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| Mosquito management in Victoria |
| Information for landowners and land occupiers |
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# Mosquitoes can carry diseases

There are almost a hundred species of mosquitoes in Victoria. Most are just annoying and do not spread disease. However, some mosquitoes can carry diseases that are transmitted through mosquito bites.

In Victoria, the most common viruses transmitted by mosquitoes to humans are Ross River and Barmah Forest viruses. Infections caused by Japanese encephalitis, Murray Valley encephalitis and West Nile (Kunjin) viruses are rare but have the potential to cause severe disease.

The best way to prevent mosquito-borne diseases is by avoiding mosquito bites.

In most years, during the months of October to March, under favourable environmental conditions, mosquitoes can increase in large numbers causing nuisance, and at times pose a public health disease risk for nearby communities. Mosquitoes can also breed in large numbers after heavy rainfall or flooding events, increasing the risk of disease transmission. During these times, it is often necessary for landowners and land occupiers to manage mosquito numbers through an integrated mosquito management program.

Residents also play a role in mosquito management on their own properties by removing mosquito breeding habitats. For further information, see the [Mosquitoes - protect your home a checklist webpage](https://www.betterhealth.vic.gov.au/health/healthyliving/mosquitoes-protect-your-home-checklist).

# Integrated mosquito management in Victoria

The Victorian Arbovirus Disease Control Program (VADCP) is a state-wide collaborative program run by the Department of Health and delivered through participating local councils to reduce the impacts of mosquito-borne diseases. This program integrates mosquito management principles, which include:

* Mosquito surveillance
* Chemical control
* Mosquito bite prevention, behavioural change and public awareness
* Physical control (source reduction).

It is recognised worldwide that the successful management of mosquitoes requires multiple interventions, as no single intervention method alone will successfully reduce the risk of mosquito-borne diseases. Integrated mosquito management is based on an understanding of mosquito biology, mosquito life cycles and disease transmission.

Through the application of a combination of each of these control measures, councils and residents have the best chances of successfully managing the risks arising from mosquitoes.

## Mosquito surveillance

A range of local councils across Victoria trap mosquitoes each week and submit the samples for identification, counting and virus screening. If viruses are detected in the mosquitoes, it provides an early warning that there is a health risk to local communities and that interventions to manage mosquitoes are required.

This mosquito surveillance is essential as it informs public health actions and reduces the risk of mosquito-borne diseases to the community. This allows councils to make informed decisions on the best intervention strategies to be implemented to reduce mosquito numbers.

Local councils decide which methods are best used to control mosquito numbers depending on weekly trapping results, the weather, environmental conditions, and the level of risk to the community.

## Chemical control

Chemical control is the application of products designed to kill adult mosquitoes or mosquito larvae. It is used when there is an increased risk of mosquito-borne diseases.

All products used for chemical control must be approved for use in Australia by the [Australian Pesticides and Veterinary Medicines Authority (APVMA)](https://apvma.gov.au/). Specific information on registered products, including the active ingredient, and label information, can be accessed through the AVPMA’s [Public Chemical Registrations Information System Search (PubCRIS)](https://portal.apvma.gov.au/pubcris) database.

The use of any chemical must be applied as specified on the product label. The label will also specify the safety precautions that need to be undertaken when applying chemical products. This includes the use of appropriate personal protective equipment (PPE).

Chemical control applicators have to meet a range of legislative and regulatory requirements to ensure products are used and stored effectively and safely. The department provides a range of training to help local council officers meet these requirements.

### Larvicides

Larvicides kill or disrupt the development of mosquito larvae, resulting in death before the adult mosquito can emerge and pose a potential health risk to humans. Larvicides are specifically designed to target mosquito larvae and have little to no impact on other aquatic organisms or ecosystems. Therefore, the impact on the environment is negligible. Mosquito breeding sites (such as ponds, slow moving water, stagnant water) often contain high numbers of mosquito larvae that can be targeted for treatment before they emerge as adults. For these reasons, larvicides are the preferred control option over adulticides, if chemical control is deemed to be the most appropriate management strategy.

### Adulticides

Where public health risk is increased from high mosquito numbers or virus circulating in the mosquito population, and other mosquito management methods are not satisfactorily controlling the risk, it is important to kill adult mosquitoes to reduce the spread of disease and protect communities. Adulticide applications may include fogging and/or residual barrier treatments.

One scenario where adulticiding may be required occurs after flooding creates widespread breeding sites. Larvicide becomes increasingly difficult to apply due to lack of ability to access affected water bodies and the size of the habitat that requires treatment. The detection of virus in mosquito populations also signals an imminent risk to humans that requires adulticiding to prevent mosquitoes transmitting disease to people.

#### Fogging

Fogging involves the application of an adulticide using a natural or synthetic pyrethroid chemical, as a cloud or mist that hangs in the air and kills mosquitoes, much like fly sprays used at home. The chemicals used disrupt the nervous system of the mosquito, resulting in their paralysis and death. Fogging is the only means of killing adult mosquitoes that are known to be carrying disease, and it is important to use it when the risk of mosquito-borne diseases is present.

As adulticides can impact other insects, particularly those smaller than a mosquito, fogging is only recommended when there is an elevated public health disease risk. Fogging activities are only performed when mosquitoes are active, typically around dawn and dusk, which also minimises the impact on other non-target insects that are not active at these times of the day.

Like fly spray, fogging will knock down mosquitoes in a particular area and reduce mosquito biting for 2-3 days. It may be performed as a single treatment e.g. to remove mosquitoes from parkland hosting a large festival, or as repeat treatments e.g. in bushland adjoining a town.

Fogging products are registered for use in domestic settings as fly spray. Any fogging activities undertaken to reduce mosquito-borne disease risk are undertaken with careful consideration of the environment, weather and other factors that impact their success.

#### Residual barrier treatments

Residual barrier treatments involve the application of a synthetic pyrethroid to a surface where adult mosquitoes may land. This may include internal/external building walls, eaves, fences, vegetation, or foliage. When applied, the product binds to surfaces and can provide mosquito control for up to 6-8 weeks.

Barrier treatments cannot be applied on a wide scale like fogging. They are reserved for smaller, targeted areas to protect groups of people from mosquitoes entering their space. This often includes applications surrounding popular or regularly used locations, such as campgrounds, public toilets, and BBQ/playground areas.

Barrier products are registered for use in domestic settings as surface sprays. Some are only registered for crawling insects, not flying insects. Residents can also have these treatments applied by a licenced pest control operator.

## Mosquito bite prevention

Mosquito bite prevention includes education to raise public awareness and modify behaviour to reduce contact with mosquitoes. This is often achieved through community education campaigns and media releases or alerts. Local councils play a key role in informing their residents of the current public health disease risks and actions they can take to reduce contact with mosquitoes.

You can prevent mosquito bites by:

* Wearing long, loose fitting clothes outdoors
* Using effective mosquito repellents containing picaridin or DEET on all exposed skin
* Trying to limit outdoor activity if lots of mosquitoes are about
* Using ‘knockdown’ fly sprays and plug-in repellent devices indoors
* Sleeping under mosquito nets treated with insecticides if you don’t have flywire screens on windows in your home or are sleeping in an untreated tent or out in the open.

## Physical Control (source reduction)

Physical control relies on reducing or eliminating mosquito breeding sites. This has advantages over other control measures in providing long-term solutions that can reduce mosquito numbers for months to years into the future. However, they can be expensive, may require specialised equipment and often need environmental approvals from various Government bodies.

Examples of physical control may include:

* Physically filling low lying depressions with soil or sand to permanent remove breeding habitat
* Draining areas with water-holding capacity by opening channels to natural wetlands or river systems allowing pooling water to drain
* Maintenance of drainage systems to ensure free-flowing water and allow natural predators to consume mosquito larvae
* Removal of emergent vegetation allowing predators access to consume mosquito larvae and removing larval development habitat.

# Roles and responsibilities for mosquito control

In Victoria, the Public Health and Wellbeing Regulations 2019 (the Regulations) outline responsibilities for mosquito management. Mosquito management is the responsibility of all landowners or land occupiers. This applies to land owned/managed by both the public sector or government, or private residents, businesses and organisations.

## Role of public sector landowner/occupier

About one third of Victoria is Crown land. Most is owned by the Victorian Government, with the remainder owned by the Commonwealth Government.

* Approximately 50% of Crown land in Victoria is national or state parks. These lands are managed by Parks Victoria.
* Approximately 39% of Crown land are Victorian State Forests. These are managed by the Department of Energy, Environment and Climate Action (DEECA).
* Approximately 7% of Crown land in Victoria is Crown land reserves. This can include most public schools, public hospitals, public roads and government railways, parks and recreation reserves. This land may be managed by a range of owner/occupiers, including local government, hospitals, VicRoads, a school or Department of Education, Department of Justice and Community Safety, water corporations, or voluntary committees of management that report to DEECA.

All public sector landowners/occupiers are responsible for their own mosquito management and ensuring mosquito disease risk originating on their land is not impacting the community or members of the public accessing these public places.

## Role of local councils

As a landowner/occupier of public land, councils have responsibility for mosquito management in these public spaces. Much of this land is in populated areas, closely connected to residential areas, places of business, and recreational areas.

In addition to their responsibilities as a landowner/occupier, local council also plays a role in administering other mosquito-related components of state legislation and regulations. This can include managing and investigating nuisance complaints and issuing improvement notices and infringements to other landowners/occupiers to ensure compliance with their mosquito management responsibilities.

Local government also plays a key role in outbreak management and mitigating public health disease risks, and work closely with the Department of Health on these matters.

## Role of the Department of Health

The Department of Health monitors mosquito-borne diseases and oversees a range of activities that reduce the risk to the Victorian community. The Department of Health:

* Operates and funds a state-wide mosquito surveillance system to monitor mosquitoes, their numbers and their viruses, delivered through local councils
* In conjunction with Local Public Health Units, conducts state-wide human disease surveillance and investigates all cases of mosquito-borne disease
* Analyses surveillance data and intelligence from multiples sources and conducts risks assessments
* Develops risk mitigation strategies
* Funds an emergency response high-capacity vector control equipment program
* Supports and funds local government to participate in outbreak management response
* Delivers a public health campaign designed to reduce mosquito biting
* Liaises and engages with national bodies, other state and territory jurisdictions and state agencies
* Manages incidents and emergencies

The Department of Health also works closely with other government departments and agencies, such as the Department of Education, DEECA, Parks Victoria, Agriculture Victoria and other key agencies to promote mosquito management and mosquito bite prevention across a range of community settings in Victoria.

## Role of private landowner/occupier

Private landowners/occupiers are responsible for mosquito management on a range of land, including domestic, commercial and agricultural.

In urban settings, mosquito management can often include a range of simple strategies that effectively reduce mosquito activity, such as removing and preventing breeding sites, and maintaining and cleaning the property to prevent adult mosquitoes from seeking refuge.

In agricultural settings, mosquito management can often be more difficult due to the size and geography of a property, presence of dams and troughs and intentional widespread water use. Agricultural landowners/occupiers are responsible for mosquito management and ensuring that measures are taken e.g., installation of efficient watering systems, that prevent increased mosquito-borne disease risk to the wider community.

# Summary

Through a combination of surveillance, chemical control, mosquito bite prevention and physical control, an integrated mosquito management approach can prevent and control both nuisance mosquitoes and mosquitoes that spread disease. Everyone has a responsibility to help manage the risks posed by mosquitoes.

For further information, see:

* [Mosquito-borne disease (Health.vic)](https://www.health.vic.gov.au/infectious-diseases/mosquito-borne-diseases)
* [Better Health Channel – Protect yourself from mosquito-borne diseases](https://www.betterhealth.vic.gov.au/protect-yourself-mosquito-borne-disease)
* [Better Health Channel – Mosquitoes can carry diseases](https://www.betterhealth.vic.gov.au/health/healthyliving/mosquitoes-can-carry-diseases)
* [Better Health Channel – Mosquitoes: Protect your home checklist](https://www.betterhealth.vic.gov.au/health/healthyliving/mosquitoes-protect-your-home-checklist)
* [Better Health Channel – Mozzie proof your holiday checklist](https://www.betterhealth.vic.gov.au/health/healthyliving/mosquitoes-protect-your-holiday-checklist)

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