatures resulted in a massive increase in breeding areas as well as more favourable conditions for the rapid development of larvae.
- Unfortunately, weather patterns and tides are not things that can be controlled. Although efforts are made to counteract undesirable tides such as increasing the number and size of treatments, often, reduced control rates are unavoidable.

## **WHAT IS RUNNELLING?**

- Runnels are small channels that are installed in the saltmarshes to facilitate tidal movement. This allows predators, such as fish, access to the larvae rich pools. They also allow the water to move off the wetlands so that mosquito egg laying and larval development is disrupted.
- Runnels have worked very well in other locations both in Australia and abroad and small studies in the Peel Region also indicated that they have the ability to greatly reduce mosquito numbers.
- The Runnelling Program is being implemented by DOH and is being undertaken in stages, with those sites of lower environmental value already runnelled. This is to allow any effects to be monitored and the program modified if needed. The discovery of Acid Sulfate Soils (ASS) has caused the program to be suspended.
- ASS can cause lower pH levels in water which is conducive to mosquito breeding as well causing vegetation loss and soil degradation.

## **WILL RUNNELLING SOLVE THE MOSQUITO PROBLEM?**

- The answer to this question is NO!
- The Runnelling Programme should greatly reduce the amount of mosquitoes in the Peel Region once complete. However, some breeding sites will not be suitable to runnel and reliance on other forms of treatment will be likely.
- Also, if tidal levels reach those that were experienced in the 1999/2000 season (La Niña), it is unlikely that the runnels will have any major impact on mosquito breeding, as the water will sit above the runnels.

Should you require any further information on the Mosquito Management Program, please do not hesitate to contact the Environmental Health Services section on 9550 3746.



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