



Planning a Mosquito Management Program

1. Introduction

The management of mosquitoes is rarely as simple as taking one approach (e.g. the application of larvicide) to achieve an acceptable level of control. In general, an effective mosquito management program will be based on an integrated approach, that combines various methods to minimise interaction between mosquitoes and the public and to reduce the risk of mosquito-borne disease, and yet will be environmentally and economically sustainable over the long-term.

Mosquito populations will fluctuate from year to year (as well as seasonally) in response to changing environmental conditions. Therefore there will need to be corresponding flexibility in the resources available to the program.

Approaches to mosquito management can be direct or indirect. Direct interventions include the removal of breeding habitat by physical modification, the introduction of biological controls (e.g. predatory fish) or the application of pesticides. Indirect approaches reduce human-mosquito conflict, for example utilising planning mechanisms to create adequate buffers around wetlands and educating the public to avoid mosquitoes. Another important indirect approach is for mosquito managers to actively liaise and collaborate with other departments/authorities to ensure that storm water and wastewater management, the planting and harvesting of aquatic vegetation, the design of roads, prevention of animal and vehicle access, and the impact of land use (e.g. mining, irrigation, farming) are undertaken in such a way as to minimise the potential for mosquito breeding.

This chapter provides a generic framework and checklist to assist people developing a mosquito management plan. Related elements and considerations for mosquito management plans have been grouped together with a brief explanation about their significance to mosquito management.

This information is a brief coverage of the issues only, and it is intended that reference should be made to the Department of Health's 2006 Mosquito Management Manual for more detailed information on the various aspects of mosquito management.

2. Where do I Start?

Knowing just where to start with a mosquito management plan may seem daunting, especially if there is little or no evidence of a previous program in your region. However, in most cases there is some information that will help you get underway. This can be used to decide when and where to start with surveys to define and manage the problem.

Existing Information

As a starting point, contact colleagues in your own and other organisations, including previous incumbents. The following will provide important clues about the sources and extent of mosquito impacts:

- Previous mosquito surveys or reports if they exist (within agency or contact MBDC Branch, DOH)
- Public complaints (most local governments keep a complaints register)
- Disease reports and case follow-up information [can be obtained from DOH (MBDC Branch, Population Health Units)]
- Geographical survey:
 - location of man-made water infrastructure (belonging to council and other agencies) (e.g. sewage lagoons, constructed wetlands, rainwater and effluent re-use tanks, roadside drains and culverts)
 - maps, aerial photographs
 - local knowledge
- Land ownership & responsibilities (council planners, Dep't of Land Administration)
- Applicable environmental legislation (council planners; environmental agencies)



Baseline Mosquito Surveys

If there is no prior information about mosquito breeding sites, seasonal productivity and the most prevalent species, then the following baseline surveys will be essential.

- Larval surveys: survey all potential mosquito breeding habitats, natural and man-made
- Adult surveys: undertake adult mosquito trapping in a range of natural and domestic locations
- Timing of surveys: surveys should follow breeding triggers [e.g. rainfall, tides, human manipulation of water sources (irrigation, dam releases, backyard sprinklers, effluent re-use)] to maximise the effectiveness of the survey to locate breeding sites
- Prioritise surveys in areas closest to residential and recreational areas and work out from there

Determining Mosquito Management Needs and Options

The analysis of existing information and baseline mosquito surveys (above) will allow you decide whether, when, where and how mosquito management should be undertaken.

Necessity (the need for control):

- Cases of mosquito-borne disease
- Severe nuisance (complaints, impact on quality of life)

Timing:

- Likely season(s) of nuisance and disease risk
- Triggering environmental conditions or human activities
- Timing of monitoring and treatments (larviciding/adulticiding) or other interventions in relation to season, breeding triggers, activity of life stages of the target species

Priority sites from nuisance and public health perspectives:

- Proximity of breeding sites to human habitation
- Productivity of sites (size of breeding area and density of larvae)
- Pest and disease vector status and biology of mosquito species emanating from site

Options for management within available resources:

- Cultural - will the public respond to encouragement about personal preventive measures?
- Physical (source reduction) - can the site be modified or removed to prevent breeding?
- Chemical - larvicides (ground and aerial applications)
- Chemical - adulticides (fogging and residual surface adulticides)
- Biological - is it possible and appropriate to introduce mosquito predators (e.g. fish) to the site?

In-principle Support

- Obtain initial in-principle support for a program based on the above (later, the organisation will need to accept the program as part of the core business plan to ensure ongoing commitment to funding and support)

3. Operational Aspects

Once you've decided on the broad approach you will need to determine necessary resources, stakeholder support and involvement, and then implement the program.

Determining budget and resources

- Manpower - personnel required to undertake the management options identified above
- Equipment - chemical application, earthworks, PPE, etc
- Chemicals, prices, number of treatments, area to be treated
- Advertising, educational and promotional material
- Vehicles



Approvals and Collaboration

- Identify key partners/stakeholders
- Seek environmental approvals
- Seek aboriginal heritage and native title approvals
- Inform other departments/agencies about proposed program and liaise over potential conflicts (e.g. with agricultural biocontrol programs)
- Advise other departments/land-owners of management responsibilities and options

Public Education, Advice and Warnings

The public have a key role and responsibility in any integrated program to manage mosquitoes. It is important that communities are kept informed and become stakeholders in achieving a successful program.

- Develop information displays and material for letter drops
- Undertake school and community education
- Promote the program and your key messages using local media
- Disseminate warnings when environmental and mosquito monitoring indicate a risk of mosquito-borne disease is likely
- Advise the public of planned chemical and physical mosquito control activities
- Inform and educate the public about their responsibilities for personal preventive measures and backyard mosquito control (e.g. septic tanks, rainwater tanks, fish ponds, roof gutters, pot plant saucers, tyres and other water-holding 'containers')

Determining the Effectiveness of the Program

- Post-treatment monitoring of larvae and adults
- Monitor public complaints
- Occasional inspection of physically modified sites
- Measure the coverage and impact (on behaviour) of your publicity and warnings
- Monitor human case notifications (although this may not necessarily indicate the effectiveness of the program because disease transmission depends on more than just adult mosquitoes)

4. Support and Resources to Make a Mosquito Control Program Happen

Effective mosquito management is an ongoing commitment for the agency concerned. This means dedicating some time to ensuring the program is supported and adequately resourced over the long term.

Organisational Commitment

- Secure long-term commitment to program from council/agency by adoption of strategic plan
- Achieve recognition of fluctuating nature of funding requirements
- Achieve recognition that program will evolve and grow over time
- Ensure local councillors, politicians and community are aware of and supportive of your program
- Promote the need for adequate buffers between residential areas and high risk areas for nuisance and disease vectors with planning staff in your agency

Program Funding

- Secure funding for current financial year
- Obtain commitment to long-term funding in line with the agency's adoption of your strategic plan
- Seek opportunities for collaborative funding (e.g. DOH CLAG funding program, mining companies, local industry)
- Investigate the possibility of developer contributions to funding control of mosquitoes affecting new residential subdivisions



Document Program Activities and Procedures

Deliberately develop an institutional memory of the program to prevent loss of knowledge and information when staff leave or are promoted through the organisation.

- Maintain thorough records/archive files on the mosquito management program
- Document activities and write an annual report/summary
- Archive copies of maps, aerial photos, equipment manuals, chemical labels and other operational resources
- Integrate your program onto your agency's Geographic Information System, if it has one
- Ensure that other staff receive training in running the program so that back-up is available when needed (e.g. during annual leave), and to avoid the loss of your knowledge and experience if you resign

5. Ongoing Refinement of the Program

There will be an ongoing and indefinite need to review and refine the program. Additional breeding sites will be found and some others may be created by human activities. Alternative approaches to mosquito management may become available or desirable (e.g. due to the development of resistance to a particular chemical group).

Periodically, review achievements and results from several consecutive seasons to identify emerging trends or risks.

Join the Mosquito Control Association of Australia and attend their conferences to continue to develop your professional skills and knowledge in this field (see website below).

6. Further reading:

- Department of Health (2006) Mosquito Management Manual. Contact the Mosquito-Borne Disease Control Branch of DOH to obtain a copy
- Mosquito Control Association of Australia (2002). Australian Mosquito Control Manual. For purchasing details, see <http://www.mcaa.org.au/>

Further Information:

For further information on mosquito control, please contact your local government Environmental Health Officer

or

Environmental Health Directorate
Department of Health
PO Box 8172
PERTH BUSINESS CENTRE WA 6849

Telephone: (08) 9385 6001

Facsimile: (08) 9383 1819

Produced by Environmental Health Directorate
© Department of Health, Western Australia 2006