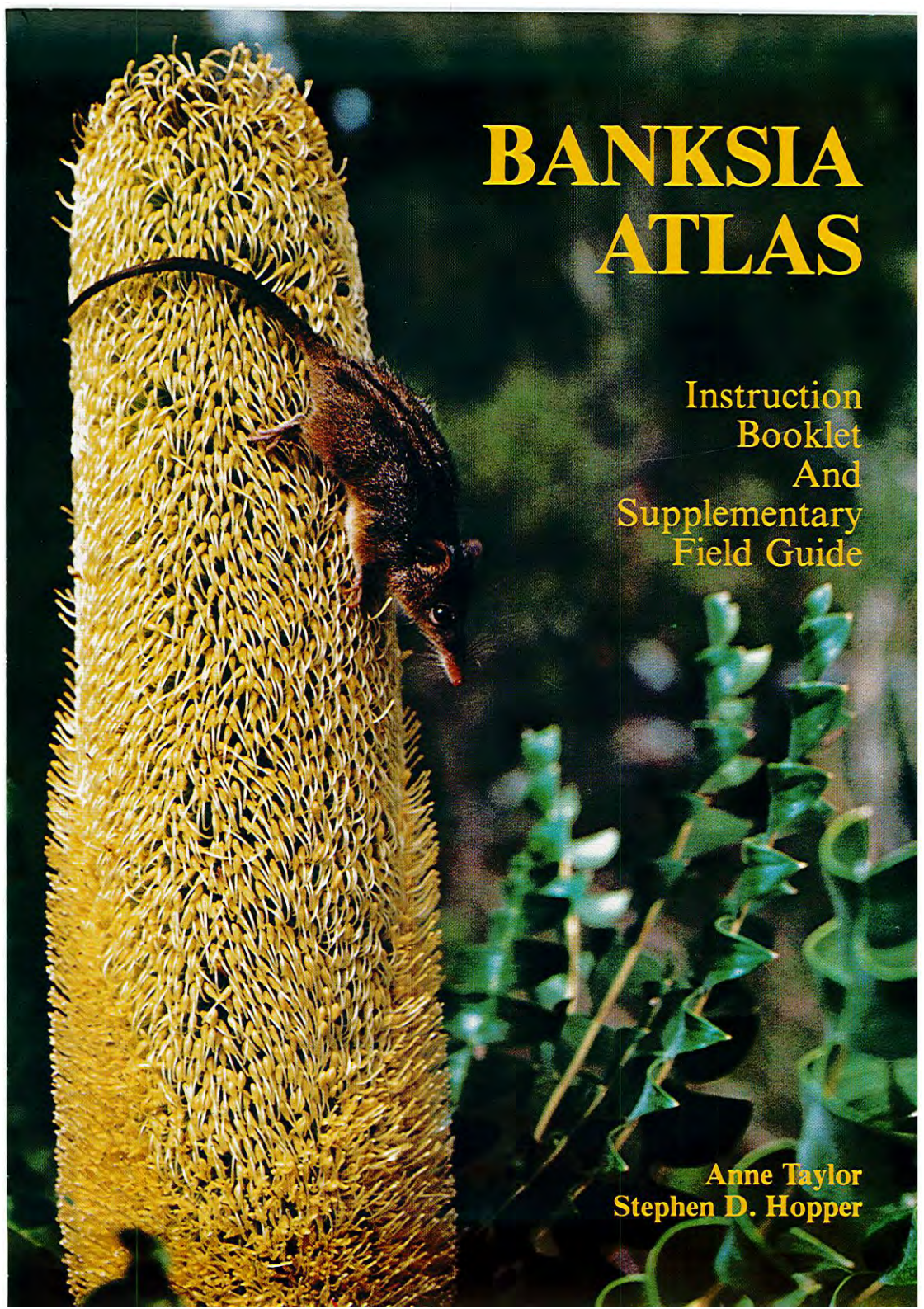
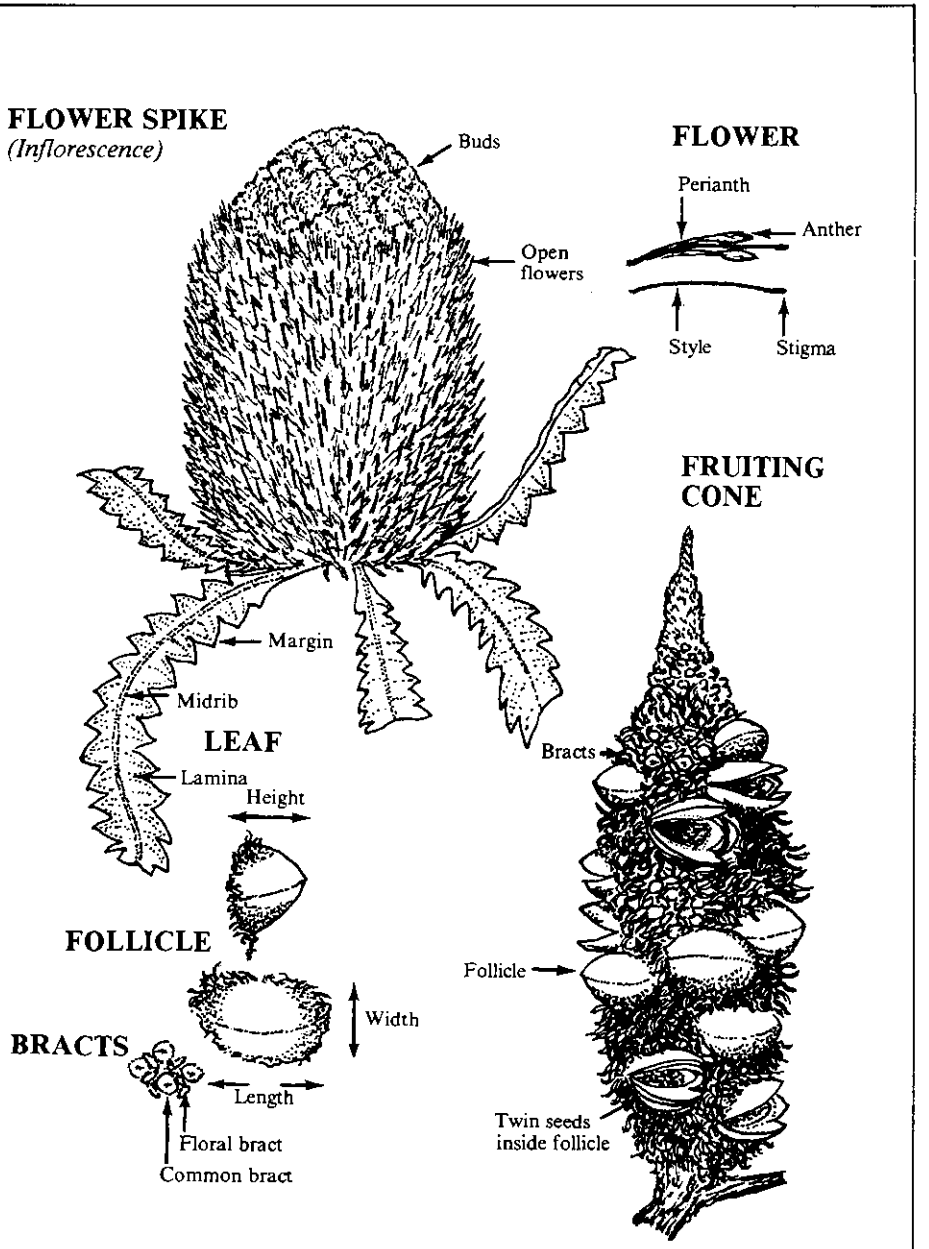


BANKSIA ATLAS

Instruction Booklet And Supplementary Field Guide

Anne Taylor
Stephen D. Hopper



Cover Photo: Honey possum on *Banksia grandis* (S.D. Hopper)

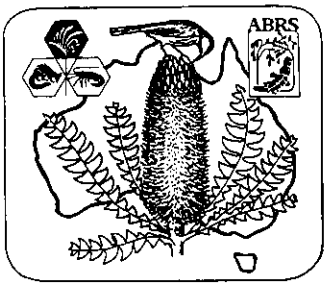
BANKSIA ATLAS

Instruction Booklet and Supplementary Field Guide

by

Anne Taylor and Stephen D. Hopper
Western Australian Wildlife Research Centre
P.O. Box 51, Wanneroo W.A. 6065

Line Drawings
by
Susan J. Patrick



1984

PHOTOGRAPHIC CREDITS

Photographer	Page
P.G. Armstrong	43 (left)
T. Blake	29 *(B. paludosa)*
A.P. Brown	35 (top), 44, 46, (left)
A.A. Burbidge	53
R. Frith	2 (except lower right), 3, 8
A.S. George	38
S.D. Hopper	2 (lower right), 4, 5, 13, 15, 16, 17, 20, 21, 22, 23, 24, 25, 28, 29 (except *B. paludosa),* 35 (except top), 39, 40, 43 (right), 45, 46 (right), 48 (top), 51, 52, 54, 55, 56, 57, 58, 59 (lower left), 60, 62, 64
G.J. Keighery	42, 61
K. McNamara	26
A. Salkin	33, 34, 47, 48 (except top)
P.C. Taylor	59 (top right)

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CONTENTS

INTRODUCTION

This booklet aims to introduce the Banksia Atlas, explain how to contribute to it, and to provide an aid to identification of the new species and varieties described by George (1981).

The Banksia Atlas is the first Australia-wide plant mapping project to be undertaken using volunteer contributors. It is programmed to run for three years (1984-86).

Joint funding by the Australian Biological Resources Study (ABRS) and the Western Australian Department of Fisheries and Wildlife has enabled the appointment of a national coordinator (Anne Taylor) and a computer programmer to run the project. They will be based at the Western Australian Wildlife Research Centre. It is appropriate to base the Banksia Atlas in Western Australia because 57 of the 72 named species occur in the State. Moreover, staff at the Wildlife Research Centre have six years' experience in running pilot plant atlas projects aimed at developing suitable systems for a project like the national Banksia Atlas.

The Atlas project aims to involve interested persons throughout Australia in recording information on the distribution, habitat and biology of banksias. Information will be sorted and analysed by computer enabling rapid retrieval of desired tabulations and maps for any particular species.

The role of volunteers in assisting in the collection of scientific data is particularly relevant in a country the size of Australia which has only a relatively small number of professional botanists located mainly in capital cities. Collaboration of this nature is well established in other countries, particularly the U.K., whose Atlas of the British Flora was completed in 1969 largely on the basis of records contributed by amateur botanists throughout the country.

In Australia, the Royal Australasian Ornithologists union (RAOU) recently enlisted the help of 3000 volunteers over a five year period (1976-81) to provide records for their Atlas of Australian Birds. This project was so successful that the RAOU is now running a follow-up survey of waterbirds, initially in south-west W.A., to see if useful biological and breeding data can also be recorded by interested volunteers.

Between 1979-84 the Department of Fisheries and Wildlife selected kangaroo paws and orchids as the subjects for two pilot projects to test the feasibility of computer-based flora mapping using amateur volunteers for field recording. Both projects have been successful in providing experience to Wildlife Research Centre staff in running a volunteer contributor Atlas Project.

Banksias were considered to be most suitable for a nation-wide flora mapping project for the following reasons:-

They are a relatively distinctive group of large Australian plants found in all states.

The majority of species are easy to recognise by their flowers or foliage. Moreover, a field guide (Holliday and Watton 1975) and recent taxonomic study (George 1981) are readily available.

The geographical distribution of most species is known in broad outline only. The occurrence of banksias in national parks and other conservation reserves is poorly known. Thus, a reasonable assessment of conservation status is not possible on current information.

Being dominant trees or shrubs in many vegetation types across Australia, banksias play an important role in providing food and shelter to a wide range of native animals and plants. For example, banksias support large populations of nectar and pollen-feeding birds, mammals and insects. Careful management of

Banksia stands through the use of fire will be important to the maintenance of their ecosystems and the plants and animals they support. A knowledge of the fire response of each species is essential for such management.

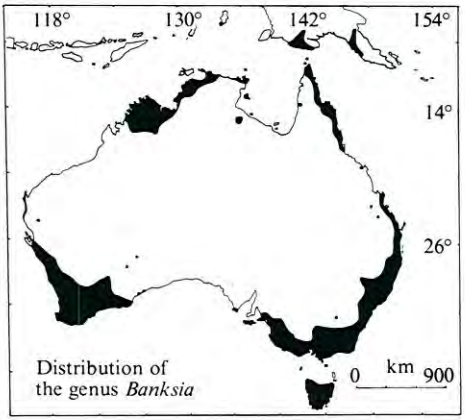
Both as nursery plants and as cut flowers, banksias rank among the most economically valuable of our native plants. Information on the distribution, habitat and biology of each species will be useful to *Banksia* farmers and nurserymen.

One of the main outcomes of the project will be up-to-date maps on the abundance and distribution of all *Banksia* species throughout Australia. Such maps are the first stage in understanding the environmental factors limiting species distribution.

They are also an extremely important tool enabling immediate assessment of the conservation status of a species by observing its distribution both throughout its range and within protected areas such as National Parks/Nature Reserves. Possible threats to a species' existence by, for example new land releases or mining ventures, can be quickly identified and appropriate action taken where necessary.

Information gained on the habitat and biology of banksias including pollination mechanisms and the response of different species to fire, will be useful in preparing reserve management plans, particularly when the fragile populations of rare or endangered species need to be safeguarded.

Apart from these valuable functions it is also hoped that the Atlas will provide a meaningful and enjoyable reason for contributors to travel in the bush and to learn more about their countryside and native plants first hand.



How the Atlas will Work

1. After contacting the coordinator, each contributor will receive a book of recording sheets, instruction manual and field notebook.
2. Completed record sheets sent to the Wildlife Research Centre, Wanneroo.
3. All information received entered onto computer.
4. Three monthly newsletter and six monthly interim distribution maps sent to all contributors.

A number of field trips are planned both to localities where rare or endangered banksias are thought to occur, and to remote areas which would otherwise probably not be covered. Contributors to the Atlas will have the opportunity to join in many of these trips.

All volunteers are welcome in this project whatever their previous knowledge of banksias. Field trip - identification sessions will be held for those who would like extra instruction.

Interested persons please contact Anne Taylor (Ph. (09) 405 1555) at the Wildlife Research Centre, P.O. Box 51, Wanneroo, Western Australia 6065

ACKNOWLEDGEMENTS

We are grateful to the Australian Biological Resources Study and the Western Australian Department of Fisheries and Wildlife for funding the project, to Sue Patrick for line drawings and assistance with other artwork, to the curators of the Western Australian Herbarium and the Queensland Herbarium for providing access to specimens, to Paul Gioia, Wilf Lehre and Norm Hall for developing the computer systems, to many colleagues Australia-wide who assisted in testing and improving on the design of the Sight Record Sheets, to the State National Parks and Wildlife Services (or equivalents) and Departments of Lands and Survey (or equivalents) who provided information and maps relevant to the activities of Atlas contributors, and to the photographers listed on page *ii* who provided their work free of charge as a contribution to the Banksia Atlas.

REFERENCES

George, A.S. (1981). The genus Banksia L.f. (Proteaceae). *Nuytsia* 3 : 239-474.

Holliday, I., & Watton, G. (1975). A Field Guide to Banksias. Rigby, Adelaide.

A SELECTION

Clockwise from above:
B. prionotes, B. coccinea,
B. pulchella, B. praemorsa,
B. petiolaris, B. occidentalis

OF BANKSIAS

Clockwise from above:
B. menziesii, B. ornata,
B. baueri, B. quercifolia
B. ilicifolia, B. elegans

BANKSIA ATLAS — SIGHT RECORD SHEET

Use BLOCK LETTERS to fill in blank boxes ☐ inserting one letter per space.
Shaded boxes ☐ are "for office use only".
On dashed lines .... use own handwriting.
If in doubt about a record, leave space blank.
Write zero as "Ø", seven as "7", letter I as "I", letter Z as "Z".

Observer: R C A T A | State code: WA | Date of Observation Yr Mn Dy: 84 Ø3 27 | Locality No. for day: 3

Map used and scale: WA. Nat Parks / Nature Reserves 1:1,000,000

LOCALITY

latitude: G D 3 Ø 2 6 3 Ø | longitude: 1 1 5 2 7 Ø Ø | Locality Resolution code: 3 | Local Authority code: ☐ | Name of Local Authority (Shire etc.): Dandaragan.

Nearest named place: N P BADGINGARRA | Straight line distance from nearest place (km) (last digit ↓): 12·5 | Direction from nearest place (↑ first letter): SW

Further details of location: L O N 1KM FROM BIBBY RD ALONG EAST BOUNDARY FIREBREAK

Reserve or National Park? P R Y (Y = yes, N = no) | Reserve/Park Name: Badgingarra Nat. Park | Reserve number: ☐ | Reserve class: ☐

HABITAT

Altitude (last digit ↓): H T 125 | Altitude Resolution Code: 2

Within 2 Km of Coast? N (Y = yes, N = no) | Landform code: GS | Aspect of Slope (x x x = no slope) (first letter) → NW

Surface Soil code: S | Soil Colour code: W | Vegetation Structure code: SS | Vegetation restricted to road verge? N (Y = yes, N = no)

If "x" (= other) recorded for any of above, please specify.

Signs of Fire? N (Y = yes, N = no) | If yes, approx. number of months ago (Ø = less than 1 month): ☐ ← (last digit)

Dominant species at Record Locality: Species rich heath. No dominants.

BANKSIAS PRESENT

	Name	Species code	Shrub (S) or Tree (T)	Population code	Flower code	New Shoot growth? (Y = yes, N = no)	Response to fire code	Average Height (metres) (last digit ↓)	Pollinator code	Specify Name of Pollinator if Known
O B	B. micrantha	MIC	S	1	F	Y		Ø·8		
O B	B. incana	INC	S	2	F	N		1		
O B	B. menziesii	MEN	S	2	F	N		1·5	1	White cheeked honey-eater.
O B										
O B										

B S 3 ← Number of Banksia species at this Locality

Additional Remarks: Some flower spikes of menziesii snapped/bitten off. Cockatoos?

State Codes	
AC	ACT
NS	NSW
NT	N. Terr.
TA	Tas.
QU	Qld
SA	Sth. Aust
VI	Vic
WA	West. Aust

Locality Resolution Codes

1 = 1" 2 = 10" 3 = 30"
4 = 1' 5 = 10' 6 = 30'
7 = 1°

Altitude Resolution Codes

1 = 5m 2 = 20m
3 = 50m 4 = 100m
5 = 250m 6 = 500m

Landform Codes	
HT	Hill/mountain top
SS	Steep slope (> 20°)
GS	Gradual slope (<20°)
VA	Valley bottom or swale
RK	Rock outcrop
FL	Flat
SW	Seasonally wet swamp
LE	Lake edge
RB	Riverbank or dry bed
XX	Other

Soil Type Codes	
S	sandy
L	loamy
C	clayish
G	gravel
R	rocky
T	laterite
P	peaty
N	sand over laterite
V	sand over rock
X	other

Soil Colour Codes	
B	brown
G	grey
K	black
R	red
W	white
Y	yellow
N	orange
X	other

Vegetation Structure Codes	
GR	Grassland
SS	Small shrubs (< 2m)
LS	Large shrubs (> 2m)
MA	Mallee
WL	Woodland
FT	Forest
RF	Rainforest
CF	Cleared farmland/plantations, orchards etc
XX	Other

Population Size Codes	
1	1 - 10
2	10 - 100
3	more than 100

Flower Codes	
B	majority in bud
F	majority in full flower
A	mainly old flowers and/or immature fruiting cones
N	no flowers

Response to Fire Codes	
K	Killed by fire — no seedlings present
S	Killed by fire — seedlings present
L	Not killed — resprouting from below ground
T	Not killed — resprouting from trunk

Pollinator Codes	
1	Bird
2	Mammal
3	Butterflys/Moths (Lepidoptera)
4	Bees, Wasps, Ants (Hymenoptera)
5	Beetles (Coleoptera)
6	Flies (Diptera)
X	Other
N/	No pollinator observed

Species Codes * First 3 letters of a species' name = species code EXCEPT B.candolleana = CAD , B.caneı = CAE

ACU	aculeata	GRA	grandis	OCC	occidentalis
AEM	aemula	GRO	grossa	ORE	oreophila
ASH	ashbyi	HOO	hookerana	ORN	ornata
ATT	attenuata	ILL	ilicifolia	PAL	paludosa
AUD	audax	INC	incana	PET	petiolaris
BAU	baueri	INT	integrifolia	PIL	pilostylis
BAX	baxteri	INTI	" var. integrifolia	PLA	plagiocarpa
BEN	benthamiana	INTC	" var. compar	PRA	praemorsa
BLE	blechnifolia	INTA	" var. aquilonia	PRI	prionotes
BRO	brownii	LAE	laevigata	PUL	pulchella
BUR	burdettii	LAEL	" subsp. laevigata	QUE	quercifolia
CAL	caleyi	LAEF	" subsp. fuscolutea	REP	repens
CAD	candolleana*	LAN	lanata	ROB	robur
CAE	caneı*	LAR	laricina	SAX	saxicola
CHA	chamaephyton	LEM	lemanniana	SCA	scabrella
COC	coccinea	LEP	leptophylla	SCE	sceptrum
CON	conferta	LIN	lindleyana	SER	serrata
CONC	" var. conferta	LIT	littoralis	SOL	solandri
CONP	" var. penicillata	LITL	" var. littoralis	SPE	speciosa
CUN	cuneata	LITS	" var. seminuda	SPH	sphaerocarpa
DEN	dentata	LUL	lullfitzii	SPHS	" var. sphaerocarpa
DRY	dryandroides	MAR	marginata	SPHC	" var. caesia
ELD	elderana	MED	media	SPHD	" var. dolichostyla
ELE	elegans	MEI	meisneri	SPI	spinulosa
ERI	ericifolia	MEIM	" var. meisneri	SPIS	" var. spinulosa
ERIE	" var. ericifolia	MEIA	" var. ascendens	SPIC	" var. collina
ERIM	" var. macrantha	MEN	menziesii	SPIU	" var. cunninghamii
GAR	gardneri	MIC	micrantha	TEL	telmatiaea
GARG	" var. gardneri	NUT	nutans	TRI	tricuspis
GARB	" var. brevidentata	NUTN	" var. nutans	VER	verticillata
GARH	" var. hiemalis	NUTC	" var. cernuella	VIC	victoriae
GOO	goodii	OBL	oblongifolia	VIO	violacea

COMPLETING A SIGHT RECORD SHEET

A. GENERAL INSTRUCTIONS

Please read the following instructions carefully before recording any observations.

1. **A Sight Record Sheet is used to record information from a single "record locality".** This is the place where you actually sight one or more species of *Banksia.* It is identified by you by latitude and longitude coordinates. If the area is of uniform habitat (the same soil, landform and vegetation type) then the maximum size of a record locality is a 500m x 500m square. However, if the habitat changes within the 500m square, then a new record locality is defined and a new sight record sheet should be used.
2. Sight Record Sheets can be completed either directly in the field or at home, the information being transferred from the Field Notebook included in your Atlas Kit.
3. Always strive to put maximum effort into completing each Sight Record Sheet **accurately** and **thoroughly.** Double check all recorded information to make sure it is correct. If you are in any doubt about the accuracy of any record, leave the space blank. Fill in as much of the sheet as you can - don't miss out "difficult" sections because they take a bit more time to complete. Pay particular attention to accurate and complete locality information. This is essential if the maps generated from that information are to be regarded as reliable.
4. If more than 5 *Banksia* species occur in one "record locality", data for species 6, 7, 8, etc. should be recorded on an extra Sight Record Sheet. On this sheet enter only "Nearest named place", "Observer", "State", "Date of observation", "Locality number for day" (the same number as on the previous sheet for species 1-5). Put a slash through the rest of Locality and Habitat information.
5. **Confirmation of Species Identification**
   If you are in any doubt about the true identification of a species, send a photograph and/or leaf specimen to your State coordinator. Specify growth habit (prostrate, shrub, tree etc.), flower colour or other features of note, associated vegetation, soil, landform, date of collection, locality of collection (preferably with latitude and longitude coordinates), your name, and what you think the species may be.

   In the absence of a good photograph, an entire "voucher specimen" (flower, cone and leaf) may be sent to either your State coordinator or State herbarium. Include a label with details as listed above.

   To be able to collect specimens from publicly owned land it will first be necessary for you to obtain a scientific permit or licence from the relevant authority in each State (refer to page 26). On privately owned land, you should always seek the owner's permission. In Western Australia, it should be noted that the following rare banksias are protected under the Wildlife Conservation Act and may not be collected either from public or privately-owned land without the Minister's approval:

   B. brownii
   B. chamaephyton
   B. cuneata
   B. goodii
   B. meisneri var. *ascendens*
   B. sphaerocarpa var. *dolichostyla*
   B. tricuspis

Identifying Banksias - if you're not sure, leave it out.

6. When completing a Sight Record Sheet use BLOCK LETTERS to fill in blank boxes, inserting one letter per space. Shaded boxes are for "office use only". Dashed lines ..... may be written on in your own handwriting
7. Write zero as Ø, seven as 7̶, letter 'i' as I, letter 'z' as Ƶ. This helps the punch card operators to punch your information correctly.

B. SPECIFIC INSTRUCTIONS

The following instructions should be read carefully **whilst completing your first sight record sheet.** They may appear daunting at first, but if taken step-by-step are in fact quite easy. A completed example of a Sight Record Sheet appears on page 6. Take particular notice of this example. It summarises many of the instructions.

Observer Code

A 3 letter code, the first 2 letters being your initials (Christian name and surname).

Your personal observer code is ☐☐☐ . Please enter it in the space provided.

State Code

This code indicates the State of Australia in which this record sheet was completed. Refer to the State codes listed on the inside cover of the Sight Record Sheet pad. Enter the appropriate code in the boxes provided.

Date of Observation
The sequence for entering the date is Year (Yr), Month (Mn), Day (Dy). **All spaces must be filled in. Those that are not filled by a number 1 to 9 must have a zero ø entered.** The following example represents March 2nd 1984.

Date of Observation

Yr		Mn		Dy	
8	4	ø	3	ø	2

Locality Number for Day
On any day, the "Record Localities" in which banksias are observed should be numbered 1, 2, etc. (up to the number of localities visited in one day). On a new day begin again with number 1.

If more than five species of *Banksia* occur in one Record Locality use two Sight Record Sheets and in this case the second sheet should have the same locality number as the first (refer to point 4, General Instructions).

Map Used and Scale
Name the type of map used to obtain your latitude and longitude coordinates. Specify its scale. Example: W.A. National Parks and Nature Reserves Map 1:1 000 000.

LOCALITY

This information defines the exact position of the record locality to which the Sight Record Sheet refers. It must be as accurate as possible so that the distribution maps generated from this information may be regarded as reliable. The limits of a single record locality are defined above in point 1, General Instructions.

Latitude
These are represented by horizontal lines on a map and refer to the number of degrees north or south of the Equator (0°). Parts of a degree (°) are expressed as minutes (′) and seconds (″). There are 60 minutes in a degree and 60 seconds in a minute. The relationship between the latitude coordinates and distance is as follows:-

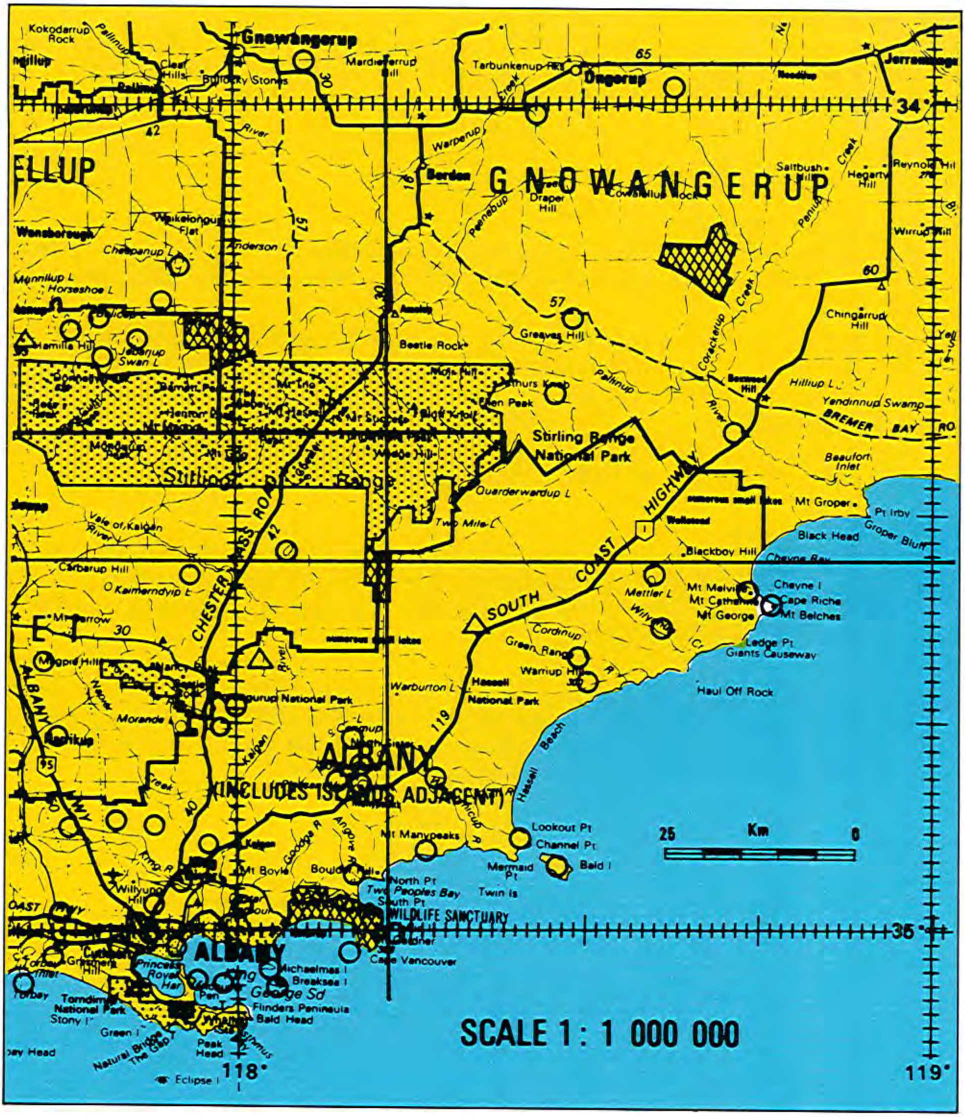
1° = 108 km
30′ = 54 km
10′ = 18 km
1′ = 1.8 km
30″ = 900 m
10″ = 300 m
1″ = 30 m

Latitude coordinates will be marked on the left or right hand side of the map. To make sure you are using the correct numbers, look carefully for the degrees (°) and minutes (′) symbols. There may also be other numbers along the sides of the map. These are national grid numbers and in this case should be ignored.

Australia stretches between approximately 10°00′00″ and 43°30′00″ south. The latitude of any "Record Locality" recorded on a Sight Record Sheet should be between these coordinates.

The level of accuracy attained will largely depend on the scale of map being used, e.g. on the Nature Reserves/National Parks Map of W.A., scale 1:1 000 000, every minute (′) is marked. With the aid of a ruler it is therefore possible to be accurate to the nearest minute or even half minute (30 seconds) by estimating halfway between the minute lines.

On a larger scale map e.g. 1:100 000 Natmap, it should be possible to define the position of the record locality to the nearest ten seconds (10″).



Latitude and longitude coordinates can be determined from maps as shown above. In this example, a ruler was placed on a location on South Stirling Nature Reserve in the Shire of Albany, W.A. Red lines were then drawn across and up to lines of longitude and latitude. The intersection of these lines gives the coordinates 34° 33′ 30″S 118° 13′ 00″E, and the resolution is to the nearest 30″ (code no. 3).

When recording latitude on the Sight Record Sheet every space must be filled. Those not filled by a number 1 to 9 must have a zero ø entered.

Longitude

These are the vertical lines on a map and refer to the number of degrees east or west of the Greenwich Meridian in London. Australia stretches between approximately 113° 07′00″ and 153° 38′00″ east. The longitude of any recorded locality should lie between these coordinates.

Longitude coordinates will be marked along the top or bottom edge of the map.

The same remarks on level of accuracy etc. apply to longitude as well as latitude (see above).

Locality Resolution Code

This indicates the degree of accuracy with which you have located the "Record Locality" on a map and given the latitude and longitude. On the inside cover of the Sight Record Sheet pad is a list of Locality Resolution Codes. Having referred to these codes, record a number 1 to 7 in the Resolution Box depending on the degree of accuracy.

For example, if you are using a map which allows you to measure only to the nearest minute you should enter code 4 in the box. If, however, you had a larger-scale map which allowed you to measure to the nearest ten seconds (10″), then code 2 should be entered.

It may be that sometimes you are unable to locate the **exact** position of the record locality (you may have walked to an area and not be quite sure where you are!). In this case, refer to the table below which sets out the approximate relations between Resolution Codes, Degrees and Distance. If you know that the record locality is within a 1 kilometre radius of the point defined by your latitude and longitude entries, the Resolution Code to be entered would be 4.

If you are less sure of the record locality position and know only that it is within a 5 kilometre radius of the point defined by your latitude and longitude entries, you would enter 5 in the Locality Resolution Code box.

Resolution	Degree	Distance
7	1°	108 km
6	30′	54 km
5	10′	18 km
4	1′	1.8 km
3	30″	900 m
2	10″	300 m
1	1″	30 m

Local Authority Name

If known, write in the name of the local authority (i.e. shire, municipal authority etc.) in which the "Record Locality" is found. The box Local Authority Code is for "office use only".

Nearest Named Place

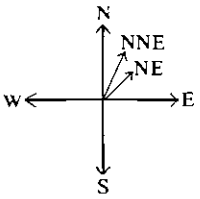
The information to be entered here is the officially recognised name of a town, siding, mountain, lake or other landmark nearest to the record locality. For some remote localities this may be many kilometres distant. Other record localities may occur **directly at** a named place in which case this name should be recorded.

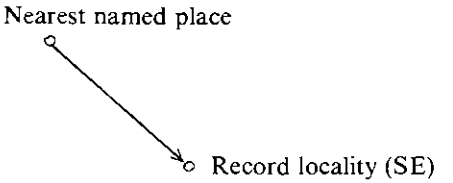
Straight Line Distance from Nearest Place

This box is **different** from most others, as it is filled in **from right to left.** The examples provided represent (a) 0.5 km; (b) 7 km; (c) 15 km; (d) 124 km.

(a) [ ][ ][ø][·][5] (b) [ ][ ][ ][ ][7] (c) [ ][ ][ ][1][5] (d) [ ][ ][1][2][4]

Direction from Nearest Place
The direction is FROM the nearest named place TO the record locality.





When entering this information, the standard form for the sixteen major compass points should be used. They are N, NNE, NE, ENE, E, ESE, SE, SSE, S, SSW, SW, WSW, W, WNW, NW, NNW and should be entered from left to right as follows:

N		

N	N	E

N	E	

Further Details of Location
Write any additional information which would assist in relocating the Record Locality. This may be a plain word description e.g.

L	O	J	U	N	C	T	I	O	N		O	F		Y	O	R	K		R	O	A	D		A	N	D		I	N	K	P	E	N		R
		O	A	D																																	
L	O	S	O	U	T	H		S	I	D	E		O	F		R	E	S	E	R	V	E		N	E	A	R		G	R	A	V	E	L	
		P	I	T																																	

If distances are included, it is important to distinguish between straight line distance, and distance along a road (or river). To avoid confusion the following rules regarding recording of distance should be followed. Where straight line distance is used, the distance should be entered first, followed by direction, e.g.

L	O	3	1	K	M		N		O	F		E	N	E	A	B	B	A		W	H	E	R	E		S	A	M	P	S	O	N		R	D
			A	P	P	R	O	A	C	H	E	S		S	M	I	T	H		R	D																

Where distance along a road or river is used, the direction should be entered first, followed by distance, then the road or river name. In this case the use of the word "along" is strongly recommended, e.g.

L	O	S	E		1	1	K	M		F	R	O	M		P	E	R	T	H		A	L	O	N	G		B	R	O	O	K	T	O	N	
			H	I	G	H	W	A	Y																												

When measuring distance from any town or village, the post office is assumed to be the starting point unless otherwise stated.

Abbreviations for some words, such as Road (Rd), may be used where space is limited, but consistency should be maintained.

Reserve or National Park?

These are areas of reserved Crown land including Nature Reserves, Conservation areas, State Reserves, National Parks etc. where native flora and fauna is protected. If the record locality is known to be in such a reserve or National Park then enter 'Y' in the box. If it is not, enter 'N'. **If you're not sure either way, leave the box blank.** If the name of the reserve is known, e.g. Thomsons Lake Nature Reserve or John Forrest National Park, please write it on the dashed line.

You are encouraged to search for banksias in reserves etc. as this will provide valuable information on the conservation status of the species recorded.

The boxes Reserve Number and Reserve Class are for office use only.

Banksia brownii among low shrubs on the summit of Bluff Knoll, Stirling Range National Park, W.A.

HABITAT

The altitude, proximity to coast, vegetation, landform, soil and fire history that occur in the record locality being observed are collectively called the HABITAT.

Altitude

Record the altitude of the record locality as accurately as possible. Maps with 20 m contour intervals (1:100 000 series) are available for most areas where banksias occur. The following two examples illustrate how the information should be entered. Note that the boxes are filled in from right to left.

Example 1 A record locality lies between 140 m and 160 m. Record the average (mid-way) height, i.e. 150 m, as follows

	1	5	0

Example 2 A record locality lies between 1000 and 1250 m.
Record the average (mid-way) height i.e. 1125 m, as follows:

1	1	2	5

Example 3 You are not quite sure of the **exact** position of the record locality but know that it lies somewhere between 750 m and 810 m.
Record the average (mid-way) height between 750 m and 810 m i.e. 780 m in the Altitude box as follows:

	7	8	0

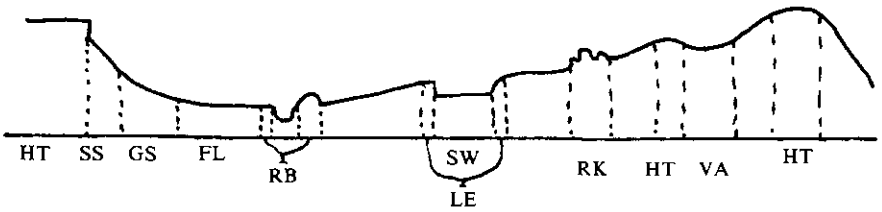
If you are using a map which does not have altitude information, leave the spaces blank.

Altitude Resolution Code
This indicates the degree of accuracy with which you have recorded the altitude of the record locality. Refer to the list of altitude Resolution Codes and record a number 1 - 6 according to the degree of accuracy achieved (this will depend largely on contour intervals).

For example, if you are using a map which allows you to record altitude to the nearest 20 m (20 m contour intervals) record 2 in the box provided. If however you are using a smaller scale map which allows you to record altitude only to the nearest 100 m (100 m contour intervals), then code 4 should be recorded.

Within 2 km of coast?
If the record locality is within 2 km of the coast enter 'Y' in the box. If it is further than 2 km, write 'N'.

Landform Code
Refer to the landform codes on the inside cover of the Sight Record Sheet pad. Match up the landform of the record locality with one of the categories described and enter the code in the Landform box. Landform categories and their appropriate codes are illustrated in the following diagram.



If none of the landforms described are suitable then enter | X | X | for "other" and describe the landform in the space provided half way through the HABITAT section. Every effort, however, should be made to use the landform codes provided. If two landforms seem equally applicable to a record locality, choose the most noteworthy and record its code in the landform box. Make a note of the other landform under Additional Remarks.

Aspect of Slope
This describes the direction in which the land surface faces at the record locality. Fill in the box from left to right using one of the sixteen compass points described under "Direction from Nearest Place". If there is no slope and therefore no aspect enter | X | X | X | in the box.

Soil Type and Soil Colour Codes
Match the soil of the record locality to the soil type and soil colour codes listed and enter the codes in the appropriate boxes. For example, if the soil is predominantly sandy and grey in colour, record [S] for soil type and [G] for soil colour. If you feel that the type and/or colour of the soil at any given record locality does not appear in the choices available, enter [X] in the appropriate box and describe the soil in the space provided (next line down). Every effort, however, should be made to use the codes provided.

Where a surface layer of leaf litter occurs, it should be kicked away and the underlying soil recorded. The presence of such a surface layer should be noted under Additional Remarks.

The term "laterite" as used here refers to the dull red rock made up largely of spherical pebbles cemented in a buff coloured matrix which occurs widely throughout Australia. It is also commonly known as "duricrust" or "ironstone" - an indication of its high iron content. Gravels derived from the in-situ weathering of lateritic rock e.g. much of the Darling Plateau, Western Australia, should also be included in this category.

Vegetation Structure Code
This describes the nature of the vegetation at the record locality. The vegetation structure codes are listed on the inside cover of the Sight Record Sheet pad. Match the vegetation at the record locality with one of the categories listed and write the appropriate letters in the Vegetation Structure box. If you feel that the vegetation at any given record locality does not appear in the choices available, enter [X][X] and describe the vegetation in the space provided (next line down). Every effort, however, should be made to use the vegetation codes provided.

Prostrate coastal form of *Banksia grandis* growing with low shrubs on a rock outcrop at Torbay, W.A.

The following definitions describe the categories used in the Vegetation Structure List:-

Grassland: dominated by perennial grasses.

Small shrubs: dominated by shrubs less than 2 metres in height. Often referred to as "heath" or low "scrub".

Large shrubs: dominated by shrubs greater than 2 metres in height. Often referred to as "thicket" or "scrub".

Mallee: dominated by eucalypts which have a shrub-like form (i.e. several stems emerging from an underground lignotuber).

Woodland: dominated by low to tall trees whose canopies shade up to 30% of the ground.

Forest: dominated by mainly tall trees whose canopies interlace and shade more than 30% of the ground.

Rainforest: dominated by trees which form a two or more layered dense canopy, in which lianes and epiphytes are usually conspicuous. Amongst the ground flora, ferns are often common.

Banksia integrifolia in flat grassland on a farm, Wilson's Promontory, Vic.

Banksia verticillata with small shrubs on the edge of a seasonally wet swamp, Two Peoples Bay Nature Reserve, W.A.

Banksia oreophila on a steep mountain slope among small shrubs, Bluff Knoll, Stirling Range National Park, W.A.

Banksia coccinea on flat sandplain among large shrubs, South Stirling area, W.A.

BANKSIAS IN VARIOUS HABITATS

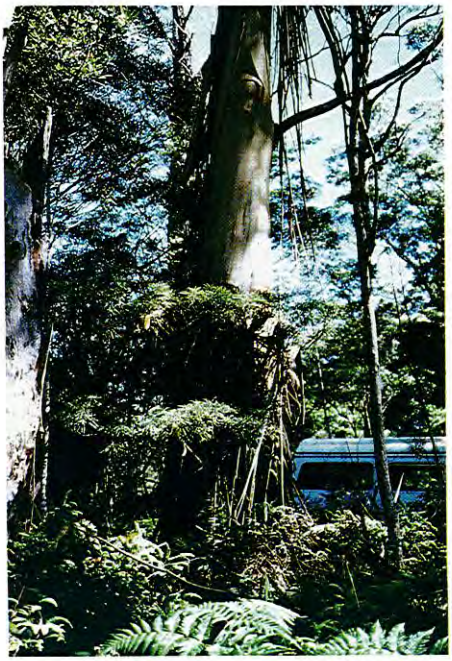
Banksia menziesii in a low woodland on flat sandplain, Woodvale Nature Reserve, W.A.

Banksia marginata in forest on a gradual slope, eastern Tas.

Banksia marginata (left) and *B. ornata* with mallee eucalypts on a gradual slope, Flinders Chase National Park, Kangaroo Island, S.A.

Banksia tricuspis emergent from small shrubs on a gradual laterite slope, proposed Mt. Lesueur Nature Reserve, W.A.

Banksia spinulosa var. *collina* in marginal montane temperate rainforest with *Eucalyptus oreades*. Warrie National Park, Qld.



Vegetation Restricted to Road Verge?
This item refers to the vegetation associated with the species observed. If the vegetation is restricted to the road verge only, that is if it is surrounded by cleared land, then enter 'Y' in this box.

If the vegetation is not restricted to the road verge, but stretches back into bushland enter 'N' in this box.

If 'X' (= other) Recorded For Any Of Above, Please Specify
If you have felt that the landform, soil, or vegetation of the record locality have not matched up with the choices available and have therefore recorded [X] or [X X] in the appropriate box, use the dashed line to write a brief description of the relevant item.

Signs of Fire?
If there are clear indications that a fire has been through the record locality within recent years, enter 'Y' in the box provided. If no evidence of fire is obvious, enter 'N'.

If 'Yes', Approx. Number of Months Ago
The box is only to be filled in if the answer to the previous question was Yes (Y). If the answer was No (N), then leave this box blank.

Write the approximate number of months ago that the fire went through the record locality. This box is **different** from most others, as it is filled in **from right to left.** The following examples represent (a) less than one month - note the special use of Ø, (b) 6 months, (c) 24 months.

a) [| Ø] b) [| 6] c) [2 | 4]

If you can see there has been a fire through the record locality, but you have no idea how long ago, leave the box blank.

Dominant Species at Record Locality
On the dashed lines write down any of the dominant plants which you are able to identify at the record locality. They may be either trees, shrubs, or herbaceous plants. Include any of the *Banksia* species recorded if they are one of the dominant plants at this locality. Use either common names (e.g. jarrah) or scientific names (e.g. *E. marginata*), whichever you are most sure of.

BANKSIAS PRESENT

This section records details about the species of *Banksia* that are present at a locality. For every species that you wish to note, one line of the BANKSIAS PRESENT section should be filled in. An individual species record thus consists of the following:

	Name	Species Code	Shrub(s) or Tree	Population Code	Flower Code	New Shoot growth	etc
01	.....						

Name
Write on the dashed line the name of the *Banksia* species being observed. If you are not sure of a species' name, **please don't guess.** Leave the space blank. Send a photograph and / or leaf specimen to your State coordinator for positive identification (see point 5 under General Instructions) and send in a Sight Record Sheet later.

Species Code
On the inside front cover of the Sight Record Sheet pad are listed all *Banksia* species and their codes. It should be noted that in almost all cases the species code is the first three letters of the species name, e.g., *Banksia aculeata* = ACU.

The two exceptions are *Banksia candolleana* = CAD and *Banksia canei* = CAE.

The three letter codes should be entered in the first three spaces of the box, leaving the fourth space blank, e.g.

B. aculeata = [A][C][U][ ]

A few species, however, can be subdivided into varieties or subspecies. The differences between these are not of sufficient magnitude for them to be classified as different species. Where there exists a variety or subspecies a four letter code is used - the first three letters being the species code and the fourth letter, the variety/subsp. code, e.g.

B. conferta var. *conferta* = [C][O][N][C]

When you are recording one of these subdivided species, attempt to identify the correct variety/subspecies. In most cases, they are illustrated and described in the field guide section of this booklet. *Banksia laevigata* and its subspecies are described in "A Field Guide to Banksias" by Holliday and Watton. **However, if you find it too difficult to distinguish between varieties but are certain of the species, then record only the appropriate three letter code for that species e.g.**

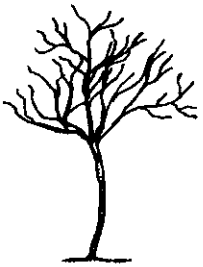
B. conferta [C][O][N][ ]

Shrub (S) or Tree (T)

Most *Banksia* species are consistent in their form and exist either as trees or shrubs. A few species, however, show considerable variation in this respect. In the sandy woodlands around Perth *Banksia attenuata* and *Banksia menziesii* grow as small trees, up to 15 m in height. However, north of Moore River they become low shrubs (1-2 m high) with many stems arising from ground level.

In the box provided record the form of the species being observed. Write [T] if it is a tree, or [S] if it is a shrub. In this case, the prostrate types are included as shrubs.

The difference between trees and shrubs is that a tree has a single main trunk that branches some distance from the ground whereas a shrub has no main trunk, the branches generally arise at, near, or just below, ground level.



Tree

Shrub

Population Code

Refer to the population codes on the inside cover of the Sight Record Sheet pad. Estimate the number of individual plants of the *Banksia* species being observed at the record locality (for a definition of record locality refer to point 1, General Instructions) and insert the appropriate code in the box.

Flower Code

The flower codes are listed on the inside cover of the Sight Record Sheet pad. If there are no flowers evident in the species being observed, write 'X' in the box provided. If there are some

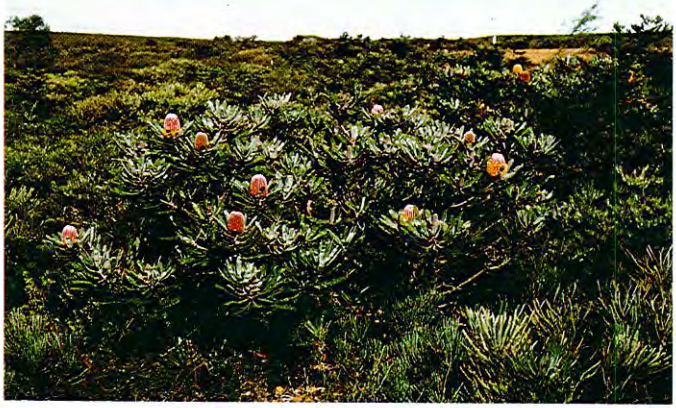
VARIATION IN BANKSIA MENZIESII

Normal flower colour

Rare yellow form

◀ Tree 4m tall, Woodvale Nature Reserve, Perth, W.A.

Shrub 1m tall south of Eneabba, W.A. ▼



The occurence of unusual variants in a species such as the yellow flower form shown above can be noted on Sight Record Sheets in the box labelled "Additional Remarks".

flowers, look carefully at the inflorescences (flower spikes) to determine the stage of flowering.

The inflorescence is said to be in full flower (F) when the style ends become free producing the "fluffy" appearance typically associated with banksias. Prior to this stage, the individual flowers appear more closed and are said to be in bud (B).

In bud

Opening from base upwards

In full flower

The flowers of an inflorescence generally open in sequence from the base of the inflorescence upwards. This process can take up to two weeks. It is therefore quite possible to find an inflorescence with half its flowers in bud and half in full flower. In this apparently confusing case, remember that the codes apply to the **flowers** (up to 6000 or more on a single inflorescence!). Looking at the entire population of flowers (all flowers on all inflorescences) it becomes a matter of deciding whether the majority are in bud (B) or in full flower (F).

New Shoot Growth

Write 'Y' in the box if there is new shoot growth, if not, write 'N'. If you are not sure, then leave the space blank.

New shoot growth on most banksias can be identified by leaves which are smaller and softer than usual. They are frequently brown or rust coloured and are often covered with soft, dense hairs.

Red-brown new growth on *Banksia goodii*.

Response to Fire Code

Banksia species vary in their response to fire. Some have dormant buds which are protected either by being below ground level or beneath extra thick bark on the trunk. They are able to resprout after a fire has killed much of the old growth on the tree.

Other types do not possess these protected buds. The parent plant is killed by fire but regenerates from seed released soon after the fire. With these types the seed-enclosing follicles on the cone often do not open unless burnt. Seed is stored on the branches in a dormant state. After fire, the follicles open, seed is released, and if suitable conditions prevail, germination takes place.

In the box provided, write the code letter that matches the response to fire of the observed species. This box is filled in from left to right. In most cases only one letter will be needed, this should be written in the first space. If a species is resprouting both from below ground and from the trunk, write both 'T' and 'L', using both spaces provided. If the question is not applicable since there has been no fire in the area, leave the space blank.

Two contrasting responses to fire. Left - dead parent plant of *B. baxteri* with seedlings growing below open follicles of a burnt cone (code S). Right - new shoots resprouting from a trunk of *B. attenuata* (code T).

Average Height in Metres

This box is **different** from most others in that it is filled in from **right to left.** The following examples represent a) 0.2m (20 cm), b) 1.5 m, c) 10 m.

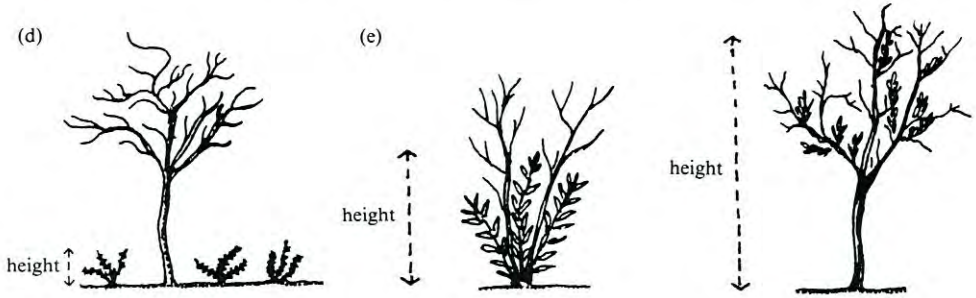
a) [ø][·][2] b) [1][·][5] c) [ ][1][ø]

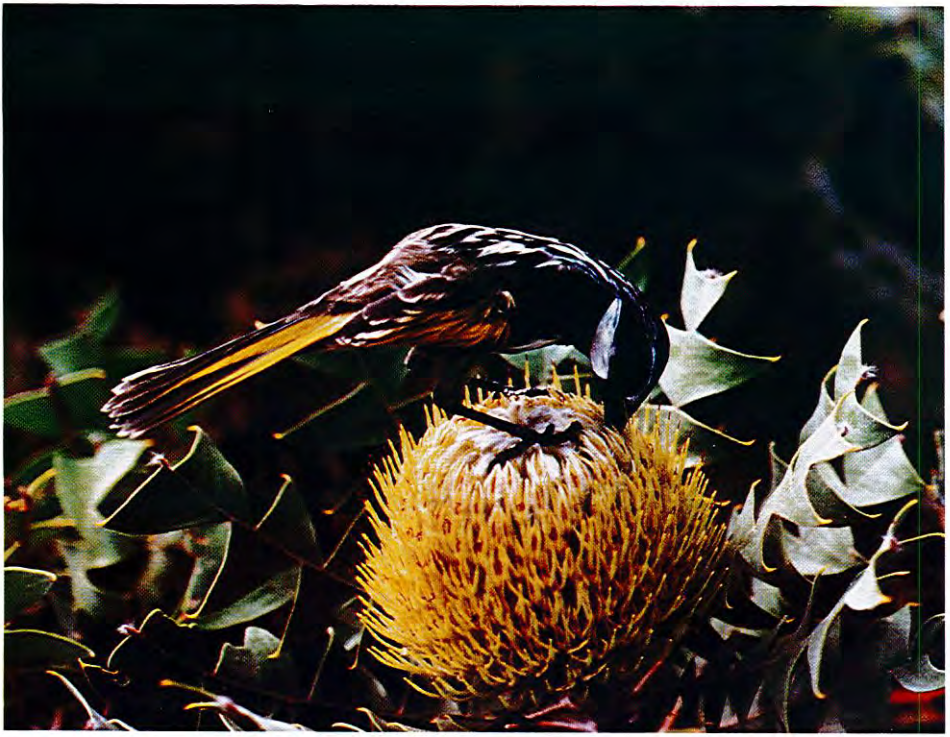
If there are seedlings present as well as mature plants, record only the average height of the mature plants.

In the case of plants having been burnt by fire, the following procedures for recording height should be noted.

d) If the mature plants have been killed by fire but there are new seedlings growing, **record the height of the seedlings, not the old dead plants.**

e) If the mature plants are re-shooting either from below ground or from their trunks, **record the height of the top-most living shoot,** ignoring all dead branch tips.

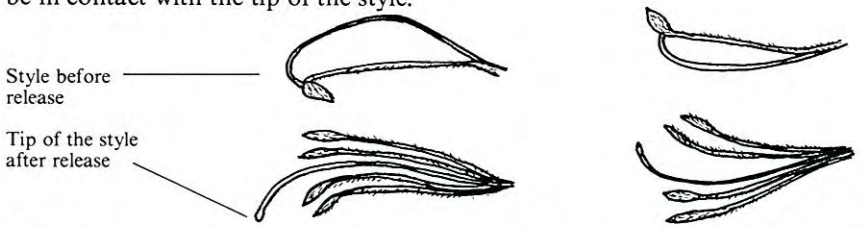




White-cheeked Honeyeater on *Banksia baxteri*.

Pollinator Code and Name

Many types of birds, insects and mammals visit *Banksia* flowers for nectar and in so doing may act as pollinators for the plant. For pollen to be effectively transferred, the animal must be in contact with the tip of the style.



If such an observation is made, record the appropriate pollinator code number in the first box. If more than one type is observed enter each code number in a separate box. If you are able to specify the name of the pollinator(s), write it on the dashed line.

Some very small creatures, however, are able to "rob" the flower of its nectar without ever touching the style tip in which case no cross pollination takes place.

Number of Banksia Species at this Locality
In this box, enter the total number of *Banksia* species you are recording at this record locality. If you have had to go on to an extra Sight Record Sheet because more than 5 species were found at the one locality, please include those from the extra sheet in the number recorded.

Additional Remarks
This space is available for additional remarks about any of the species being observed or about the habitat of the record locality. You may wish to note an unusual flower/style colour, a suspected hybrid, or maybe a large percentage of dead banksias. In the case of insufficient space, continue on an ordinary sheet of paper and attach it to the relevant Sight Record Sheet.

POSSUMS ON BANKSIAS
clockwise from right, honey possum on *Banksia nutans* var. *cernuella*, eastern pygmy possum on *B. spinulosa*, honey possum on *B. coccinea*, honey possum on *B. goodii*, honey possum on *B. dryandroides*.

BANKSIAS — OLD AUSTRALIANS
This fossil species was named recently *Banksia archaeocarpa* (Greek for "old fruit"). It comes from sandstones in the Kennedy Range, inland from Carnarvon, W.A. The sediments are Eocene in age, about 50 million years old. The fossil resembles species such as *B. attenuata,* which currently occurs 300km to the south in higher rainfall country than the arid Kennedy Range.

FLORA COLLECTION - AUTHORITIES TO CONTACT

If you wish to collect specimens on Crown Land to confirm your identification of a *Banksia* please obtain the necessary permit from the relevant authority listed below.

AUSTRALIAN CAPITAL TERRITORY
The Conservator of Wildlife
A.C.T. Conservation Service
Department of Territories
and Local Government
G.P.O. Box 158
CANBERRA A.C.T. 2601
Telephone (062) 46 2308

SOUTH AUSTRALIA
The Director
National Parks and Wildlife Service
Department of Environment and Planning
G.P.O. Box 1782
ADELAIDE S.A. 5001
Telephone (08) 216 7777

TASMANIA
Specimens from Crown Lands:-
The Director
Department of Lands
134 Macquarie Street
HOBART Tas. 7000

From State Reserves, National Parks etc:-
The Director
National Parks and Wildlife Service
PO Box 210
SANDY BAY Tas. 7005
Telephone (002) 30 8033

From State Forests:-
Chief Commissioner
Forestry Commission
Surrey House, 199 Macquarie Street
HOBART Tas. 7000

NORTHERN TERRITORY
The Director
Conservation Commission of the
Northern Territory
PO Box 38496
WINNELLIE N.T. 5789

VICTORIA
Department of Conservation, Forests
and Lands,
Division of Forests,
601 Bourke Street
MELBOURNE Vic. 3000
Telephone (03) 617 9222

Within National Parks, Nature Reserves etc:-
Department of Conservation, Forests
and Lands,
Division of Conservation,
240 Victoria Parade
EAST MELBOURNE, Vic. 3002
Telephone (03) 651 4011

WESTERN AUSTRALIA
The Director
Department of Fisheries and Wildlife
108 Adelaide Terrace
PERTH W.A. 6000
Telephone (09) 325 5988

QUEENSLAND
National Parks and Wildlife Service
PO Box 190
North Quay
BRISBANE Qld 4000

NEW SOUTH WALES
The Director
National Parks and Wildlife Service
G.P.O. Box 2626
SYDNEY N.S.W. 2001
Telephone (02) 237 6500

SUPPLEMENTARY FIELD GUIDE

The following guide is meant to complement Ivan Holliday and Geoffrey Watton's *A Field Guide to Banksias*, published by Rigby in 1975. This book needs amendment following A.S. George's taxonomic revision of *Banksia*, published in *Nuytsia* in 1981. George described 72 species and 15 varieties, whereas Holliday and Watton treated only 57 species. All new species and varieties not covered by Holliday and Watton are described and illustrated below, and will also be featured in a comprehensive book, *Banksias*, by Alex George, due to be published late in 1984 by Kangaroo Press.

Amendments to Holliday and Watton's Field Guide

In addition to new species and varieties, several names used by Holliday and Watton have been changed as a result of George's taxonomic research. These names and their current equivalent are as follows:-

Old Name	Current Name
B. aspleniifolia	*B. oblongifolia*
B. collina	*B. spinulosa* var. *collina*
B. littoralis (unnamed)	*B. littoralis* var. *seminuda*
B. quercifolia var. *integrifolia*	*B. oreophila*
B. serratifolia	*B. aemula*
B. sphaerocarpa var. *major**	*B. leptophylla*
B. sphaerocarpa var. *pinifolia**	*B. leptophylla*

*These two *B. sphaerocarpa* varieties are no longer differentiated. Both are now known under the name of *B. leptophylla.*

A few other species illustrated by Holliday and Watton require special comment.

B. ilicifolia (page 60)
The "inland shrubby form with red inflorescences" mentioned in the description, is now known as *B. cuneata.* This rare plant is illustrated below on page 64.

B. meisneri (page 84)
Two varieties are now recognised for *B. meisneri.* The description and illustration on pages 84 and 85 refer to *B. meisneri* var. *meisneri.* The other variety, *B. meisneri* var. *ascendens* appears below on page 61.

B. menziesii (page 86)
As with *B. attenuata,* this species can grow as a shrub as well as the more frequently seen tree (see photos page 20 above). The shrub form occurs in the northern part of its range (north of the Hill River, W.A.).

B. prostrata (page 104)
The description of *B. prostrata* includes some of the recently named prostrate species e.g. *B. gardneri, B. chamaephyton, B. blechnifolia.* These are all illustrated below on pages 39-44. The name *B. prostrata* is no longer used.

B. repens (page 112)
The large illustration of *B. repens,* page 113 is in fact *B. blechnifolia.* In the smaller illustration (bottom right), the upper leaf is that of *B. repens,* the lower leaf, that of *B. blechnifolia.* Both of these somewhat similar banksias are illustrated below on pages 43 and 44.

B. sphaerocarpa (page 126)
The description of *B. sphaerocarpa* includes some of the recently named species with spherical flowers and linear leaves, e.g. *B. grossa, B. incana, B. leptophylla, B. micrantha, B. lanata, B. telmatiaea, B. scabrella.* All these closely related plants (including *B. sphaerocarpa* and its varieties) are illustrated below on pages 50 to 60.

B. integrifolia, B. ericifolia, B. spinulosa. These were described by Holliday and Watton as species only. However, for each species distinct varieties are now recognised. Their distinguishing features are illustrated below on the following pages:-
B. integrifolia pages 35 - 37, *B. ericifolia* pages 48 - 49, *B. spinulosa* pages 46 - 47.

The Supplementary Field Guide

This is presented in two formats. First, pages 30 and 31 illustrate leaves of all species and varieties at the same scale (x ¼). This is provided to enable rapid preliminary identification in the field. It is recommended that other features of the species are checked against the descriptions and illustrations in the Field Guide or Supplementary Field Guide to confirm all preliminary identifications done on leaves alone.

The bulk of the Supplementary Field Guide describes and illustrates the recently named species and varieties of *Banksia.* All information presented was drawn from A.S. George's taxonomic revision. The line drawings were based either upon specimens annotated by A.S. George at the W.A. Herbarium, or on material collected and photographed by us. The maps give only approximate distributions because they are based on locations of herbarium specimens.

Banksia ashbyi and spiny -cheeked honeyeater.

Banksia caleyi in bud.

B. littoralis var. *seminuda.* This variety is now generally regarded as a species distinct from *B. littoralis.*

Banksia laricina

Banksia hookeriana

B. media

B. tricuspis

B. lindleyana

B. serrata

B. attenuata

B. littoralis

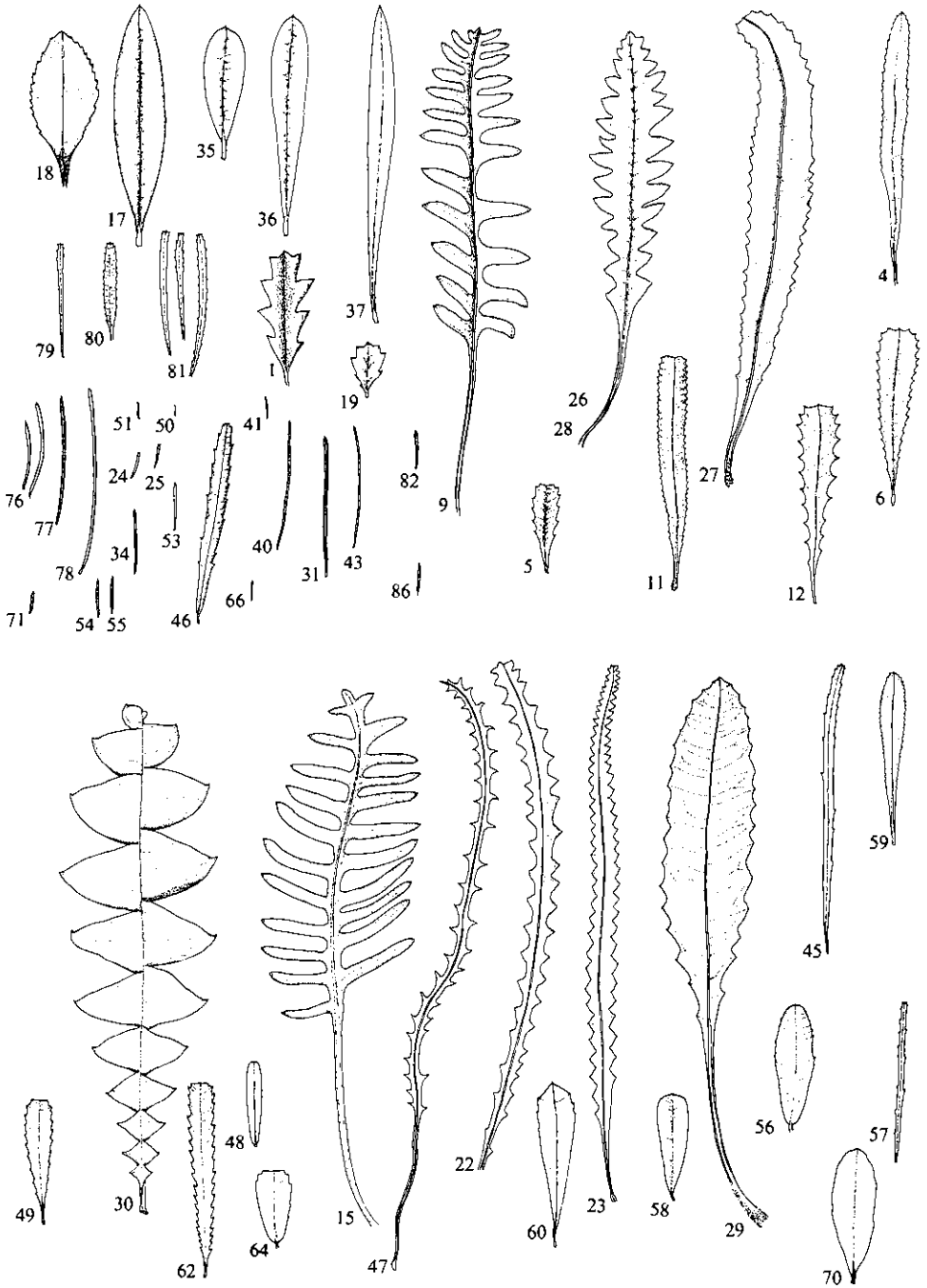
B. marginata

B. verticillata

B. paludosa

Key to the Banksia leaf drawings on pages 30 and 31

1. *aculeata*
2. *aemula*
3. *ashbyi*
4. *attenuata*
5. *audax*
6. *baueri*
7. *baxteri*
8. *benthamiana*
9. *blechnifolia*
10. *brownii*
11. *burdettii*
12. *caleyi*
13. *candolleana*
14. *canei*
15. *chamaephyton*
16. *coccinea*
17. *conferta* var. *conferta*
18. var. *penicillata*
19. *cuneata*
20. *dentata*
21. *dryandroides*
22. *elderana*
23. *elegans*
24. *ericifolia* var. *ericifolia*
25. var. *macrantha*
26. *gardneri* var. *gardneri*
27. var. *brevidentata*
28. var. *hiemalis*
29. *goodii*
30. *grandis*
31. *grossa*
32. *hookeriana*
33. *ilicifolia*
34. *incana*
35. *integrifolia* var. *integrifolia*
36. var. *compar*
37. var. *aquilonia*
38. *laevigata* subsp. *laevigata*
39. subsp. *fuscolutea*
40. *lanata*
41. *laricina*
42. *lemanniana*
43. *leptophylla*
44. *lindleyana*
45. *littoralis* var. *littoralis*
46. var. *seminuda*
47. *lullfitzii*
48. *marginata*
49. *media*
50. *meisneri* var. *meisneri*
51. var. *ascendens*
52. *menziesii*
53. *micrantha*
54. *nutans* var. *nutans*
55. var. *cernuella*
56. *oblongifolia*
57. *occidentalis*
58. *oreophila*
59. *ornata*
60. *paludosa*
61. *petiolaris*
62. *pilostylis*
63. *plagiocarpa*
64. *praemorsa*
65. *prionotes*
66. *pulchella*
67. *quercifolia*
68. *repens*
69. *robur*
70. *saxicola*
71. *scabrella*
72. *sceptrum*
73. *serrata*
74. *solandri*
75. *speciosa*
76. *sphaerocarpa* var. *sphaerocarpa*
77. var. *caesia*
78. var. *dolichostyla*
79. *spinulosa* var. *spinulosa*
80. var. *collina*
81. var. *cunninghamii*
82. *telmatiaea*
83. *tricuspis*
84. *verticillata*
85. *victoriae*
86. *violacea*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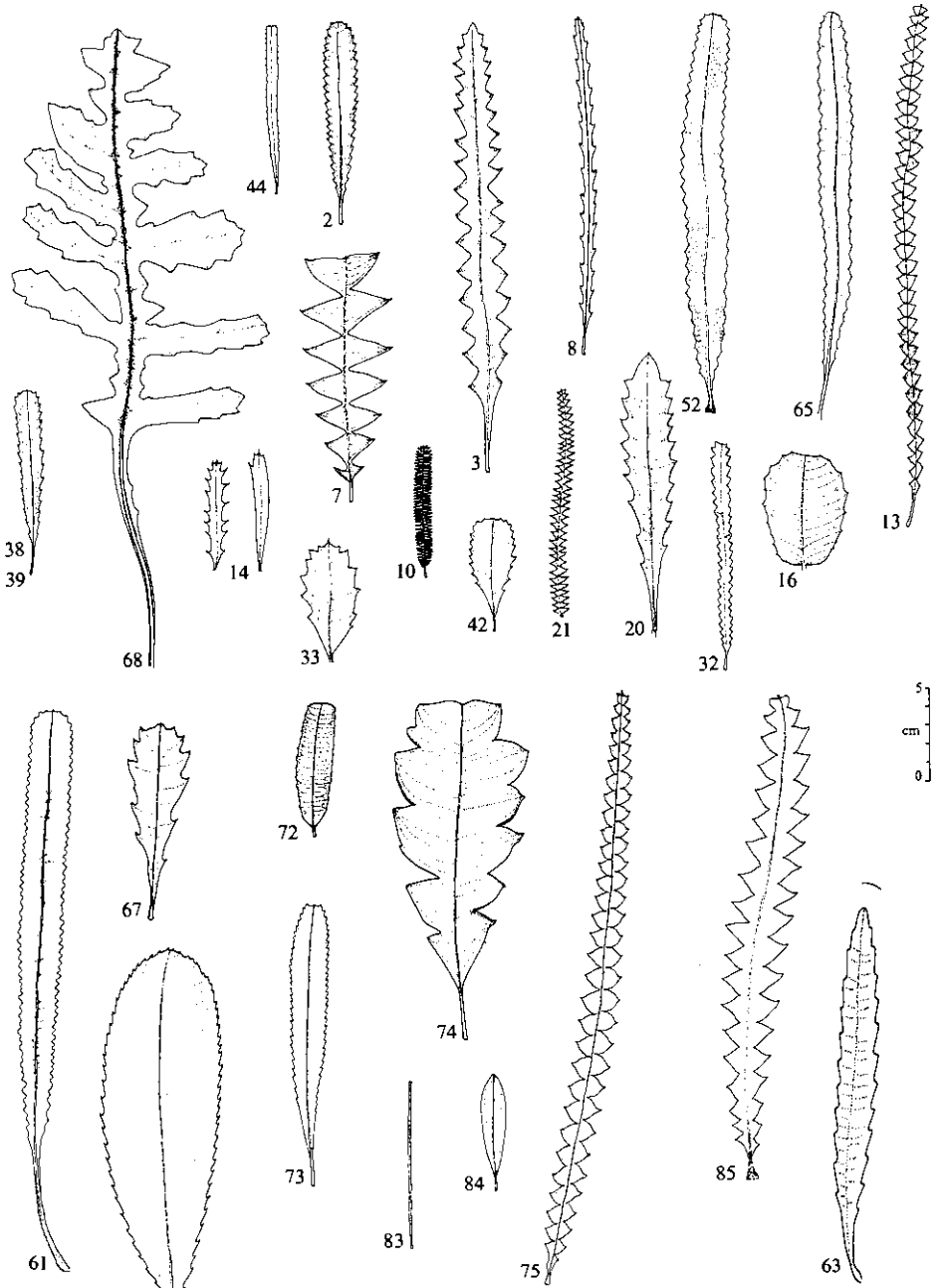


LEAVES OF ALL BANKSIAS (x¼)

Key to numbers on page 29

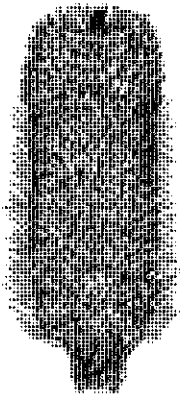
BANKSIA CONFERTA A.S. George

From the Latin, *confertus,* crowded, in reference to the closely set flowers.

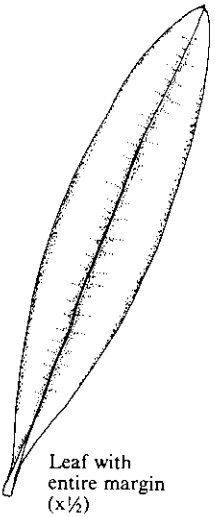
Distinctive characteristics: A large shrub, up to 4 m tall with long, cylindrical flower spikes and whorled leaves, similar to those of *B. integrifolia.* It can be distinguished by its crowded flowers, pinkish brown and grey in bud, opening to yellow, and also by the fruiting cones on which the persistent old flowers surround the small follicles (8-15 mm long, 2-6 mm high, 3-5 mm wide). The follicles are very numerous (often over 100) and mostly remain closed until burnt.

The species has two varieties distinguished mainly by bark texture and leaf form. Their responses to fire are also thought to be different. The flower spikes of both varieties are similar. The two varieties are found in areas some 600 km apart.

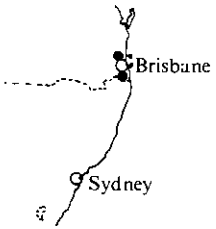
BANKSIA CONFERTA A.S. George var. **CONFERTA**

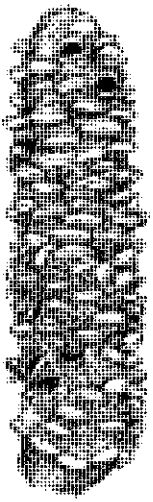


Flower spike (x½)



Leaf with entire margin (x½)





Fruiting cone (x½)

Distinctive characteristics: The bark is smooth at first, later becoming thickened and rough. The leaf margins are entire. After a fire it is thought to resprout from a lignotuber below ground, though further studies are needed to confirm this.

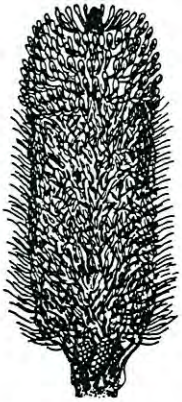
Other characteristics: Flowers and fruits are as described for *B. conferta.*

Flowering period: Late April - July.

Distribution and habitat: Queensland, Glasshouse Mountains and Lamington Plateau. Occurs on steep, rocky slopes amongst tall shrubs.

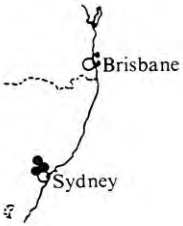
BANKSIA CONFERTA A.S. George var. **PENICILLATA** A.S. George

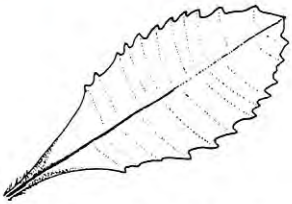
From the Latin, *penicillatus,* tufted, in reference to the tuft of long hairs on the apex of the common bracts.



Flower spike (x½)

Fruiting cone (x½)





Leaves with saw-toothed margins (x½)

Distinctive characteristics: Differs from *B. conferta* var. *conferta* in its generally smooth bark and leaves with saw-toothed margins. This variety appears to be killed by fire, regenerating from seed. It is also similar to *B. paludosa* and both may occur in the same area (New South Wales, Blue Mountains). It may be distinguished by its larger habit, larger flower spikes (7-19 cm long by 5-6 cm wide), the crowded nature of the flowers, and its sensitivity to fire.

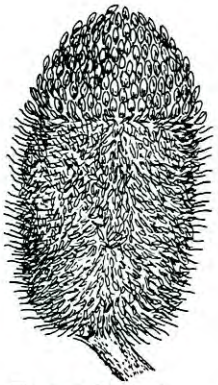
Other characteristics: Flower colour and appearance of fruiting cone are as described for *B. conferta.*

Flowering period: March - June.

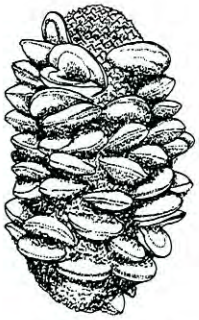
Distribution and habitat: New South Wales, Blue Mountains. Occurs on steep rocky slopes in forest or woodland with *Eucalyptus, Angophora, Leptospermum* etc.

BANKSIA SAXICOLA A.S. George

From the Latin, *saxum,* a rock, and the suffix - *cola,* a dweller, in reference to the preferred habitat.



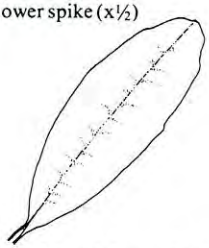
Flower spike (x½)



Fruiting cone (x½)

perianth

Single flower (x½)



Leaf (x½) with furry white lower surface

Distinctive characteristics: Can either be a spreading shrub (up to 3 m in height) or erect tree (up to 13 m tall) depending on location. Very similar to *B. integrifolia* but can be distinguished by the much thinner bark (2-4 mm), the greyish-yellow flowers with shorter perianth (19-22 mm) produced only in summer, and by the follicles on the fruiting cone which remain closed for one to several years.

Other characteristics: Leaves are whorled, 4-10 cm long, 1-3.5 cm wide, the margin usually entire though sometimes with a few short lobes. The upper surface is dark green and shining, the lower surface furry white.

Flowering period: January - March.

Distribution and habitat: Victoria, Wilsons Promontory and the Grampians (above 600 m) where it grows as a shrub. Occurs in rocky soils amongst small or tall shrubs, sometimes in forest or woodland.

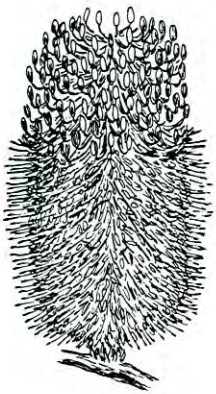
BANKSIA INTEGRIFOLIA L.f.

From the Latin *integer,* entire and *folium,* leaf, in reference to the margins of the mature leaves.

B. integrifolia is described and illustrated in Holliday and Watton's "Field Guide to Banksias", page 62. However, this description includes two new species of *Banksia (B. saxicola, B. conferta)* previously regarded as variants of *B. integrifolia.* In order to distinguish *B. integrifolia* from its close allies, the following description should therefore be noted.

Distinctive characteristics: A large tree of varying height (5 - 25 m) according to habitat. Bark is roughly fissured and up to 2 cm thick. Leaves are whorled except for one of the recently named varieties (see below). Very similar to *B. saxicola,* but differs in its longer flowering season (January - June), generally longer perianth (22 - 25 mm) and the follicles on the fruiting cone which open within a year of flowering. From the very similar *B. conferta,* it can be distinguished again by the early opening of the follicles and also by the old flowers dropping off the fruiting cone at an early stage. Also the flower spike of *B. integrifolia* differs slightly from that of *B. conferta,* being of a uniform pale yellow colour both in bud and full flower. Also similar to *B. dentata, B. integrifolia* can be distinguished by its much narrower leaves (5 - 20 cm long, 6 - 35 mm wide) usually with entire margins, though sometimes with a few short teeth. The undersurface of the leaves is furry white (as with *B. saxicola, B. conferta* and *B. dentata)* but this feature alone distinguishes it from *B. marginata.*

B. integrifolia is a very variable species. Three varieties are now recognised distinguished mainly on the basis of their different leaf forms. The flower spike and fruiting cone are the same for all three varieties.



Flower spike (x½)

perianth
Flower (x½)

Fruiting cone (x½)

BANKSIA INTEGRIFOLIA L.f. var. INTEGRIFOLIA

Distinctive characteristics: Juvenile leaves are wedge shaped, 3-6 cm long, 2-3 cm wide. Mature leaves are short (length 4-10 cm), flat or almost so, generally dull dark green above, furry white beneath and arise from whorls (i.e. an arrangement where the leaves arise from several common levels on the stem).

Other characteristics: Can grow up to 25 m in height in sheltered localities. Flowers and fruits are as described for *B. integrifolia.*

Flowering period: Mainly January - June

Distribution and habitat: Queensland, N.S.W., and Victoria, from Fraser Island to Port Philip Bay, always coastal or a short way inland along tidal inlets. Occurs on deep sands generally in woodland.

BANKSIA INTEGRIFOLIA L.f. var. COMPAR (R.Br.) Bailey

From the Latin *comparum,* like or equal to another, presumably referring to its similarity to var. *integrifolia.*

Distinctive characteristics: Juvenile leaves are longer and narrower (length 10-18 cm, width, 1-2 cm) than those of var. *integrifolia.* Mature leaves are wavy and are also longer (10-20 cm). They have a shining dark green upper surface, furry white lower surface and arise from a whorl.

Other characteristics: A large tree up to 10 m in Queensland, and up to 16 m in the mountain forests of New South Wales. Flowers and fruits are as described for *B. integrifolia.*

Flowering period: Mainly January - June.

Distribution and habitat: Queensland and New South Wales. Coastal within Queensland, generally in the mountains of New South Wales. In northern New South Wales some populations are intermediate between var. *compar* and var. *integrifolia.* Occurs in a wide range of habitats from coastal dunes (Queensland) to mountain woodlands or forests (N.S.W.) sometimes in seasonal swamps.

BANKSIA INTEGRIFOLIA L.f. var. AQUILONIA A.S. George

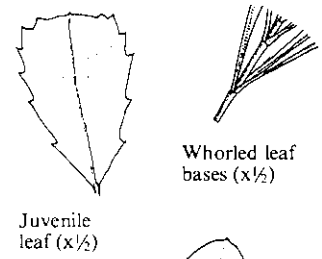
From the Latin, *aquilonius,* northern, in reference to its distribution relative to the other varieties.

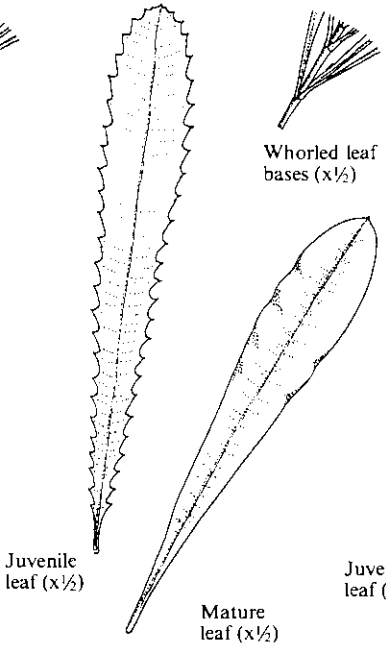
Distinctive characteristics: Juvenile leaves are 7-24 cm long, 6-21 mm wide, often denate. Mature leaves are scattered, (rarely whorled), 5-20 cm long, 6-12 mm wide. They are shining dark green above, the under surface furry white and generally with rusty coloured hairs along both sides of the midrib. The tips of the leaves are more pointed in outline then either of the other two varieties.

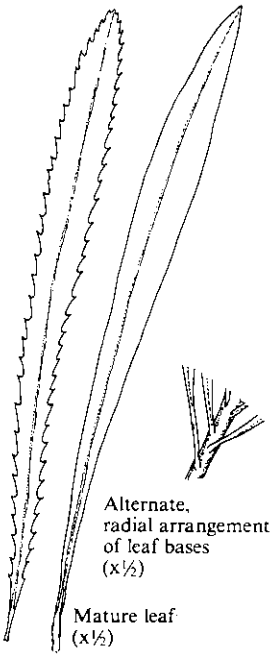
Other characteristics: A large tree, up to 15 m tall. Flowers and fruits are as described for *B. integrifolia.*

Flowering period: March - June.

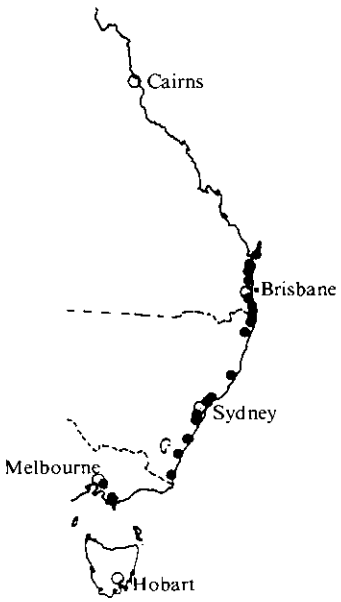
Distribution and habitat: North Queensland from Mt Finnigan National Park to the Paluma Range. Occurs in a wide variety of habitats from hill tops to flats, generally in sand, and either in woodland or forest, sometimes amongst tall shrubs.



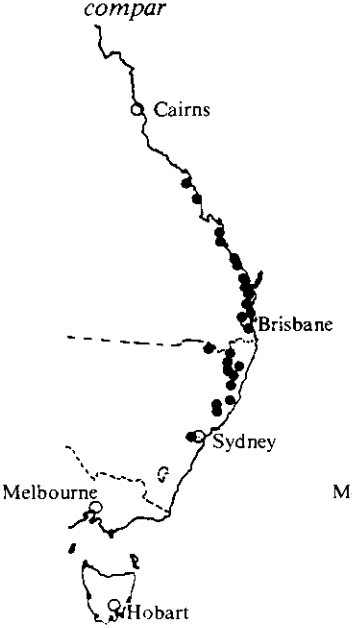




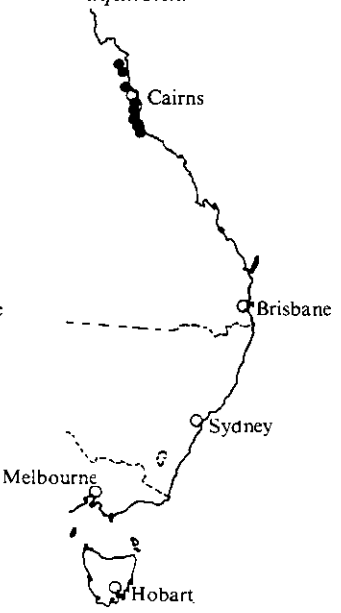
B. integrifolia var. *integrifolia*



B. integrifolia var. *compar*



B. integrifolia var. *aquilonia*



BANKSIA PLAGIOCARPA A.S. George

From the Greek, *plagios*, sloping and *carpos*, a fruit, in reference to the distinctively shaped follicles.

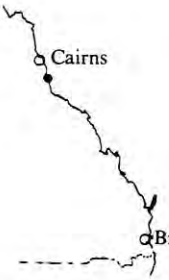
Bluish grey buds

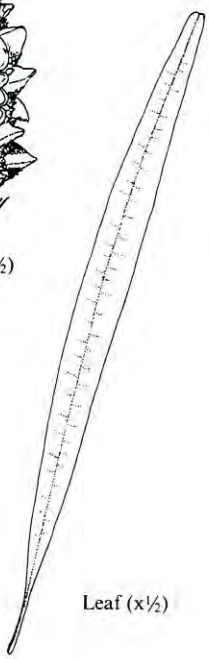
Cone from above showing obliquely triangular follicles

Fruiting cone (x½)

Flower spike (x½)

Single flower





Leaf (x½)

Distinctive characteristics: A large shrub up to 5 m tall with a short, stout trunk. Found only on Hinchinbrook Island, Queensland and the adjacent mainland. Similar to *B. oblongifolia* but can be distinguished by its larger size and its longer and generally narrower leaves (8-20 cm long, 6-17 mm wide). The bluish-grey to mauve colour of the flower buds is quite distinctive compared to the occasional blue tinge of *B. oblongifolia* buds. Once open, the flower of *B. plagiocarpa* is pale pink-brown. The style is pale yellow with a brown tip. The fruiting cone is distinctive, having obliquely triangular follicles which are slightly upturned. Some follicles may open after 1-2 years, others remain closed. Also resembling *B. integrifolia* var. *aquilonia*, *B. plagiocarpa* can be distinguished by its wider leaves, its slower opening follicles and by the colour of the flowers.

Flowering period: Flowers recorded in January and June.

Distribution and habitat: Queensland, restricted to Hinchinbrook Island and adjacent mainland. Occurs on rocky granite slopes, altitude 270 - 530 m.

BANKSIA GARDNERI A.S. George

Renamed *B. gardneri,* based on *B. prostrata* (see Holliday and Watton page 104).

Named after Charles A. Gardner (1896 - 1970), government botanist in W.A. 1929 -1960.

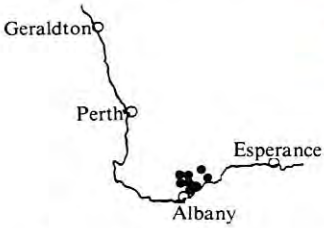
Distinctive characteristics: A low shrub with horizontal branches usually above ground. Similar to *B. goodii,* it can be distinguished by its leaves which are more regularly lobed or toothed. The flower spike is usually smaller (5.5 - 12 cm long) and the bracts at the base of the flower spike have a dense covering of rusty-brown to grey woolly hairs.

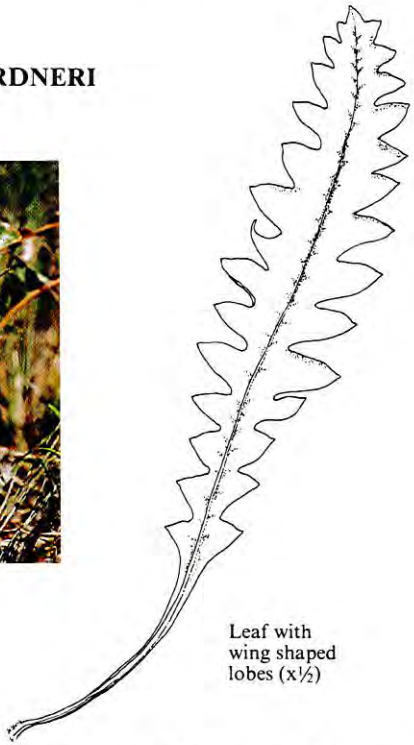
Other characteristics: Flowers are rusty brown, pale brown or pink. Mature leaves are deep green. New growth is pink-red, soft and furry. Up to 25 follicles occur on each fruiting cone.

The species has three varieties distinguished on the basis of their leaf form, flower colour and flowering period.

BANKSIA GARDNERI A.S. George var. **GARDNERI**

Fruiting cone (x½)





Leaf with wing shaped lobes (x½)

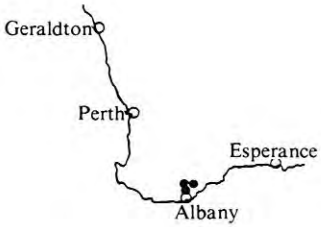
Distinctive characteristics: Very similar to *B. gardneri* var. *hiemalis* differing only in the rusty-brown colour of its erect flowers and later flowering period (September - October). From var. *brevidentata* it can be distinguished by its leaves which are divided about half-way to the mid-rib by narrowly triangular or wing-shaped lobes, up to 3 cm long.

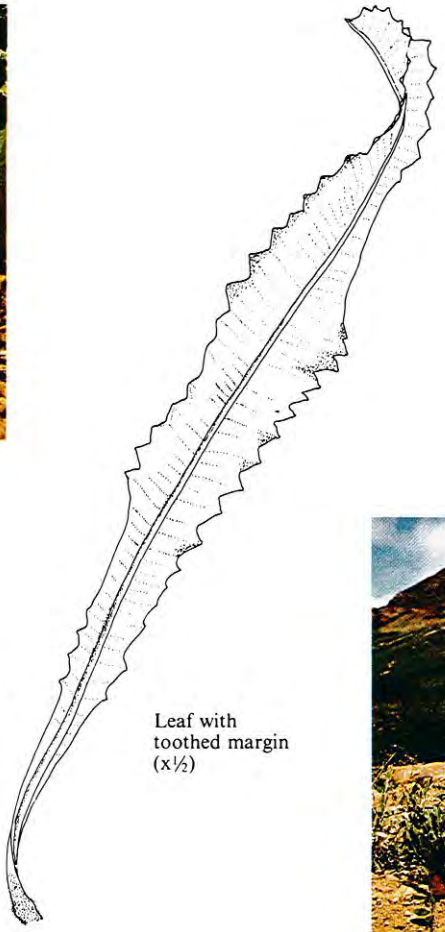
Other characteristics: Leaf colour and fruiting cone are as described for *B. gardneri.*

Flowering period: September - October

Distribution and habitat: S.W. Western Australia from Stirling Range to Albany, west to Cranbrook and east to Bremer Bay. Occurs in sand or gravel amongst small or large shrubs, sometimes in low jarrah woodland.

BANKSIA GARDNERI A.S. George var. **BREVIDENTATA** A.S. George
From the Latin, *brevis,* short, *dentatus,* toothed, in reference to the leaf margins.





Distinctive characteristics: Leaf margins are toothed, not lobed which distinguishes it from the other *B. gardneri* varieties. Somewhat similar to *B. goodii* but has narrower leaves (3.5 -10 cm long by 2-3 cm wide) and more regular dentation.

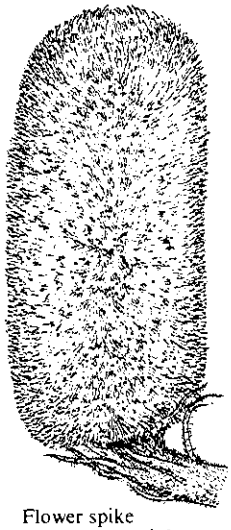
Other characteristics: Flower colour is rusty brown. Leaf colour and fruiting cone are as described for *B. gardneri.*

Flowering period: April - July.

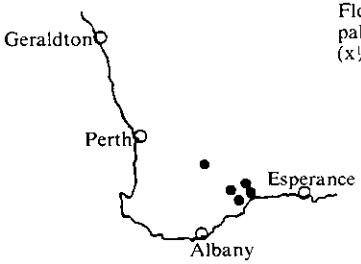
Distribution and habitat: S.W. Western Australia, Stirling Range. One collection from near Albany. Occurs in sands amongst tall shrubs, sometimes in low jarrah woodland.

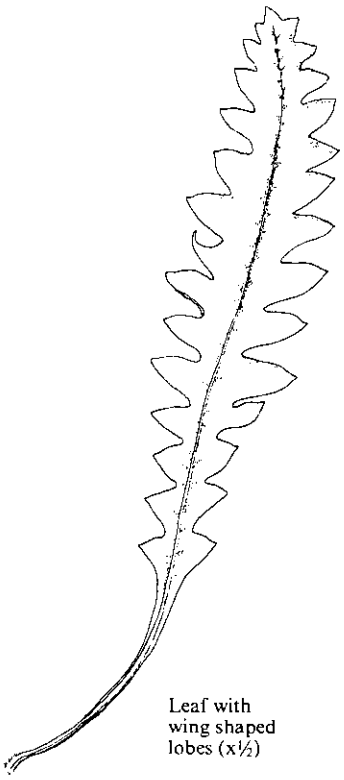
BANKSIA GARDNERI A.S. George var. **HIEMALIS** A.S. George.
From the Latin, *hiemalis,* of winter, referring to the flowering period.

Fruiting cone (x½)



Flower spike
pale brown - pink
(x½)





Leaf with
wing shaped
lobes (x½)

Distinctive characteristics: Very similar to *B. gardneri* var. *gardneri* differing only in the pale brown-pink colour of its erect flowers, and earlier flowering period (June - August). From var. *brevidentata* it can be distinguished by its leaves, which are identical to those of var. *gardneri.*

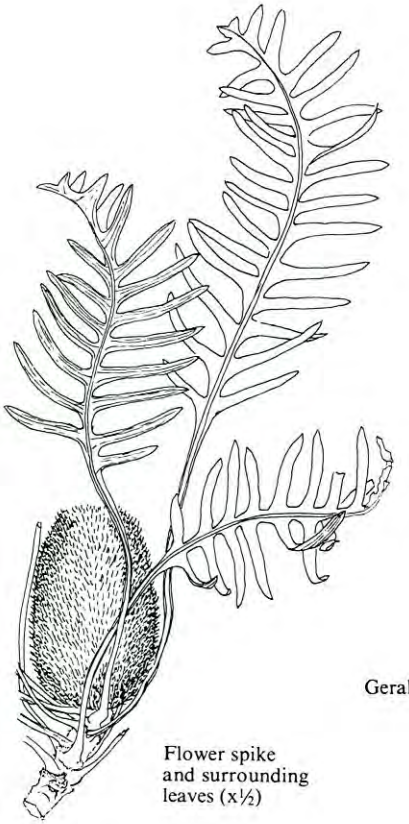
Other characteristics: Leaf colour and fruiting cone are as described for *B. gardneri.*

Flowering period: June - August.

Distribution and habitat: S.W. Western Australia between West Mt Barren, Harrismith and Ravensthorpe. In sand or loam amongst low shrubs and scattered mallee eucalypts.

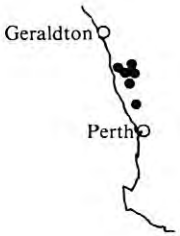
BANKSIA CHAMAEPHYTON A.S. George

From the Greek, *chamae,* low growing and *phyton,* a plant.



Flower spike and surrounding leaves (x½)

Fruiting cone with persistent old flowers (x½)



Distinctive characteristics: A low shrub with underground horizontal stems. Leaves are similar in shape to those of *B. blechnifolia,* but lack the blue green colour. Flower spikes are 8-14 cm long and the flowers are cream and brown with pink buds at the tip of the spike. This is the only prostrate species of *Banksia* growing in the heaths north of Perth.

Other characteristics: There may be up to 15 follicles on the fruiting cone on which the old flowers persist.

Flowering period: Late October - early December.

Distribution and habitat: S.W. Western Australia between Mogumber and Eneabba. Occurs in grey-white sand over laterite amongst small shrubs.

BANKSIA REPENS Labill.

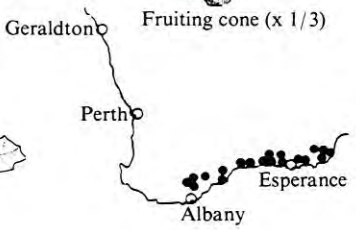
From the Latin, *repens,* creeping, in reference to the stems.

Flower spike
(x 1/3)

Single flower (x 1/3)

Large leaves
(x 1/3)

Fruiting cone (x 1/3)



Distinctive characteristics: Easily recognised amongst the prostrate species by its leaves which are divided almost to the mid-rib by large lobes (up to 9 cm length) variable in shape and having irregularly toothed margins. The leaves tend to be crowded in clusters along the prostrate stems which are usually 1-4 cm below ground. Flowers are cream and pink, sometimes pale brown.

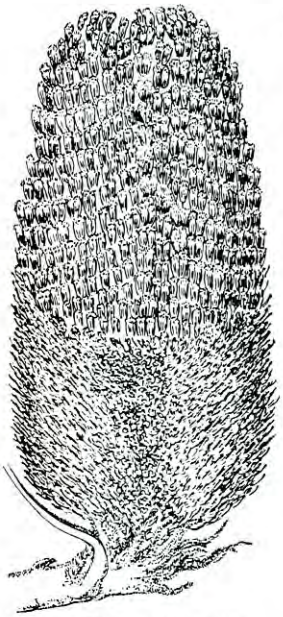
Other characteristics: A low shrub whose erect leaves are bright green when mature. New growth is bronze-red. Flower spikes are borne erect at the tips of the stems. They may be up to 20 cm way from the nearest leaves and appear isolated on the soil. Only a few follicles are produced, many fruiting cones having none.

Flowering period: October - November.

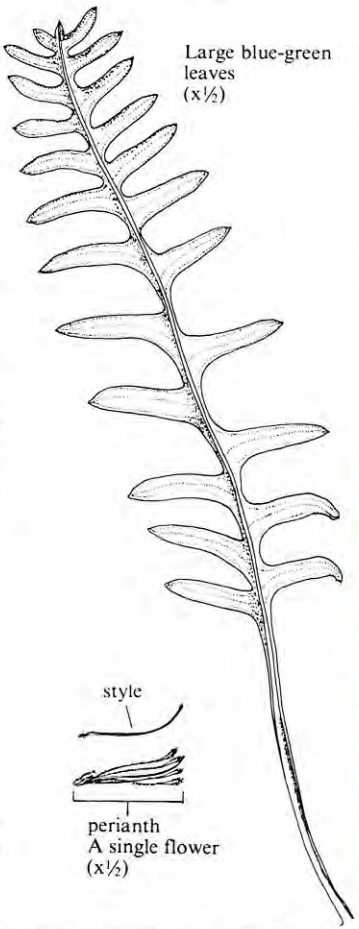
Distribution and habitat: S.W. Western Australia from the Stirling Range to Israelite Bay. Occurs in sands or loams, sometimes gravel, amongst small and tall shrubs.

BANKSIA BLECHNIFOLIA F. Muell.

From the Latin, *folium*, a leaf, and *Blechnum*, a genus of ferns, in reference to the shape of the leaves.

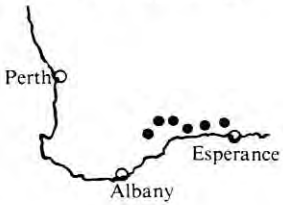


Flower spike (x½)



Large blue-green leaves (x½)

cone (x½)



A single flower (x½)

Distinctive characteristics: Easily distinguished from the other prostrate species by its large blue green leaves divided almost to the mid-rib by entire lobes 2-5 cm in length. Flower colour is also different, being dominantly reddish-pink, turning pale brown then grey after flowering.

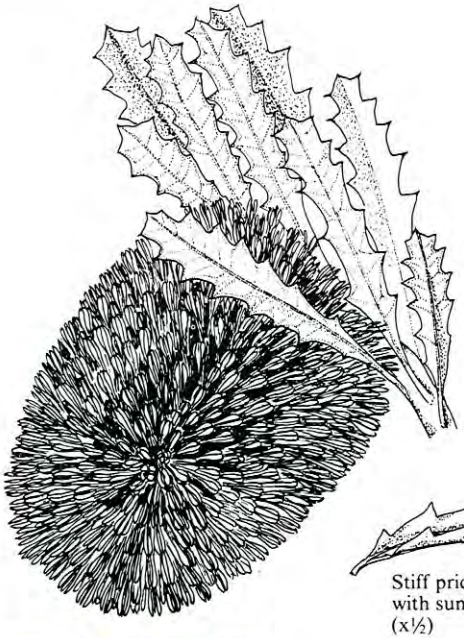
Other characteristics: A low shrub with horizontal branches at ground level or just below. Young growth is bronze-red and velvety. Flower spikes are 9-19 cm long and borne erect at the tips of the stems. The follicles on the fruiting cone are often almost obscured by the persistent old flowers.

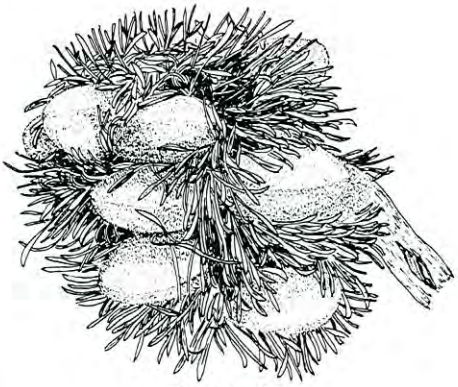
Flowering period: Late September - mid November.

Distribution and habitat: S.W. Western Australia between Jerramungup, Gibson and Lake King, not recorded within 10 km of the coast. Occurs in sands, amongst small shrubs and mallee eucalypts.

BANKSIA ACULEATA A.S. George

From the Latin *aculeatus,* sharp, in reference to the leaf lobes.





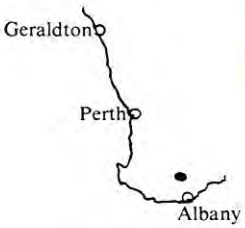
Cone (x½)

Style

Stiff prickly leaf with sunken midrib (x½)

perianth

A single flower (x½)



Distinctive characteristics: A dense, prickly shrub up to 2m in height. Leaves are hard, stiff and very prickly. Very similar to *B. caleyi,* but may be distinguished by its leaves, with fewer, larger lobes (3 - 10 on each side, up to 1 cm in length) and a canaliculate (sunken) midrib. The perianth is longer (30 - 43 mm in *B. aculeata,* 30 - 33 mm in *B. caleyi*). The short flowering period (February - March) is also later than that of *B. caleyi.*

Other characteristics: The flower spikes are pendulous and mainly hidden within the bush. Flowers are cream coloured grading to red at their bases. Mature leaves are dark glossy green, new growth is covered with soft brown hairs.

Flowering period: February - March.

Distribution and habitat: S.W. Western Australia, Stirling Range. In gravels, sands and loams amongst small and large shrubs, often with mallee eucalypts.

BANKSIA SPINULOSA Smith

From the Latin, *spinosus,* spiny, in reference to the leaves.

B. spinulosa is described and illustrated in Holliday and Watton's Field Guide, page 128.

Distinctive characteristics: Similar to *B. ericifolia* but differing in its longer leaves (3-12 cm), sometimes serrated and generally with the margins turned under.

The species is very variable with a wide range of flower colours and leaf types. However, three varieties are now recognised on the basis of their leaves and growth habit. The appearance of the flower spike and the fruiting cone is the same for all three varieties.

Fruiting cone (x½)

BANKSIA SPINULOSA Smith var. **SPINULOSA**

Distinctive characteristics: A shrub up to 2 m, rarely 3 m tall, with many branches arising from below ground level. Can be distinguished from var. *collina* and var. *cunninghamii* by its narrow linear leaves, with several small teeth at the tip. Leaf margins are rolled under to the midrib (revolute). There is no prominent venation on the under surface of the leaf. From var. *cunninghamii* it is also distinguished by its shrubby habit.

Flowering period: April - July, sometimes later.

Distribution and habitat: N.S.W. and Queensland, several separate localities, always within 100 km of the coast. Occurs in sands, or loam, often amongst rocks, in forest or woodland.

BANKSIA SPINULOSA Smith var. **CUNNINGHAMII** A.S. George

Distinctive characteristics: A tall shrub (up to 5 m) with branches arising from a single stem above ground level. Leaves are very variable and resemble those of both other varieties. However the margins are less rolled under (revolute) than those of var. *spinulosa,* and the pale brown undersurface without prominent venation differs from that of var. *collina.*

Flowering period: April - July.

Distribution and habitat: Queensland, N.S.W. and Victoria from Stanthorpe and the Lamington Plateau, along the Great Dividing Range and Dandenongs to Wilsons Promontory. Occurs in loam, clays, sands, sometimes amongst rocks in forest or woodland.

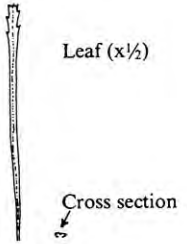
BANKSIA SPINULOSA Smith var. **COLLINA** (R. Br.) A.S. George.

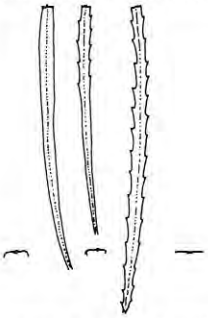
Previously known as *B. collina* (page 42, Holliday and Watton's Field Guide).

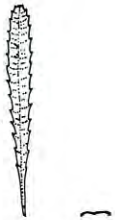
Distinctive characteristics: A shrub up to 4 m tall, with many branches arising from below ground level. Can be distinguished from var. *spinulosa* by its slightly broader leaves which are usually evenly serrated along their whole length. The leaf margins are turned under (recurved) but not to such an extent as those of var. *spinulosa*. From var. *cunninghamii* it can be distinguished by the white under surface of the leaf and by its shrubby habit. It is also the only one of the three varieties with very obvious venation on the undersurface of the leaf.

Flowering period: April - August.

Distribution and habitat: Queensland and N.S.W. from Nambour to Hawkesbury River. Occurs in sands or loam, often over sandstone, amongst small shrubs or in forest or woodland.







var. *spinulosa*

var. *cunninghamii*

var. *collina*

BANKSIA ERICIFOLIA L.f.

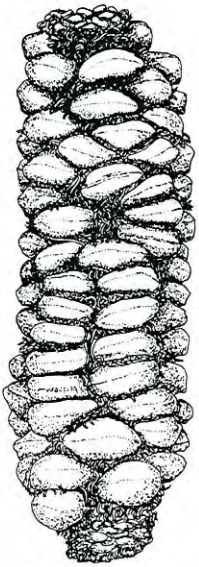
From the resemblance of the leaves to those of the genus, *Erica*.

B. ericifolia is described and illustrated in Holliday and Watton's "Field Guide to Banksias", page 52.

The species has two varieties distinguished by seedling leaves and flower length.

Section of branch bearing leaves (x½)

Mature leaf from underside (life-size)



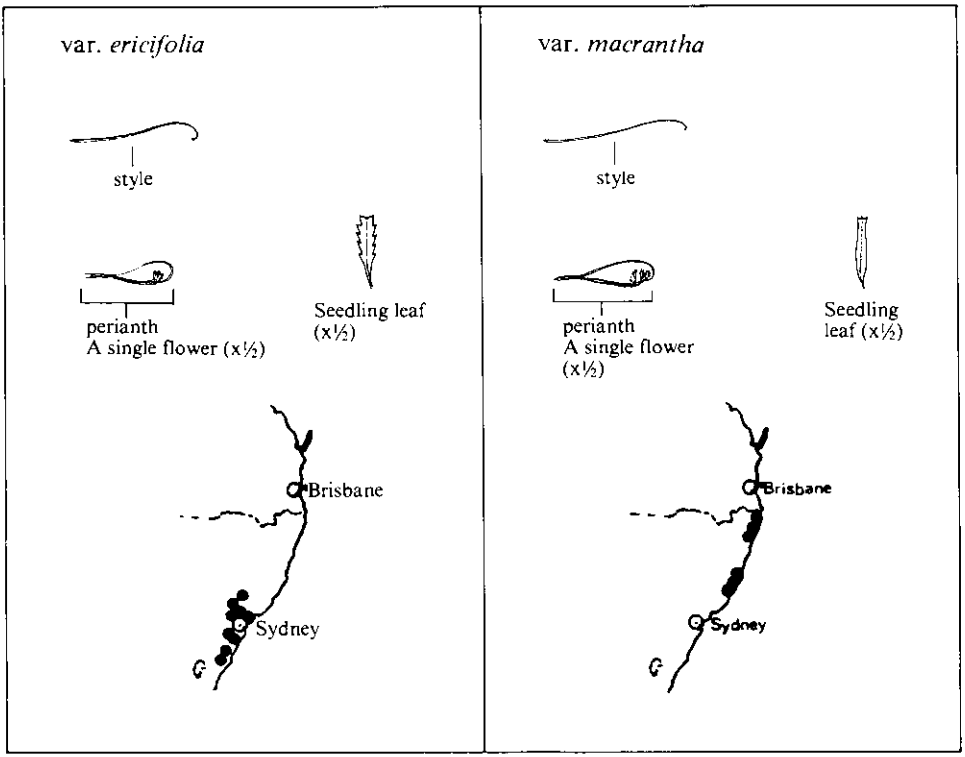
Fruiting cone (x½)

BANKSIA ERICIFOLIA L.f. var. ERICIFOLIA

Distinctive characteristics: Differs from *B. ericifolia* var. *macrantha* in its seedling leaves with 2-6 teeth on each side, and also its generally smaller flowers (perianth 19-22 mm long, style 30 - 35 mm long).

Flowering period: Mainly April - August.

Distribution and habitat: New South Wales between Jervis Bay, Ellenborough and Collaroy, recorded at altitudes up to 1,100 m. Occurs in deep sands, loam or shallow sand over sandstone, amongst small or tall shrubs, sometimes in woodland. Occasionally found in semi-swampy places.



BANKSIA ERICIFOLIA L.f. var. MACRANTHA A.S. George

From the Greek, *macros*, large and *anthos*, flower, in reference to the flowers.

Distinctive characteristics: Differs from *B. ericifolia* var. *ericifolia* in its generally larger flowers (perianth 26-28 mm long, style 46-48 mm long), and its seedling leaves which have 1 (rarely 2) teeth on each margin.

Flowering period: April - August.

Distribution and habitat: Between Grafton and Murwillumbah. Occurs in deep sand, often low lying and seasonally damp, amongst tall shrubs.

NOTE ON B. SPHAEROCARPA AND ITS CLOSE ALLIES

Until recently *B. sphaerocarpa* included many of the other banksias with spherical flowers and linear leaves which have since been renamed as separate species e.g. *B. grossa, B. incana, B. leptophylla, B. micrantha, B. lanata, B. telmatiaea, B. scabrella.* The description of *B. sphaerocarpa* in Holliday and Watton's "Field Guide to Banksias" (page 126) includes these newly named species under the one description. All these closely related species (including *B. sphaerocarpa)* are described and illustrated in the following pages.

BANKSIA SPHAEROCARPA R.Br.

From the Greek *sphaericos,* round, and *carpos,* a fruit.

Distinctive characteristics: A variable species, 1-4 m in height, often wider than it is tall. The linear leaves are pointed (but not as sharply as those of *B. micrantha),* and are 2.5-10 cm long, 1.5 mm wide. They are often blue-green in colour. The spherical flower spikes (7-10 cm diam.) are rusty brown-gold in colour, the perianth 24-39 mm long, the style 29-46 mm long and sometimes purplish. On some fruiting cones, the old flowers persist, on others they drop off at an early stage. The follicles are generally smooth, shiny and dark brown, often with patches of orange-gold. They usually have a prominent ridge either side of the suture.

Flowering period: January - July.

The species has three varieties distinguished by growth habit, leaf colour, flower colour, length of perianth and style, and follicle size.

BANKSIA SPHAEROCARPA R.Br. var. SPHAEROCARPA

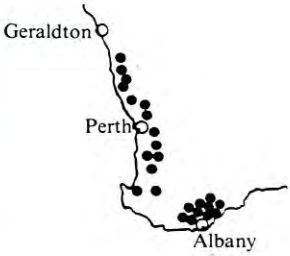
Distinctive characteristics: Similar to *B. sphaerocarpa* var. *caesia* but differing in its generally smaller habit (0.5 - 2 m tall), and the leaves which are usually dark green. Also, the follicles on the fruiting cone are slightly larger (15-30 mm long, 5-8 mm high, 10-25 mm wide). Also very similar to *B. micrantha* from which it can be distinguished by the generally larger flower spike (7-10 cm diam.), the longer perianth (24-39 mm) and style (29-46 mm), and the less sharply pointed leaves. Also different is the fruiting cone with its smooth, shiny follicles often with orange gold patches (see photograph).

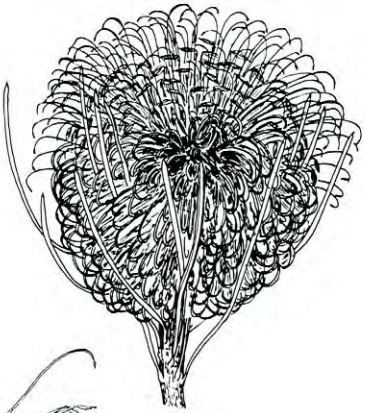
Other characteristics: Flowers are generally rusty brown-gold, sometimes almost purplish. *B. sphaerocarpa* var. *sphaerocarapa* is very variable throughout its range. Generally the leaf length is 2.5 - 10 cm, but in the south of its range there is a small leaved (2.5 - 4 cm), small flowered type. In the north of its range the plant rarely exceeds 1 m in height and is very similar to *B. micrantha.*

Flowering period: January - July.

Distribution and habitat: S.W. Western Australia in two separate regions, one between Denmark and the Stirling Range, the other from Eneabba to Boyup Brook. In the south it generally occurs in gravels or shallow sand over laterite amongst tall shrubs, sometimes in open woodland. In northern parts it grows in laterite or shallow sand over laterite amongst small shrubs.

BANKSIA SPHAEROCARPA R.Br. var. **SPHAEROCARPA**



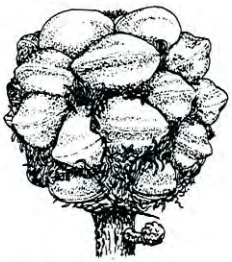


Flower (x½)

Small flowered, small leaved form (x½)

Flower (x½)

Large flowered, large leaved form (x½)

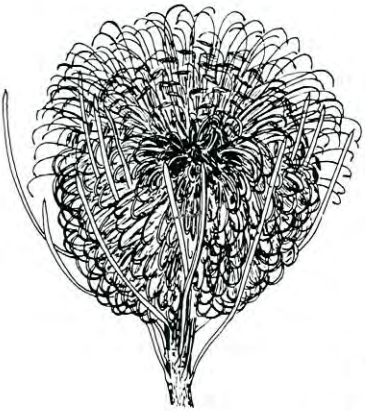


Fruiting cone (x½)

B. micrantha (left),
B. sphaerocarpa var. *sphaerocarpa* (right)

BANKSIA SPHAEROCARPA R.Br. var. **CAESIA** A.S. George

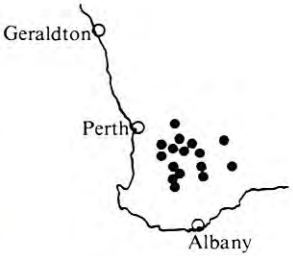
From the Latin, *caesius,* pale blue, in reference to the colour of the leaves.



Flower spike (x½)

Fruiting cone without persistent old flowers (x½)

Fruiting cone with persistent old flowers



Distinctive characteristics: Similar to *B. sphaerocarpa* var. *sphaerocarpa* but can be distinguished by its generally larger habit (1.5 - 4 m tall), and the leaves which are usually bluish green. The follicles are generally shorter (8-17 mm long, 4-7 mm high, 10-12 mm wide) than those of var. *sphaerocarpa.*

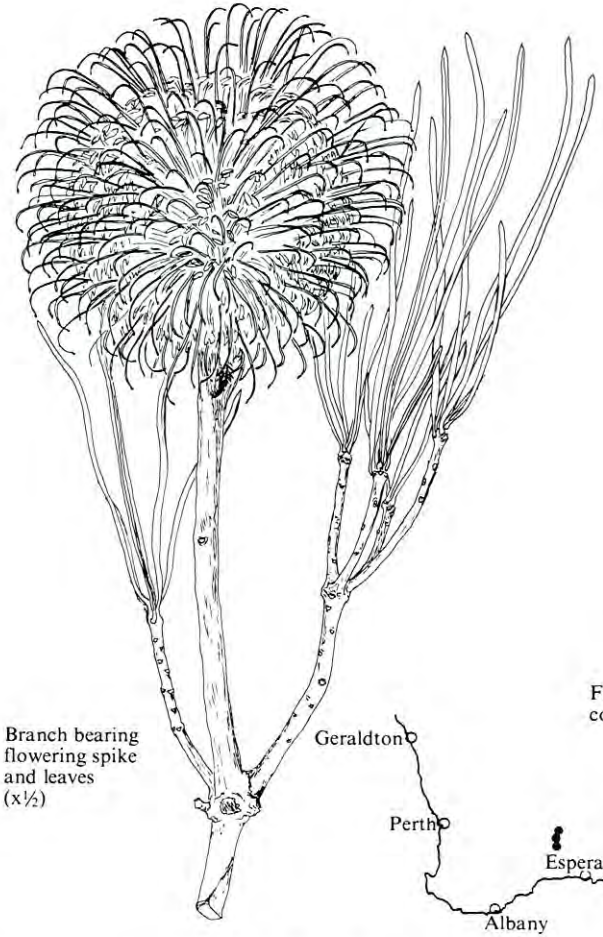
Other characteristics: The flowers are golden in colour, with a perianth 30-36 mm long and style 40-46 mm long. On some fruiting cones the old flowers persist. On others they drop off at an early stage.

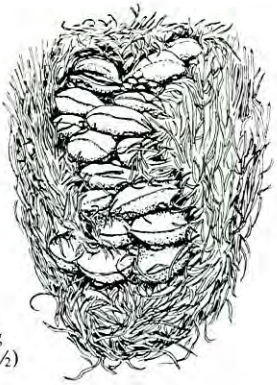
Flowering period: January - July.

Distribution and habitat: S.W. Western Australia between Piawaning, Kojonup and Corrigin. Occurs in lateritic gravels or shallow sand over laterite amongst small and tall shrubs, sometimes in woodland.

BANKSIA SPHAEROCARPA R.Br. var. **DOLICHOSTYLA** A.S. George

From the Greek, *dolichos,* long, and *stylos,* pillar, hence style.





Distinctive characteristics: Very similar to *B. sphaerocarpa* var. *caesia* but can be distinguished by its much longer perianth and style (perianth 49-55 mm, style 50-65 mm). Occurs only in a restricted area from Mount Holland to South Ironcap (east of Hyden), which is further east than any known locality for var. *caesia.*

Other characteristics: A shrub, 2-3 m in height, with bluish-green linear leaves and golden flowers. The flower spike is erect and spherical. The styles are hooked just below the apex.

Flowering period: March - May.

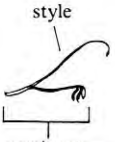
Distribution and habitat: S.W. Western Australia, Mount Holland to South Ironcap (east of Hyden). Grows in lateritic gravel, amongst small shrubs and in open woodland.

BANKSIA MICRANTHA A.S. George

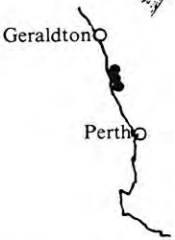
From the Greek, *micros,* small, and *anthos,* flower, in reference to the flowers.

Flower spike (x½)

Sharply pointed linear leaf (x½)



Flower (x½)



Fruiting cone (x½)

Distinctive characteristics: Very similar to *B. sphaerocarpa* var. *sphaerocarpa* but generally can be distinguished by its low, sprawling habit (up to 60 cm tall and 1.2 m wide). However, in the heaths north of Perth the two species are very similar in stature. The spherical inflorescence is usually smaller (3.5 - 5 cm diam.) and both perianth and style are shorter (perianth 17 - 20 mm long, style 19 - 22 mm long). The linear leaves (1.3 cm long) are also more sharply pointed, and the follicles on the fruiting cone are brown and slightly hairy. Also similar to *B. incana* but differing in the generally smaller flower spike, the inner surface of the perianth being hairy and the fruiting cone with its persistent old flowers and brown hairy follicles.

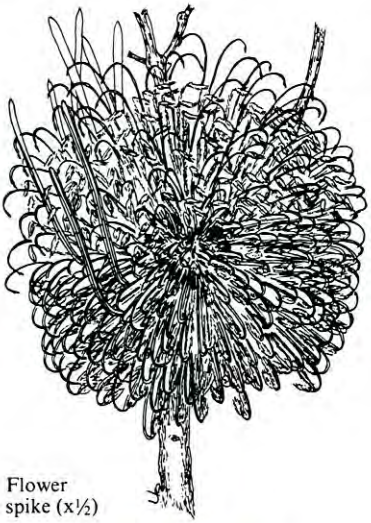
Other characteristics: Flower colour is pale yellow, sometimes purplish, greenish pink in bud. New leaf growth is bright green.

Flowering period: January - May, a few as late as September.

Distribution and habitat: S.W. Western Australia, between Eneabba and Cervantes. Occurs in shallow sand over laterite amongst small shrubs.

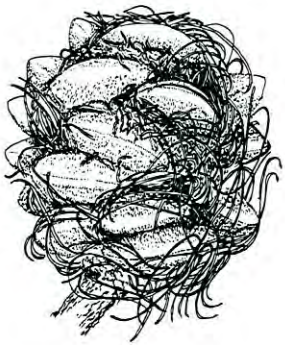
BANKSIA GROSSA A.S. George

From the Latin, *grossus*, coarse, in reference to the large leaves, flowers and fruits compared with those of its closest allies.

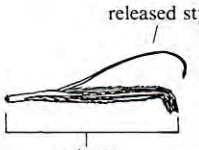


Flower spike (x½)

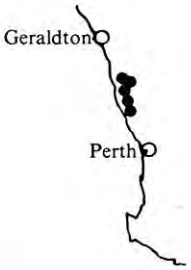
Coarse leaves (x½)



Fruiting cone (x½)



A single flower (x½)



Distinctive characteristics: Similar to *B. leptophylla, B. sphaerocarpa,* and *B. lanata* but distinguished by its much wider leaves (4-12 cm long, 1.8 - 2.8 mm wide), larger perianth (35 -45 mm long) and the fruiting cone with its long, thickened styles curling stiffly around and against the follicles. It is also a small shrub up to 1 m high, which distinguishes it from *B. leptophylla.*

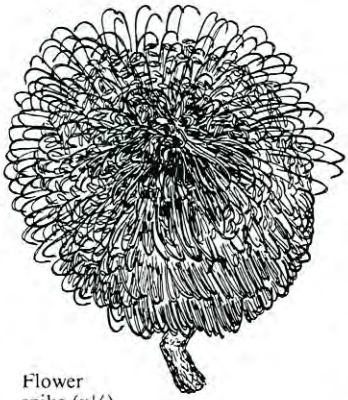
Other characteristics: Cylindrical - spherical flower spikes (8 - 9 cm diam.) may be within the bush or on the ends of branches. Flowers are golden brown-rust coloured, styles dark red-purple and 38 - 48 mm long.

Flowering period: March - September, peaking in Winter.

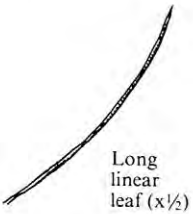
Distribution and habitat: S.W. Western Australia, between Eneabba and Regans Ford. Occurs in shallow sand over laterite, sometimes in deeper sands, usually amongst small shrubs.

BANKSIA LEPTOPHYLLA A.S. George

From the Greek, *leptos,* fine or slender, and *phyllon,* a leaf, in reference to the long, slender leaves.



Flower spike (x½)



Long linear leaf (x½)

Single small flower (x½)

Single large flower (x½)

Fruiting cone (x½)

Distinctive characteristics: A large shrub up to 2 m tall and 3 m wide. The long linear leaves (4 - 10 cm long, 1 - 1.5 mm wide) are shared only by *B. sphaerocarpa, B. grossa,* and *B. lanata.* From *B. sphaerocarpa* it is distinguished by the leaves being soft to touch. It is generally taller than either *B. grossa* or *B. lanata.* Further differences from *B. lanata* are the rust-coloured new growth and the yellow, sometimes pale brown flowers which always turn brown on fading.

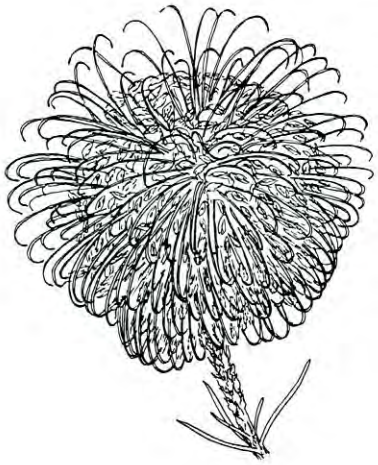
Other characteristics: Flower spikes are 7 - 12 cm in diameter, and generally hidden within the bush. The large fruiting cone measures 6 - 10 cm in diameter. A variable species, some flower spikes are very large (style up to 58 mm long, perianth up to 45 mm long). This large-flowered form generally flowers in summer, the smaller flowered form in winter.

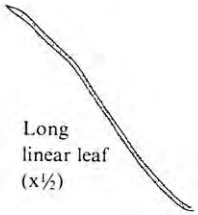
Flowering Period: December - August

Distribution and habitat: S.W. Western Australia, north of Guilderton and inland to Tathra National Park. Occurs in deep sands or shallow yellow sand over limestone amongst small and tall shrubs.

BANKSIA LANATA A.S. George

From the Latin, *lanatus,* woolly, in reference to the woolly floral bracts.

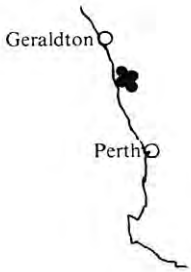


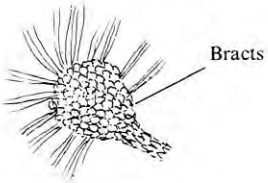


Fruiting cone with enlarged, sometimes pointed bracts (x½)

Single flower (x½)

Deep pink new leaves





Axis of flower spike with flowers removed showing white woolly bracts (x½)

Distinctive characteristics: A small, spreading shrub to 1 m tall. Similar to *B. scabrella* and *B. leptophylla* but easily distinguished by its low habit (less than 1 m), deep pink new leaves, and the white woolly hairs covering the bracts at the base of each flower. The linear leaves (3 -10 cm long, 0.75 - 1 mm wide) are longer than those of *B. micrantha, B. scabrella, B. incana, B. telmatiaea.*

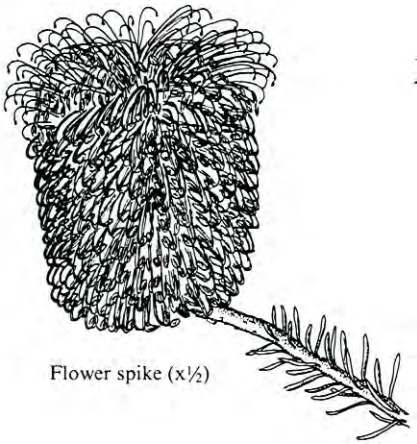
Other characteristics: The flower spike is spherical (7-10 cm diam.) with pale cream, sometimes pale brown flowers and purple styles. It is usually hidden within the bush.

Flowering period: Late October - January.

Distribution and habitat: S.W. Western Australia between Tathra National Park, Arrowsmith Lake and Coomallo Creek. Occurs in deep white sands or shallow sands over laterite, usually amongst small shrubs.

BANKSIA SCABRELLA A.S. George

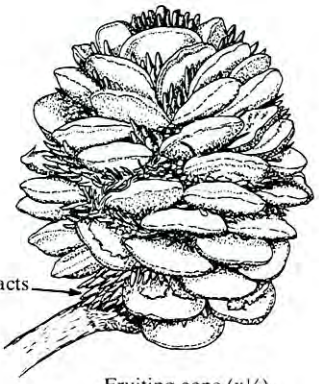
From the latin, *scaber,* rough, in reference to the leaves.



Flower spike (x½)

Flower spike from above

Short linear leaves (x½)



Enlarged bracts

Fruiting cone (x½)

Elongated, pointed bracts

Single flower (x½)

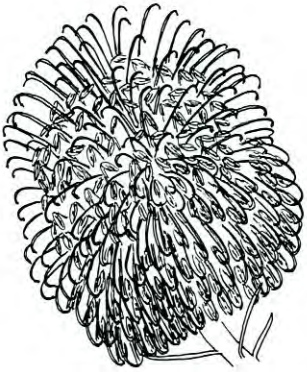
Distinctive characteristics: A shrub to 2 m tall and 3 m wide. Similar to *B. leptophylla* but can be distinguished by its widely spreading habit, the lowermost branches often resting on the ground. Also the flowers are pale yellow-cream in colour, the style sometimes purple. The linear leaves are shorter (8 - 28 mm long) and are rough to touch. Both common and floral bracts are narrowly elongated (6 - 10 mm in length) and densely hairy. On the fruiting cone these bracts become enlarged and prominent. Resembling *B. lanata* in its spreading habit and flower colour, *B. scabrella* can be distingished by its short, roughened leaves, extended bracts and the distinctive fruiting cone.

Flowering period: September - January.

Distribution and habitat: S.W. Western Australia near Mt Adams and Walkaway. Occurs in deep white or yellow sands amongst low shrubs.

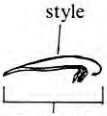
BANKSIA TELMATIAEA A.S. George

From the Greek, *telmatiaeos,* of a marsh, in reference to the preferred habitat.

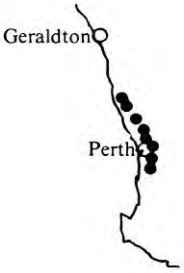


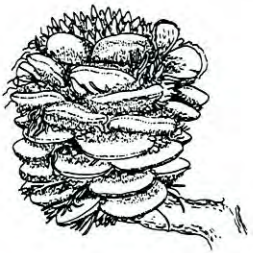
Flower spike (x½)

Short linear leaves (x½)



A single flower (x½)





Fruiting cone (x½)

Distinctive characteristics: Similar to *B. leptophylla* but can be distinguished by its shorter leaves (1.5 - 3 cm long, 1 - 1.3 mm wide), its cylindrical flower spike with smaller flowers (perianth 22 - 25 mm long, style 25 - 29 mm long), and the smaller fruiting cone (less than 6 cm diam.). Generally *B. telmatiaea* grows in winter-wet swamps whereas *B. leptophylla* occurs in deep, well-drained sands.

Other characteristics: A shrub up to 2 m in height. Cylindrical flower spikes have golden-pale brown flowers and cream styles. They are usually hidden well within the bush. New growth is pale brown at first becoming bright green.

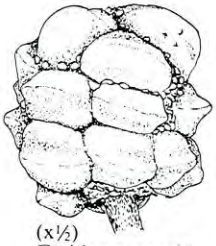
Flowering period: May - August

Distribution and habitat: S.W. Western Australia, west of the Darling Scarp between Badgingarra and Serpentine. Occurs in winter-wet depressions on sandy loams, amongst shrubs or sometimes in low woodland.

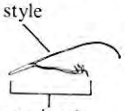
BANKSIA INCANA A.S. George

From the Latin, *incanus*, hoary, in reference to the silky, grey follicles.

Flower spike (x½)

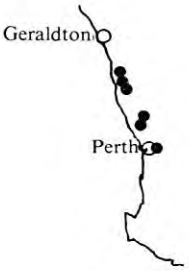


(x½)
Fruiting cone with large follicles. Old flowers do not persist



A single flower (x½)

Leaf (x½)



Distinctive characteristics: A small shrub up to 70 cm tall and 1 m wide. Similar to *B. micrantha* but easily distinguished by its generally larger flower spikes (6 - 7 cm diam.) which are usually bright yellow, occasionally reddish towards the top though sometimes may be quite purple. Also the inner surface of the perianth is smooth. The fruiting cone is very distinctive, the old flowers do not persist and the follicles are very large (18 - 33 mm long, 4 - 16 mm high, 10 - 30 mm wide). They are firstly green along the ridge grading to red brown at the base, later becoming grey and covered with short silky hairs.

Other characteristics: Leaves are usually 1 - 3 cm in length, very rarely up to 6 cm.

Flowering period: November - April, occasionally into Winter.

Distribution and habitat: S.W. Western Australia between Arrowsmith River and Perth. Occurs in deep sands or shallow sand over laterite, amongst small or tall shrubs, sometimes in open woodland.

BANKSIA MEISNERI Lehm.

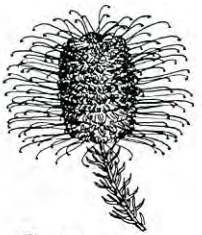
Named after K.F. Meisner (1800 - 74), professor of medicine and botany at Basle, Switzerland, who named many Australian plants.

The species *B. meisneri* has two varieties with similar flower spikes and fruiting cones. They are differentiated solely on the basis of their leaves. They also occur in different localities.

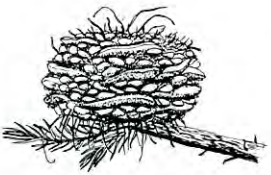
B. meisneri var. *meisneri* is described and illustrated on page 84 of Holliday and Watton's "Field Guide to Banksias". For the purposes of comparison, its leaves and a map of its distribution are illustrated below.

BANKSIA MEISNERI Lehm. var. **ASCENDENS** A.S. George

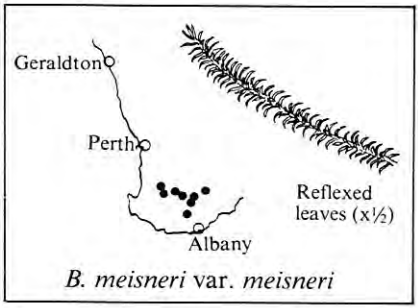
From the Latin, *ascendens,* ascending, in reference to the leaves.



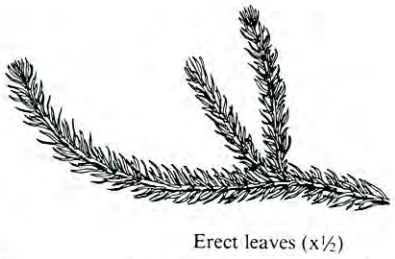
Flower spike (x½)



Fruiting cone with narrow follicles (x½)



B. meisneri var. *meisneri*



Erect leaves (x½)

B. meisneri var. *ascendens*

Distinctive characteristics: A spreading somewhat straggly shrub up to 1.5 m high. Very similar to *B. meisneri* var. *meisneri* with the same small flower spike and fruiting cone. However, the leaves are longer (8 - 15 mm) than those of var. *meisneri* (less than 7 mm). Also they are usually erect or spreading, whereas those of var. *meisneri* are generally reflexed (down-turned). From *B. pulchella,* it can be distinguished by its fruiting cone with loosely packed, narrow, flattened follicles.

Flowering periods: Late April - August.

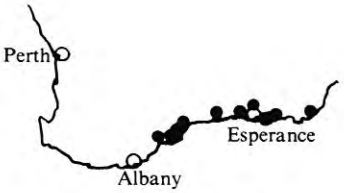
Distribution and habitat: S.W. Western Australia, near Busselton and on the Scott River Plains. Occurs in deep white or grey sands, on or near swamp flats, amongst small shrubs sometimes in woodland.

BANKSIA NUTANS R.Br.

From the Latin, *nutans,* nodding, in reference to the pendulous flower spike.

B. nutans is described and illustrated in Holliday and Watton's "Field Guide to Banksias", page 88.

The species has two varieties, distinguished by the size of the follicles and to a lesser extent, the size of the flowers. The appearance of the flower spike and the shape of the plant are the same for both varieties and are illustrated below.



Distribution of var. *nutans*

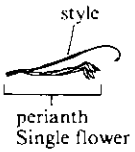
Distribution of var. *cernuella*

BANKSIA NUTANS R.Br. var. NUTANS

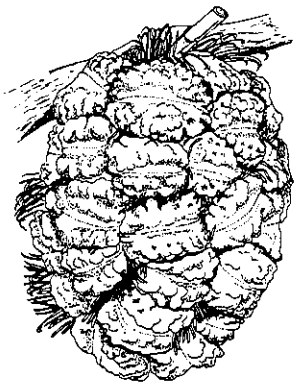
Distinctive characteristics: Differs from *B. nutans* var. *cernuella* in its larger follicles (25 - 40 mm long, 10 - 15 mm high, 15 - 38 mm wide) which are flattened on top and usually very knobbly. Sometimes there may be lateral flanges as with var. *cernuella*. Flowers are also larger (perianth length 25 - 33 mm, style length 30 - 35 mm).

Flowering period: November - February.

Distribution and habitat: S.W. Western Australia from Pallinup River to Israelite Bay, within 30 km of the coast. Occurs in deep sands amongst tall shrubs.



Single flower


Fruiting cone with knobbly follicles (x½)


Fruiting cone with lateral flanges on follicles (x½)

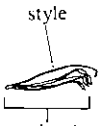
BANKSIA NUTANS R.Br. var. CERNUELLA A.S. George

From the Latin, *cernuus*, nodding, and *ellus*, a suffix used to denote diminutiveness, in reference to the relatively small flowers and follicles.

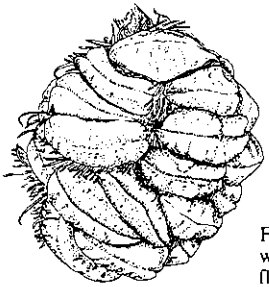
Distinctive characteristics: Differs from *B. nutans* var. *nutans* in its smaller follicles (18 - 30 mm long, 8 - 12 mm high, 8 - 15 mm wide) with lateral flanges. They may be slightly wrinkled or knobbly. Flowers are also smaller (perianth length 22 - 24 mm, style length 22 - 25 mm).

Flowering period: Late January - early April.

Distribution and habitat: S.W. Westen Australia between Albany, Stirling Range and Pallinup River. Also an isolated record locality near Woodanilling. Occurs in deep sands amongst tall shrubs, sometimes in woodland.



Single flower


Fruiting cone with lateral flanges (x½)

BANKSIA CUNEATA A.S. George

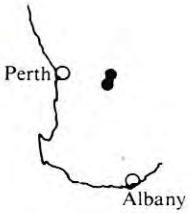
From the Latin, *cuneatus*, wedge-shaped in reference to the leaves.

Front view of follicle (x½)

Side view of follicle (x½)

Branch bearing flower head and follicles (x½)

Wedge-shaped leaf (x½)



Distinctive characteristics: Similar to *B. ilicifolia* but can be distinguished by its smooth bark and smaller leaves (1 - 4 cm long, 0.5 - 1.5 cm wide). Flower colour is also different, being pink-red, sometimes green, with a prominent green tip (the pollen presenter). The perianth is also smaller (24 - 25 mm long).

Other characteristics: A shrub or small tree up to 5 m in height with very prickly, wedge-shaped leaves and a globular, head-like flower spike.

Flowering period: September - December.

Distribution and habitat: Restricted to a few localities between Brookton and Bruce Rock. Occurs in deep yellow sands amongst tall shrubs or in woodland.

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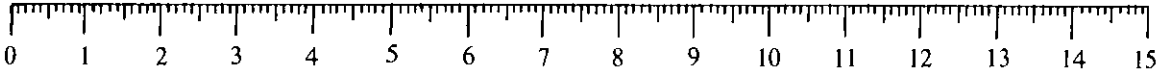

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