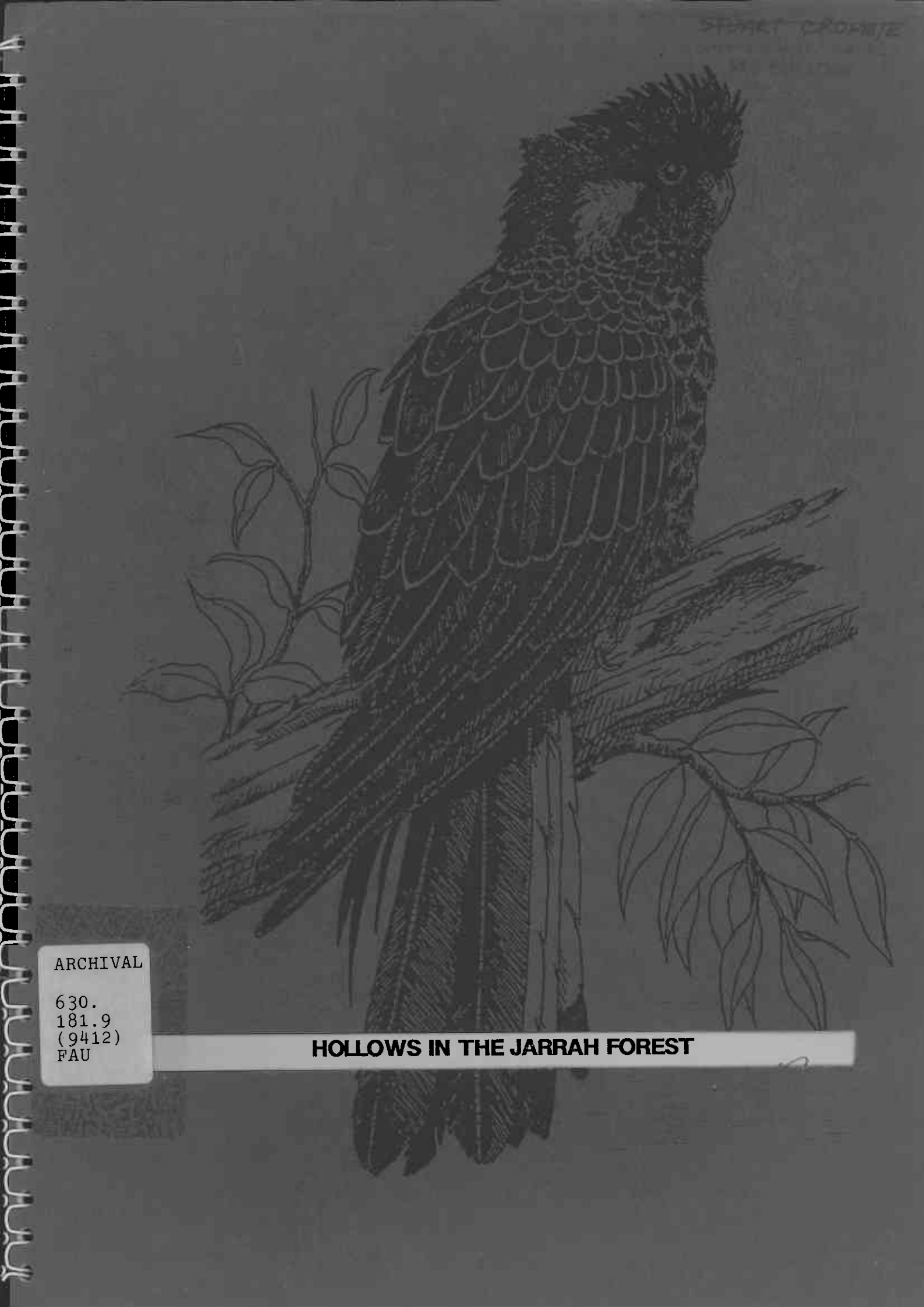

HOLLOWS IN THE JARRAH FOREST

Karen Faunt

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With Compliments

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FORMATION, FREQUENCY & LONGEVITY OF HOLLOWS IN JARRAH

EXECUTIVE SUMMARY

* **The aim of this study is two-fold :-**

1. To obtain further understanding of the formation of hollows in jarrah, their abundance in standing and fallen trees, and distribution throughout the northern jarrah forest.

2. To determine the impact of Barrack Silicon Pty Ltd's firewood operations on the population of tree hollows in the forest.

* **More specifically, the hypothesi to be investigated can be stated as follows :-**

Ho.1 Hollow size and frequency (per tree) is independent of tree size, tree age, and tree dominance status.

Ho.2 Hollow size and frequency (per tree) is independent of crown size, crown growth stage and crown condition.

Ho.3 Hollow size and frequency (per tree) is independent of fire evidence/damage & management history.

Ho.4 'Log hollow' size and frequency is independent of the amount of log material & logging history.

Ho.5 'Log hollow' size and frequency is independent of log type, dimension, state of decay and fire evidence.

Ho.6 Barrack Silicon's firewood gathering operations have no impact on:

i) The size and frequency of hollows
ii) The distribution of hollows

* **The study commenced in March 1990. Since then a pilot study has been completed and the experience and findings therein incorporated into the main sampling program now underway.**

Survey Design

* **One hectare plots (100*100m) will be used as the main sampling unit.**

* **Sample plot locations will be limited to those areas inventoried in 1987 for firewood suitable for Barrack Silicon's operations (see Appendix 1).**

It is intended that by sampling areas already assessed for firewood, relationships determined by this research may be correlated with inventory data and extrapolated across a larger area of forest.

Sampling Parameters

*** Rainfall Gradient**

Plots will be located on lateritic highlands in two rainfall categories - the high and medium zones.

Within each rainfall category, one plot will be located in forest known to have experienced severe wildfire (e.g. the Dwellingup fire).

*** Log Debris Categories**

Plots will sample three levels of coarse woody debris (high, medium & low) as determined by Inventory Branch's firewood assessment (1987).

Number of Plots

*** Based upon the above criteria, six (two rainfall * three log) plots are required. With one replicate, twelve plots.**

Method of Plot Assessment

*** Stand Description**

All trees greater than 30 cm dbhob will be assessed for specie, dominance class, dbhob & bole defects (eg termite & fire). *See proforma, appendix 2.*

*** "Hollow trees"**

One jarrah tree will be randomly selected for hollow assessment from each 10cm dbhob size class occurring within the plot. Such trees will be photographed and described in terms of crown dominance, density, size, and senescence; bole epicormics and fire scarring; and evidence of rot and fire on stump. *See proforma, appendix 3.*

In addition, height to all primary branches on the bole will be measured, and dob and core evidence of rot/termites 1.3m from where they leave the bole. *See proforma, appendix 4.*

* Log Debris

All woody debris greater than Barrack Silicon's minimum specifications for firewood will be assessed for dimensions, hollows, shelter, condition and suitability as firewood. *See proforma, appendix 5.*

*** Hollows**

Ground and standing hollows will be assessed alike. Parameters to be assessed are hollow type; cavity dimensions; extent of mudguts; evidence of fire, termites, borers; and habitability. *See proforma, appendix 6.*

APPENDIX 2: Stand Description

Tree.....number for purposes of relocation.
Live.....alive? y/n.
Specie.....e.g. jarrah, marri, allocasuarina, etc.
Dominance.....dominance category.
Fire.....Fire evidence on bole (dryside, firescar, occluded firescar).
Termites..... Termite evidence on bole? y/n.

APPENDIX 3: 'Hollow trees' - prefelling

Tree.....number.
Dbhob.....10cm dbhob size class.
Photo.....A photo of the crown and the bole is taken before felling.
Hollow estmte..The number of potential hollows is estimated from the ground before felling.
Stage.....

Crown Assessment

Position.....
Size.....
Density.....
Epicormics.....
Dead branches..
Height.....
Depth.....

Bole Assessment

Height.....
Fire.....
Epicormics.....

Stump Assessment - postfelling

Rot.....
Fire.....
Age.....

APPENDIX 4: 'Hollow trees' - postfelling

Section.....primary branches are numbered consecutively from the ground up.
Distance.....the distance from the ground to the origin of the branch at bole.
Dob.....the diameter over bark of each primary branch is measured at 1.3m from the bole.
Core.....the core of each branch is assessed (e.g. solid, mudguts or cavity, etc) at 1.3m from the bole.
Hollows.....the number of hollows on the main branch.
Fire.....the severity of fire evidence on the branch.
Dead.....? y/n.
Condition.....the condition of the branch (e.g vigorous, senescent, etc)
Stubs.....the number of stubs >5cm on the main branch.

APPENDIX 5: Log debris

Log.....number for purposes of relocation.
Hollows.....number of hollows found.
Type.....origin of log material, e.g. bole, structural branch, etc.

Decomposition classification - see appendix 5-a.

Bark.....intact, trace, or absent.
Texture.....intact, partly soft, hard, etc.
Shape.....normal to irregular.
Colour.....original, faded, light yellow/gray.
Placement.....portion of log on ground.
Class.....log decomposition class.

Fire.....severity of fire evidence.
Termite.....evidence of? y/n.
Sawn.....evidence of? y/n.
Barrack.....suitable for firewood? y/n.

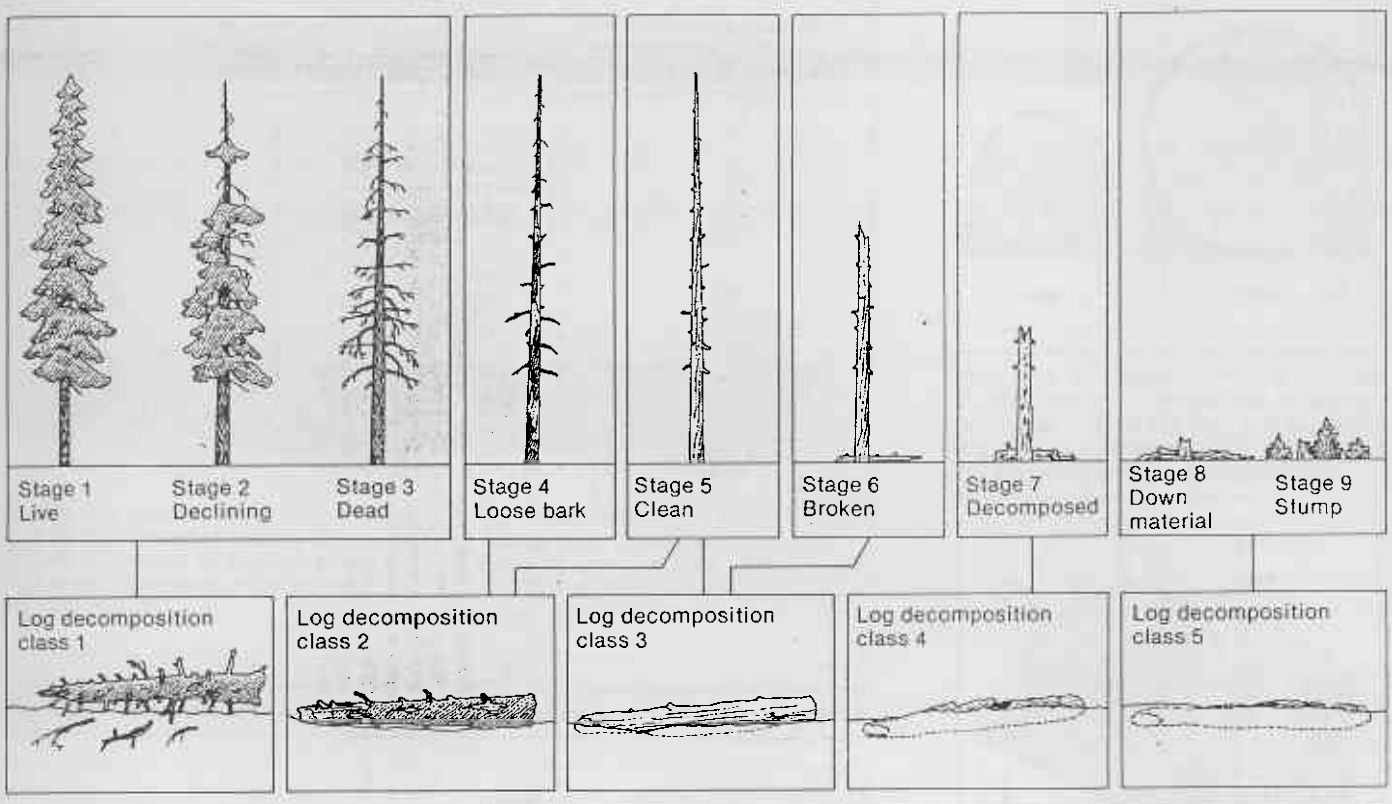
Shelter - see appendix 5-b

Quality.....shelter suitability rating.
Width.....width of shelter area.
Length.....length of shelter area.

Dimensions

Wd1 & Wd2.....width of both ends of log piece.
Girth.....width of log centre.
Length.....lentgh of log piece.

APPENDIX 5-A : SNAG & LOG DECOMPOSITION CATEGORIES



Snag stage	Snag condition	Log class
1-3	Hard snag	1
4-5	Hard snag	2
5-6	Soft snag	3
7	Soft snag, 70% + soft sapwood	4

Log characteristics	Log decomposition class				
	1	2	3	4	5
Bark	intact	intact	trace	absent	absent
Twigs <3 cm (1.18 in)	present	absent	absent	absent	absent
Texture	intact	intact to partly soft	hard, large pieces	small, soft, blocky pieces	soft and powdery
Shape	round	round	round	round to oval	oval
Color of wood	original color	original color	original color to faded	light brown to faded brown or yellowish	faded to light yellow or gray
Portion of log on ground	log elevated on support points	log elevated on support points but sagging slightly	log is sagging near ground	all of log on ground	all of log on ground

Stage of decay	Characteristics
Standing, dead	Trees or snags, erect or leaning, but having no photosynthetic capability
Sound, felled	Logs which have been recently windthrown or struck by lightning
Diseased, felled	Timber only recently felled; pathological conditions obvious but with the invertebrate community absent
Colonization, conditioning	Wood moist, no channelizing invertebrates present, diplopods and other surface-inhabiting invertebrates present, blue-stain fungi present, mycelia of imperfect fungi present, little discoloration
Channelization	Presence and colonization by channelizing invertebrates, specifically termites, carpenter ants, and passalid beetles
Succession and secondary colonization	Colonization by channelizing invertebrates and large numbers of invertebrates without channelizing mouthparts, soil-dwelling microarthropods, predators, earthworms, large amounts of fecal material, soil, and high diversity of microbial community within channels
Maceration	Extensive fungal rizomorphs, root invasion, soil and fecal material clogging chambers, secondary colonizing invertebrates, fungal dominance obvious
Incorporation	Wood no longer recognizable by species, 20 to 30 percent soil mixed into wood, mass of mycelia, fibrous and woody root systems colonizing throughout

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APPENDIX 5-B: HABITAT USAGE OF LOGS & SNAGS

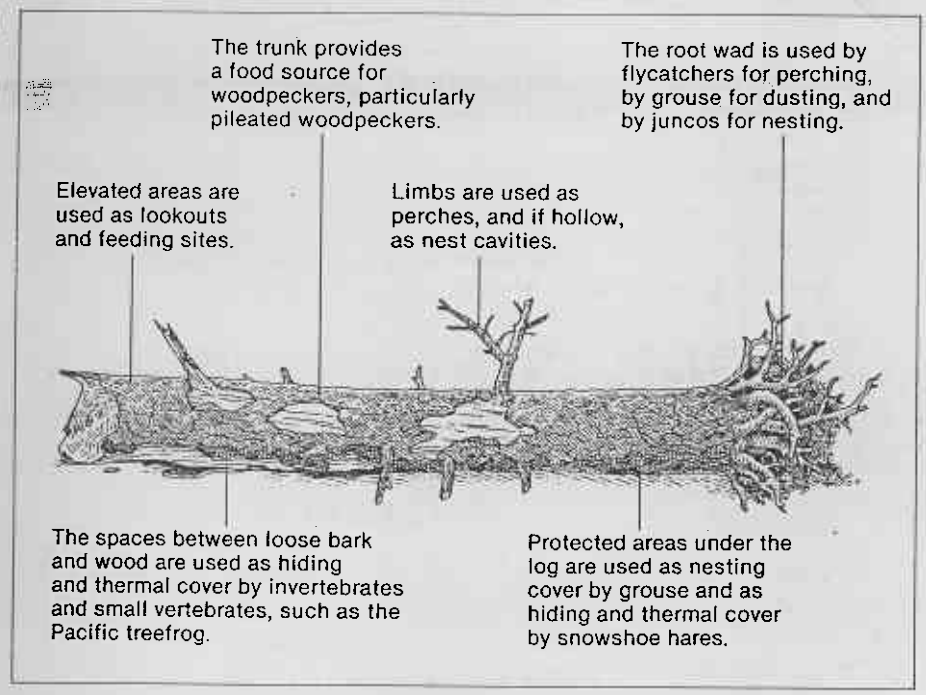

Figure 42. A class 2 log showing some of the structural features important to wildlife.

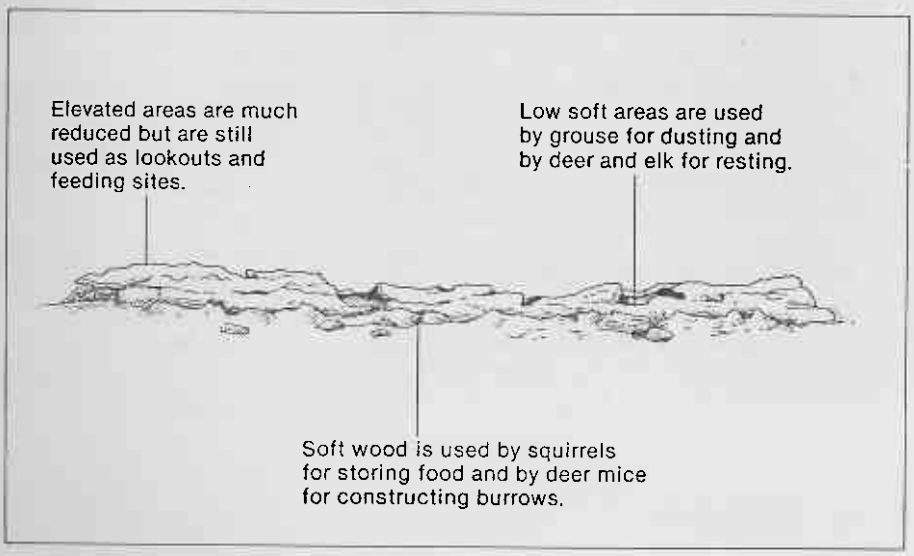

Figure 43. A class 4 log showing advanced stage of decay and some of the structural features important to wildlife.

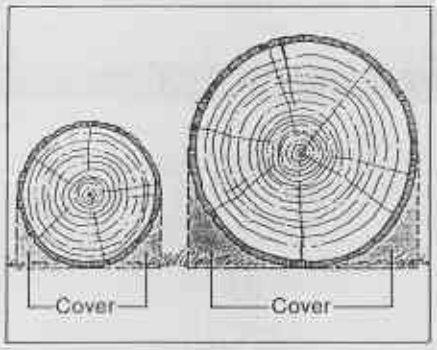

Figure 49. The amount of cover provided by logs for small vertebrates is directly related to size of the log; the larger the log, the longer it takes to decompose and the longer it provides effective cover.

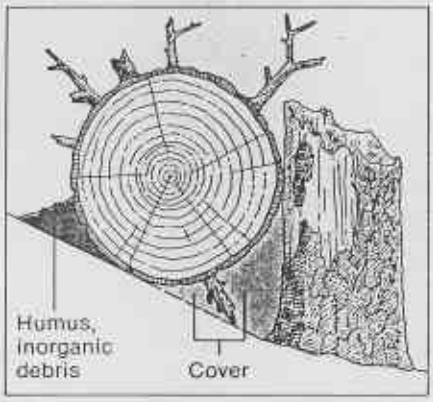

Figure 50. A log oriented along the contour of a slope. The upslope side is filled with humus and inorganic debris which allows small vertebrates to tunnel alongside. The downslope side provides protective cover for larger vertebrates.

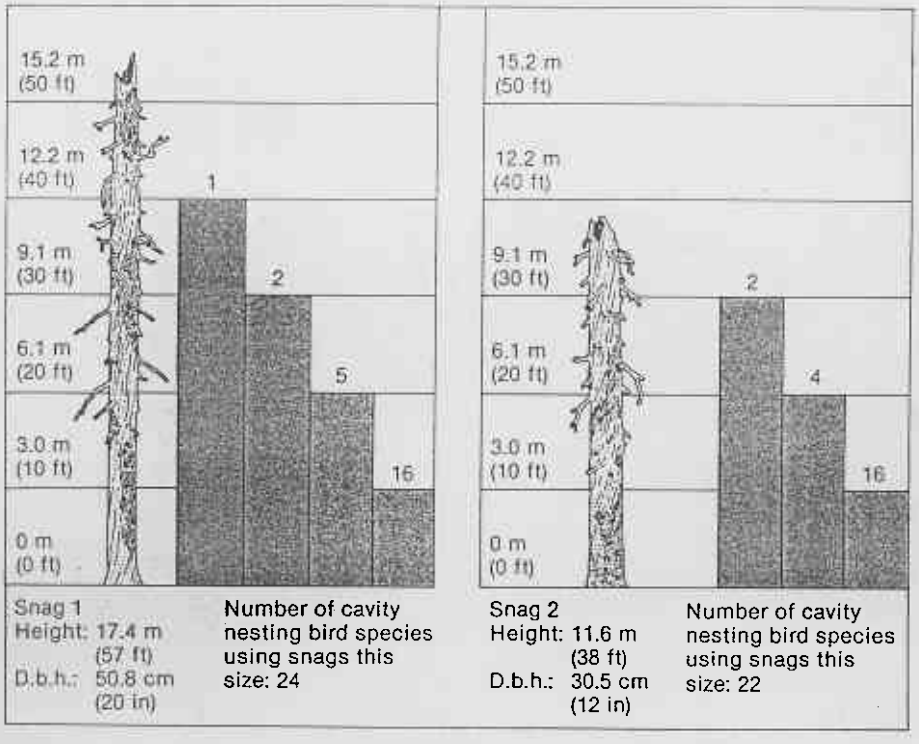

Figure 40. The potential use of a snag by wildlife depends on its diameter and height.

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APPENDIX 6: Hollows

Hollow.....number.
Section.....when assessing trees - what height section hollow is found in.
Log.....number when assessing logs.
Type.....type of hollow (illustrated).
Dead.....cavity material is dead? Y/N.

Cavity dimensions

Entry.....minimum entry width.
Depth.....depth of hollow cavity.
Diam.....diameter of hollow cavity.
at:.....depth at which cavtiy diameter is taken.

Mudguts - see appendix 6-a

Depth.....depth of mudgut cavity.
Type.....rating of density of mudguts.

Dob.....diameter over bark of cavity branch.
Fire.....evidence of fire in hollow? Y/N.
Firescars.....cavity is associated with a fire scar? Y/N
Termites.....termite evidence? Y/N.
Borers.....borers evident? Y/N.
Wet.....was the hollow protected from stem flow/weather? Y/N.
Habitability...1-3 rating of habitability.

The Availability and Dimensions of Tree Hollows that Provide Nest Sites for Cockatoos (Psittaciformes) in Western Australia

D. A. Saunders, G. T. Smith and Ian Rowley

Division of Wildlife Research, CSIRO, Clayton Rd, Helena Valley, W.A. 6056.

For each hollow:

(1) Height of entrance(s) to hollow from ground (*E*);
(2) Aspect of entrance(s) (*F*) (the direction towards which the entrance faces);
(3) Horizontal diameter of entrance(s) (*G*);
(4) Vertical diameter of entrance(s) (*H*);
(5) Internal diameter of hollow 0·5 m below the entrance(s) (*I*);
(6) Depth of hollow (*J*).

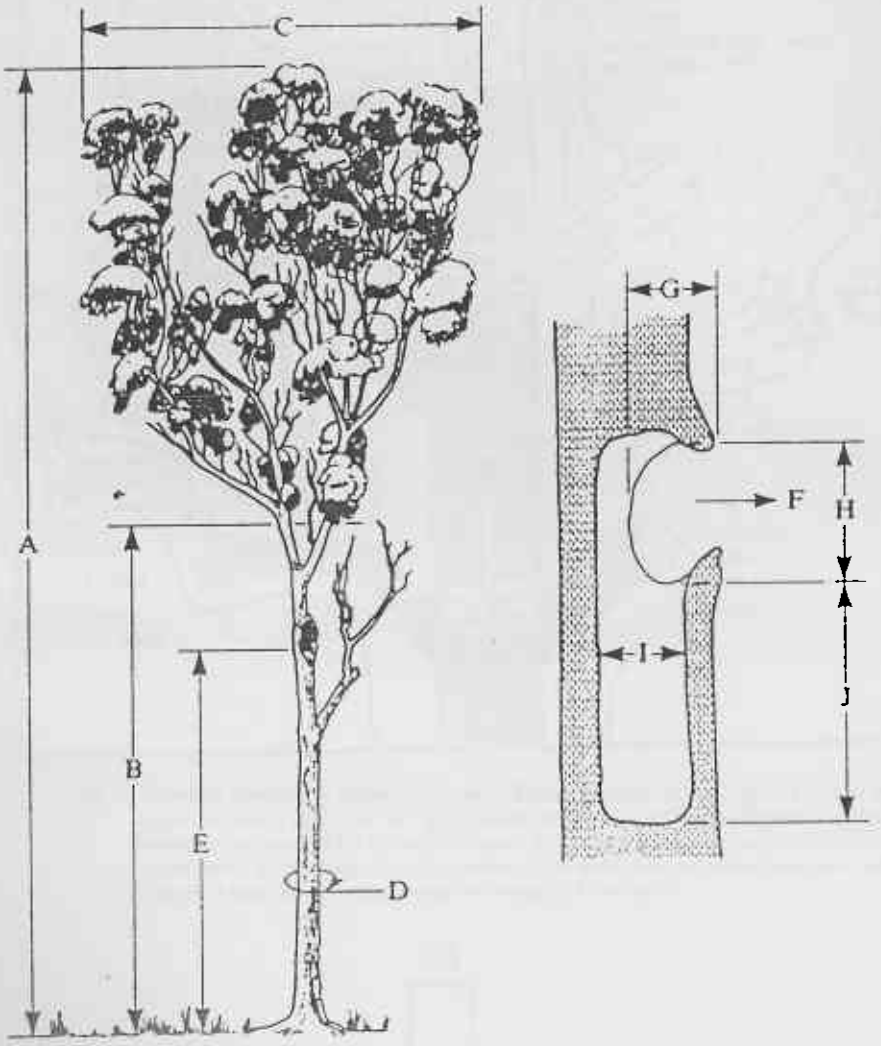


Fig. 2. Measurements taken on the survey trees and their hollows: *A*, height of tree; *B*, height from ground to base of canopy; *C*, diameter of canopy; *D*, circumference of tree at breast height; *E*, height of entrance of hollow from ground; *F*, aspect of hollow entrance; *G*, horizontal diameter of hollow entrance; *H*, vertical diameter of hollow entrance; *I*, diameter of interior of hollow 0·5 m below the entrance; *J*, depth of hollow.

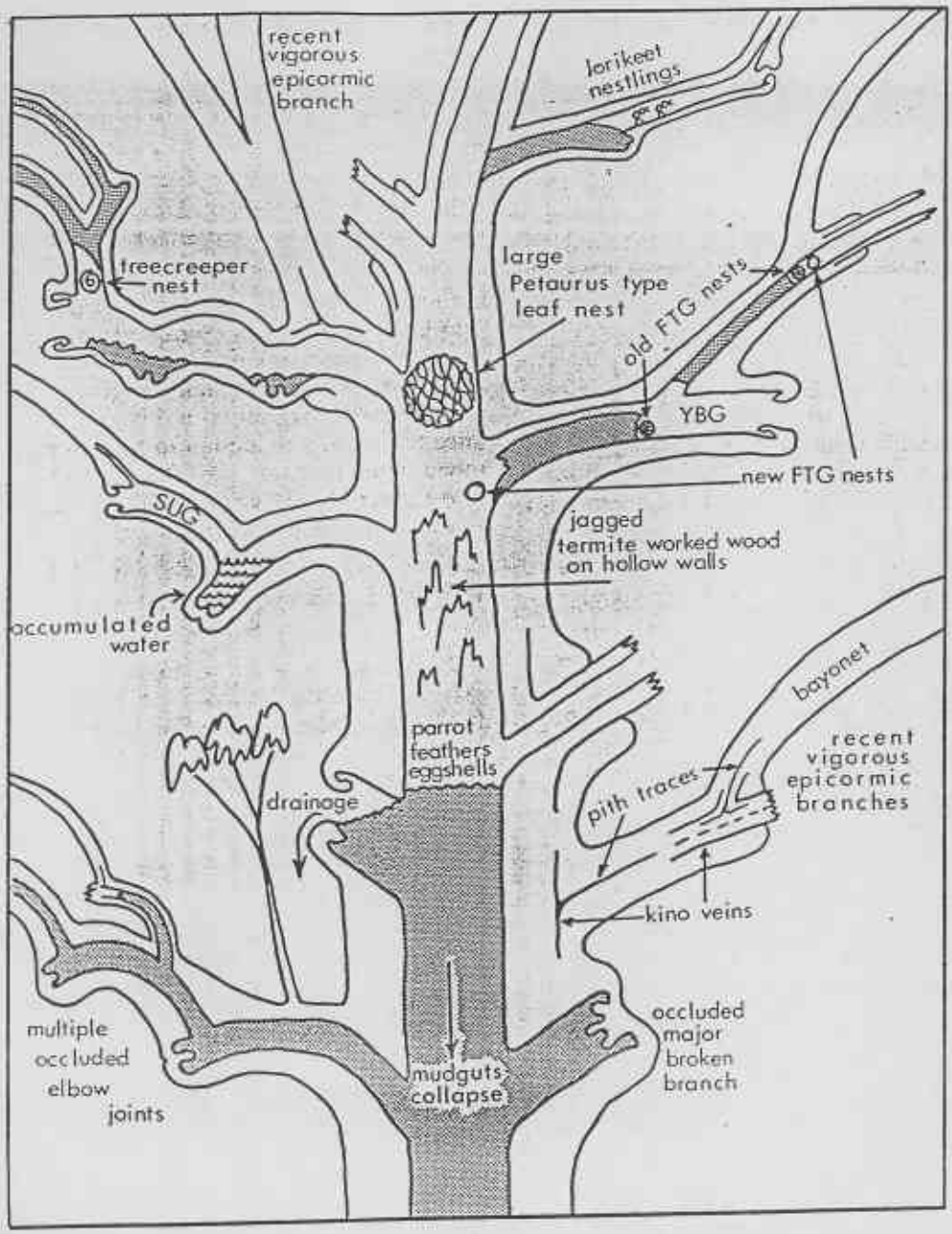
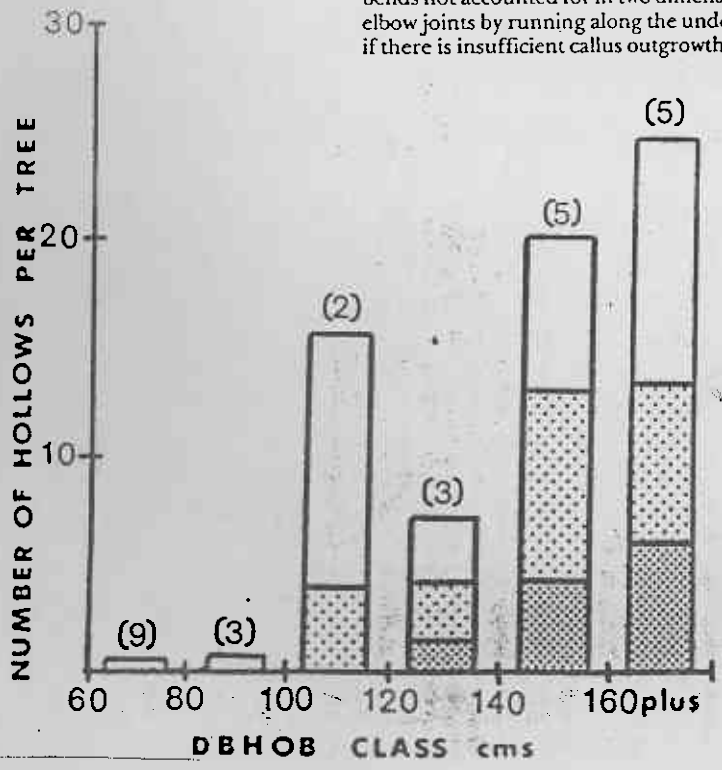


Fig. 6. Schematic Drawing of Dissection Features. Fauna symbols as for Figure 5. Nests which appear to hang in mid air in Figure 6 and mudguts similarly in Figure 5 are held in bends not accounted for in two dimensional drawing. Rainwater accumulates in some elbow joints by running along the underside of branches and into elbow joint hollows if there is insufficient callus outgrowth to shield the hollow.



Hollows. Histograms showing average number of hollows in Blackbutt trees of different size. Unshaded represents small hollows, light shading represents medium hollows and heavy shading represents large hollows plus stem hollow complexes, see text for size definitions. Bracketed figures above column indicate sample size.