Standard Operating Procedure 15
Measuring Vegetation Quadrats

Overview

This SOP describes the tasks required to establish and mark out vegetation quadrats and to measure understorey vegetation and groundcover parameters. Quadrats are placed at the perimeter of the Large Tree Plot, which has a nominal radius of 11.28 m, adjusted for slope. Ground parameters are the only items for which an estimate of cover will be made.

Glossary of definitions

Actions for Biodiversity (ABC): Web based application that enables the recording and monitoring of actions prescribed for threatened species and communities and potentially threatening processes. The ABC also provides for the automatic generation of Action Statements for listed items as required by the Flora and Fauna Guarantee Act. The application can generate summary reports of actions and results for items and geographic areas

Annual Plant: A plant with a lifespan of one year or less. Seedling germination normally occurs on a regular annual cycle.

Bare Ground: All ground surface not covered by vascular or non-vascular vegetation, rock (≥ 10 cm diameter), Coarse Woody Debris or litter, or by free-flowing or standing water. Usually mineral earth, but can include small stones (< 10 cm diameter), sand and gravel, or non-fibrous (amorphous) peat.

Bryophyte: Collective name for various small, non-vascular plants, including liverworts and mosses.

Canopy: The uppermost (highest) foliage layer in a forest. This will most often comprise *Eucalyptus* species but, depending on forest type and growth stage, may comprise other genera such as *Acacia, Nothofagus, Callitris, Allocasuarina* or even shrub species.

Clonal Plant: A plant that spreads vegetatively by forming new plant units on stolons or rhizomes (e.g. Bracken). Each of these units is capable of an independent existence after establishment.

Coarse Woody Debris (CWD): Dead woody material substantially detached from the parent tree and in contact with the ground, and which is ≥ 10 cm in diameter in both of two perpendicular directions (hence comprises large branches and logs). It does not include cut or uprooted trees that have been "hung up" on other trees: these will be considered as tree stems.

Diameter at Breast Height (DBH): The stem diameter of a tree measured at breast height. For the purpose of Ground Plot measurement, diameter at breast height implies diameter measured outside or over bark (dob). On sloping ground breast height is measured on the uphill side of the tree.

Ephemeral Plant: Plant with short life cycle that germinates irregularly in response to a particular cue, such as fire, soil disturbance or desert rain.

Fine Litter: Loose organic material < 1 cm diameter or thickness in both of two perpendicular directions. Mostly leaf litter, twigs and thin bark. Can also include fibrous peat that is predominantly formed of visible plant material.

Flora Information System (FIS): FIS is a fully-functional geographically-registered, relational database of distribution and descriptive data on Victorian plants. It contains nearly 1.8 millions records of over 7000 species, sub-species, varieties, forms, hybrids and undescribed taxa of plants (vascular and non-vascular) from over 240,000 survey or collection sites. Data have been gathered from ecological surveys carried out by DSE, herbarium specimens, professional botanists outside of DSE, competent field naturalists and the botanical literature.

Flowing Water: Water that is more or less permanently flowing, in a defined channel. Does not include temporary surface flow following recent rain.

Ground Cover: Parameters within a quadrat (excluding vascular plants) that will be measured for habitat or other values. Parameters included are: bare ground, rocks, medium litter, bryophytes (whether on the ground or on other substrata within the quadrat), lichen (whether on the ground or on other substrata within the quadrat) and other (for example, flowing or standing water, logs, large tree stems or roots that reduce the area of quadrat available for understorey plants). Parameters not normally included are Coarse Woody Debris (although it may form a component of 'Other' if it takes up a large proportion of the quadrat) and fine litter.

Lichen: Composite non-vascular plant consisting of a fungus living symbiotically with algae, without true roots, stems or leaves. Various forms, including crustose (like a crust), fruticose (branched) and foliose (leafy).

Liverwort: Small, non vascular plant, often moss-like in appearance or consisting of a flat, ribbon-like green thallus (no recognisable shoot, root or leaf regions). Some species have lobe-shaped leaves that resemble a liver.

Medium Litter: Loose organic (usually woody) material 1-10 cm in diameter or thickness in both of

two perpendicular directions. Will include material such as small branches and thick bark.

Moss: Small spore-producing plant usually with a slender leaf-bearing 'stem' with no true vascular tissue, roots or leaves.

Perennial Plant: A plant that lives for more than one year, and produces flowers and seeds multiple times over its lifespan. Above-ground material may persist for decades to centuries (e.g. shrubs and trees) or die back seasonally (e.g. herbaceous species such as some *Senecio*).

Renascent Plant: A plant that will grow back seasonally or periodically from underground material that remains alive (e.g. orchids).

Rock: Any rock at least 10 cm x 10 cm in size (hence equivalent to a minimum of 1% cover within a quadrat). Areas of smaller stones will be treated as bare ground.

Standing Water: A more or less permanent body of standing water, such as a lake or pool. Does not include temporary pooling due to ground saturation following recent rain.

Tree: Any species with its Plant Growth Form listed in the Flora Information System (FIS) as LT (Large Tree), T (Large Shrub to Medium Tree) or MT (Mallee Tree). These Growth Form categories are based on potential size, not actual. Note that tree ferns are not considered to be 'trees' in this classification. See Appendix 15.3 for list of all tree species.

Tree Recruit: Any tree species less than 10 cm Diameter at Breast Height and less than 1.3 m in height.

Understorey: All vascular plant species, regardless of height, that are not categorised as trees (see Appendix 15.1), AND tree recruits < 1.3 m in height. The understorey may be a lower stratum subordinate to the forest canopy, or may be the highest vegetation in the plot, depending on the vegetation type or growth stage. Note that tree ferns are considered as understorey.

Vascular Plant: A plant with a system of water and solute-conducting tissues (xylem and phloem); collectively the pteriodophytes (ferns and fern allies), gymnosperms (conifers), monocotyledons and dicotyledons. Does not include bryophytes, lichens or fungi.

Equipment list

GPS

Compass, preferably sighting type

Sample Point Location Maps, Aerial Photos, location instructions and slope adjustment data

Clip board and pens

Field Forms

Site species list (if site has been assessed before)

Species list for area or region

List of species classed as trees (= FIS codes LT, MT or T, see Appendix 15.1)

Tape measure (minimum 15 m)

Tent peg or similar for securing tape measure

Diameter tape (optional)

Ruler

Hypsometer (optional)

Square quadrat frame (1 m x 1 m internal) that can be pulled apart for placement

Minimum of 12 marker pegs (> 0.5 m long) to delineate plot perimeter

Telescopic height measuring pole, capable of minimum 5 m extension

Clinometer (for shrubs taller than measuring pole)

Plastic bags of various sizes, incl. zip-lock bags for plant samples

Personal Protective Equipment

Plant identification aids

Binoculars

Hand Lens (x 10 magnification)

Knife, trowel or other digging tool

Plastic vials (sealable)

Secateurs

Procedure

Set out quadrat marker points: Twelve quadrats are to be arranged in a regular radial pattern at 30º separations (Figure 15.1, Appendix 15.2), with the quadrat number (1 to 12) corresponding to the equivalent hour position on a clock face.

Standing at the Sample Point Location that represents the centre of the Large Tree Plot, line up the direction of the first quadrat using a sighting compass.

Measure out the radius-adjusted distance (refer to the *Large Tree Plot Form* for the adjusted radius) to the first quadrat position using a tape measure (or hypsometer). An allowance may be needed to allow for misalignment of the tape because of interfering vegetation.

Push a temporary (highly visible) marker of length at least 0.5 m into the ground at the measured point.

Repeat for other quadrats so that, upon completion of this initial mark-out, the Large Tree Plot will have been delineated for the measurement of coarse woody debris and stumps (see SOP16).

Setting up when line-of-sight is blocked: In some instances the presence of dense vegetation (for example, a wire grass or sword sedge thicket) may prevent the measuring tape from being extended along the correct line. In this instance the quadrat position can be estimated by sighting back from a previous marker (Appendix 15.2, Figure 15.2).

One observer should be placed on the correct compass line at roughly the correct distance. The second observer can then move to a previous quadrat marker, and direct the first observer to move directly towards or away from the plot centre until they are positioned at the appropriate angle. The angle between the plot centre and first adjacent quadrat should be 75º (Figure 15.2). The angle is 60º for the second quadrat and 45º for the third quadrat.

Applying safety precautions: If hazards or obstacles, such as a stream or pile of slippery logs, prevent safe placement of any quadrat, and if it is not possible to accurately judge what the contents of that quadrat are, then that quadrat may be omitted. Any omitted quadrats must be clearly marked on the *Vegetation Quadrat Form* with comments made to justify the reason for any omissions made.

Placing a quadrat in the correct position: At each quadrat location, place the quadrat frame on the ground so that the midline of the frame lies along the original compass direction, and the outer edge of the quadrat frame (which should be touching the marker) is tangential to the Large Tree Plot boundary (Figure 15.1, Appendix 15.2). The frame may need to be disassembled for correct placement. It is also possible that a tree trunk or log may partially interfere with the quadrat placement; in that instance the available quadrat area will simply be smaller: it should not be moved.

Identify and record all understorey species within quadrat: Identify (to species level) every vascular (non-tree) species, and every tree species less than 1.3 m in height, growing within or projecting over each quadrat. Refer to Tree List in Appendix 15.3 if unsure of a species' classification.

The understorey may be a lower stratum subordinate to the forest canopy, or may be the highest vegetation in the plot, depending on the vegetation type or growth stage. Note that tree ferns are considered as understorey.

What is included as understorey (refer to other definitions):

- All living (non-tree) vascular plants, including ferns, rooted within the quadrat.
- All tree recruits < 1.3 m high, including canopy species, rooted within the quadrat.
- Living branches, fronds or leaves from vascular understorey plants and trees < 1.3 m high hanging directly over the quadrat.
- Identifiable dead annuals: these were alive recently, and will grow again next season from seeds.
- Identifiable 'dead' renascent species: these were growing actively recently, and will grow back seasonally from underground material that remains alive.
- Identifiable dead ephemeral species: these were alive recently, and indicate that a suitable disturbance (e.g. fire) has recently occurred.

What is NOT included as understorey (refer to other definitions):

- Trees ≥ 1.3 m high, even if the section of canopy overhanging the quadrat is < 1.3 m high.

- Dead perennial (non-renascent) plants (e.g. shrubs). These may have been dead for some time, and may require an irregular germination cue before they will appear again.
- Dead tree and shrub branches that extend over the quadrat, regardless of whether other branches (outside the quadrat) are still alive.
- Dead clonal units (e.g. bracken fronds), regardless of whether they may be attached by rhizomes to living units.

Using a height measuring pole (or optional ruler for small plants), measure the maximum height (in cm, to the nearest cm) of overhanging foliage of each species within the quadrat, vertically to the soil level, and record the height in the appropriate quadrat column on the Field Form. The recorded height should be the maximum height of the living overhanging foliage that projects vertically into the quadrat, which may not be the maximum height of the plant itself. The height should include the inflorescence if that protrudes above the foliage. The height of a scrambling or climbing plant should be the height to which it has climbed.

Measuring tall plants: If a shrub in or near the quadrat is too tall for the available height measuring pole (and the species is NOT on the Tree List), the observer should estimate, from two perpendicular directions, whether overhanging foliage would project into the quadrat. If so, determine the maximum height of the foliage directly over the quadrat using a clinometer, and record this on the data sheet to the nearest 10 cm.

Dealing with unknown species: For each unidentifiable species, follow the procedures outlined in *SOP 20A: Plant Specimen Collection and Identification Procedures* to collect specimens and to record ancillary information. Create a temporary descriptive name that is unique to each specimen collected. This name should include two or more descriptors, for example, "Hairy grey daisy". Once a specimen is collected and a temporary name assigned, the name can be re-used on the Vegetation Quadrat Form each time the same unknown plant is detected.

In many instances, especially for monocots, it may not be possible to identify plants to species level in the absence of flowering material; the plants should then be recorded as '*Genus*' spp. on the data sheet.

Interesting species outside quadrat: If a species known to be rare or threatened is noted within the Large Tree Plot but is not detected within any of the Vegetation Quadrats, a note should be made for incorporation in the Flora Information System or Actions for Biodiversity Conservation as a site record. However, to avoid sampling bias, it should not be included in the quadrat data.

Estimate and record percentage cover of ground parameter: Estimate the proportion of the quadrat covered by each ground cover parameter. Ground Cover includes:

- bare ground
- rocks
- medium litter
- bryophytes, whether on the ground or on other substrata within the quadrat
- lichen, whether on the ground or on other substrata within the quadrat
- other (for example, flowing or standing water, logs, large tree stems or roots that reduce the area of quadrat available for understorey plants).

Ground Cover does not include:

- Coarse Woody Debris (although it may form a component of 'Other' if it takes up a large proportion of the quadrat).
- fine litter.

Note: that a combined area of 10 cm x 10 cm within a quadrat is equivalent to 1% cover, a combined area the size of an A4 page is equivalent to around 6%, and a combined area the size of an A3 page is equivalent to around 12% (Figure 15.3, Appendix 15.4).

Record the percent cover in the appropriate quadrat column on the Field Form. Note that cover values may sum to more than 100%, for example, if high cover of medium litter is itself covered by mosses or lichens.

Data and Information:

Complete the `Identification` *section at the top of each page on the Large Tree Plot Form*: Fill in the Sample Point Identification Code, Bioregion, the SOP version number, Date, Contractor Company Name and the Names of each Contractor Field Crew member present, in the `<sample_point_ID>`, `<bioregion>`, `<SOP version>`, `<date>` and `<contractor_company>` fields. Against each `<field_crew_member_number>` fill in the Contractor Field Crew member surname `<field_crew_member_surname>` and first name `<field_crew_member_firstname>`. The Contractor Field Crew Leader should be the first name recorded in the `Identification` section of the form. The crew member who enters information on the form (i.e. the scribe) checks the box `<Scribe>` next to their name.

Complete the Vegetation Quadrats *section of the form:* For each quadrat (1 to 12) record the scientific binomial name of every vascular (non-tree) species detected and every tree species less than 1.3 m in height in <Species name>.

Unidentifiable species should be given a descriptive name and recorded in the Field Form in <Species name>. Check the <temporary name> box to mark this record as an unidentified species that is temporarily named. The temporary name can be re-used on the *Vegetation Quadrat Form* each time the same unknown plant is detected. Follow the procedures outlined in *SOP 20A: Plant Specimen Collection and Identification Procedures* to record further information about unidentified species on the *Plant Specimen Collection Form*.

Record the maximum height of each separate species: For each quadrat, record the maximum height (in cm, to the nearest cm) of each separate species in the Vegetation Quadrats section of the form.

Record the percentage cover of ground parameters: For each quadrat, record the percentage ground cover to the nearest 1% in the Ground Cover section of the form. Record the percentage cover of bare ground in <% Bare Ground>. Record the percentage cover of rock in <% Rock>. Record the percentage cover of mosses and liverworts in <% Mosses and Liverworts>. Record the percentage cover of lichen in <% Lichen>. Record the percentage cover of medium litter in <% Medium Litter>. Record the percentage cover of other parameters in <% Other> and describe the parameter in the field <Other description>.

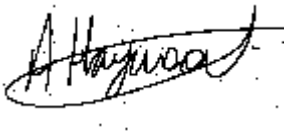
Record any site related comments: Identify any site specific comments related to understorey vegetation and ground cover parameters in the <Comments> field.

Complete the Field Form Check *section at the bottom of the form:* the Contractor Field Crew Leader initials the <Team Leader Initials> field, enters the date <Date checked> and writes down any comments about data verification in the <comments> field.

Complete the Data Entry Check *section at the bottom of the form:* the Field Crew member who enters the data into the Working Database writes their surname in the <Contractor Surname> field and the date data entry was completed for the form in <Date entered>.

An example *Vegetation Quadrat Form* is given in Appendix 15.1

Version (current)	Version (previous)	Author	Date	Summary of changes
1.0		Arn Tolsma		
1.0		NB29	15/08/2010	Edited Arns SOP – Recreated Field Form in xls
1.1	1.0	mw0a	04/07/2011	Amendments made post field season 1

Endorsed		**Date**	**18/02/2011**
Name:	Andrew Haywood		
Position:	Manager, Knowledge Unit		
Division/Branch:	Forests and Parks Division / Management and Operations Branch		

Standard Operating Procedure 15
Measuring Vegetation Quadrats
Appendix 15.1

Example Vegetation Quadrat Form – page 1

IDENTIFICATION

Sample Point ID	PE_____N _____	*Bioregion*	SEC
Date (DD/MM/YYYY)	19/ 06 / 2010	*Contractor Company*	Contractor Company Ltd

Field Crew Member #	*Contractor Field Crew Member Surname*	*Contractor Field Crew Member First Name*	*Scribe*
1 (Team Leader)	Smith	Jo	☐
2	Jones	Kim	☐
3	Williams	Alex	☑
4			☐
5			☐

SOP 15: Measuring Vegetation Quadrats	
SOP version	1.0

Vegetation Quadrats

Species Name	*Temp Name*	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*	*Q6*	*Q7*	*Q8*	*Q9*	*Q10*	*Q11*	*Q12*
Platylobium formosum	☐	45	-	45	66	50			70	75	80	60	23
Pteridium esculentum	☐	58	-		75		84	128		55	108	90	
Tetrarrhena juncea	☐	75	-	50	40	62	126	42	68	100	88	75	184
Amperea xiphoclada	☐	42	-						8	58			
Patersonia glabrata	☐	30	-	40	28	15	28	45	48	50		15	40
Acacia terminalis	☐	42	-				325	232				140	307
Eucalyptus sieberi	☐	50	-				127				18	95	
Allocasuarina littoralis	☐	40	-										
Caustis flexuosa	☐		-			30	45	65	50	112	35	90	55
Lomandra filiformis	☐		-		15							12	
Aotus ericoides	☐		-	20			23		55				
Gonocarpus teucrioides	☐		-		36	38	60	12	15	75	55	25	
Dianella caerulea	☐		-										
Xanthosia tridentata	☐		-		2	5	8						
Epacris impressa	☐		-	28					40		6		
Hibbertia empetrifolia	☐		-	15		20					5	22	25
Joycea pallida	☐		-	20									
Austrostipa sp.	☐		-		15								
Tetratheca pilosa	☐		-		27					70			
Viola hederacea	☐		-		2								
Lomatia ilicifolia	☐		-			23	25				18	20	8
Persoonia linearis	☐		-			18							
Pimelea humilis	☐		-			20						6	
Rhytidosporum procumbens	☐		-			35	3						
Cassytha phaeolasia	☐		-			50				35			
Acacia myrtifolia	☐		-				85		22	70		108	
Xanthosia pilosa	☐		-				20						
Opercularia varia	☐		-				2						
Scaevola ramosissima	☐		-					32					
Banksia spinulosa	☐		-						185				
Casinnia longifolia	☐		-						70				

Field Form Check				**Data Entry Check**	
Team Leader Initials	*JS*	*Comments*	*No data for Quadrat 2 - ommitted*	*Date entered (DD/MM/YYYY)*	22/06/2010
Date checked (DD/MM/YYYY)	20/06/2010			*Contractor Surname*	*Williams*

Department of Sustainability and Environment

Standard Operating Procedure 15
Measuring Vegetation Quadrats
Appendix 15.1

Example Vegetation Quadrat Form – page 2

Vegetation Quadrats

Species Name	Temp Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Leucopogon collinus	☐		-						20		25	20	
Comesperma ericinum	☐		-						47				
Lepidosperma laterale	☐		-								45		
Persoonia levis	☐		-										191
Hairy grey daisy	☑	12	-	15	4	8				13	11		
	☐												
	☐												
	☐												
	☐												
	☐												
	☐												
	☐												
	☐												
	☐												
	☐												
	☐												
	☐												
	☐												
	☐												
	☐												
	☐												
	☐												
	☐												
	☐												

Ground Cover

Ground Cover Parameter	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
% Bare ground	0	-	1	2	0	5	3	2	0	1	1	0
% Rock	0	-	0	0	0	0	0	0	0	0	0	0
% Mosses & Liverworts	0	-	0	0	0	0	<1	0	1	0	0	0
% Lichen	5	-	1	<1	0	1	2	0	1	1	1	4
% Medium litter (1-10 cm)%	3	-	5	4	1	1	2	3	20	4	8	3
% Other	40	-	0	0	0	5	20	0	40	15	0	10
Other description	logs	-				tree root	logs		logs	tree root		tree root

Comments

A general description of the state of the understorey vegetation at the Sample Point including other comments about field work.

Understorey veg typical of Lowland Forest, a lot of Forest Wire-grass present on site.
Quadrat 2 was ommitted due to safety reasons (large widow-maker overhanging the quadrat).
Hairy grey daisy collected for id. Austrostipa sp also collected.

Orchid spp found on Large Tree PLot but not detected on any quadrats - notes and sample taken for identification.

Field Form Check				Data Entry Check	
Team Leader Initials	JS	Comments	No data for Quadrat 2 - ommitted	Date entered (DD/MM/YYYY)	22/06/2010
Date checked (DD/MM/YYYY)	20/06/2010			Contractor Surname	Williams

Standard Operating Procedure 15
Measuring Vegetation Quadrats
Appendix 15.2

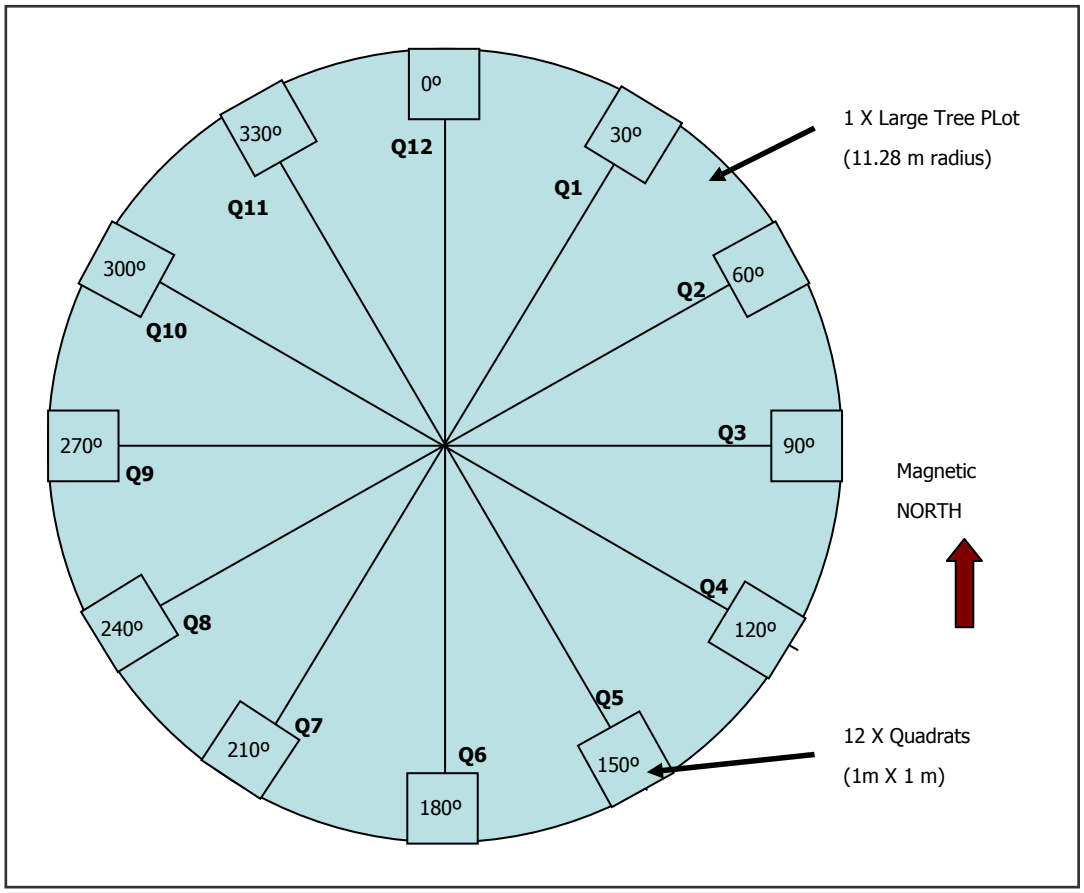


Figure 15.1: Layout of assessment plots for measuring understorey Vegetation Quadrats (SOP 15),

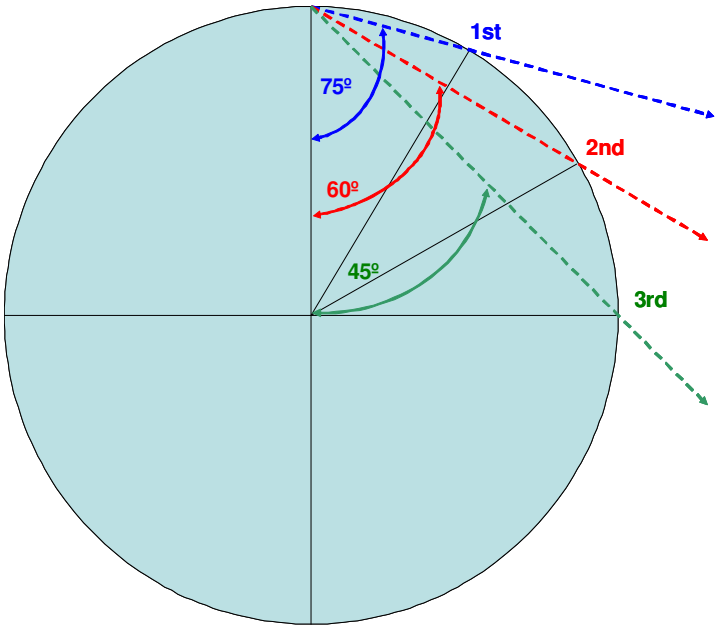


Figure 15.2: Estimating quadrat position when it is not possible to accurately run out the tape.

Standard Operating Procedure 15
Measuring Vegetation Quadrats
Appendix 15.3

Tree Species*

* This list comprises all species with an FIS 'LIFELOOK' code of LT, MT or T.

SCIENTIFIC NAME	COMMON NAME	FIS No.
Acacia binervia	Coast Myall	3635
Acacia caerulescens	Limestone Blue Wattle	3633
Acacia cognata	Narrow-leaf Bower-wattle	0021
Acacia dallachiana	Catkin Wattle	0023
Acacia dealbata	Silver Wattle	0025
Acacia deanei	Deane's Wattle	0026
Acacia decurrens	Early Black-wattle	0028
Acacia difformis	Drooping Wattle	0029
Acacia dodonaeifolia	Sticky Hop Wattle	4269
Acacia doratoxylon	Currawang	0030
Acacia elata	Cedar Wattle	0031
Acacia falciformis	Large-leaf Hickory-wattle	0033
Acacia floribunda	White Sallow-wattle	0036
Acacia frigescens	Frosted Wattle	0037
Acacia howittii	Sticky Wattle	0044
Acacia implexa	Lightwood	0045
Acacia irrorata	Green Wattle	3631
Acacia kettlewelliae	Buffalo Wattle	0046
Acacia leprosa	Cinnamon Wattle	0049
Acacia loderi	Nealie	0052
Acacia longifolia	Coast/Sallow Wattle	5128
Acacia maidenii	Maiden's Wattle	0055
Acacia mearnsii	Black Wattle	0056
Acacia melanoxylon	Blackwood	0057
Acacia melvillei	Myall	0058
Acacia mucronata	Narrow-leaf Wattle	0062
Acacia nano-dealbata	Dwarf Silver Wattle	0064
Acacia obliquinervia	Mountain Hickory Wattle	0067
Acacia obtusifolia	Blunt-leaf Wattle	0068
Acacia omalophylla	Yarran Wattle	0069

SCIENTIFIC NAME	COMMON NAME	FIS No.
Acacia oswaldii	Umbrella Wattle	0070
Acacia pendula	Weeping Myall	0073
Acacia penninervis	Hickory Wattle	0074
Acacia phlebophylla	Buffalo Sallow-wattle	0076
Acacia podalyriifolia	Queensland Silver Wattle	5210
Acacia pravissima	Ovens Wattle	0077
Acacia prominens	Gosford Wattle	3649
Acacia pycnantha	Golden Wattle	0078
Acacia retinodes	Wirilda	0079
Acacia salicina	Willow Wattle	0083
Acacia saligna	Golden Wreath Wattle	0084
Acacia schinoides	Frosty Wattle	5133
Acacia silvestris	Red Wattle	0087
Acacia stenophylla	Eumong	0090
Acacia subporosa	Bower Wattle	0093
Acacia terminalis	Sunshine Wattle	0095
Acacia verniciflua	Varnish Wattle	0099
Acer - ALL SPECIES	MAPLE	
Acmena smithii	Lilly Pilly	0115
Acronychia oblongifolia	Yellow-wood	0116
Agonis - ALL SPECIES	MYRTLE	
Ailanthus altissima	Tree Of Heaven	0163
Akebia quinata	Five-leaf Akebia	5799
Alectryon - ALL SPECIES	ALECTRYON	
Allocasuarina littoralis	Black Sheoak	0677
Allocasuarina luehmannii	Buloke	0678
Allocasuarina torulosa	Forest Oak	5383
Allocasuarina verticillata	Drooping Sheoak	0685
Angophora - ALL SPECIES	APPLE	
Arbutus unedo	Irish Strawberry Tree	0253
Atherosperma moschatum	Southern Sassafras	0311
Banksia integrifolia	Coast Banksia	0362
Banksia saxicola	Rock Banksia	0365
Banksia serrata	Saw Banksia	0366
Bedfordia arborescens	Blanket-leaf	0382
Betula aff. pubescens	Birch	5819
Brachychiton populneus	Kurrajong	0447

SCIENTIFIC NAME	COMMON NAME	FIS No.
Bursaria spinosa	Sweet Bursaria	0515
Callistachys lanceolata	Greenbush	3908
Callistemon pallidus	Lemon Bottlebrush	0564
Callistemon salignus	Willow Bottlebrush	5398
Callitris endlicheri	Black Cypress-pine	0577
Callitris glaucophylla	White Cypress-pine	0576
Callitris gracilis	Slender Cypress-pine	0578
Callitris oblonga	Dwarf Cypress-pine	5365
Callitris rhomboidea	Oyster Bay Pine	0579
Callitris spp. (naturalised)	Cypress-pine	9281
Casuarina - ALL SPECIES	SHEOAK	
Codonocarpus cotinifolius	Bell-fruit Tree	0792
Commersonia sp. aff. fraseri	Blackfellow's Hemp	0802
Coprosma repens	Mirror Bush	0823
Coprosma robusta	Karamu	0824
Cornus capitata	Himalayan Strawberry-tree	4253
Correa lawrenceana	Mountain Correa	0831
Corymbia - ALL SPECIES	GUM - BLOODWOOD	
Crataegus monogyna	Hawthorn	0867
Cupressus - ALL SPECIES	CYPRESS	
Daviesia laxiflora	Tall Bitter-pea	4405
Dodonaea viscosa 'Purpurea'	Purple Hop-bush	5413
Elaeocarpus holopetalus	Black Oliveberry	1136
Elaeocarpus reticulatus	Blue Oliveberry	1137
Eremophila bignoniiflora	Bignonia Emu-bush	1198
Eremophila longifolia	Berrigan	1203
Eriobotrya japonica	Loquat	5295
Eucalyptus - ALL SPECIES	EUCALYPT	
Eucryphia moorei	Eastern Leatherwood	1327
Euonymus europaeus	Common Spindle Tree	5943
Eupomatia laurina	Bolwarra	1344
Exocarpos cupressiformis	Cherry Ballart	1350
Ficus - ALL SPECIES	FIG	
Fraxinus - ALL SPECIES	ASH	
Geijera parviflora	Wilga	1419
Geissorhiza aspera	Wine Cups	5620
Grevillea barklyana	Gully Grevillea	1529

SCIENTIFIC NAME	COMMON NAME	FIS No.
Grevillea robusta	Silky Oak	7157
Hakea laurina	Pincushion Hakea	5747
Hakea leucoptera	Silver Needlewood	1564
Hedycarya angustifolia	Austral Mulberry	1600
Ilex aquifolium	English Holly	1759
Lagunaria patersonia	Pyramid Tree	5751
Laurus nobilis	Bay Laurel	7480
Leptospermum grandifolium	Mountain Tea-tree	1955
Leptospermum laevigatum	Coast Tea-tree	1957
Leptospermum lanigerum	Woolly Tea-tree	1958
Leptospermum trinervium	Paperbark Tea-tree	1950
Ligustrum lucidum	Large-leaf Privet	2002
Lomatia fraseri	Tree Lomatia	2050
Malus pumila	Apple	2118
Melaleuca lanceolata	Moonah	2150
Melaleuca linariifolia	Flax-leaf Paperbark	7526
Melaleuca styphelioides	Prickly Paperbark	7288
Melia azedarach	White Cedar	5455
Metrosideros excelsa	New Zealand Christmas Tree	7533
Monotoca glauca	Currant-wood	3859
Myoporum insulare	Common Boobialla	2239
Myoporum laetum	Ngaio	5779
Myoporum montanum	Waterbush	2240
Myoporum platycarpum	Sugarwood	2242
Nematolepis squamea subsp. squamea	Satinwood	4814
Notelaea ligustrina	Privet Mock-olive	2280
Notelaea venosa	Large Mock-olive	2282
Nothofagus cunninghamii	Myrtle Beech	2283
Olea - ALL SPECIES	OLIVE	
Olearia argophylla	Musk Daisy-bush	2299
Paraserianthes lophantha	Cape Wattle	0169
Paulownia tomentosa	Paulownia	5456
Persoonia arborea	Tree Geebung	2459
Persoonia silvatica	Forest Geebung	2469
Phebalium squamulosum subsp. squamulosum	Forest Phebalium	4817
Philotheca trachyphylla	Rock Wax-flower	1227

SCIENTIFIC NAME	COMMON NAME	FIS No.
Photinia glabra	Red-leaf Photinia	5862
Photinia serratifolia	Chinese Hawthorn	5863
Picea - ALL SPECIES	SPRUCE	
Pinus - ALL SPECIES	PINE	
Pittosporum bicolor	Banyalla	2540
Pittosporum crassifolium	Karo	3953
Pittosporum tenuifolium	Kohuhu	5796
Pittosporum undulatum	Sweet Pittosporum	2543
Podocarpus sp. aff. lawrencei	Errinundra Plum-pine	4741
Polyscias murrayi	Pencil Cedar	2642
Pomaderris apetala subsp. apetala	Grampians Pomaderris	2649
Pomaderris aspera	Hazel Pomaderris	2650
Populus - ALL SPECIES	POPLAR	
Prostanthera lasianthos	Victorian Christmas-bush	2743
Prostanthera lasianthos var. lasianthos	Victorian Christmas-bush	4845
Prunus cerasifera	Cherry Plum	2758
Prunus cerasus	Sour Cherry	5987
Prunus dulcis	Almond	5530
Prunus laurocerasus	Cherry Laurel	2759
Prunus lusitanica	Portugal Laurel	5235
Prunus X domestica	Plum	5759
Pseudotsuga menziesii	Douglas Fir	5711
Pyrus communis	Pear	5201
Quercus - ALL SPECIES	OAK	
Rapanea howittiana	Mutton-wood	2916
Robinia pseudoacacia	Locust Tree	3967
Salix - ALL SPECIES	WILLOW	
Santalum lanceolatum	Northern Sandalwood	3005
Schinus molle	Pepper Tree	3027
Sorbus aucuparia	Rowan	5834
Stenocarpus salignus	Scrub Beefwood	7547
Symplocos thwaitesii	Buff Hazelwood	3330
Telopea oreades	Gippsland Waratah	3339
Trema tomentosa	Peach-leaf Poison-bush	3419
Tristaniopsis laurina	Kanooka	3458
Ulmus - ALL SPECIES	ELM	
Zieria arborescens	Stinkwood	3601

Standard Operating Procedure 15
Measuring Vegetation Quadrats
Appendix 15.4

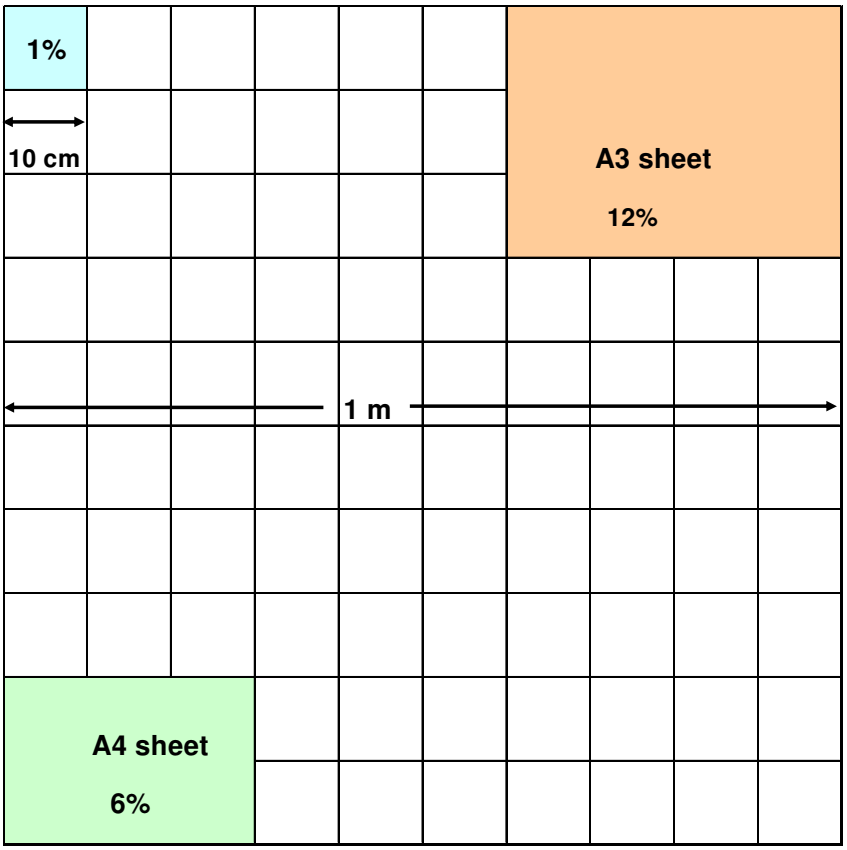


Figure 15.3: Estimating percent cover of ground parameters. The observer should imagine the individual portions of a parameter being drawn together into a single clump.