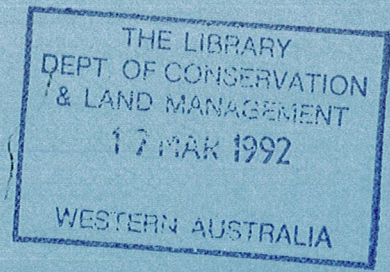


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Department of Conservation
and Land Management



Wood Utilisation Research Centre

**INCIDENCE OF TERMITES OF ECONOMIC
SIGNIFICANCE IN PERTH
A. Postle**

**October 1991
W.U.R.C. Technical Report No. 40**

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**INCIDENCE OF TERMITES OF ECONOMIC
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INCIDENCE OF TERMITES OF ECONOMIC SIGNIFICANCE IN PERTH

A. Postle*

SUMMARY

A survey of termites carried out by pest control operators in metropolitan Perth found four major species: *Coptotermes michaelsoni* Silvestri, *C. acinaciformis raffrayi* Wassmann, *Nasutitermes exitiosus* (Hill) and *Heterotermes platycephalus* Froggatt. The first two species were the most frequently collected. Most termite damage was recorded in outdoor situations. Hardwoods were more frequently infested than softwoods, and details of the types of wood infested, classified by species, are given.

INTRODUCTION

The ever-increasing number of enquiries concerning termite infestations in suburban Perth, and the lack of precise information available on this matter, prompted the Department of Conservation and Land Management (CALM) to initiate a survey in 1987 of the incidence of termite attack, the locations of possible 'hot spots' of infestation, and the identity of the species involved.

Similar surveys undertaken in Melbourne (Howick 1966), Darwin (Beesley and Gay 1966), Sydney (Reynolds and Eldridge 1972), and Canberra (Watson and Barrett 1981) had indicated that only a few of the termite species recorded from these cities were of any economic significance. Howick's (1966) report also suggested that some areas of a city might be more prone to attack than others.

A study of the incidence of termites and their associated damage in Perth would be of intrinsic value and could enable comparisons with the other cities of the termites' preferences for particular wood types, soil types, and rainfall areas. The vulnerability of a particular zone or suburb to termite attack might then be predicted.

METHODS

The assistance of pest control operators involved in termite eradication was requested because of the nature of the work and the area and time involved in carrying out a survey. Through the secretary of the United Pest and Weed Control Association of Western Australia Incorporated, CALM notified the 25 urban pest

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control firms in the Association of the proposed survey. Nineteen of the firms agreed to participate. An independent pest control company joined the survey later.

Each pest control firm was issued with 20 copies of a standard questionnaire (Appendix A), 20 plastic sample bags and 20 vials of 70 per cent alcohol. The operators were requested to collect a vial of specimens of the termites (in particular soldiers) along with samples of damaged wood from each site of infestation, and seal them in a plastic bag with one of the questionnaire sheets. The survey was to be conducted for 1 year, after which, between 500 and 1000 samples of wood and termites were predicted to be available for study.

RESULTS AND DISCUSSION

One hundred and fifty-five vials and 126 wood samples, representing the efforts of 12 pest control firms (Appendix B) had been returned to CALM by April 1989. The termites were identified to species level by using the keys provided in Perry *et al.* (1985). Wherever possible, wood samples were designated as softwood or hardwood, and classified to generic or species level with the aid of CSIRO's modified Cardbox key. However, excessive decay or damage prevented the identification of several samples.

Only 4 species of termites were recorded: *Coptotermes michaelsoni* Silvestri, *C. acinaciformis raffrayi* Wassmann, *Nasutitermes exitiosus* (Hill) and *Heterotermes platycephalus* Froggatt (Table 1). The great majority of the vials contained one or other of the 2 *Coptotermes* species: *N. exitiosus* and *H. platycephalus* were present in only 4 samples and 2 samples respectively.

C. acinaciformis is widespread throughout Australia and is responsible for most of the damage to buildings in Perth and Adelaide, and in country towns in New South Wales, South Australia, southern Queensland and inland Victoria (French 1986). *C. acinaciformis raffrayi* is a sub-species of *C. acinaciformis* found only in the wetter areas of south-west Western Australia. It is the most abundant species in Perth and apparently the most destructive. *C. michaelsoni* is also very common around Perth (Calaby and Gay 1956), and in the current survey was the most frequently encountered species. However, this termite is restricted to the south-west of Western Australia.

N. exitiosus is known throughout southern Australia (Hill 1942), and is of economic significance owing to the damage it causes to fence posts, poles and constructional timber (Gay and Calaby 1970). However, it is rarely a problem in built-up areas because of its mound-building habits, and is more of a problem in outer suburbs and in rural situations. Each of the sites from which it was collected in this survey is adjacent to vacant land.

Code	Pest-control Company	Suburb	Date	Location of damage	Type of attack	Wood Species	Wood type	Termite species
MW1	Flick	Bentley	05.08.1988	Residential	In ground, in floor boards, rafters walls.	No sample. Stated as hardwood	Hard	<i>C. michaelsoni</i>
MW2	Flick	Gosnells	09.08.1988	Residential	Wood stacked on soil	Jarrah	Hard	<i>C. acinaciformis raffrayi</i>
KD1	Flick	City Beach	27.08.1988	Residential and outdoors	Cupboard on concrete floor and two tuart trees	No sample. Stated as hardwood (trees) and softwood (cupboards)	Hard Soft	<i>C. acinaciformis raffrayi</i>
KD2	Flick	Scarborough	08.08.1988	Residential and Outdoors	In tree stump and Jarrah post	No sample. Stated as Jarrah and Tuart	Hard	<i>C. acinaciformis raffrayi</i>
KD3	Flick	Cannington	09.08.1988	Industrial	In floor boards and below floor	Jarrah	Hard	<i>N. exitiosus</i>
KD4	Flick	Ardross	28.08.1988	Outdoors	In tree and fence	? (non eucalypt)	Hard	<i>C. michaelsoni</i>
KD5	Flick	Wattle Grove	28.08.1988	Outdoors	In wattle tree	No sample. Stated as Acacia	Hard	<i>C. michaelsoni</i>
KD6	Flick	Maylands	12.07.1988	Outdoors	In live redgum	No sample. Stated as Redgum	Hard	<i>C. acinaciformis raffrayi</i>
KD7	Flick	Sth Fremantle	04.08.1988	Residential and Outdoors	Pergola	Karri	Hard	<i>C. michaelsoni</i>
KD8	Flick	Warwick	05.08.1988	Outdoors	In trees	Oak	Hard	<i>C. michaelsoni</i>
KD9	Flick	Floreat Park	29.07.1988	Outdoors	In ground and trees	Karri	Hard	<i>C. michaelsoni</i>
KD10	Flick	Fremantle	04.07.1988	Outdoors	In ground and fence	Jarrah	Hard	<i>C. michaelsoni</i>
KD11	Flick	Bentley	13.07.1988	Industrial	In rafters of a restaurant store-room Fibre board	Jarrah	Soft (masonite) Hard(Jarrah)	<i>C. acinaciformis raffrayi</i>

Table 1.

The incidence and identification of termites of economic significance collected in Perth between January 1988 and April 1989. The pest control firms involved with the collections, the suburbs in which the infestations occurred, the locations of the damage and the identification of the wood under attack are also given.

Code *	Pest-control Company	Suburb	Date	Location of damage	Type of attack	Wood Species	Wood type	Termite species
BL1	Barclay's	Stoneville	14.01.1988	Residential	Tree stump	Jarrah	Hard	<i>Coptotermes michaelsoni</i>
BL2	Barclay's	Kensington	21.01.1988	Residential	In floor boards	Jarrah	Hard	<i>C. acinaciformis raffrayi</i>
GL1	Littlewood's	Claremont	10.06.1988	Residential	In floorboards; below floor; wall studs and weather boards	No sample. Stated as Jarrah	Hard	<i>C. acinaciformis raffrayi</i>
GL2	Littlewood's	Bayswater	16.06.1988	Residential	Wall studs on concrete floor	Karri	Hard	<i>C. michaelsoni</i>
GL3	Littlewood's	Eden Hill	18.06.1988	Residential	Door step	No sample. Stated as Jarrah	Hard	<i>Nasutitermes exitiosus</i>
GL4	Littlewood's	Beckenham	23.06.1988	Outdoors	Poplar trees	No sample. Stated as Poplar	Hard	<i>C. michaelsoni</i>
GL5	Littlewood's	Duncraig	28.06.1988	Outdoors	Damage to garden edging	Jarrah	Hard	<i>C. michaelsoni</i>
GL6	Littlewood's	Lathlain	16.07.1988	Outdoors	Damage to contents and timber rails in garage	Alpine Ash <i>E.delegatensis</i>	Hard	<i>C. michaelsoni</i>
GL7	Littlewood's	Banjup	29.07.1988	Residential	In ground, below floor	No sample. Stated as hardwood	Hard	<i>C. michaelsoni</i>
GL8	Littlewood's	Como	10.08.1988	Residential and outdoors	Wall studs, garage, workshop	No sample. Stated as Jarrah	Hard	<i>C. michaelsoni</i>
VL1	Allpest	South Perth	23.03.1988	Residential	Kitchen cupboard	Pine?	Soft	<i>C. acinaciformis raffrayi</i>
VL2	Allpest	Maylands	24.03.1988	Residential	Below floor, in floorboards and door frames	Spruce	Soft	<i>C. acinaciformis raffrayi</i>

Code	Pest-control Company	Suburb	Date	Location of damage	Type of attack	Wood Species	Wood type	Termite species
TC1	Allpest	Inglewood	22.02.1988	Outdoors	In ground	Oak	Hard	<i>C. michaelsoni</i>
TC2	Allpest	Carlisle	22.02.1988	Residential	In shed, in cardboard boxes	-	-	<i>C. michaelsoni</i>
BGM1	Allpest	MaidaVale	19.01.1988	Outdoors	Tree and loose timber stack	No sample. Stated as Marri and Jarrah	hard	<i>C. acinaciformis raffrayi</i>
BGM2	Allpest	Thornlie	20.01.1988	Residential	In ground, in floorboards	No sample. Stated as Pine and Wattle	Soft (Pine) Hard(Wattle)	<i>Heterotermes platycephalus</i>
BGM3	Allpest	Lynwood	21.01.1988	Outdoors	In ground, in tree	No sample. Stated as Virgilia, a legume	-	<i>C. michaelsoni</i>
4 P1	Protector	Serpentine	11.01.1988	Residential and outdoors	In fence	Jarrah	Hard	<i>No soldier termites in sample</i>
P2	Protector	Waroon	11.01.1988	Residential and outdoors	Jarrah	In ground	Hard	<i>C. michaelsoni</i>
P3	Protector	Forrestfield	12.01.1988	Residential and outdoors	In ground	Jarrah	Hard	<i>C. michaelsoni</i>
P4	Protector	Wembley	12.01.1988	Residential	In ground (tree stump)	?	Hard	<i>C. michaelsoni</i>
P19	Protector	Thornlie	29.01.1988	Residential	In ground	Karri ?	Hard	<i>C. acinaciformis raffrayi</i>
BR1	Bob Rankine's	Victoria Park	11.02.1989	Industrial	In ground	No sample. Stated as Karri	Hard	<i>C. michaelsoni</i>
BR2	Bob Rankine's	South Perth	10.02.1989	Residential	In ground in sleepers	No sample. Stated as Karri	Hard	<i>C. acinaciformis raffrayi</i>
BR3	Bob Rankine's	Swanview	02.03.1989	Residential	In ground, in post	No sample. Stated as Karri	Hard	<i>C. acinaciformis raffrayi</i>

Code	Pest-control Company	Suburb	Date	Location of damage	Type of attack	Wood Species	Wood type	Termite species
BR4	Bob Rankine's	Parkerville	03.03.1989	Residential	Pine wardrobe in brick paved garage	No sample. Stated as Pine	Soft	<i>C. acinaciformis raffrayi</i>
BR5	Bob Rankine's	Darlington	05.03.1989	Residential	In ground. In pine post	No sample. Stated as Pine	Soft	<i>C. acinaciformis raffrayi</i>
BR6	Bob Rankine's	Mt. Lawley	08.03.1989	Residential	Below floor and in floor boards	No sample. Stated as Jarrah	Hard	<i>C. acinaciformis raffrayi</i>
BR7	Bob Rankine's	Stoneville	13.03.1989	Residential	In floor boards	No sample. Stated as Pine	Soft	<i>C. michaelsoni</i>
BR8	Bob Rankine's	Darlington	28.03.1989	Residential	Below floor and in floorboards	No sample. Stated as Jarrah	Hard	<i>C. acinaciformis raffrayi</i>
BR9	Bob Rankine's	Guildford	15.04.1989	Residential	Below floor and in floorboards and door frame	No Sample. Stated as Pine and Jarrah	Soft (Pine) Hard(Jarrah)	<i>C. acinaciformis raffrayi</i>
BR10	Bob Rankine's	Greenmount	16.04.1989	Residential	In floorboards, post and weather board	No sample. Stated as Jarrah	Hard	<i>C. acinaciformis raffrayi</i>
KP1	Fremantle	Highgate	15.02.1988	Outdoors	In ground	No sample. Stated as Karri	Hard	<i>C. acinaciformis raffrayi</i>
KP2	Fremantle	Claremont	15.01.1988	Outdoors	Tree stump	Keys to <i>Tristania conferta</i>	Soft	<i>C. michaelsoni</i>
BW	Fremantle	Claremont	15.01.1988	Residential and outdoors	Shrub stump	Very dark heart-wood. Not in card key	Hard	<i>C. acinaciformis raffrayi</i>
MH1	Fremantle	East Fremantle	11.01.1988	Outdoors	In ground under railway sleepers	No sample. Stated as Jarrah	Hard	<i>N. exitiosus</i>
MH2	Fremantle	Gooseberry Hill	29.04.1988	Outdoors	In ground near gumtree	No sample. Stated as gumtree	Hard	<i>C. acinaciformis raffrayi</i>

Code	Pest-control Company	Suburb	Date	Location of damage	Type of attack	Wood Species	Wood type	Termite species
MH3	Fremantle	Bicton	01.08.1988	Outdoors	In ground under sleepers	No sample. Possibly Jarrah	Hard	<i>C. michaelsoni</i>
KM1	Fremantle	Beaconsfield	24.08.1988	Residential	Wall of garage. House 2 yrs old, not pretreated	No sample. No information	-	<i>C. michaelsoni</i>
KM2	Fremantle	Subiaco	20.01.1988	Residential	In ground, below floor boards, rafters	Jarrah	Hard	<i>C. michaelsoni</i>
KM3	Fremantle	Willagee	08.06.1988	Residential	In ground, below floorboards, in floorboards, in pine cupboard of garage	Sample too small	Soft	<i>C. michaelsoni</i>
KM4	Fremantle	Nth Fremantle	26.02.1988	Residential	In ground, floorboards, rafters, kitchen cupboards	-	-	<i>C. acinaciformis raffrayi</i>
KM5	Fremantle	East Fremantle	12.07.1988	Residential	In ground, weather boards, side of house coming out of concrete verandah	Jarrah	Hard	<i>C. acinaciformis raffrayi</i>
JE1	Aaron Lee	Alfred Cove	08.01.1988	Residential and Outdoors	In ground and in Karri sleepers as garden border	Karri	Hard	<i>C. michaelsoni</i>
JE2	Aaron Lee	Bibra Lake	11.01.1988	Residential and Outdoors	Jarrah sleeper retaining wall	Jarrah	Hard	<i>N. exitiosus</i>
JE3	Aaron Lee	Lynwood	12.01.1988	Residential and Outdoors	Jarrah fence	Jarrah	Hard	<i>C. michaelsoni</i>
ROD1	Aaron Lee	Riverton	13.01.1988	Residential	Smooth edge on concrete floor	Pine	Soft	<i>C. michaelsoni</i>
ROD2	Aaron Lee	Yangebup	12.01.1988	Residential	Railway sleepers	Jarrah	Hard	<i>C. michaelsoni</i>
CB	Aaron Lee	Riverton	08.01.1988	Residential	In door frames and internal timbers	Karri	Hard	<i>C. michaelsoni</i>

Code	Pest-control Company	Suburb	Date	Location of damage	Type of attack	Wood Species	Wood type	Termite species
KD12	Flick	Koondoola	18.01.1988	Outdoors	In large tree stump	Karri	Hard	<i>C. michaelsoni</i>
KD13	Flick	Manning	08.01.1988	Outdoors	Loose timber on ground	Jarrah	Hard	<i>C. michaelsoni</i>
KD14	Flick	Kingsley	14.01.1988	Residential and Outdoors	Termites active in pergola, trees, posts, garden shed and various live shrubs	Jarrah, Tuart. Cardboard and newspaper also	Hard	<i>C. michaelsoni</i>
KD15	Flick	Cottesloe	12.01.1988	Residential and Outdoors	Fences and timber frame and plate of garage	Jarrah	Hard	<i>C. michaelsoni</i>
KD16	Flick	North Perth	19.01.1988	Outdoors	In live tree	No sample. Stated as Jarrah	Hardwood. Non-eucalypt	<i>C. michaelsoni</i>
KD17	Flick	Greenwood	18.01.1988	Outdoors	In ground	Jarrah	Hard	<i>C. michaelsoni</i>
KD18	Flick	Belmont	11.01.1988	Residential	In ground, below floor, in floor boards	Jarrah, Pine	Hard (Jarrah)	<i>C. acinaciformis raffrayi</i>
KD19	Flick	Subiaco	08.01.1988	Residential	Very large blocks of wood and post of pergola	No sample. Stated as Jarrah	Hard	<i>C. acinaciformis raffrayi</i>
KD20	Flick	Subiaco	09.01.1988	Residential and outdoors	In ground, below floor, in floor boards to jarrah foundation stumps, wall frame and flooring.	Jarrah, Karri, Loquat, Plum	Hard	<i>C. michaelsoni</i>
KD21	Flick	Warwick	13.01.1988	Residential	Wood panelling, panel frame	Stated as Jarrah, Karri, Pine	Soft(Pine) Hard (Jarrah) (Karri)	<i>C. michaelsoni</i>
EM1	Flick	Scarborough	25.08.1988	Residential	No sample, no information			<i>C. michaelsoni</i>
EM2	Flick	Hamilton Hill	02.08.1988	Residential and outdoors	In ground (sleepers)	Karri	Hard	<i>C. michaelsoni</i>

Code	Pest-control Company	Suburb	Date	Location of damage	Type of attack	Wood Species	Wood type	Termite species
EM3	Flick	Maida Vale	26.07.1988	Residential	Below floor, in rafters	Karri (?)	Hard	<i>C. acinaciformis raffrayi</i>
EM4	Flick	Duncraig	20.07.1988	Residential	Tree	Bark only. Possibly eucalypt	Hard	<i>C. michaelsoni</i>
EM5	Flick	Mt Lawley	15.01.1988	Outdoors	Fence	Karri	Hard	<i>C. michaelsoni</i>
EM6	Flick	Jandakot	05.08.1988	Industrial	Timber wall frame to concrete floored factory	-	-	<i>C. michaelsoni</i>
M1	Flick	Yokine	19.01.1988	Residential	In ground	Eucalyptus sp	Hard	<i>C. acinaciformis raffrayi</i>
DHB1	Premier	Balga	03.03.1988	Outdoors	In ground	Karri	Hard	<i>C. michaelsoni</i>
DHB2	Premier	Beechboro	17.02.1988	Outdoors	In ground	Araucaria sp	Soft	<i>C. michaelsoni</i>
PGR1	Atlas	Noranda	03.02.1988	Residential	Concrete floor under carpets and bathroom cupboards	Pine	Soft	<i>C. michaelsoni</i>
PGR2	Atlas	High Wycombe	03.02.1988	Residential	In ground	Karri	Hard	<i>C. michaelsoni</i>
PGR3	Atlas	Greenwood	04.02.1988	Residential	In ground	Jarra	Hard	<i>C. michaelsoni</i>
PGR4	Atlas	Daglish	04.02.1988	Residential	In ground	Unidentified	Hard	<i>C. michaelsoni</i>
PGR5	Atlas	Thornlie	08.02.1988	Residential	Tools in garage on concrete floor	Spotted gum	Hard	<i>C. michaelsoni</i>
PGR6	Atlas	Thornlie	13.02.1988	Outdoors	In ground	Jarra	Hard	<i>C. michaelsoni</i>
PGR7	Atlas	Karrinyup	16.02.1988	Outdoors	In ground	Eucalyptus sp	Hard	<i>H. platycephalus</i>
PGR8	Atlas	Edgewater	17.02.1988	Outdoors	In ground	Bamboo	Hard	<i>C. michaelsoni</i>
PGR9	Atlas	Hamilton Hill	01.02.1988	Outdoors	In ground	Jarra	Hard	<i>C. michaelsoni</i>

Code	Pest-control Company	Suburb	Date	Location of damage	Type of attack	Wood Species	Wood type	Termite species
PGR10	Atlas	Padbury	29.02.1988	Residential	In ground	Jarrah	Hard	<i>C. michaelsoni</i>
PGR11	Atlas	Maida Vale	01.03.1988	Outdoors	In ground	Karri	Hard	<i>C. michaelsoni</i>
PRG1	Atlas	Allinjarra	04.02.1988	Outdoors	Timber on sand	Pine	Soft	<i>C. michaelsoni</i>
PRG2	Atlas	Padbury	09.02.1988	Residential and Outdoors	Timber into brick paving	Karri	Hard	<i>C. michaelsoni</i>
AP1	Eagle	Duncraig	11.01.1988	Outdoors	Railway sleepers	Jarrah	Hard	<i>C. michaelsoni</i>
AP2	Eagle	Kensington	14.01.1988	Outdoors	Garden sleepers	Karri	Hard	<i>C. michaelsoni</i>
AP3	Eagle	Mt Lawley	18.01.1988	Outdoors	Fence	Tasmanian Oak	Hard	<i>C. michaelsoni</i>
AP4	Eagle	Morley	19.01.1988	Outdoors	Letter box post	Karri	Hard	<i>C. michaelsoni</i>
AP5	Eagle	Caversham	19.01.1988	Outdoors	Peach Tree	Stated as Peach. Not in key	Hard	<i>C. michaelsoni</i>
AP6	Eagle	Dianella	21.01.1988	Outdoors	Front lawn stump	White Cedar (?)	Hard	<i>C. michaelsoni</i>
AP7	Eagle	Tuart Hill	21.01.1988	Outdoors	On the fence	Karri	Hard	<i>C. michaelsoni</i>
AP8	Eagle	Duncraig	22.01.1988	Outdoors	Garden post	Karri	Hard	<i>C. michaelsoni</i>
AP9	Eagle	Subiaco	22.01.1988	Outdoors	In the tree	Unidentified exotic	Hard	<i>C. acinaciformis raffrayi</i>
AP10	Eagle	Yokine	30.01.1988	Outdoors	In a pile of wood	Karri	Hard	<i>C. michaelsoni</i>
AP11	Eagle	Bayswater	03.02.1988	Outdoors	Telephone pole	Karri	Hard	<i>C. michaelsoni</i>
AP12	Eagle	North Perth	03.02.1988	Outdoors	On a post in a firewood shed	Spruce	Soft	<i>C. acinaciformis raffrayi</i>
AP13	Eagle	Morley	05.02.1988	Outdoors	On sleepers of swimming pool	Karri	Hard	<i>C. michaelsoni</i>

Code	Pest-control Company	Suburb	Date	Location of damage	Type of attack	Wood Species	Wood type	Termite species
AP14	Eagle	Inglewood	08.02.1988	Outdoors	On door of shed	Karri	Hard	<i>C. michaelsoni</i>
AP15	Eagle	Mt. Hawthorn	10.02.1988	Outdoors	On almond tree	Almond	Hard	<i>C. michaelsoni</i>
AP16	Eagle	Subiaco	09.02.1988	Outdoors	On a picket fence	Unidentified	Hard	<i>C. michaelsoni</i>
AP17	Eagle	Floreat Park	11.02.1988	Outdoors	Tree	Unidentified native	Hard	<i>C. acinaciformis raffrayi</i>
AP18	Eagle	Mt. Lawley	13.02.1988	Outdoors	Under concrete slab	-	-	<i>C. michaelsoni</i>
AP19	Eagle	Innaloo	19.02.1988	Outdoors	Post at shed	Karri	Hard	<i>C. michaelsoni</i>
AP20	Eagle	Morley	20.02.1988	Outdoors	Firewood	Jarrah	Hard	<i>C. michaelsoni</i>
AP21	Eagle	Wembley	26.02.1988	Outdoors	Near footpath	Karri	Hard	<i>C. michaelsoni</i>
AP22	Eagle	Doubleview	03.03.1988	Outdoors	Pergola Post	Jarrah	Hard	<i>C. michaelsoni</i>
AP23	Eagle	Nollamara	04.03.1988	Outdoors	Tree stump	Non eucalypt	Hard	<i>C. michaelsoni</i>
AP24	Eagle	Morely	12.03.1988	Outdoors	In sleepers	Jarrah	Hard	<i>C. acinaciformis raffrayi</i>
AP25	Eagle	Dianella	18.03.1988	Outdoors	In stump	Non eucalypt	Hard	<i>C. michaelsoni</i>
AP26	Eagle	Nollamara	23.03.1988	Outdoors	On tree	Eucalyptus sp.	Hard	<i>C. michaelsoni</i>
AP27	Eagle	Tuart Hill	23.03.1988	Outdoors	4m above ground in tree	Eucalyptus sp.	Hard	<i>C. acinaciformis raffrayi</i>
AP28	Eagle	Morley	23.03.1988	Outdoors	On tree	Insufficient sample	Hard	<i>C. michaelsoni</i>
AP29	Eagle	Greenwood	24.03.1988	Outdoors	On tree that had fallen due to termites	Bark only	Hard	<i>C. michaelsoni</i>
AP30	Eagle	Bassendean	30.03.1988	Outdoors	On ground next to tree	Marri	Hard	<i>C. acinaciformis raffrayi</i>
AP31	Eagle	Dianella	02.04.1988	Outdoors	Dry pine tree	Pine	Soft	<i>C. michaelsoni</i>

Code	Pest-control Company	Suburb	Date	Location of damage	Type of attack	Wood Species	Wood type	Termite species
AP32	Eagle	Kingsley	05.04.1988	Outdoors	Log on ground	Banksia	Hard	<i>C. michaelseni</i>
AP33	Eagle	Gidgegannup	11.04.1988	Outdoors	On log	Jarrah	Hard	<i>C. acinaciformis raffrayi</i>
AP34	Eagle	Morley	12.04.1988	Outdoors	On a stump	Non eucalypt	Hard	<i>C. michaelseni</i>
AP35	Eagle	Guildford	12.04.1988	Outdoors	On wall	Jarrah	Hard	<i>C. acinaciformis raffrayi</i>
AP36	Eagle	Girrawheen	18.04.1988	Outdoors	On a stump	Banksia (?)	Hard	<i>C. michaelseni</i>
AP37	Eagle	Ardross	28.04.1988	Outdoors	Post near swimming pool	No sample. Stated as hardwood	Hard	<i>C. michaelseni</i>
AP38	Eagle	Wembley	29.04.1988	Outdoors	On tree in back yard	Insufficient sample. Non eucalypt	Hard	<i>C. michaelseni</i>
AP39	Eagle	Noranda	05.05.1988	Outdoors	Wooden pole	Pine	Soft	<i>C. michaelseni</i>
AP40	Eagle	Henley Brook	09.05.1988	Outdoors	Cupboard on verandah	Fibreboard	Soft	<i>C. acinaciformis raffrayi</i>
IRB1	Rentokil	Bateman	11.01.1988	Residential	Support timbers of garage	Karri	Hard	<i>C. michaelseni</i>
IRB2	Rentokil	Wembley	12.01.1988	Toilet Block, public bowling green	Termites travelling up cavity and behind ceramic tiles.	No timber attacked	-	<i>C. acinaciformis raffrayi</i>
IRB3	Rentokil	Nedlands	13.01.1988	Outdoors	Firewood in yard area	Spruce (?)	Soft	<i>C. michaelseni</i>
IRB4	Rentokil	Peppermint Grove	14.01.1988	Residential	To cupboard in garage area	Pine	Soft	<i>C. acinaciformis raffrayi</i>
IRB5	Rentokil	Tuart Hill	14.01.1988	Outdoors	Debris timber on ground	Karri	Hard	<i>C. michaelseni</i>
JS1	Rentokil	Shenton Park	08.01.1988	Outdoors	Rear fence post	Jarrah	Hard	<i>C. acinaciformis raffrayi</i>
JS2	Rentokil	East Vic Park	12.01.1988	Outdoors	In sleepers	Jarrah	Hard	<i>C. acinaciformis raffrayi</i>
JS3	Rentokil	Palmyra	14.01.1988	Outdoors	In yard on bench	White Oak	Hard	<i>C. michaelseni</i>

Code	Pest-control Company	Suburb	Date	Location of damage	Type of attack	Wood Species	Wood type	Termite species
JS4	Rentokil	Vic Park	27.01.1988	Residential and Outdoors	In fence, in ground	Jarrah	Hard	<i>C. michaelsoni</i>
JS5	Rentokil	Shenton Park	01.02.1988	Residential	In floorboards and in wardrobes	Jarrah	Hard	<i>C. michaelsoni</i>
SG1	Rentokil	Doubleview	12.01.1988	Residential	Door frames	Karri	Hard	<i>C. acinaciformis raffrayi</i>
SG2	Rentokil	Nedlands	14.01.1988	Residential	Door frame above cement slab	Insufficient sample.	Soft	<i>C. michaelsoni</i>
SG3	Rentokil	Claremont	15.02.1988	Outdoors	In ground, in telegraph pole	Insufficient sample. Possibly eucalypt	Hard	<i>C. michaelsoni</i>
SG4	Rentokil	Nedlands	12.02.1988	Residential	In front garden fence	Insufficient sample. Probably Karri	Hard	<i>C. michaelsoni</i>
SG5	Rentokil	Floreat	28.01.1988	Residential	Laundry cupboard, on cardboard raft	Insufficient sample.	Hard	<i>C. michaelsoni</i>
TK1	Rentokil	Duncraig	07.01.1988	Outdoors	Tree stump in front garden	Bark sample only. <i>Eucalyptus</i> sp?	Hard	<i>C. michaelsoni</i>
TK2	Rentokil	Kalamunda	09.02.1988	Outdoors	Ground	Jarrah	Hard	<i>C. acinaciformis raffrayi</i>
TK3	Rentokil	Greenmount	09.02.1988	Outdoors	In ground	<i>Eucalyptus</i> sp.	Hard	<i>C. acinaciformis raffrayi</i>
TK4	Rentokil	Darlington	09.02.1988	Outdoors	In ground	Small sapwood sample. Not enough cells.	Hard	<i>C. acinaciformis raffrayi</i>

* The code refers to specific pest control firms as listed in Appendix B.

H. platycephalus occurs only in Western Australia and South Australia (Gay and Calaby 1970) and although common in some reserves in Perth (Perry, personal communication*), it is not known to be of economic significance (Gay and Calaby 1970). The species was recorded only twice in the 1988/89 survey but was not attacking structural timber (Table 1).

Termite damage was more commonly recorded from outdoor situations such as trees and tree stumps, wood piles, fences, posts, than from inside houses (Table 2). This probably reflects the termite-proofing measures which are incorporated in the construction of all buildings in Perth, although it may also be a function of nesting-site preferences. A large proportion of termite infestations reported from dwellings were recorded from floorboards or beneath floorboards.

The results did not indicate whether infestations represented the actual nesting sites or were exploratory galleries from outside. Termites are known to construct galleries up to 50 m from a nest (Greaves 1959; Gay and Calaby 1970).

Termite infestations were detected in a variety of timbers (Tables 1 and 3). The majority of these were hardwoods, usually karri (*Eucalyptus diversicolor* F. Muell) or jarrah (*E. marginata* Donn ex Sm.) although other eucalypts - tuart (*E. gomphocephala*), marri (*E. calophylla* Lindl.), and alpine ash (*E. regnans* F. Muell) were also attacked. This apparent preference for hardwoods probably reflects the abundance of these timbers in Perth buildings, rather than the comparative immunity of softwoods to termite attack (Table 4).

The distribution of the 4 species throughout Perth as indicated by the survey (Figure 1) shows that although *C. michaelsoni* and *C. acinaciformis raffrayi* are confirmed as the most commonly occurring and destructive termite species in Perth, the incidence of termite attack is difficult to assess because of the small number of samples available for consideration. According to the data, the majority of infestations occur on the north side of the Swan River, especially around Subiaco, Wembley, Mt. Lawley, Morley and, interestingly because it is a newer suburb, Duncraig. Residential suburbs of similar ages south of the river seem to enjoy a comparatively termite-free status.

There were only a few reports of damage from industrial areas (Table 5). This could be owing to a shortage of nesting sites or suitable food material, but there is a possibility that with fewer permanent residents in these suburbs, termites are not observed.

* Mr D. Perry. Retired from Forests Department of Western Australia, Perth.

Table 2

The substrates in which termites were recorded and the species of termites collected in Perth between January 1988 and April 1989.

Substrate	No of reported cases	Incidence of <i>C. michaelsoni</i>	Incidence of <i>C. ac. raffrayi</i>	Incidence of <i>N. exitiosus</i>	Incidence of <i>H. platycephalus</i>
Below floor-boards	12	2	9	1	-
Floor boards	18	6	10	1	1
Wall studs	8	5	3	-	-
Rafters	5	2	3	-	-
Door frames and steps	7	3	3	1	-
Wood panelling and weatherboard	5	1	4	-	-
Furniture (Cupboards)	8	4	4	-	-
Ground	40	25	13	-	2
Concrete slabs	3	3	-	-	-
Trees	22	17	5	-	-
Tree stumps	12	10	2	-	-
Railway sleepers	13	8	3	2	-
Garages and contents	10	9	1	-	-
Wood piles	10	7	3	-	-
Fences and posts	24	19	5	-	-
Pergolas	4	3	1	-	-
Other	2	2	-	-	-

Table 3

Trees and timber products in which termites were recorded in Perth between January 1988 and April 1989. The species of termites attacking these materials are also listed

Tree/timber product	No of reported cases	Incidence of <i>C. michaelsoni</i>	Incidence of <i>C. ac. raffrayi</i>	Incidence of <i>N. exitiosus</i>	Incidence of <i>H. platycephalus</i>
Jarrah (<i>Eucalyptus marginata</i> Donn ex. Sm.)	49	26	19	4	-
Karri (<i>E. diversicolor</i> F. Muell.)	32	27	5	-	-
Alpine Ash/ Tasmanian Oak (<i>E. delegatensis</i> R.Baker)	2	2	-	-	-
Marri/Red Gum (<i>E. calophylla</i> R. Br.)	3	-	3	-	-
Tuart (<i>E. gomphocephala</i> D.C.)	2	1	1	-	-
Spotted Gum (<i>E. maculata</i> Hook.)		1	-	-	-
Unidentified <i>Eucalyptus</i> sp (p) 8		4	3	-	1
Poplar (<i>Populus</i> spp.)	1	1	-	-	-
Spruce (<i>Picea</i> spp.)	3	1	2	-	-
Oak (<i>Quercus</i> spp.)	2	2	-	-	-
Wattle (<i>Acacia</i> spp.)	2	1	-	-	1
Virgilia (<i>Virgilia</i> spp.)	1	1	-	-	-
Brush Box (<i>Lophostomum confertus</i> syn. <i>Tristania conferta</i>)	1	1	-	-	-
Loquat (<i>Eriobotrya japonica</i> Lindl.)	1	1	-	-	-
Bamboo(?)	1	1	-	-	-
Plum (<i>Prunus</i> spp.)	1	1	-	-	-
Peach (<i>Prunus</i> spp.)	1	1	-	-	-
Almond (<i>Prunus</i> spp.)	1	1	-	-	-
Hoop Pine (<i>Araucaria cunninghamii</i>)	1	1	-	-	-
White Cedar (<i>Melia azadarach</i> L.)	1	1	-	-	-
White Oak (<i>Quercus alba</i> L.)	1	1	-	-	-
Banksia (<i>Banksia</i> spp.)	2	2	-	-	-
Cardboard	2	2	-	-	-
Fibreboard	1	-	1	-	-

Table 4

The comparative susceptibility of hardwoods and softwoods to termite attack in Perth between January 1988 and April 1989. The species of termites collected are also recorded.

Wood type	No of reported cases	Incidence of <i>C. michaelsoni</i>	Incidence of <i>C. ac. raffrayi</i>	Incidence of <i>N. exitiosus</i>	Incidence of <i>H. platycephalus</i>
Hardwood	126	84	36	4	2
Softwood	24	11	12	-	1

Table 5

The locations of termite damage in Perth between January 1988 and April 1989 and the species of termites involved.

Location of damage	No of reported cases	Incidence of <i>C. michaelsoni</i>	Incidence of <i>C. ac. raffrayi</i>	Incidence of <i>N. exitiosus</i>	Incidence of <i>H. platycephalus</i>	Other
Residential	51	27	22	1	1	-
Outdoors	80	60	18	1	1	-
Residential and Outdoors	17	12	3	1	1	1
Industrial	4	2	1	1	-	-
Other	1	-	1	-	-	-

Attempts to correlate the incidence of *C. michaelsoni* and *C. acinaciformis raffrayi* with soil types were inconclusive. Most of suburban Perth is built on sand-plain, which is comprised mostly of the Quindalup, Cottesloe, Karakatta and Bassendean soil systems (Bettenay *et al.* 1960). No termites were recorded from the Quindalup sands which front the coastline, and only a few from suburbs built over the Cottesloe sands. The majority of termites were collected from areas dominated by the deeper Karrakatta and Bassendean sands, possibly because these soils contain more clay which *C. michaelsoni* and *C. acinaciformis raffrayi*, at least, require for nest building. Further collecting is necessary before it can be established whether this situation does exist, and is not merely a function of inadequate sampling.

Thirty-two species of termites have been recorded from the extreme south-west of Western Australia (Perry *et al.* 1985) and of these, at least 22 are known to occur in the Perth metropolitan area. The present survey has indicated that only 2 termite species pose any serious threat to buildings and other wood-derived material in

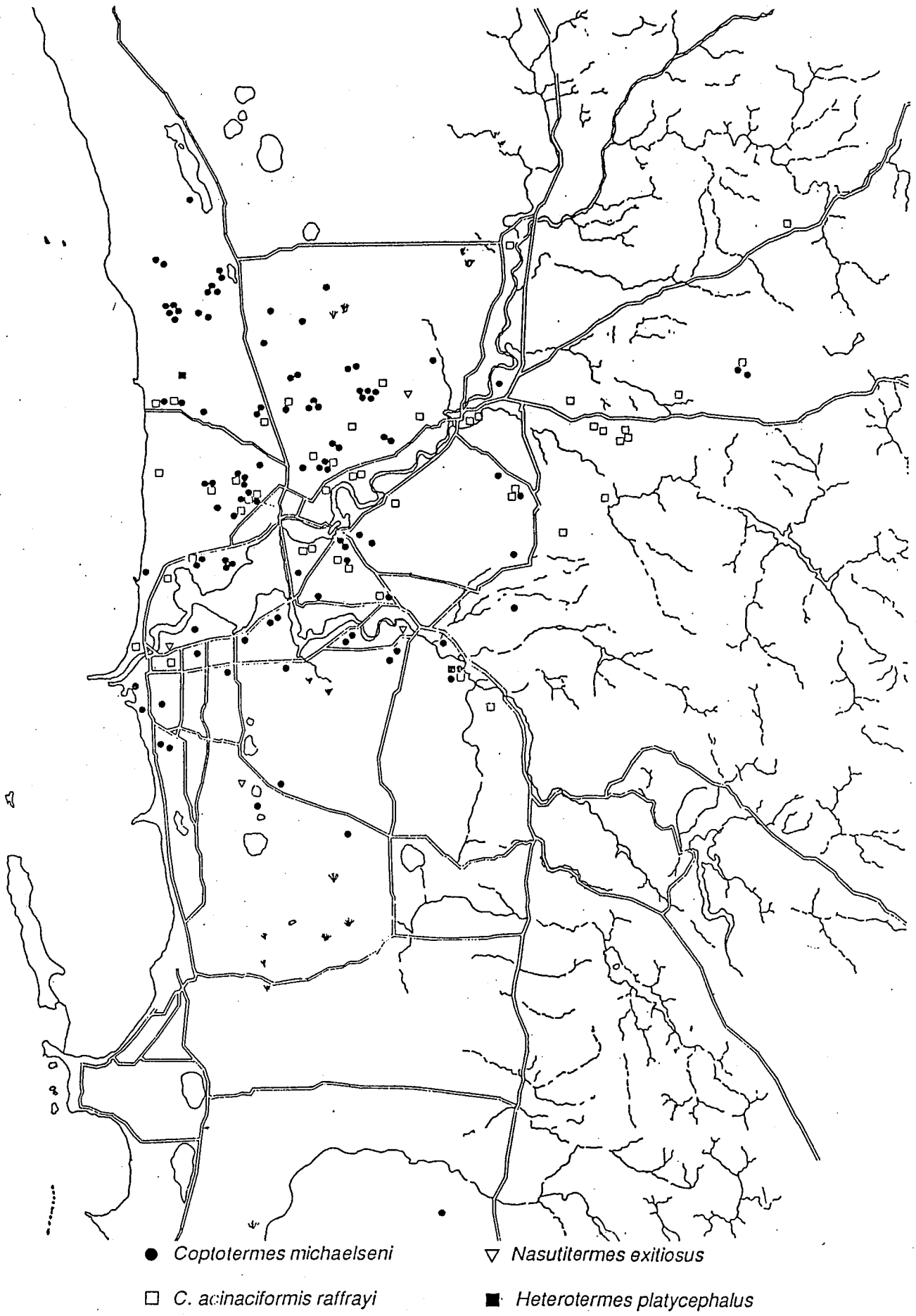


Figure 1

Distribution of termites collected from Perth dwellings, 1988/89

Perth, despite the fact that several other species are common throughout the city. More collecting is required, obviously, before the full extent of termite occurrence and infestations throughout Perth is revealed, but the system of voluntary collecting by pest control operators, although helpful, is inadequate.

Future surveys of this kind should perhaps be undertaken by CALM staff or contract employees who could accompany pest control operators to sites of termite attacks and carry out the appropriate collections and observations. Meanwhile, student projects may be devised to obtain further information on the occurrence, nest-building habits, wood preference, etc. of termite species in reserves, parks, vacant properties and uncleared crown land in and around Perth. An information booklet, combining these data and including, perhaps, illustrations and identification-keys, might then be distributed to the public and other interested parties. The appearance of such a publication seems long overdue.

REFERENCES

- BEESELEY, J. and GAY, F.J. (1966). The prevention of termite attack in the Northern Territory. Report on a visit to Darwin, Northern Territory, sponsored by the Commonwealth Department of Works, to advise on termite hazard and control procedures. (Unpublished).
- BETTENAY, C., MC ARTHUR, W.M. and HINGSTON, F.J. (1960). The soil associations of part of the Swan Coastal Plain, Western Australia. CSIRO Soils and Land Use Series No. 35.
- CALABY, J.H. and GAY, F.J. (1956). The distribution and biology of the genus *Coptotermes* (Isoptera) in Western Australia. Australian Journal of Zoology 4, 19-39.
- FRENCH, J.R.J. (1986). Termites and their economic importance in Australia. In Economic impact and control of social insects. Praeger Press, New York. 422 pp.
- GAY, F.J. and CALABY, J.H. (1970). Termites of the Australian Region. In Biology of Termites Vol. 2. Academic Press, New York and London. 643 pp.
- GREAVES, T. (1959). Termites as forest pests. Australian Forestry 23: 114-120.
- HILL, G.F. (1942). Termites (Isoptera) from the Australian Region. CSIRO Melbourne. 479 pp.
- HOWICK, C.D. (1966). The incidence and distribution of termite attack in Melbourne and environs. The Quantity Surveyor 13 (4): 18-19.
- PERRY, D.H., WATSON, J.A.C., BUNN, S.E., and BLACK, R. (1985). Guide to the termites (*Isoptera*) from the extreme south-west of Western Australia. Journal of the Royal Society of Western Australia 67 (2): 66-78.
- REYNOLDS, J.L. and ELDRIDGE, R.H. (1972). The distribution and abundance of termites attacking wood in service in the Sydney area. CSIRO 16th Forest Products Research Conference, Volume 1, Topic 3/39. Melbourne, November 1972.
- WATSON, J.A.L. and BARRETT, R.A. (1981). Termites in the Canberra region. CSIRO, Canberra. 38 pp.

Appendix A

A copy of the questionnaire distributed to the pest control firms which participated in the 1988/89 survey of the incidence of termite infestation in Perth.

SURVEY OF TERMITES IN METROPOLITAN PERTH

1. CODE NO.
(Observer's Initials followed by consecutive numbers e.g. PRG 1, PRG 2 etc).
Use this code number to label the vial containing the termites and the plastic bag containing the wood sample. Please write labels with pencil.
Species of termites can only be identified if soldiers are present. These have brown, rather than white, heads.

2. STREET: _____

3. SUBURB: _____

4. DATE: _____

5. COMPANY: _____

6. OBSERVER: _____

7. LOCATION OF DAMAGE: Residential?
Industrial? (Tick the appropriate box)
Outdoors?

8. TYPE OF ATTACK:

Structure attacked is: in ground?
above ground but below floor?
above ground but in floorboards?
above ground but in rafters?
elsewhere (specify) _____

9. SPECIES OF WOOD ATTACKED:

If possible, provide sample in plastic bag, add label, and seal bag.

If not possible to provide sample, is the wood a hardwood?
or a softwood?

What species do you think it is? _____

Thankyou.

Appendix B

The list of pest control firms whose operators returned samples of termites and timber in the 1988/89 survey of the incidence of termite infestation in Perth

Pest-control Company	No. of termite samples	No. samples identified	No. of wood samples	No. of samples identified
Barclay's	2	2	2	2
Littlewood's	8	8	3	3
Allpest	7	7	4	4
Protector	5	4*	5	4
Rankine's	10	10	0	-
Fremantle	11	11	7	3
Aaron Lee	6	6	6	6
Flick	30	30	23	19
Premier	2	2	2	2
Atlas	13	13	13	12
Eagle	40	40	40	27
Rentokil	19	19	19	12
Unlabelled	2	2	2	-
Total	155	154	126	94

* One vial contained no soldiers