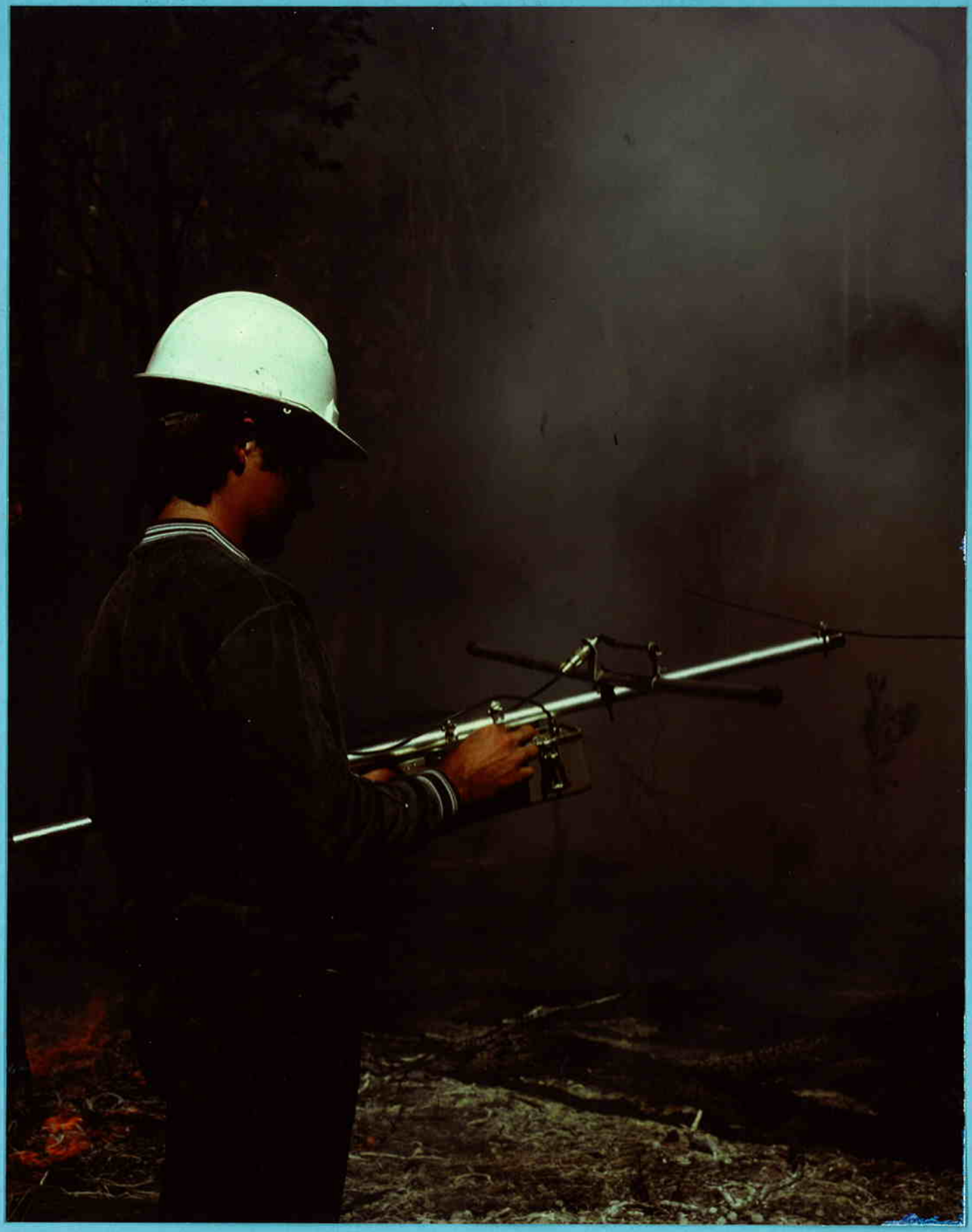
OBSERVATIONS OF THE BRUSHTAIL POSSUM

(*Trichosurus vulpecula* Kerr)



Movements and habitat use by the Brushtailed Possum *(Trichosurus vulpecula* Kerr) in the Perup using radio tracking methods.

by C. Vellios
1981

Cover Photograph

AVM receiver with hand-held yagi directional antenna used during study.

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SUMMARY

The four brushtailed possums that were studied by radio tracking appeared to establish a definite home range. Total home range of possums were:-

CH1 - 4.5 hectares
CH3 - 2.05 hectares
CH4 - 3.22 hectares
CH9 - 9.85 hectares

The possums spent a reasonable percentage of time on the ground moving about, they were active almost the entire night, they left their nesting trees 15 - 30 minutes after complete darkness until 15 - 30 minutes before day break.

Weather conditions do not seem to have an effect on their movements, they were active every night even on nights when it rained.

High intensity fires have an adverse effect on the brushtail possums, two of the four possums (CH1 and CH3) studied were killed and a number of other deaths (7 brushtail and 4 ringtail possums) were recorded within the burn. A high percentage of nesting trees were damaged or destroyed, CH4 whose home range was in the middle of the study area, had moved its nesting area and increased its home range after the burn from 3.22 hectares to 7.77 hectares. CH9 was not effected badly because its home range was divided between the burn and adjacent unburnt area.

INTRODUCTION

The brushtailed possum *(Trichosurus vulpecula* Kerr) is probably one of the best known members of the Australian marsupial family. Its widespread distribution in Australia and its successful adaptation to a changing environment have made it a useful species for study (C.H. Tynsdale - Biscoe).

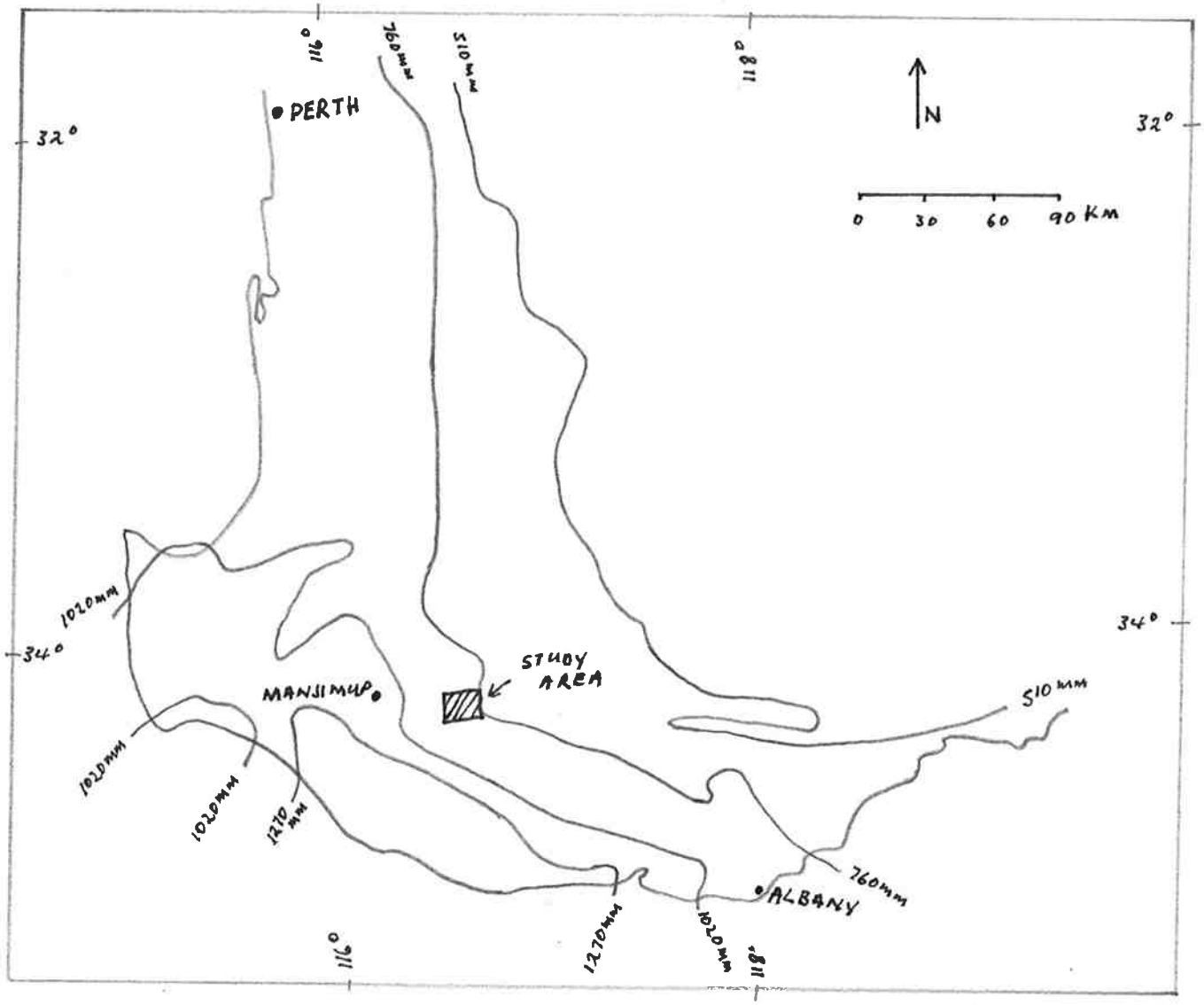
Unfortunately the brushtail possum is better known for the damage caused in orchards and its inhabitance of the roofs of houses, even in cities.

Most of the studies of brushtail possums have been done in the Eastern states and New Zealand.

In Western Australia the brushtail possum is of little economic concern although in the past possums were hunted for their skins. Little research has been undertaken concerning the ecological effects of the brushtail possum in the south-west forest. It is hoped that this study will be of some use for future studies of this species.

FIGURE 1

MAP OF THE SOUTH-WEST OF WESTERN AUSTRALIA SHOWING LOCATION OF STUDY AREA



METHODS

The study area was sited in Boyicup Block approxmiately 42 km east of Manjimup, between the roads, Glendale, Glendale 2, Boyicup and Boyicup 3 (Appendix 4). This area comprised approximately 124 hectares that has been protected from prescribed burns and logging operations.

It lies within the Perup forest (Fig. 1), an area set aside by the W.A. Forests Department as a Fauna and Flora Priority area, primarily for the conservation of fauna and flora and ecological research (Christensen, 1974).

The fuel age of the area was 15 to 16 years on the ridges and 25 - 30 years in the gullies. The last logging operations were in 1972, to the west of the study area and of very low intensity. No evidence of logging operations was found within the study area itself.

The forest consists mainly of open woodlands of jarrah *(Euc. marginata)*, marri *(Euc. calophylla)*, occasional wandoo *(Euc. wandoo)* and some flooded gum *(Euc. rudis)* in the gully. The understorey is composed of the species, *Bossiaea ornata, Bossiaea linophylla, Leucopogon capitellatus, Hakea lissocarpa* and *Acacia pulchella* on the ridges. The understorey in the gullies is mainly thickets of heartleaf poison *(Gastrolobium bilobum)*.

Four brushtail possums *(Trichosurus vulpecula)* were captured and fitted with transmitters. The animals used were those whose home range areas were judged to lie within the study area. This was determined by using previous data of animals captured and recaptured in studies done by Dr. Christensen and research staff.

The animals were fitted with A.V.M. transmitters which were attached by means of a collar (Plate 5). Radio tracking was done using a twelve channel A.V.M. model LA 12 portable receiver, operating on the 150.850 to 151.150 M.H.Z. band, with a hand held yagi antenna.

Two animals were captured and fitted with transmitters on 3/2/81 and released the following day.

CH1 (male) - This was fully grown and weighed 1750 grams. The animal was first trapped in the area on 10/5/78.

CH4 (male) - This also was fully grown and weighed 1870 grams. This animal was trapped several times within the area, first capture was on 16/4/80.

CH3 (female) - The third animal caught on 4/2/81, it was fitted with a transmitter and released the following day. It was fully grown and had no joey in its pouch, it weighed 1850 grams. It was first captured in the area on 10/5/78.

CH9 (male) - The fourth possum was caught and fitted with a transmitter on the 5/2/81 it was released the same day. It was also fully grown weighing 1800 grams. This animal was captured several times within the study area, the first capture being on 21/10/81.

A weather station was set up consisting of a rain guage and a thermohygrograph for temperature and humidity recording.

Radio tracking of the four animals was done both during the day and at night. The nesting tree of each animal was located by daytime tracking, by use of the directional antenna. Each nesting tree was tagged with possum number, channel number, date and tree number. These were later surveyed (Appendix 5). Having located a nesting tree the following data was also recorded; tree species, diameter (D.B.H.), conditions of tree, condition of crown, estimated tree height, estimated height of possum hole and hole position (Appendix 1).

With night surveys the animals were located by means of triangulation. Grid points (area was grided from previous studies in Boyicup Block) were used for triangulation, bearings were taken from a minimum of three points. Thirty three day readings and 20 night readings were taken from the time they were fitted with a transmitter until the burn on 24/3/81.

A Rustrak continuous drum recorder plugged into the receiver using a ground antenna was used for continuous recording of night movements. This has a range of approximately 200 to 250 metres. The rustrack was recording movements of channel 4 for 18 nights, but was discontinued after that because the animal was within range all the time, and the rustrak did not record enough information on the trace.

On 24/3/81 a high intensity burn was carried out in the study area, this was for the purpose of regenerating heartleaf thickets for tammars. This ideally suited the possum study. Radio tracking and close observation was continued after this hot burn, so that its effect on the possums could be studied.

PLATE 1: Brushtail Possum *(Trichosurus vulpecula)*

PLATE 2: Marri nest tree with 'hole in bole due to broken branch.

RESULTS

Pre-Burn

After mapping all nesting trees and night recording it appeared that the four possums had a definite home range. The possums seem to have a number of nesting trees and a large feeding area (Appendix 4). Nesting trees of the three animals (CH1, 3, 4) that were in the central block didn't overlap, but feeding areas did so. It was discovered that CH9 had a larger home area shared between the study area and adjacent forest outside the study area, it also had more nesting trees than the other three animals (Appendix 4).

HOME RANGE OF THE 4 BRUSHTAIL POSSUMS

CHANNEL NO.	SEX	NESTING AREAS (HECTARES)	FEEDING AREAS (HECTARES)
1	M	1.00	4.5
3	F	.20	2.05
4	M	.45	3.22
9	M	2.83	9.85

Nesting trees as shown in (Appendix 1) and (Inions, 1981), vary a lot in size and conditions. It is assumed that trees had to be a certain size (45.5 cm dia.) before they were large enough to have nesting holes. Position of nesting holes were found to be in broken branches, in bole due to broken top or broken branches and in forks at crown break. It appeared that possums show little bias between tree species when choosing a nesting site. All feeding areas had plenty of healthy, live trees for food supply.

It appears that brushtail possums are active almost the entire night. Radio recordings were taken at intervals throughout the night and the indications are that possums get out of nesting trees 15 - 30 minutes after complete darkness and do not return to nesting tree until 15 - 30 minutes before day break. Recording was done by setting the receiver on a possum before dusk and waiting until the signal started fluctuating, which meant the possum was coming out of the nesting tree and become active as it moved about

its feeding area. Another method used to determine when the possums come out of nesting trees was to observe when it came down the tree. This was done by hiding behind a log in close range and looking through a screen of branches and leaves, the radio receiver was also switched on to find out when the possum started moving about in its nest. It was too dark to see the animal when it did climb down from the nesting tree, but it was heard running through the forest. To determine when a possum returned to its nesting tree the receiver would be fixed on a certain possum well before day break. When the signal stopped fluctuating it was assumed the possum was in its nesting tree, this was then confirmed by going into the forest and discovering which tree the possum was in. On one occasion we were too close to a nesting tree (T1) of CH4, it remained undaunted as it circled around us and proceeded to tree 3, 150 metres from tree 1.

Locating of animals during night recording was sometimes difficult because it was discovered that they spent some time running about on the ground. Several bearings had to be taken in order to get them to intersect, so that they could be mapped. The animals would just keep ahead at a certain distance, channel 9 was seen several times crossing the track ahead of us, on one occasion it climbed a young marri sapling on the side of the track. A number of times the animals were followed through the forest and were discovered in feeding trees, but it was difficult to actually see them with a torch.

Weather conditions seem to have no effect on the movements of possums, they were active every night even on nights when it rained.

Difficulty was experienced in locating nesting site of CH1 on 17/3/81. After extensive searching it was located in a marri log, the only time this happened during the study. Ten metres from CH1 log, CH4 was located in a new nesting tree, this tree was only used on that occasion. Both possums were on the extreme edge of their home range. It is assumed that some interaction occurred between these two male possums as six days later CH3 (female) was found in the same nesting tree as CH4 (T1 - CH4). Possibly the two male possums were exhibiting agression during mating time.

PLATE 3: Structure of stand before burn.

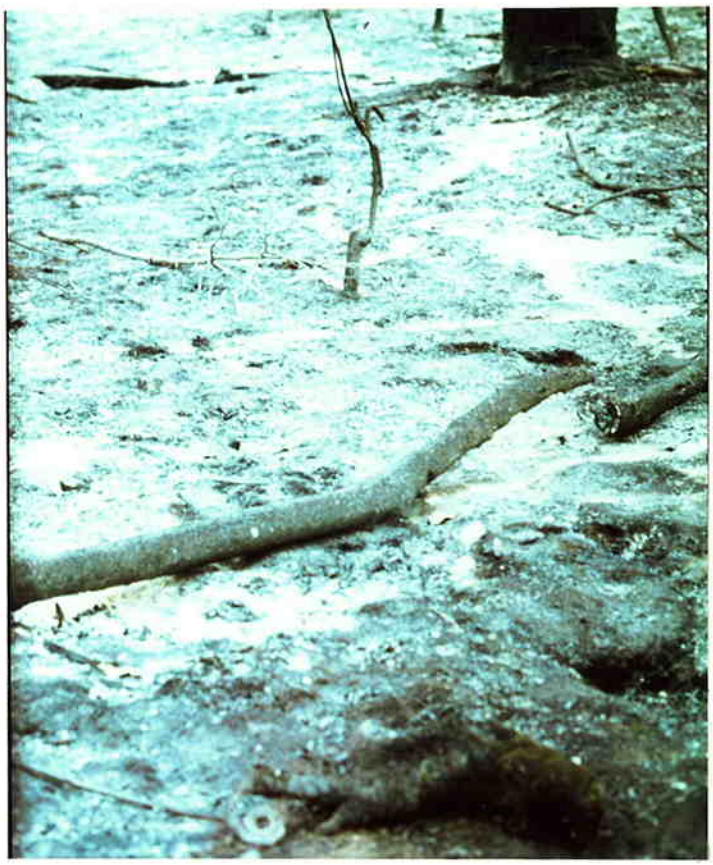


PLATE 4: The effect of the burn. Note a possum in the foreground.

RESULTS

During and After Burn

The burn was carried out on 24/3/81, the area was strip burnt on a north, south bearing. Block one (see Appendix 4) between roads Glendale, Glendale 2, Boyicup and Boyicup 1 was lit at 12.15. We were stationed at B1/7 where we could observe the nesting trees of CH3 (T2) and CH4 (T1), the trees that these two were nesting in on that day. Regular checks with radio receiver were also done. It was also possible to keep check of CH1 which was in tree 6, but we could not pick up CH9 (T9) because it was out of range. There was no sign of the animals coming out of nesting trees even when some smoke surrounded these trees, all three signals remained steady.

Block 2 between roads Glendale, Glendale 2, Boyicup 1 and Boyicup 2 was lit at 13.50 hrs. As the smoke got thicker around CH3 and CH4 there was no sign of them coming out of nesting hole and by 14.10 hrs when the fire came up the ridge and was very hot they didn't come out of nesting hole even though the radio signal was fluctuating. By 14.15 hrs fire surrounded CH3 and CH4 nesting trees and CH3's tree was alight about 5 metres above its nesting hole. All three signals became steady again. At 14.40 hrs CH3's tree was alight around nesting hole but the possum didn't come out, CH4's tree did not catch fire. Smoke was thinning out and flames were very low. At 15.30 hrs CH3's signal fluctuated madly, it then steadied for a while, and died out, it was the last signal received. The animal did not come out of its nesting hole therefore it was assumed that it was burnt. At 15.40 hrs an unidentified possum was sighted in a spar next to T2 CH3, also there was no signal received from CH1 (later it was discovered that is nesting tree was also burnt, therefore it too must have got burnt).

CH4 and CH9 stayed in their nesting trees until the fire cooled down and then moved out sometime between midnight and morning. CH9 moved to tree 7 which is in adjacent unburnt forest and CH4 moved to new tree 5 which is also outside the burn.

It appears that possums are severely affected by high intensity fires as many of their nesting trees are damaged or destroyed. Many of the nesting trees of the possums studied were damaged or destroyed (Appendix 3). As indicated by the deaths of CH1 and CH3 a large number of possums may be killed.

Radio tracking was continued on CH4 and CH9 to determine the effects of fire on them. CH9, which had a big home range before the fire, both in the study area and adjacent forest, continued in the same vein of spending sometime in the burnt forest (study area) and in adjacent unburnt forest. It did venture on two occasions right down the gully in the middle and one of the most intense burnt areas. Its actual home range dropped in area from 9.85 hectares to 7.77 hectares and its nesting area dropped from 2.83 to 1.13 hectares.

With CH4 it was interesting to note that it stayed in the burn. Although it moved out of the burn the day after the burn to tree 5, it returned into the burn the following day and has spent the rest of the time in the burn. This was so until the last recording on 18/8/81, nearly 5 months after the burn. It has now moved its main nesting area across the gully (Appendix 7). Within the first week it used tree 3 twice and tree 8 once, these are trees situated on the ridge in cooler parts of the burn. Since then it has remained in its main nesting area, mainly tree 7. It has enlarged its feeding area after the burn from 3.22 hectares to 7.77 hectares. Although the burn produced heavy scorch to crowns of trees, there was a number of unscorched crowns and it is assumed that healthy possums which were left in the burn including CH4 and CH9 used these for feeding.

Organized searching of the burn was carried out to assess effects of the burn on possums. It was discovered where fire was of high intensity, severe damage had occurred, and a number of nesting trees were damaged or destroyed (Inions, 1981). A burn assessment was carried out by the fire research crew (Appendix 8) and it showed that possums suffered most in the high intensity areas, 1 000 - 5 000 kwm^{-1} and 5 000 - 1 000 kwm^{-1}. Seven brushtail possums and 4 ringtail possums were found killed, some were badly burnt and others only mildly burnt. All dead possums which climbed down from burning nest trees burnt their feet in hot coals while seeking refuge. Two possums were found dead in burnt out stump holes obviously seeking alternative refuge sites.

Three live brushtail possums were found alive but very sick, these were caught and close study revealed that their feet were badly burnt. When released it was observed that these animals could not climb trees, after several attempts they gave up and ran along on the ground. Two of these possums were fitted with transmitters and radio tracked, but died after three days. They stayed within the burn and it appears that they died of

dehydration, because they could not climb trees and there was no scrub vegetation for them to feed on.

It can be assumed that a lot more possums may have been killed in their nesting holes, two out of the four possums radio tracked were killed because they stayed in their nesting holes and there was a high percentage of nesting trees damaged and destroyed (Inions, 1981).

PLATE 5: A radio tracked possum after burn. This possum died 3 days later.

PLATE 6: Possum taking refuge on limb while T2 CH2 burns in the background.

DISCUSSION

The four possums that were studied by radio tracking appeared to establish a definite home range. Home range is defined as the area traversed by possums in their activities of feeding, nesting, mating and caring for young. Males exhibited a large home range than the female. Total home range of the possums studied were:-

CH1 (male)	-	4.5 hectares
CH3 (female)	-	2.05 hectares
CH4 (male)		3.22 hectares
CH9 (male)		9.85 hectares

This agrees with other studies (Crawley, 1973 & Dunnet, 1957 & 1964).

Possums spend a reasonable percentage of time on the ground moving about, they were active almost the entire night, they left their nesting trees 15 - 30 minutes after complete darkness and returned to their nesting trees 15 - 30 minutes before day break. Other studies (Fitzgerald, 1979 & Meads, 1974) show that 60 - 90% of the possums diet is basically aborial foliage, the remaining percentage is made of understorey species. Therefore a reasonable amount of time is spent foraging on the forest floor or moving between feeding trees.

High intensity fires have an adverse effect on the brushtail possum, two of the four possums (CH1 and CH3) studied were killed and also a number of other deaths (7 brushtail and 4 ringtail possums) were found in the burn. A higher percentage of their nesting trees were damaged or destroyed.

If the Forests Department implements high intensity burns, a detrimental effect can be expected on the possums and their nest trees.

ACKNOWLEDGEMENTS

I wish to acknowledge the assistance of Dr. P.E.S. Christensen for guidance and field assistance. G. Inions, T. Leftwich, P. Skinner and G. Liddelow for field assistance. Manjimup Forests Department Fire Research team for providing the fire intensity data. T. Leftwich for photographs and Fiona Styles for typing the report.

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APPENDIX 1

TABLE OF DATA ON NEST TREES USED BY RADIO TRACKED POSSUMS

CHANNEL TREE NO.	SPECIES	CONDITION		DIAMETER (cm)	HEIGHT (m)	HOLE HEIGHT (m)	HOLE POSITION
		ALIVE/DEAD	CROWN				
CH1 T1	J	Alive	Poor	54.3	12	8	In bole after broken branch
CH1 T2	M	Dead	Old	100.0	23	20	In broken branch
CH1 T3	M	Alive	Poor	65.0	12	12	In bole due to broken top
CH1 T4	J	Alive	Poor	68.0	27	15	In fork at crown break
CH1 T5	M	(Log on	Ground)	50.0	10	-	Hole in log
CH1 T6	J	Dead	Recent	80.0	20	18	In broken branch
CH3 T1	J	Alive	Poor	112.0	25	12	In bole at crown break
CH3 T2	M	Dead	Old	99.0	35	20	In bole at crown break
CH3 T3	M	Dead	Old	98.0	25	23	In broken branch
CH3 T4							CH3 T4 is CH4 T1
CH4 T1	M	Dead	Old	47.7	25	18	In bole due to broken branch
CH4 T2	J	Dead	Recent	104.0	15	10	In broken branch
CH4 T3	M	Alive	Fair	95.0	23	15	In broken branch
CH4 T4	M	Dead	Recent	90.0	22	20	In broken branch
CH4 T4	J	Alive	Fair	55.0	20	10	In broken branch
CH4 T6							CH4 T6 is Ch1 T2
CH4 T7	M	Dead	Old	93.0	15	15	In bole due to broken branch
CH4 T8	M	Alive	Fair	92.5	25	23	In broken branch
CH4 T9	M	Alive	Fair	77.4	11	11	In bole due to broken branch
CH4 T10	M	Alive	Fair	76.0	20	17	In broken branch
CH9 T1	J	Alive	Fair	98.0	21	15	In broken branch
CH9 T2	J	Alive	Fair	54.0	20	16	In broken branch
CH9 T3	J	Dead	Recent	86.0	17	15	In broken branch
CH9 T4	J	Alive	Poor	70.0	6	6	In bole due to broken top
CH9 T5	J	Alive	Poor	98.0	25	23	In broken branch
CH9 T6	J	Alive	Poor	102.0	20	15	In broken branch
CH9 T7	J	Alive	Fair	104.0	25	19	In broken branch
CH9 T8	J	Alive	Poor	82.0	20	15	In broken branch
CH9 T9	J	Alive	Poor	77.0	20	15	In broken branch
CH9 T10	M	Alive	Fair	74.0	10	10	In bole due to broken top
CH9 T11	J	Alive	Fair	123.0	25	23	In broken branch

APPENDIX 2

FREQUENCY OF USE OF POSSUM NEST TREES

BEFORE BURN

CHANNEL	TREE NO.	NO.
CH 1	1	4
CH 1	2	3
CH 1	3	16
CH 1	4	7
CH 1	5	1
CH 1	6	2
CH 3	1	1
CH 3	2	27
CH 3	3	4
CH 3	4	1
CH 4	1	17
CH 4	2	13
CH 4	3	2
CH 4	4	2
CH 9	1	1
CH 9	2	2
CH 9	3	4
CH 9	4	10
CH 9	5	2
CH 9	6	4
CH 9	7	7
CH 9	8	1
CH 9	9	2

AFTER BURN

CHANNEL	TREE NO.	NO.
CH 4	1	1
CH 4	3	2
CH 4	5	1
CH 4	6	1
CH 4	7	16
CH 4	8	1
CH 4	9	3
CH 4	10	3
CH 9	4	2
CH 9	7	4
CH 9	9	12
CH 9	10	3
CH 9	11	5

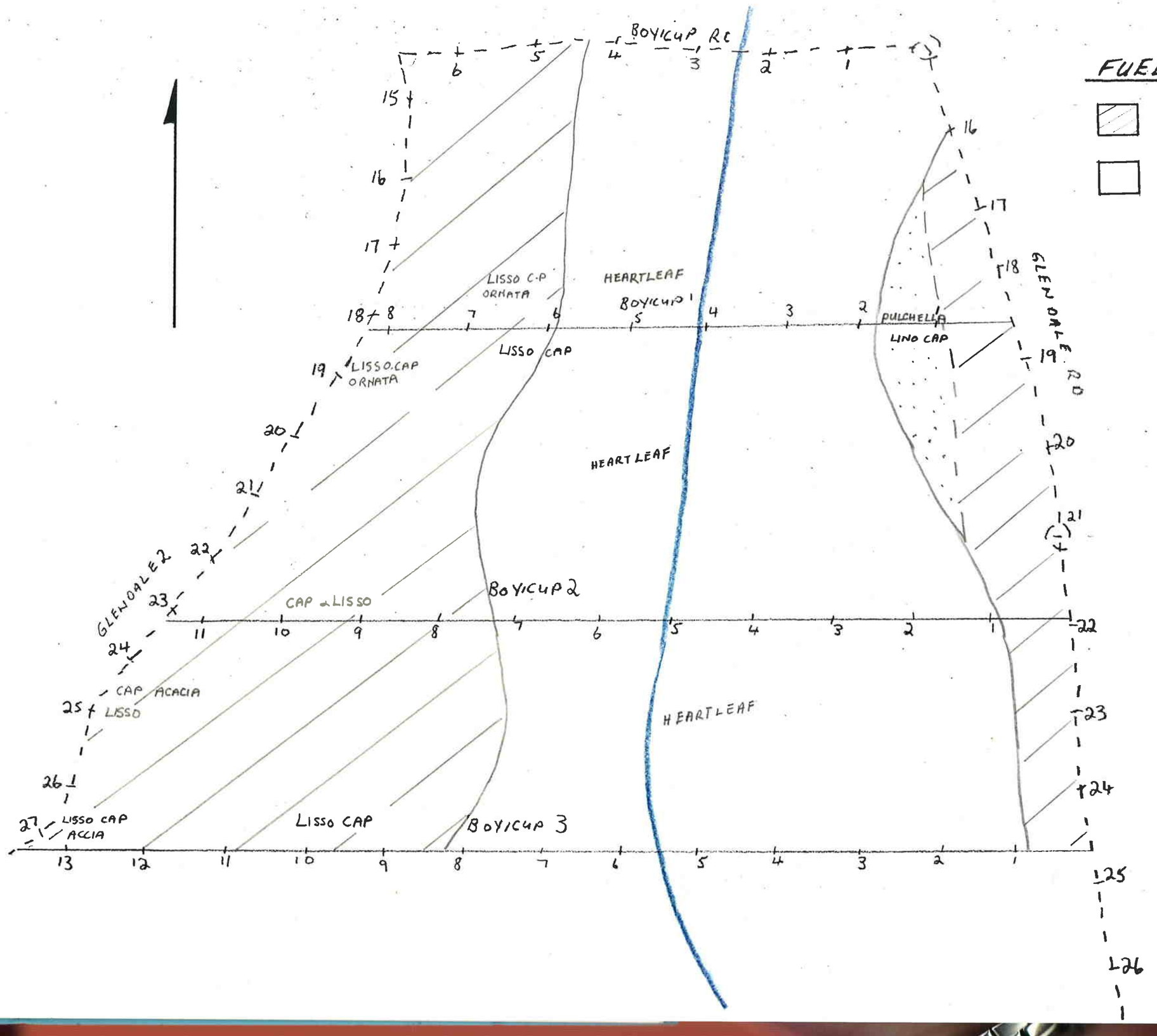
APPENDIX 3

TABLE OF DAMAGE TO NEST TREES

CHANNEL	TREE NO.	DEGREE OF DAMAGE
CH1	T1	Light damage - inhabitable
CH1	T2	Destroyed
CH1	T3	Heavy damage - inhabitable
CH1	T4	Severe damage - inhabitable
CH1	T5	(log) - Destroyed
CH1	T6	Destroyed
CH3	T1	Destroyed
CH3	T2	Destroyed
CH3	T3	Destroyed
CH3	T3	CH4 T1 Undamaged - inhabitable
CH4	T1	Undamaged - inhabitable
CH4	T2	Severe damage - uninhabitable
CH4	T3	Undamaged
CH4	T4	Severe damage - uninhabitable
CH9	T5	Heavy damage - inhabitable
CH9	T6	Heavy damage - inhabitable

APPENDIX 4

VEGETATION TYPES & FUEL AGE

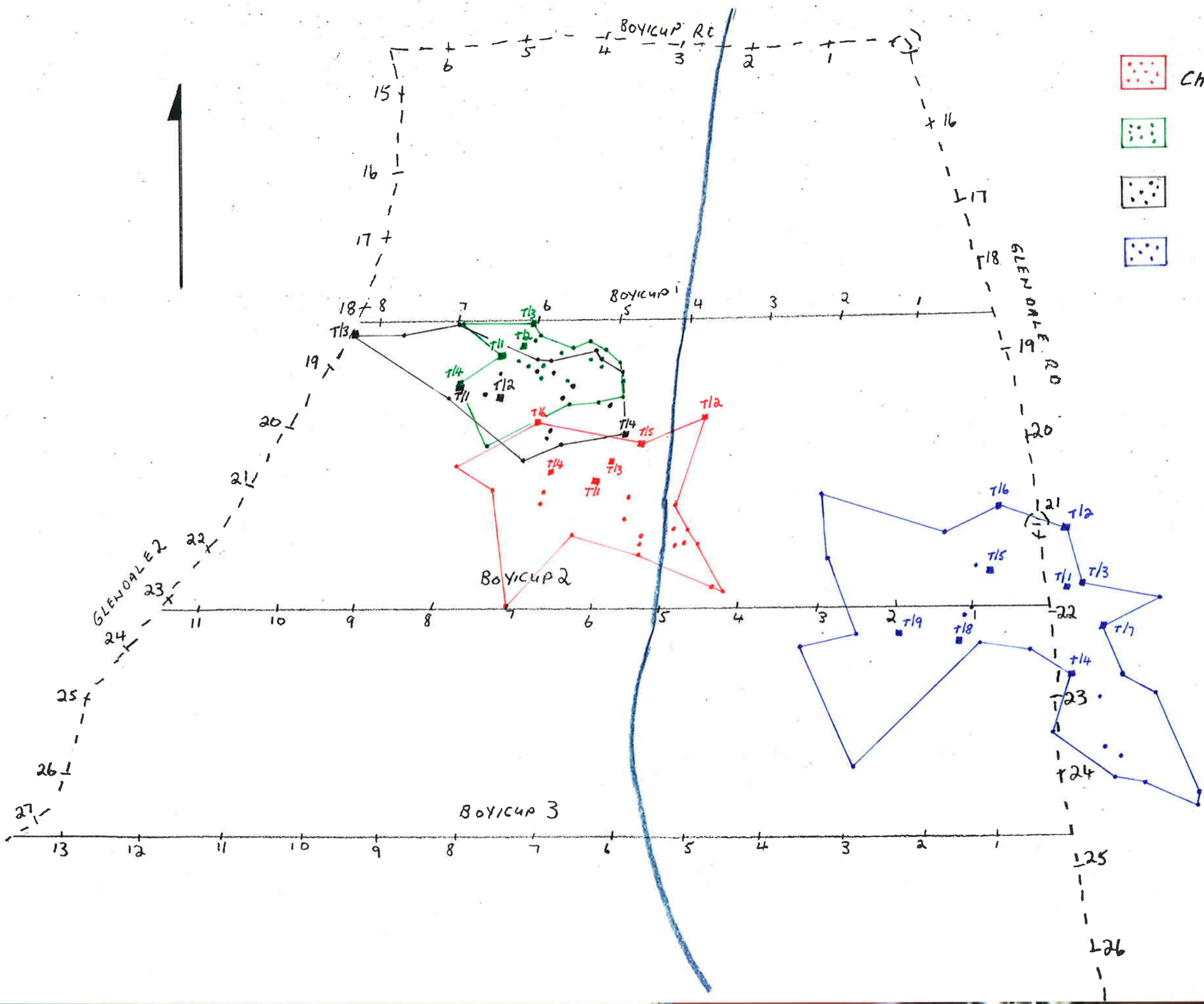


FUEL AGE

- 15-16 Yrs.
- 25-30 Yrs

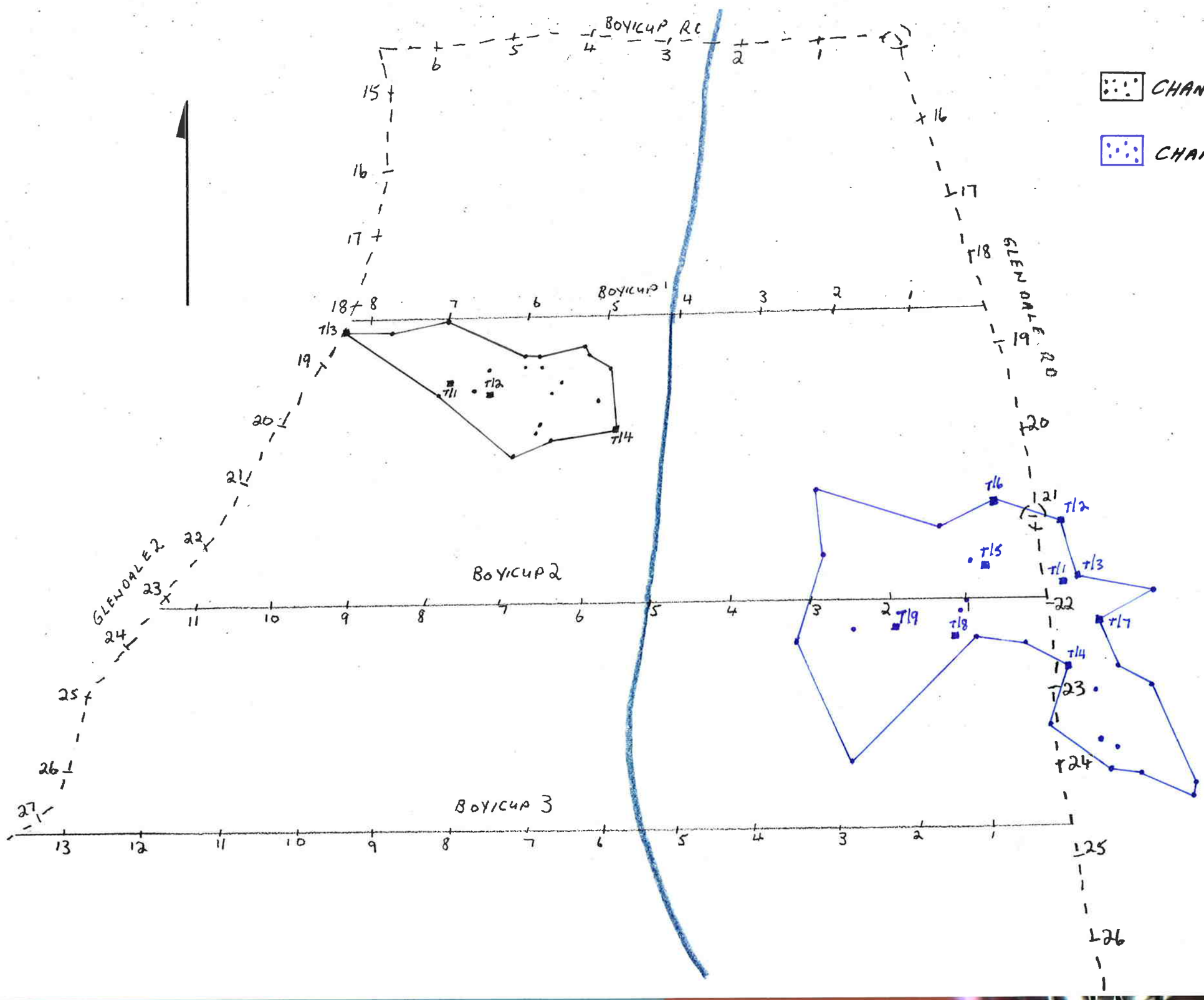
APPENDIX 5

HOME RANGES of 4 INDIVIDUALS By RADIO TRACKING (PRE-BURN)



APPENDIX 6

Home Ranges of CHANNELS 4 & 9 (PRE-BURN)



APPENDIX 7

Home RANGES of CHANNELS 4 & 9 (Post-BURN)