
MIDGE NOTES

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RESULTS OF THE 1987/88 MIDGE RESEARCH PROGRAM

BACKGROUND

In July 1987, State and Local Government agreed to jointly fund a three-year investigation into improved methods of midge control. This move was in response to concerns about the decreasing effectiveness, increasing cost and potentially harmful environmental effects of current midge control methods.

The Midge Research Steering Committee was formed, with representation from Armadale, Cockburn, Melville, Perth, Stirling and Wanneroo City Councils, the Environmental Protection Authority, State Planning Commission, and the Department of Conservation and Land Management.

The local authorities are involved in midge control while the three State Government authorities have statutory responsibilities for ensuring that control methods used are environmentally acceptable.

The 1987/88 midge research program was conducted under contract by a research team from Murdoch University's School of Biological and Environmental Sciences. Total funding was \$60,000 with \$30,000 coming from the six local councils involved and a matching \$30,000 from the State Government.

The Steering Committee met on several occasions during 1987/88 to receive progress reports from the Murdoch team.

RESEARCH REPORT

In June of this year, the research team presented its first annual report. This is now publicly available.

Copies of the report are available for viewing in each of the relevant State Government and local authority libraries. They may also be purchased from the Murdoch University Bookshop at \$12 per copy. Mail orders (also \$12, including postage) should be addressed to:

Ms S. Harrington,
School of Biological and Environmental Science,
Murdoch University,
Murdoch W.A. 6150.

Cheques should be made payable to Murdoch University Midge Account.

RESEARCH FINDINGS

Some important findings of the report are as follows:

Each of the six lakes which were studied (Monger, Goollelal, Forrestdale, Jackadder, North and Booragoon) was different in terms of the types of midges it contained and the number of midge larvae it produced. Species composition and larval abundance also varied seasonally, and the pattern of variation was different for each lake. Species also differed in their sensitivity to various larvicides which were tested. The implications for midge control are that midge populations of each lake must be monitored and managed individually, with larval control programs tailored to suit the particular species present and its peaks in abundance.

The "threshold" required to produce a significant midge nuisance in houses adjacent to Perth's wetlands is around 2000 larvae per square metre of lake bottom. If midges are to be controlled by the use of larvicides, lakes should be treated as soon as densities of major nuisance species reach the threshold level. This approach to midge nuisance control requires that regular larval monitoring programs be undertaken at lakes where midge problems are likely.

Temephos, an organophosphate larvicide which has been used on Perth wetlands for the past 10 or so years to deal with the midge nuisance, is now of limited usefulness in controlling midge numbers. It is almost totally ineffective against the main midge species at Lake Monger, *Chironomus australis*, and although at times effective against another major nuisance species, *Polypedilum nubifer*, it cannot be relied upon. Perth's midges appear to have developed resistance to Temephos.

Laboratory and field tests conducted during 1987/88 have shown that another readily available organophosphate larvicide, Chlorpyrifos, is highly effective in killing midge larvae. However, Chlorpyrifos is also highly toxic to other forms of aquatic life such as fish. Its use to control midges could therefore be undesirable from an ecological viewpoint. Single applications of Chlorpyrifos followed, if necessary, by applications of Temephos may, however, be an acceptable short term strategy for control of midges.

Preliminary tests with a newly-developed and highly specific bacterial larvicide called Bti (*Bacillus thuringiensis*) have produced mixed results. Bti caused high mortality in two rela-

tively minor nuisance species, but not in Lake Monger's *Chironomus australis*. A major difficulty faced by the Murdoch researchers was the fact that Bti is not yet available in a form suitable for use in field trials. Efforts are being made to overcome this problem.

Overseas researchers have had some success in controlling midges with two other new types of chemicals, IGR's (Insect Growth Regulators) and synthetic pyrethroids. These chemicals may be well suited for controlling species which have developed resistance to more traditional chemicals such as Temephos. The study team has obtained small amounts for experimental purposes and these will be tested during 1988/89.

Monitoring of nutrients, larval numbers and midge nuisance levels has shown that the lakes with the most severe midge problems (North and Forrestdale Lakes in 1987/88) are also the lakes with the highest nutrient levels. Peaks in midge numbers at these two lakes were preceded by profuse growth ("blooms") of algae. Breakdown of these blooms would have provided large food sources for the larval midges inhabiting the lake sediments. It is now clear that as part of a long term strategy to reduce Perth's midge nuisance problems, the amount of nutrient draining into suburban lakes must be reduced.

Experimental use of a light trap by the City of Cockburn has produced some promising results. Further testing is proposed in 1988/89 to determine whether significant reductions in midge nuisance levels may be achieved by this means.

There is a great deal of house-to-house variation in midge nuisance levels. Some households may be inundated by midges while other houses in the same street may have little or no problem. Further study is required to explain these differences.

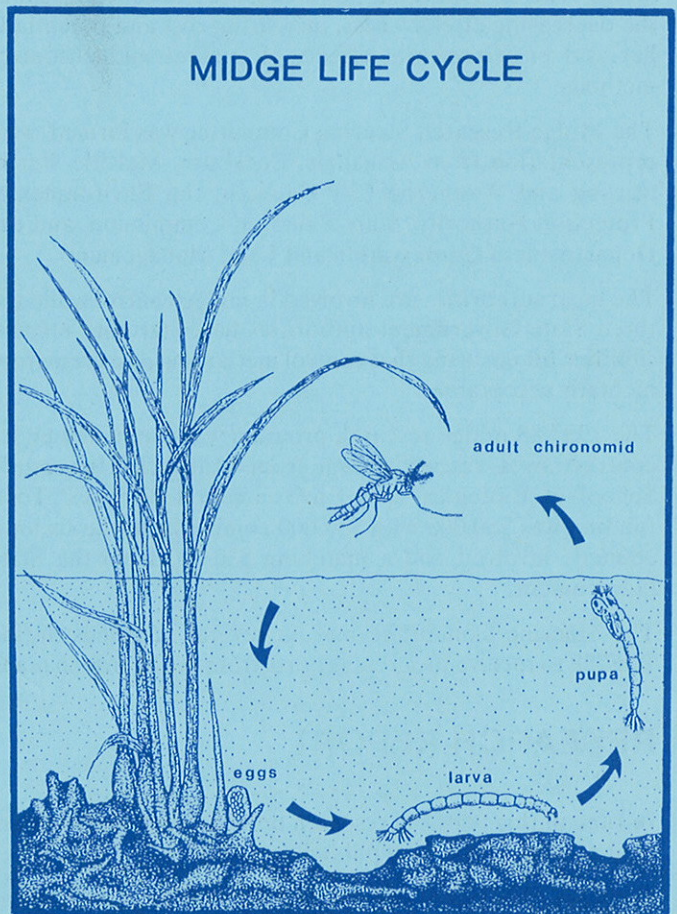
RESEARCH PLANNED FOR 1988/89

Priorities for research during the next 12 months are:

1. Laboratory and field testing of Insect Growth Regulators, synthetic pyrethroids and granulated Bti so that, if results are promising, one or more of these preferred alternatives can be trialled in spraying programs during the spring and summer of 1988/89.
2. Close monitoring of the effectiveness of Councils' routine midge control activities.
3. Development of simplified midge larval monitoring programs to facilitate rapid treatment of lakes when densities of the major nuisance species exceed the threshold of 2000 larvae/sq metre.

4. Monitoring of adult midge dispersal and the influence of environmental factors such as vegetation buffers, wind direction and air temperature on this.
5. Monitoring of midge nuisance levels in residential areas adjacent to lakes.
6. Identification of factors which make some residences more attractive to midges than others.
7. Testing of the usefulness of light traps in reducing midge nuisance levels.
8. Further collection of midge life history and environmental data to construct a midge production "model" which can be used to gain a better understanding of the factors and processes which lead to unacceptable increases in midge numbers.

In 1988/89 it will be essential for the Murdoch study team to focus its efforts on one lake in order to obtain adequate data on midge population dynamics, adult midge dispersal and the effectiveness of pesticide applications. North Lake, which had the most severe midge problems in 1987/88, has been selected for intensive study.



FURTHER INFORMATION

More information concerning the midge nuisance problem, control options, research findings, etc., will be provided by the Midge Research Steering Committee in future Midge Notes.

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