LAND USE AND BITING INSECTS
IN THE FINNISS RIVER AREA
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MEDICAL ENTOMOLOGY RECOMMENDATIONS ON

LAND USE IN THE FINNISS RIVER AREA

MEDICAL ENTOMOLOGY BRANCH

DEPARTMENT OF HEALTH AND COMMUNITY SERVICES

1987
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1.0 INTRODUCTION

The Finniss River area drains an area of around three thousand square kilometres into Fog Bay and Port Patterson. It is located approximately 100 kilometres from Darwin by road and contains no established communities or towns. It extends from the Litchfield Shire boundary in the east, to Fog Bay in the west. It is bordered by the Wagait Aboriginal land and the Finniss River in the south and extends north to Port Patterson and the southern side of Bynoe Harbour.

The area was subdivided by the Northern Territory government in 1986. Various areas are now the subject of private subdivision proposals to exploit the recreational and commercial potential of the area.

The Policy and Planning Division of the Department of Lands and Housing is preparing a land use structure plan for the Finniss River Region and has requested the Department of Health and Community Services to advise on recommendations of size, scale and location of land uses near mosquito and biting midge areas.

A number of surveys have been carried out by the Medical Entomology Branch of the Department of Health and Community Services to determine the presence and relative abundance of biting insects of both pest and public health importance. The recommendations below
have been derived from information gathered by the above surveys, together with information on the potential health risks of the various vector mosquito species present, and the pest potential of the various biting insects.

2.0 BITING INSECT SURVEYS OF THE AREA

Four biting insect surveys have been carried out recently and are listed below:


Reports of these surveys have been forwarded to the Department of Lands and Housing. They detail the biting insects present and comment on their potential impact on the development of particular areas.

More information on the potential problems posed by mosquitoes can be found in the Departmental publication "Mosquitoes of public health importance in the Northern Territory and their control" by P. Whelan 1984.
The various habitats of biting insects and their potential impact on the development of rural areas has previously been dealt with in "Biting insects and the rural area strategy plan, April 1987" and most of the guidelines are applicable in the Finniss area.

3.0 THE BITING INSECTS OF PUBLIC HEALTH IMPORTANCE

Mosquitoes are the insects of major public health importance in the Northern Territory.

Malaria is the most important potential mosquito borne disease, and *Anopheles farauti* s.l. is the most important vector. More importance is given to the breeding locations of *Anopheles farauti* than other malaria vectors, but areas of high numbers (over 50 female mosquitoes per CO2 trap per night) of the saltwater species *Anopheles hilli*, and the freshwater species *Anopheles annulipes* and *Anopheles bancroftii* pose potential health threats.

Of the other mosquito vectors, *Culex annulirostris* is next in importance to the *Anopheles* species above. This species is the vector of Australian encephalitis, epidemic polyarthritis and other arbovirus diseases. Areas of high numbers of this species (over 200 female mosquitoes per CO2 trap night) are of high public health concern.

Next in importance are *Aedes vigilax*, the salt marsh mosquito, and *Aedes normanensis*, the flood water mosquito. These two species are vectors of epidemic polyarthritis and are major pest species. Numbers of over 50 females per CO2 trap night are regarded as pest levels and areas with over 100 females per CO2 trap night would be of moderate public health concern.
The biting midges are not a public health concern, although they can be extreme pests, and can lead to secondary health problems. *Culicoides ornatus* is the greatest pest species, while *Culicoides hewitti* is a significant pest within 1km of mangroves.

4.0 LAND USE PLANNING AND BITING INSECTS

The underlying philosophy of land use recommendations, from a medical entomology point of view, is to separate as many people as possible from areas of potentially high numbers of biting insects. Primarily, it is desirable to exclude permanent residential areas from within the effective flight range of the most important malaria vectors. Of secondary importance is to reduce the degree of contact between people and other vector and pest insects.

The other major consideration is to avoid development near environmentally sensitive areas such as flood plains, swamps, marshes and tidal areas. These areas are the major sources of biting insects, and by restricting development near these areas, there will be less likelihood of deleterious ecological changes, and less probability for later pressure to carry out ecologically destructive remedial works.

Urban areas, where residential density is high, have the highest potential to contain people with imported malaria parasites exposed to potential vectors.

Rural living areas, with a lower residential density and more separation from vector breeding or harbouring areas, have a reduced probability to contain such people.
Weekender land use, where maximum use may be at periods of reduced biting insect numbers, and where use is likely to be infrequent, would pose even lower potential problems.

Large tourist developments, while having a relatively higher potential to contain people with malaria parasites, have the means, and a vested interest in carrying out the physical elimination of vector breeding sites and providing biting insect free accommodation and recreation areas.

Planning can protect people from biting insects by:

a. preventing permanent residential development adjacent to significant sources of vector mosquitoes;

b. increasing block size near significant sources of vector or pest insects;

c. locating high use accommodation or recreation activities away from areas that would lead to contact with vector or pest insects;

d. creating buffer zones of limited access between developments and actual or potential biting insect breeding areas in order to protect vulnerable areas from deleterious human activity and to allow access for future land management.

5.0 RECOMMENDATIONS FOR LAND USE IN THE FINNIS RIVER AREA

The major habitats of mosquitoes or biting midges in the Finniss River area have been separated into five categories. Land use recommendations have been given on the type, size and location of land use near these habitats.
The land use recommendations for the Finniss area includes larger minimum block sizes than are currently authorized in other areas. This larger size is felt necessary because of a number of factors including:

1. Lack of local government responsibility for land management and rectification works.

2. Remoteness of the area from an established population centre making checking and response to biting insect problems difficult.

3. Probable lower standard of housing with respect to insect proofing.

4. Possible lack of ground water and an increased need to store water.

These recommendations are intended as a guide on the importance of the different biting insect habitats in terms of potential public health or pest problems. The minimum size of blocks for the various habitats should not be seen as a recommendation for blocks of that size in that location. These recommendations are only from an entomological point of view, and there are other health constraints that need to be considered in land use planning.

5.1 Major brackish and salt water mosquito breeding areas

Land use recommendations

1. No urban development within 1.5km of upper tide limit.

2. No rural blocks less than 10ha within 500m of upper
3. No weekender blocks less than 5 ha within 500m of upper tide limit.

4. No tourist accommodation within 1.0km of upper tide limit.

Examples of such areas in decreasing order of importance are:

a. Large tidal area north and east of Native Point.

b. Tidal influenced interdune swamps near the mouth of the Finniss River.

c. Large mangrove area near Stingray Head.

d. Large mangrove area between Native Point and Stingray Head.

e. Tidal areas of the Finniss River flood plain.

5.2 Extensive fresh water paperbark swamps or flood plains

Land use recommendations

1. No urban development with 1.5km of the Q100 line.

2. No rural blocks less than 5ha within 1.5km of the Q100 line, and rural blocks to have 50% of area above the Q100 line.

3. No weekender blocks less than 2.5ha and weekender blocks to have at least 25% of area above the Q100 line.
4. No tourist accommodation within 1.0km of the Q100 line.

Examples of such areas include the very large wet season flooded area along the Finniss River and the paperbark area inland between Native Point and Stingray Head.

5.3 Minor brackish and salt water mosquito breeding areas

Land use recommendations

1. No urban development within 1.0km of the tidal limit without intensive entomological investigation.

2. No rural blocks less than 2.5ha within 1.0km of the tidal limit, with all rural blocks having a 50m buffer between the blocks and the tidal limit.

3. No weekender blocks less than 1.0ha and with a 10m buffer between weekender blocks and the tidal limit.

4. No restriction on tourist accommodation if remedial drainage works are carried out where necessary.

Examples of these areas include the tidally influenced upper reaches of drainage lines emptying into Port Patterson and Bynoe Harbour, small tidal creeks between Native Point and Stingray Head, and disturbed tidal margins on Crab Claw Island.
If the minor brackish and salt water mosquito breeding areas are completely rectified, the recommendations are the same as for the mangrove areas.

5.4 Extensive mangrove areas with no mosquito breeding sites

Land use recommendations

1. No urban development within 1.0km of tidal limit unless intensive entomological investigations indicate otherwise.

2. No rural blocks of less than 2.5ha, with any rural blocks having a 10m buffer between them and the tidal limit.

3. No weekender blocks less than 1.0ha and with all blocks having a 10m buffer between them and the tide limit.

4. No tourist development within 500m of the extensive mangrove area unless entomological investigations indicate that biting midges are not a potential problem.

5.5 Narrow fringe of mangroves along the coast or on tidal creeks

Land use recommendations

1. Urban development acceptable with a buffer of 50m between the edge of the development and the tide limit.
2. Rural blocks should not be less than 1.0ha and should have a 10m buffer between them and the tide limit.

3. Weekender blocks should be not less than 0.5ha and should have a 10m buffer between them and the tide limit.

4. Tourist developments are acceptable.

Peter Whelan
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Map 1. Survey Area - Section 2881 of the Finniss Region
- Trap and larval collection sites used in survey

- Trap site
- Larval collection site

- Mangrove area
- Area subject to inundation
- Permanent or semi-permanent swamp
- Salt flat
- Dirt road or track

Native Point
Fog
Bay
Stingray Head

Scale (km)