MIDGE NOTES

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COMPLETION OF MIDGE RESEARCH PROGRAM

BACKGROUND

In 1987 state and local government agreed to jointly fund a research project to investigate improved methods of non-biting midge (chironomid) control in Perth. This move was in response to declining effectiveness, increasing cost and potentially harmful environmental effects of midge control methods in use at that time.

The Midge Research Steering Committee comprised representatives from the Armadale, Cockburn, Melville, Perth, South Perth, Stirling and Wanneroo City Councils, the Shire of Swan, the Environmental Protection Authority, the Department of Planning and Urban Development, and the Department of Conservation and Land Management.

Research has been carried out under contract by scientists from Murdoch University's School of Biological and Environmental Sciences. In June this year the Murdoch University research group presented its fourth and final report. Copies may be viewed in each of the relevant State Government and Local Authority libraries. Copies may also be purchased from the Murdoch University Bookshop at $12.00 each.

AIMS OF THE RESEARCH PROJECT

A two pronged approach was taken by the research group. Firstly, short term control using pesticides was investigated. This involved improving the efficiency of Abate® use and the search for a suitable alternative to Abate®. Secondly the dynamics of midge populations in Perth wetlands was studied to gain a better understanding of the problem and to develop long term control options.

UNDERSTANDING THE PROBLEM

Continuous monitoring of both the midge populations and their environment has led to a clearer understanding of why midges are abundant in some wetlands but not in others. In general, the worst midge problems occur around wetlands that are highly nutrient enriched (for example Lake Monger and Bibra, Forrestdale and North Lakes).

High concentrations of nutrients in these wetlands fuel blooms of uni-cellular blue-green algae. When the alga cells die and settle to the bottom of the lake they begin to decay, providing a rich food source for midge larvae. This food, together with warm temperatures during spring and summer, creates ideal conditions for the growth of midge larva. Under these conditions the life cycle from egg to adult can be completed in less than three weeks. This short life cycle, combined with the ability of each adult female to lay hundreds of eggs, means that populations of midges can quickly rise to nuisance levels.

Many species of invertebrates are sensitive to changes in water quality and are unable to inhabit wetlands that are polluted with high concentrations of nutrients. In addition, removal of fringing vegetation reduces the diversity of habitats within the wetlands which also leads to reduced invertebrate diversity. Some of the invertebrates which disappear from degraded wetlands are those that would ordinarily feed on midge larvae and would help to control the abundance of midges.

Nuisance problems with midges are a symptom of a larger problem, that of the degradation of our wetlands.

OPTIONS FOR CONTROL

There are two possible approaches to dealing with midge nuisance problems. The first is to treat the symptoms of the problem by killing the midges at either the aquatic larval stage using insecticides or by killing the flying adults using insecticides or light traps. The second and longer term approach is to deal with the underlying causes, namely nutrient enrichment and the loss of natural wetland vegetation. Improved water quality will lead to conditions which are less favourable to midges, thus providing long term control of midge numbers.

PUBLISHED BY THE MIDGE RESEARCH STEERING COMMITTEE

Short Term Control

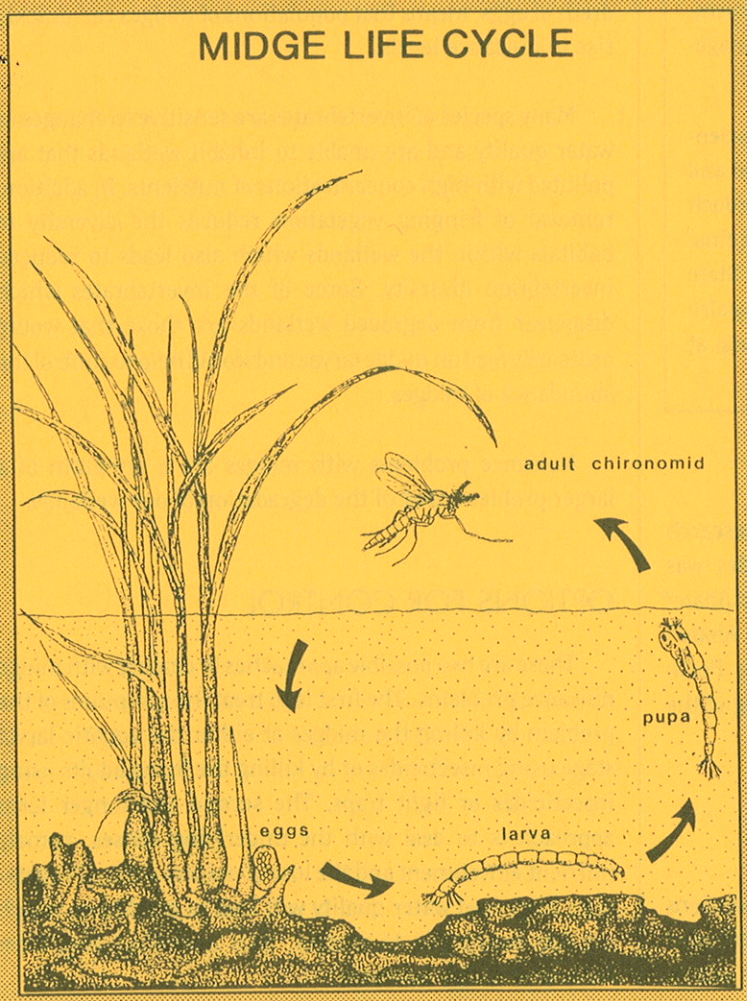
The organophosphate insecticide Abate® (temephos) is currently the only insecticide registered for use against midge larvae in Australia. Abate® has been used on Perth wetlands for the past 20 years and there is now evidence of genetic resistance to this insecticide in the midge populations of some wetlands, resulting in reduced effectiveness. The effectiveness of Abate® is likely to decline further with continued use and costs will rise as application rates are increased to offset this problem.

Several alternative insecticides were assessed during the first two years of the research program. These included another organophosphate (chlorpyrifos), a synthetic pyrethroid, a bacterial insecticide (B.t.i.) and an insect growth regulator (Sumilarv®). None of these was ideal, however Sumilarv® was found to offer the best combination of effectiveness, environmental safety and affordability. This pesticide is expected to be registered for general use in Australia by 1994.

Sumilarv® is a synthetic form of a naturally occurring insect hormone. This hormone inhibits the natural development of midge larvae into the pupal and adult stages. Thus, when the synthetic form of the hormone is applied to a wetland, emergence of adult midges is inhibited.

Sumilarv® should affect a much narrower range of species than temephos. Testing of this compound against a variety of non-target animals has recently been completed in the laboratory and field. The company which markets Sumilarv® is expected to begin registration procedures in 1992 when more toxicity data will be available. However, it may not be available for general use until 1994. This insecticide should still only be considered a short term option since deleterious effects on aquatic ecosystems cannot be entirely ruled out and resistance is likely to develop in midge populations with prolonged use.

An alternative to the use of chemicals is the use of light traps to discourage the movement of midge swarms to residential areas (midges are attracted to some lights). Light traps are currently being used by the City of Perth at Lake Monger and double as attractive footpath lighting. These traps will not reduce midge populations as the adults have already laid the eggs for the next generation of midges before they are caught, but they may help to reduce the level of nuisance near some wetlands.



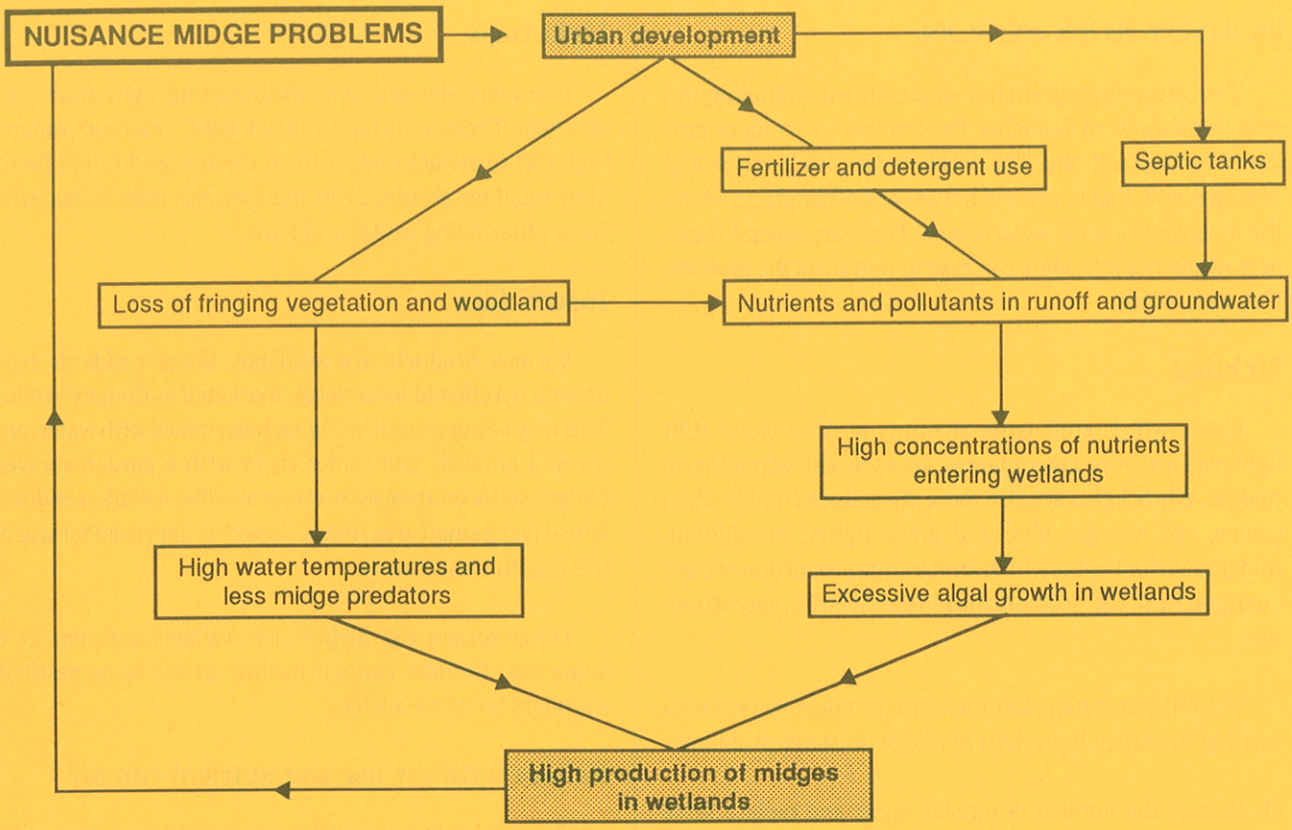
Midges - A Problem Near Wetlands

Midges are small, nonbiting insects (there are more than 20 species) which inhabit Perth's wetlands. They have four main stages in their life cycle: egg, larva, pupa (all of which are found in the wetland), and flying adult.

Following mating and laying of eggs on the water surface many adult midges may be blown by prevailing winds into surrounding areas including nearby residences. They may also be attracted by lights.

These "spent" adults - which have no further role in the midge life cycle and die within a few days - do not bite. At times, however, they may occur in large numbers and cause discomfort to local residents.

Where the discomfort is severe, local Councils do their best to reduce the number of midges. The lakes are usually sprayed with chemicals to kill midges at the larva or "wriggler" stage. Adulticides may also be used to "fog" residential areas, killing adult midges.



Long term control

Long term control of midge populations will involve the restoration of wetland water quality to reduce the production of midges. The following strategies will be the key features of such an approach.

The amount of nutrients (mainly phosphorus and nitrogen) entering wetlands needs to be reduced substantially. Reducing the levels of nutrients should eventually lead to reduced algal growth and thus less food for midges. These nutrients, which originate in residential or agricultural zones, enter wetlands via stormwater drains or the groundwater. Minimizing the use of fertilizers and detergents containing phosphorus is an important first step and this is where householders can contribute to the restoration process. Reductions in nutrient inputs can also be achieved by diverting drains away from wetlands or by removing nutrients from the water before it enters the wetland.

Many of the wetlands that produce midge problems have suffered the loss of much of their fringing vegetation (sedges, rushes and trees). This has several implications for midge problems.

- Vegetation loss has led to less shading in the shallow edge areas of the wetlands resulting in higher water temperatures which favour midge production.

- Fewer species of invertebrates (some of which, e.g. dragonflies, would ordinarily feed on midge larvae) are to be found in those wetlands that have little fringing vegetation and are nutrient enriched.

- Fringing vegetation deposits large amounts of leaf and bark litter into the wetland. Dark coloured compounds (tannins) which leach from this litter help to reduce the growth of algae by reducing light penetration in the water.

- The fringing vegetation and surrounding woodland also help to soak up nutrients from lake sediments and from the groundwater before it reaches the wetland.

- If the woodland is sufficiently tall and dense then it may provide an effective buffer between the midge swarms at the lake and the lights of residential areas.

This wetland restoration approach will also lead to enhancement of other values associated with wetlands, including aesthetics, recreation, conservation and education.

HOUSEHOLDER ACTION

The research program has concentrated on finding improved methods of reducing the numbers of midges produced by each wetland. The problem can also be tackled at the other end, that is, around houses and other places where the midge nuisance is experienced. There are several measures which householders can take to minimise the problem they experience.

Lighting

Lights which emit large amounts of ultra violet (UV) light, e.g. mercury vapour lamps, are especially attractive to midges. White lights are also more attractive to midges than yellow, red, orange, blue and green lights. In addition, midges also find lights which emit a large proportion of their energy as heat, e.g. ordinary incandescent bulbs, very attractive.

The following steps can therefore be taken by residents wishing to reduce the extent of midge nuisance problems.

- ❒ Reduce the number of outside lights and replace large (100 watt) incandescent bulbs around entrance ways with small (25 or 40 watt) bulbs (preferably yellow). Where practicable, move these away from doorways and direct light towards the entry way. Lower wattage bulbs are also cheaper to run.

- ❒ Screen lights from the wetland by using hedges, shrubs and light shades outside the house and curtains or blinds inside.

- ❒ Consider painting white surfaces around doorways with darker blue or green colours to reduce UV reflection.

- ❒ Keep windows and doors closed, or install fine-mesh insect screens to reduce the problem. Seal any gaps around doorways, windows and skylights.

- ❒ Where affordable, replace ordinary incandescent bulbs or fluorescent tubes with high pressure sodium vapour lamps, although these are expensive. These produce minimal amounts of both UV light and heat.

Light traps

Commercially available electrocuting light traps may also help. These units have a "black light" (mercury vapour, high UV) to attract midges to an electric grid to kill them. They retail for around $150 and may also help to deal with some other flying insect problems.

Insecticides

Various products are available. Some residents have found a pyrethroid insecticide, marketed as Coopex®useful. This may be purchased in 25g sachets, mixed with water, and sprayed on walls and under eaves with a garden sprayer. Midges settle on sprayed surfaces and die. A white residue is left so test a small area first. Coopex® is approved for use by the Health Department.

Other sprays, e.g. Sislin®, are available and may be of some use. Contact council health surveyors or pesticide suppliers for more advice.

Reduce fertilizer use and nutrient run off

As explained above, midge production in metropolitan wetlands is fed by algal blooms which are in turn fuelled by high concentrations of nutrients. In the long term, midge production may be reduced by lowering nutrient inputs to wetlands. Residents can help to reduce nutrient inputs by minimizing fertilizer use (e.g. native gardens require minimal fertilizer) and by using slow release brands.

Car wash detergents contain phosphorus - a nutrient which fuels midge production. It is preferable to use a phosphorus-free detergent or to wash the car on the lawn so that the grass can utilize the phosphorus, rather than on paved areas which in many cases drain directly into the wetlands.

FURTHER INFORMATION

For assistance or advice concerning midge problems and control operations in your area, contact your local City or Shire Council.

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