

MOSQUITO MANAGEMENT

Statement of Management Intent

CONTENTS

Contents.....	1
1. Introduction.....	2
2. Legislation.....	2
3. Types of Mosquito.....	3
Saltmarsh Mosquitoes	3
Freshwater Mosquitoes	4
Container-breeding Mosquitoes.....	6
4. Risks	7
5. Mosquito management products.....	8
6. Salt Marsh Treatment Program	9
7. Freshwater Treatment Program	10
8. Adult Mosquito Management	11
9. Midge	13
10. Personal protection	13
11. Research.....	13
Appendix 1 - Mosquito borne diseases outside SEQ.....	14
Appendix 2 - Saltmarsh Aerial Treatment Zones	15

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1. INTRODUCTION

There are over 350 species of mosquitoes present in Australia, but only about 15 species adversely impact residents.

Mosquitoes commonly found across the Moreton Bay region include the saltmarsh mosquito *Aedes vigilax*, the freshwater mosquito *Culex annulirostris* and the container breeding mosquito *Aedes notoscriptus*.

Mosquitoes are part of the natural ecosystem with mosquito larvae eating microscopic organic matter in the water, helping to recycle it. Mosquito larvae are also a valuable food source for fish and other species such as dragonflies. While technology and scientific advancements have led to significant improvements in mosquito management programs worldwide, it is not possible to eradicate mosquito nuisance.

To reduce the impacts of mosquitoes, Moreton Bay Regional Council (Council) implements an integrated mosquito management program that utilises multiple techniques to manage mosquitoes. The purpose of this Statement of Management Intent (SoMI) is to articulate the approach that Council will take to manage mosquitoes across the region.

2. LEGISLATION

The *Public Health Act 2005* (the Act) provides local governments with the statutory support to undertake mosquito management activities and subsequently, assists to reduce the public health risk (mosquito-borne disease) and nuisance related to mosquitoes.

Mosquito management is not the sole responsibility of local governments. All landowners have a responsibility to ensure that accumulations of water do not become a breeding site for mosquitoes. The Act requires that reasonable steps are taken by individuals to comply with this obligation, for example, by reducing mosquito breeding around the home by regularly emptying containers that hold water such as pot plant bases and bird baths.

Council's mosquito management program complies with the provisions of the *Environmental Protection Act 1994* (Section 319 - General environmental duty).

As Council's mosquito management program is conducted across areas of significant environmental value, Council also maintains a Marine Park Permit (QS2018/CVL1497) for its mosquito management operations.

3. TYPES OF MOSQUITO

Mosquitoes breed in a variety of habitats and effective control is based on the correct identification of the species and an understanding of their ecology and behavior. Mosquitoes can be divided into 3 broad types based on their habitat - saltmarsh, freshwater and container breeders.

SALTMARSH MOSQUITOES

Aedes vigilax, a saltmarsh mosquito, is the species that have the greatest impact on residents across the Moreton Bay Region.

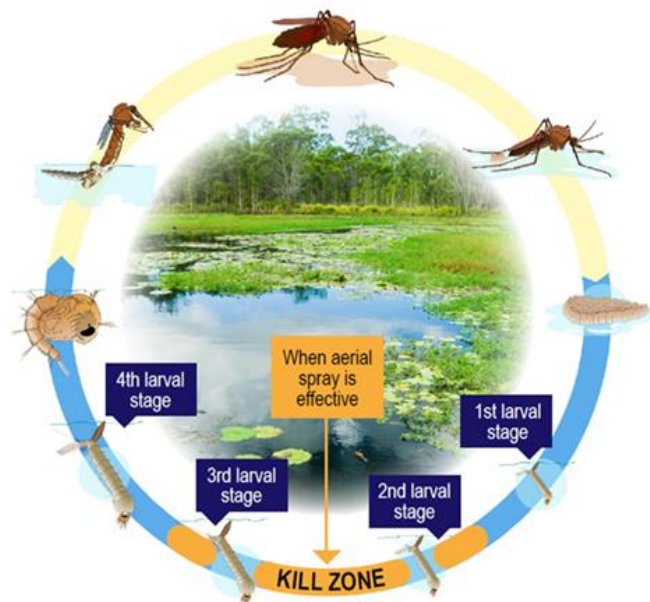
The emergence of this mosquito is triggered by either rainfall or tidal events, which inundate the inter-tidal and mangrove areas along the coastline and river estuaries.

Mosquito larvae hatch from eggs and will develop over 1 to 5 days, depending on weather conditions, and then emerge as adults (refer Figure 1).

Saltmarsh mosquito species are able to easily fly over 10km from the intertidal saltmarsh areas into residential areas, with the typical high impact zone being within 5km radius of saltmarsh areas.

The dispersed female adult mosquitoes will then seek out a blood meal in order to obtain enough protein to reproduce and lay eggs.

Figure 1: Mosquito Lifecycle



The Moreton Bay Region has over 3 000 hectares of saltmarsh mosquito habitat, which includes areas along the Pine River, Hays Inlet, Caboolture River and Bribie Island.

Image 1: Typical saltmarsh mosquito breeding site

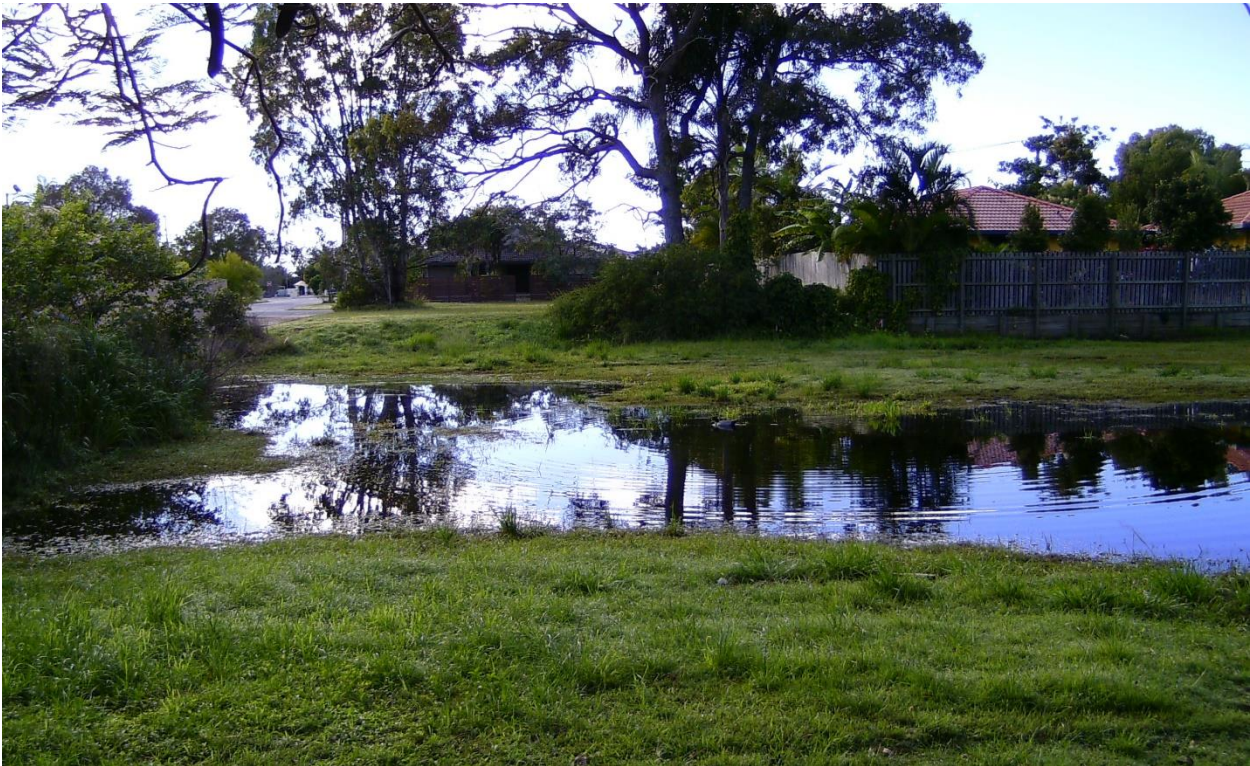


FRESHWATER MOSQUITOES

Freshwater mosquitoes breed quickly in water that is pooling after a rainfall or flood events, with the most common species found in the Moreton Bay region being *Culex annulirostris*.

Freshwater mosquitoes can be found breeding across the region, on both private and Council managed land. The emergence of freshwater mosquitoes is dependent on environmental conditions, with high or on-going rainfall resulting in ideal breeding conditions. At these times, a high number of mosquitoes can emerge and impact residential areas.

Image 2 and 3: Typical freshwater mosquito breeding sites



CONTAINER-BREEDING MOSQUITOES

The most common mosquito that breeds in containers is the *Aedes notoscriptus* mosquito.

Any container holding water, including dog bowls, pots, tyres, tarps, palm fronds, bird baths and gutters, provide habitat for these mosquitoes to develop. As little as 100mls of water can produce up to 400 adult mosquitoes.

While this species does not readily fly a great distance, they can have a major impact around the home. Residents are encouraged to regularly refresh water in dog bowls and bird baths and tip out water pooling in and around the home such as plant pots, tyres and tarpaulins.

Image 4: Typical container breeding mosquito sites



4. RISKS

Mosquitoes can spread a range of diseases that adversely impact human health. While advances in mosquito management has occurred in the last decade, there are no available vaccines for mosquito-borne diseases.

To decrease the risk of disease transmission, local governments undertake mosquito management programs aimed at reducing the number of adult mosquitoes impacting residents.

As mosquito management programs are unable to eliminate all adult mosquitoes, residents are encouraged to take personal responsibility for protecting themselves from being bitten by applying repellent and wearing long sleeves and long pants.

In addition, residents are urged to reduce mosquitoes around their properties by, emptying containers and spraying outdoor surfaces and vegetation with mosquito barrier products.

The primary mosquito diseases that occur across South East Queensland (SEQ) include:

Ross River Virus (RRV)

An average of 600 notifications occur each year. Symptoms of RRV include fever, rash and joint pains. This virus impacts humans and a range of native and domestic animals, including horses.

Barmah Forest Virus (BFV)

An average of 50 notifications occur each year. Symptoms of BFV are similar to RRV however, some individuals do not show any signs of illness (e.g. non-symptomatic). BFV impacts humans.

Other mosquito-borne diseases, such as dengue fever, do not occur within SEQ, as the mosquitoes that spread these diseases are not currently found in this region.

Queensland Health (Qld Health) and the Queensland Institute of Medical Research (QIMR) work collaboratively with local governments to monitor disease prevalence across the state, including monitoring the types and location of mosquitoes found in various regions.

More information regarding mosquito-borne disease is included in Appendix 1.

5. MOSQUITO MANAGEMENT PRODUCTS

Products used for mosquito management treatments have been approved by the Australian Pesticides and Veterinary Medicines Authority (APVMA) and are used to target either the larvae or adult life stages of the mosquito.

There are two larvicides used in Council's mosquito management program:

Bacillus thuringiensis subspecies israelensis (Bti)

This product is a naturally occurring bacterium that when eaten by the mosquito larvae kills it. It is a species targeted product and does not impact any other species and can be safely used in marine areas. Council utilises Bti to treat saltmarsh areas, with the product being distributed via helicopters.

S-Methoprene

This product is applied to mosquito breeding areas just before the mosquito larvae reach their final stage of development (e.g. just prior to pupate stage). This product works by interrupting the mosquito lifecycle, preventing them from emerging to adults.

Council typically utilises S-Methoprene in liquid form (via helicopter spraying) to treat saltmarsh and solid form (Via hand treatment) for freshwater areas.

There are two adulticides used in Council's mosquito management program:

BiFenthrin

This product is used as a barrier treatment and can be effective in reducing adult mosquito numbers for up to 6 weeks.

Council applies this product to specifically planted vegetation barriers, which provide a cool, dark place for the mosquitoes to rest during the day. Adult mosquitoes are killed when they come in contact with the product.

Twilight ULV (active ingredient Phenothrin - Ultra Low Volume)

This product is used adjacent to mosquito breeding areas and is typically distributed via a fogging machine, allowing the product to spread throughout an area suspended in the air. Adult mosquitoes are killed when they come into contact with the product. Specific environmental conditions, such as low wind speed, must be present for this technique to work effectively.

Both *BiFenthrin* and *Twilight ULV* are non-target specific and therefore impact a range of insects. These products are only used when the potential adverse impacts on the local ecosystem can be mitigated, and where the treatment will be effective in substantially reducing the adult mosquito numbers in the wider community.

6. SALT MARSH TREATMENT PROGRAM

With over 3,000 hectares of prime mosquito breeding sites across the region, Council conducts the largest saltmarsh management program in Queensland. Council treats, on average, the equivalent of 35 000 hectares of saltmarsh each year.

Saltmarsh areas are treated by helicopter - see Image 5 - following rainfall and/or high tides. To be effective, the treatments must be timed to target the correct stage of mosquito larvae development.

For Bti products, treatments are targeted between the 2nd and 3rd larval stages. S-Methoprene products are able to be applied slightly later in the mosquito lifecycle, as the larvae enters the 4th stage - see Image 6.

In summer, saltmarsh mosquitoes progress through the larval stages quickly and can develop from egg to adult over 3 days. Council closely monitors mosquito breeding sites and larvae development to ensure that treatments are timed to maximise product effectiveness.

The aerial program, in optimal conditions, can successfully reduce, up to 95% of the larval population. In some areas, heavy vegetation and powerline locations reduce the capacity to distribute product via aerial treatment. Subsequently, Council Officers apply treatment products by hand.

Image 5: Aerial treatment using a helicopter



Image 6: Mosquitos in larval stage



To track the effectiveness of treatments, Council receives spatial data from its helicopter contractor to confirm treatment areas have been completed.

Aerial treatment zones across the region are included in Appendix 2.

7. FRESHWATER TREATMENT PROGRAM

Freshwater mosquitoes lay their eggs on top of the water and therefore can emerge at various times throughout the year from areas where water is pooling for extended periods of time. Council officers conduct routine field surveys to monitor the number of larvae after rainfall events.

Council Officers treat roadsides and pooling water around the region that are holding water with products containing S-Methoprene. This product is applied in solid form and is effective in stopping adult mosquitoes from emerging for up to 60 days.

Council has also installed in specific areas (such as around sporting fields) vegetation barriers. The vegetation barriers are purpose-built plantings that are regularly treated with Bifenthrin. When combined with larval treatments, adult mosquito populations can be significantly reduced.

8. ADULT MOSQUITO MANAGEMENT

South East Queensland will always have adult mosquitoes present due to the ideal climatic conditions and the multiple breeding locations. Once mosquitoes develop and emerge as adults, control options are significantly less effective than those utilised on mosquito larvae.

Council's adult mosquito management program can reduce mosquito numbers by 5-10%. As the products utilised to treat adult mosquitoes are not selective and can impact a range of other species, treatment of adult mosquitoes is only used in specific areas in accordance with legislative requirements.

Areas where adult mosquito treatments frequently occur include Ningi, Rothwell and Murrumba Downs

Image 7: Adult mosquito treatment



Council's vector management officers monitor adult mosquito populations by placing a series of light traps around the region, adjacent to mosquito breeding areas.

The light traps contain a small amount of dry ice, which produces carbon dioxide, and a light to which adult mosquitoes are attracted and trapped.

Trapped mosquitoes are assessed by Council Officers, to identify the mosquito species and prevalent numbers, this information is used to inform local mosquito treatments.

Image 8: Light trap



9. MIDGE

Midge, which are also commonly called sandflies, are very small biting flies.

Midge develop in the subsurface layer of mud in tidal creeks, canals and river systems and can emerge in large numbers, particularly in spring and summer.

There are currently no chemicals registered in Australia to control midge larvae that are safe and approved for use in marine parks and sensitive ecosystems. In addition, the products used to control mosquito larvae are not effective on midge.

Midge can become irritating and may cause an allergic reaction in some people, however they do not transmit disease to humans. Like mosquitoes, only female midge bite, excreting a small amount of saliva into the wound which can cause an allergic reaction in some people.

Repellents are the most effective means to deter the biting behavior of midge - refer section 10.

10. PERSONAL PROTECTION

As mosquitoes and midge will persist across the region, there is a range of measures that residents can implement to reduce their impact.

Repellents are the most effective means to deter biting behaviour. There are a range of products available but those with active ingredients of diethyltoluamide (DEET) or Picaridin have been shown scientifically to be the most effective. In addition, air diffusers containing the active ingredient metofluthrin can also be effective in repelling mosquitoes from entering a defined zone or space.

Residents are also able to treat vegetation around their homes with products with the active ingredient *BiFenthrin*. This can assist to manage the impact of adult mosquitoes that typically rest in cool, dark areas around the home.

The use of fans can be highly effective in stopping midge from entering outdoor areas, as midge are very small and will not fly directly into an air current.

11. RESEARCH

Ongoing research is essential for the effective delivery of mosquito management programs.

Moreton Bay Regional Council is involved in various research projects to advance mosquito treatment methods and assist in mosquito borne disease research.

For more information on what Council is doing see

<https://www.moretonbay.qld.gov.au/Services/Community-Support/Mosquito-Management>

APPENDIX 1 - MOSQUITO BORNE DISEASES OUTSIDE SEQ

- **Chikungunya** - found worldwide particularly in Africa, Asia and India. Symptoms include fever, joint and muscle pain, headache, fatigue and rash, but are more severe than Ross River cases. Most patients recover within weeks, but it can be fatal.
- **Dengue** - endemic in North Queensland and spread by *Aedes aegypti* mosquito. Symptoms include high fever, muscle and joint pain, and rash. High risk of fatality if a person is exposed multiple times (and with different strains of the virus).
- **Japanese encephalitis** - Most cases are mild, but it can cause serious brain swelling resulting in headache, fever, vomiting and confusion. Cases have been reported in far North Qld.
- **Murray Valley encephalitis** - is a flavivirus endemic to northern Australia and Papua New Guinea. Infection can result in permanent neurological disease or death.
- **Zika Virus** - is a flavivirus which has spread around the world, is a significant risk to pregnant women and may cause neurological and other birth defects. Symptoms are mild and include fever, rash, joint pain and red eyes

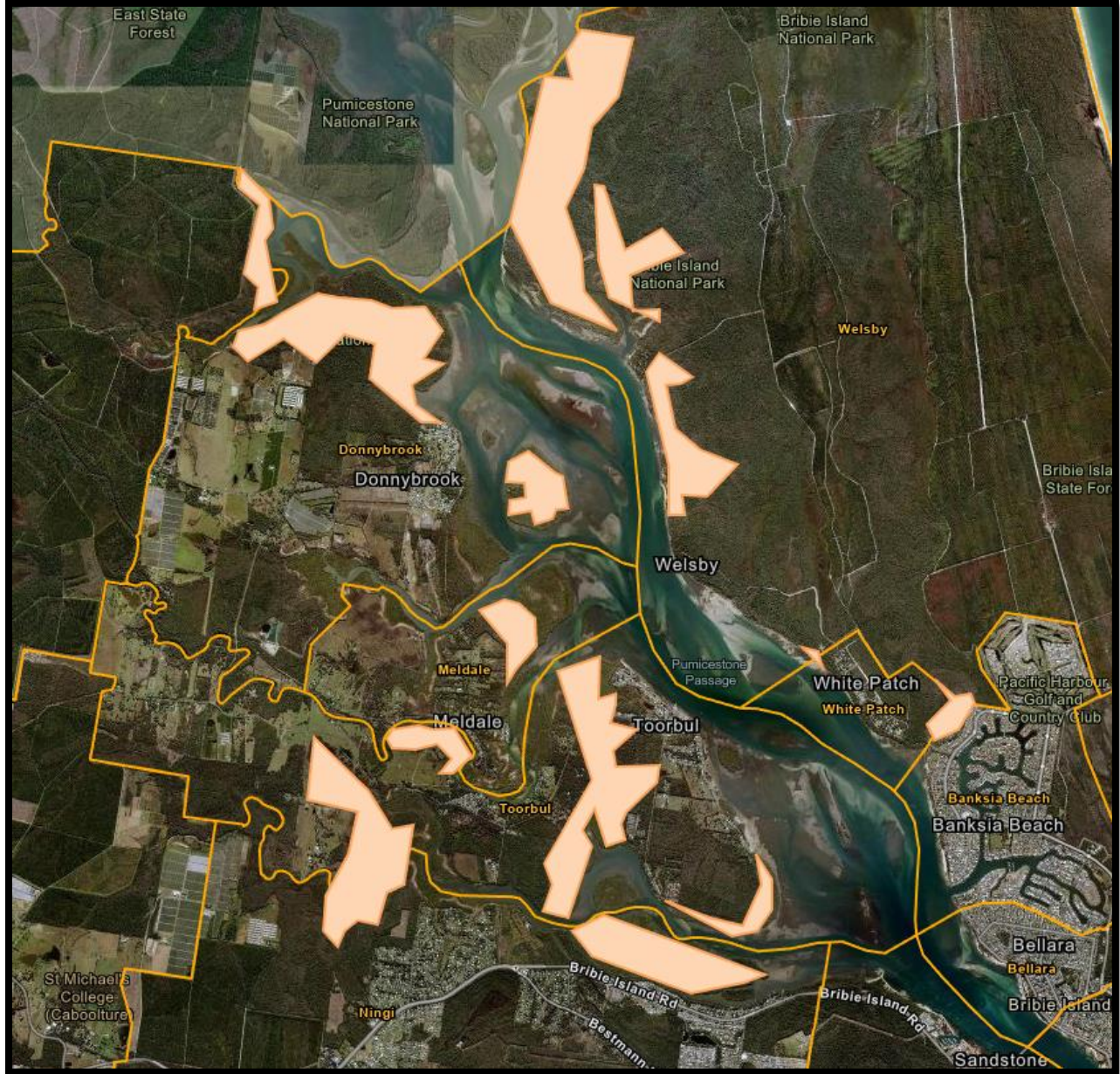
More information on mosquito diseases can be found -

<https://www.health.qld.gov.au/clinical-practice/guidelines-procedures/diseases-infection/diseases/mosquito-borne>

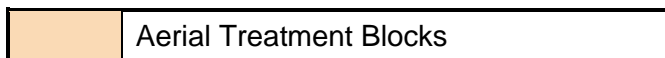
APPENDIX 2 - SALTMARSH AERIAL TREATMENT ZONES

North region aerial treatment zones

- includes areas of Bribie Island, Donnybrook, Toorbul, Meldale and Ningi.



Legend




Mid region aerial treatment zones

- Includes areas of Beachmere, Burpengary East and Deception Bay



Legend


	Aerial Treatment Blocks
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South region aerial treatment zones

- includes areas of Rothwell, Clontarf, Mango Hill and Griffin.



Legend

	Aerial Treatment Blocks
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