

QUEENSLAND HEALTH

Guidelines for Controlling Public Health Risks relating to Mosquitoes, Flies and Black Flies in a Flood Event

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1.0 Purpose

This document is intended as a guide to Queensland Health and local government in controlling public health risks relating to potential increase in mosquitoes, flies and black flies following a flood event. This document is not intended to provide comprehensive technical advice. Readers should consult medical entomologists or senior environmental health officers if further information is required.

1.1 Introduction

Receding flood waters and pooling water from heavy rainfall can provide perfect conditions for mosquito breeding. The increase in potential freshwater breeding sites can result in larger numbers of mosquitoes, which in turn increases the potential for outbreaks of mosquito-borne diseases.

The best way to control mosquitoes is to prevent them from breeding. It is important to address potential mosquito problems before there is a significant increase in the adult population. Mosquito control programs should integrate a variety of control strategies i.e. surveillance, source reduction, biological control methods, traps, larvicides, and adulticides, into a comprehensive program that exploits known mosquito vulnerabilities.

During emergency situations when resources may be limited, available resources should be targeted at the most effective methods of mosquito reduction.

Post-flood conditions can also facilitate increased numbers of flies due to excess amounts of spoiled food and other waste. Flies can mechanically transmit pathogens causing diseases such as gastroenteritis.

Numbers of black flies can also increase following a flood or heavy rain event, particularly in inland areas. Black flies are aggressive biters that breed exclusively in running water. Once water recedes the number of black flies rapidly decreases.

Black flies are active only during the day and do not bite at night. Their peak activity period tends to occur from after sunrise to mid morning (10:00 am) and late afternoon (4:00 pm) to sunset. While black flies in themselves do not transmit disease, secondary bacterial infection may occur from scratching the bites.

1.2 Aim

The prevention of widespread outbreaks of disease and nuisance issues from mosquitoes, flies and black flies following a flood event.

1.3 Scope

The geographical scope of this document is flood affected areas in Queensland.

This document relates exclusively to public health risks from mosquitoes, flies and black flies and provides general advice on controlling the insects, preventing human contact with these insects and managing any symptoms that may result from contact.

Where reference is made to the use of pesticides to control these insects, it is important to note that the requirements for the use of chemicals for controlling insects, including who is authorised to use them, is outlined in the *Pest Management Act 2001 and Pest Management Regulation 2003*. In most cases, the application of chemicals requires a Pest Management Technician Licence.

1.4 Objectives

Objective 1: To reduce the public health risks associated with mosquitoes

Rapid assessment of flood-affected areas for potential mosquito breeding sites

- Habitat surveillance for potential breeding sites; this may include reviewing any historical data and aerial photos that are available;
- Monitor public complaints about mosquitoes to help identify areas of concern;
- Implement steps to detect mosquito breeding:
 - Light traps will provide a quick method to determine type and population density of mosquitoes
 - Larval dipping will help determine where mosquitoes are breeding and determine type and density of larvae;
- Collate and map high risk areas for mosquito breeding and where high numbers of adults and larvae are present.

Reduce mosquito breeding in affected areas

- Wherever possible reduce breeding sites – concentrate on standing or stagnant water with vegetation or debris within 5km of the community, as this water poses the greatest risk. Focus initial activities within a 2 km radius of human populations and expand as resources allow.
 - Mosquitoes breed in standing water so concentrate on keeping the water moving.
 - Clear ditches, culverts and water pathways of debris which is impeding the flow of water.
 - For large areas, it may be necessary to cut temporary drainage pathways.
 - Enlist the help of the community by encouraging them to remove debris and heavy vegetation from storm water drains and ditches in and around their yards to restore the flow of water.
 - Liaise with other Queensland government departments as appropriate to engage their assistance in reducing mosquito breeding, including on their premises.
 - Encourage residents to remove or pour out items around the house which have filled with water including bird baths, buckets, containers, tyres, and boats. This is of particular importance in areas where the dengue mosquito, *Aedes aegypti*, is present.
 - Concerned residents with flood contaminated swimming pools should be advised they can treat the pool with commercially available larvicides

containing s-methoprene or a silicone based product specifically for domestic swimming pools such as aquatain AMF.

- When it is not possible to drain still, standing or stagnant water within 5 days of pooling, treat the water with a larvicide, in accordance with the pesticide label.
 - Dip various spots and determine the larval stage at each spot (the decision to apply pesticide and the type of pesticide depends on the density of the larvae, their developmental stage and the mosquito species – an average 10 larvae per dip requires treatment).
 - Early stage larvae (I to III instar) should be treated with microbial larvicide such as *Bacillus thuringiensis var israelensis* (BTI) or *Bacillus sphaericus* (BS). BS is suitable for organically rich environments and has a longer residual effect but is only effective against freshwater *Culex* species, primarily *Culex annulirostris* and *Culex quinquefasciatus*.
 - For late stage larvae (IV), methoprene treatment is appropriate. Liquid and sand formulations provide some residual control, but for longer residual control, pellets or briquettes are recommended. Pellets last for approximately one month and briquettes for approximately 3 months.
 - If unsure of the appropriate larvicide method to use, consult a medical entomologist, environmental health officer experienced in vector control, or the Australian Mosquito Control Manual (Mosquito Control Association of Australia Inc) for advice.
 - Large open areas of floodwaters can not be effectively treated by hand. In these circumstances the use of other options (all terrain vehicles, quads, amphibious ARGO, mounted sprayers, helicopters or fixed wing aircraft) for larvicide treatment may need to be considered.
 - If drains are blocked, larvicide the area before unblocking to reduce dissemination of larvae.
 - If access to private property is required to control mosquito breeding and the occupants are not willing or available to give permission to have the areas treated, local government may consider the use an authorised prevention and control program. Authorised prevention and control programs require approval from Queensland Health and strict criteria apply. Early consultation with Queensland Health regarding the need for an authorised prevention and control program is essential. More information can be found in the *Public Health Act 2005*.
 - Undertake post surveillance of treated areas to validate effectiveness of treatment and repeat treatment if needed.

Reduce number of adult mosquitoes

- When adult mosquitoes are present in significant numbers, particularly the vector species, adulticiding should be considered in conjunction with larviciding. This will allow for a rapid reduction of biting mosquitoes while larviciding. Please note that unlike larvicides, adulticides do have effects on non-target species (such as pollinators) and should not be used in close proximity to natural water sources.
- *Culex annulirostris* is the mosquito of primary concern for transmitting Ross River virus, Barmah Forest virus and Murray Valley encephalitis virus in a post-flood situation, as the large grassy areas of pooled fresh water facilitates breeding of large numbers of these mosquitoes.

- Where light traps are yielding more than 100 mosquitoes per trap, close to schools and other public spaces, the use of a residual harbourage spraying method to control mosquito numbers should be considered. Residual adulticides containing synthetic pyrethroids can be applied (via an appropriate spray system) to mosquito harbourage resting sites close to the public spaces effectively creating a barrier to protect people using the public spaces.
- If more than 100 *Culex annulirostris* are found in a trap, fogging the high risk area (away from residential areas) with synthetic pyrethroids should be considered.
- If unsure of the appropriate adulticide method to use, consult a medical entomologist, environmental health officer experienced in vector control, or the Australian Mosquito Control Manual (Mosquito Control Association of Australia Inc) for advice.
- Undertake post treatment surveillance of treated areas to validate effectiveness of treatment eg, via light or other type of traps.

Reduce number of people bitten by mosquitoes

People can reduce the risk of mosquito-borne diseases and/or nuisance bites by following a few clear directions.

- A coordinated media campaign (QH and LG) in the post-flood period is recommended to advise the public to:
 - Apply insect repellent containing DEET or picaridin, in accordance with the manufacturer's recommendations;
 - Avoid being outside at dawn or dusk;
 - Wear long, loose, light-coloured clothing;
 - Use flying insect spray to kill any mosquitoes;
 - Use bed nets if available;
 - Use mosquito coils or plug-in insecticide devices;
 - Repair defective insect screens or install insect screens;
 - Use an anti-pruritic (or 'anti-itch') cream such as calamine lotion on mosquito bites to prevent scratching and reduce the risk of secondary bacterial infection.

Manage mosquito-borne diseases

- Enhanced monitoring of the incidence of mosquito-borne diseases is recommended in the post-flood period to keep the public and health providers advised of high risk areas.
- Provide advice on symptoms of mosquito-borne disease to be alert for and to seek medical attention for:
 - Headache
 - Joint pain
 - Muscle pain
 - Fever
 - Rash
 - Fatigue
 - Nausea

Objective 2: Reduce risk of gastroenteritis relating to fly infestations

- Monitor complaints about flies
- Provide public health advice on management of flies:
 - Use fly screens wherever possible;
 - Keep food covered;
 - Use fly traps and baits;
 - Remove waste and fly breeding material.
- Where waste cannot be removed in a timely manner, the use of a residue pesticide on the waste and fly breeding material will provide temporary relief. Pesticides must always be used according to their label and must be labelled for the target pest.
- Provide public advice to be alert for symptoms of gastroenteritis and to seek medical advice if symptoms occur.
- Advise GPs and emergency departments to be alert for presentations of people with gastroenteritis.

Objective 3: Reduce risk of secondary bacterial infections related to black fly bites

Reduce number of adult black flies

- Reduce the number of black flies in their resting places along the banks of running water before they disperse into community areas.
- Pesticides containing organophosphorus compounds, bifenthrin or permethrin can be sprayed along resting sites (ie, vegetation) in their flight path. Pesticides must always be used according to their label and must be labelled for the target pest.
- If significant numbers are observed (special traps or biting counts), fogging the high risk area (away from residential areas) should be considered.

Provide public health advice on management of black flies

- Advise the public to:
 - Apply insect repellent containing DEET or picaridin, in accordance with the manufacturer's recommendations;
 - Use fly screens wherever possible;
 - Where possible, avoid going out during peak periods for black fly activity;
 - Wear appropriate clothing when contact with black flies likely:
 - ✓ Keep shirt sleeves and front closely fastened (zippered front shirts keep flies out better than buttoned shirts);
 - ✓ Wear light coloured clothing;
 - ✓ Tuck trousers inside socks or high boots.

Managing black fly bites

- Provide public health advice on managing black fly bites to prevent secondary infections:
 - Use calamine lotion or other anti-pruritic cream to discourage scratching;
 - Clean and cover open wounds;
 - Wash hands before and after touching open wounds.
- Provide advice on signs and symptoms of secondary bacterial infections and when to seek medical attention:
 - Seek medical attention if insect bites or scratches become infected (hot, red, swollen, painful);
 - Seek medical advice if feverish;
 - Rest and elevate limb if multiple wounds;
 - Advise GPs and emergency departments to be alert for presentations of people with secondary bacterial infections.

1.5 Evaluation measures

- Collate local government mosquito surveillance and control activities.
- Monitor mosquito-borne disease notifications in flood affected areas.
- Monitor public complaints about mosquitoes, flies and black flies.